

**JOINT**  
**PUBLIC NOTICE**

**CHARLESTON DISTRICT, CORPS OF ENGINEERS**  
**69A Hagood Avenue**  
**Charleston, South Carolina 29403-5107**  
**and the**  
**S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL**  
**OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT**  
**1362 McMillan Avenue, Suite 400**  
**Charleston, South Carolina 29405**

REGULATORY DIVISION

Refer to: P/N #2005-1W-182-P

10 JUNE 2005

Pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), Sections 401 and 404 of the Clean Water Act (33 U.S.C. 1344), and the South Carolina Coastal Zone Management Act (48-39-10 et. seq.) an application has been submitted to the Department of the Army and the S.C. Department of Health and Environmental Control by

**TOWN OF EDISTO BEACH**  
**SC DEPT. OF PARKS RECREATION & TOURISM**  
**c/o COASTAL SCIENCE & ENGINEERING (CSE)**  
**POST OFFICE BOX 8056**  
**COLUMBIA, SOUTH CAROLINA 29202-8056**

for a permit to perform beach nourishment in and adjacent to waters of the

ATLANTIC OCEAN

at a location along the oceanfront of Edisto Beach, Colleton County, South Carolina (Latitude 32.486900°, Longitude 80.318100°)

In order to give all interested parties an opportunity to express their views

**NOTICE**

is hereby given that written statements regarding the proposed work will be received by both of the above mentioned offices until

**12 O'CLOCK NOON, MONDAY, 11 JULY, 2005**

from those interested in the activity and whose interests may be affected by the proposed work.

The proposed work consists of placing up to 1,120,000 cubic yards of beach quality sand along 18,250 linear feet of oceanfront on Edisto Beach. Approximately 3,200 linear feet (lf) are located within or adjacent to the Edisto Beach State Park and approximately 15,000 lf are located within the Town of Edisto Beach. The sand will be dredged by hydraulic means from an inlet shoal located a minimum of 3,000 feet seaward of existing development and seaward of the Colregs line. The borrow area consists of approximately 75 acres of high energy ocean bottom

(measuring approximately 3,500 lf x 1,000 lf) and includes the area used in the 1995 nourishment project (95-1T-009). According to the applicant, the volume of sand proposed for this nourishment project is ten times greater than the previous project and is expected to provide benefits of increased beach width compared to existing conditions for a minimum of ten years. The purpose of the project is for erosion control and beach restoration.

**NOTE: Plans depicting the work described in this notice are available and will be provided, upon receipt of a written request, to anyone that is interested in obtaining a copy of the plans for the specific project. The request must identify the project of interest by public notice number and a self-addressed stamped envelope must also be provided for mailing the drawings to you. Your request for drawings should be addressed to the**

**U.S. Army Corps of Engineers  
ATTN: REGULATORY DIVISION  
69A Hagood Avenue  
Charleston, South Carolina 29403-5107.**

The District Engineer has concluded that the discharges associated with this project, both direct and indirect, should be reviewed by the South Carolina Department of Health and Environmental Control in accordance with provisions of Section 401 of the Clean Water Act. As such, this notice constitutes a request, on behalf of the applicant, for certification that this project will comply with applicable effluent limitations and water quality standards. The work shown on this application must also be certified as consistent with applicable provisions of the Coastal Zone Management Program (15 CFR 930). The District Engineer will not process this application to a conclusion until such certifications are received. The applicant is hereby advised that supplemental information may be required by the State to facilitate the review.

This notice initiates the Essential Fish Habitat (EFH) consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act. Implementation of the proposed project would impact 275 acres of estuarine substrates and emergent wetlands utilized by various life stages of species comprising the red drum, shrimp, and snapper-grouper management complexes. Our initial determination is that the proposed action would not have a substantial individual or cumulative adverse impact on EFH or fisheries managed by the South Atlantic Fishery Management Council and the National Marine Fisheries Service (NMFS). Our final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the NMFS.

The District Engineer has consulted the most recently available information and has determined that the project is likely to adversely affect the loggerhead sea turtle, *Carretta caretta*. This public notice serves as a request to the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service to initiate formal consultation on this species and/or critical habitat that may be present in the area which would be affected, pursuant to Section 7(c) of the Endangered Species Act of 1973 (as amended). A biological assessment (or other similar document) detailing our analysis of the effects of the action will be provided. Please refer to FWS Log No. 4-6-95-136.

The District Engineer has consulted the latest published version of the National Register of Historic Places for the presence or absence of registered properties, or properties listed as being

10 JUNE 2005

eligible for inclusion therein, and this worksite is not included as a registered property or property listed as being eligible for inclusion in the Register. Consultation of the National Register constitutes the extent of cultural resource investigations by the District Engineer, and he is otherwise unaware of the presence of such resources. Presently unknown archaeological, scientific, prehistorical, or historical data may be lost or destroyed by the work to be accomplished under the requested permit.

Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider this application. Requests for a public hearing shall state, with particularity, the reasons for holding a public hearing.

The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the activity on the public interest and will include application of the guidelines promulgated by the Administrator, Environmental Protection Agency (EPA), under authority of Section 404(b) of the Clean Water Act and, as appropriate, the criteria established under authority of Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the project must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the project will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, flood plain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production and, in general, the needs and welfare of the people. A permit will be granted unless the District Engineer determines that it would be contrary to the public interest. In cases of conflicting property rights, the Corps of Engineers cannot undertake to adjudicate rival claims.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this project. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the activity.

If there are any questions concerning this public notice, please contact me at 843-329-8044 or toll free at 1-866-329-8187.



Debra W. King  
Project Manager  
Regulatory Division  
U.S. Army Corps of Engineers

## 11. DESCRIPTION OF THE OVERALL PROJECT AND OF EACH ACTIVITY IN OR AFFECTING U.S. WATERS OR STATE CRITICAL AREAS

The proposed activity is a beach nourishment project along the oceanfront of Edisto Beach, Colleton County, South Carolina (see Sheet 1). Work will include **placement via hydraulic dredge of up to 1,120,000 cubic yards (cy) of beach-quality sand along the oceanfront shoreline**. The project length is ~18,250 linear feet (lf). It includes ~3,200 lf within or adjacent to Edisto Beach State Park (ie, the reach north of groin 1) and ~15,000 lf along the Town of Edisto Beach shoreline (ie, between groins 1 and 27 as depicted on Sheets 2 & 3). The exact volume will depend on available funding and bid prices. The proposed project does **not** involve alterations to existing groins.

### NOURISHMENT

#### Borrow Area

The proposed borrow area is an inlet shoal situated a minimum of 3,000 ft seaward of existing development and seaward of the Colregs line. The proposed borrow area encompasses ~75 acres of high energy ocean bottom, ranging in depth from mean lower low water (mllw) to (~) -12 ft mllw as depicted on Sheets 11, 12, and 13. It includes the area of the 1995 nourishment project (P/N 94-1T-009) which filled in rapidly after excavation (cf, Van Dolah et al 1998). Dimensions of the borrow area are ~3,200 lf by 1,000 lf.

The proposed borrow area represents ~2 percent of the north shoal of South Edisto Inlet as depicted on Sheet 11. It represents ~0.5 percent of the ebb-tidal delta area of St. Helena Sound north of the buoyed entrance channel. The next down coast developed barrier island (Harbor Island) is situated ~6.8 miles from the proposed borrow area.

Approximately 36 borings (~ 1 per 2 acres) are available within the borrow area (see Sheets 12 and 13). Sediment quality has been confirmed to a depth of -15 ft mllw (approximately -18 ft NGVD). The 1995 project excavated the same shoal to (~)-20 ft NGVD. The applicant proposes the same depth of excavation for the present project based on operational considerations of cutterhead suction dredges.

#### Sediment Characteristics

Sediment characteristics for the native beach and proposed borrow area are given on Sheets 14-16. The native beach was sampled at ten (10) stations (four samples per station) between the foredune and low-tide terrace (Sheet 14). Statistical composite sediment characteristics of oceanfront-only and all stations are given at the bottom of Sheet 14. The overall composite (oceanfront-only) character of native sediments is mean

grain size = 0.43 mm (medium-coarse sand, poorly sorted, coarse-skewed). Sediments >2 mm in size comprise ~5–10 percent of the surficial sediments on the beach depending on the zone across the profiles. Large concentrations of oyster shells exist in patches near the landward end of each groin. Shell material ( $\text{CaCO}_3$ ) makes up ~30 percent of surficial sediments on the beach (Sheets 14 & 15). The majority of shell material (>75 percent) is crushed fragments falling within the sand size range. The updrift source of sediment for Edisto Beach is Edingsville Beach. Edingsville Beach consists of a narrow washover berm with extensive exposures of marsh mud in the surf zone. Mud and shells predominate in these sediments and account for the high percentage of shell material reaching Edisto Beach. A nourishment project by the SC Highway Department in 1954, using marsh sediments behind Edisto Beach, also placed concentrations of shell material on the beach.

The proposed borrow area contains a similar range of sediment grain sizes and shell percentages as the native beach. The composite mean grain size for all cores is 0.52 mm with ~10 percent greater than 2 mm and ~30 percent shell material. Cores generally contained only trace mud (<<1 percent). Those with visible mud (three borings) tested ~1.5-6 percent (see Sheet 15). Sediment compatibility (Sheet 16) using the SPM (CERC 1984) overfill methodology shows average RA's (overfill factor) equaling less than 1.05 (typical). Based on experience with the 1995 nourishment project, borrow sediments closely match native sediments in terms of grain size distribution, color, percent shell, and percent mud. For planning purposes, the applicant assumes the borrow area will yield up to 2 percent mud, or ~22,500 cy out of the total excavation by hydraulic dredge. This estimate is reflected in Item 13 on the application form.

Excavation will be performed by an ocean-certified cutterhead suction dredge which will access the borrow area via the main channel of South Edisto River Inlet (cf, Sheet 11). Project plans will call for excavations to -15 ft mllw with a 2-ft maximum overdraft allowed. This depth is based on operational requirements as well as sediment confirmation and experience from the 1995 project. The slurry will be pumped via submerged pipeline to shore landing areas, possibly with the aid of a booster pump and barge. Shore-based pipe will extend upcoast and downcoast from landing areas to accomplish the design nourishment sections.

The applicant proposes to accomplish all work within the standard environmental window for South Carolina nourishment projects (ie, winter months) between November and April as specified by resource and regulatory agencies.

### **Fill Placement**

The fill will be placed and shaped along the beach by standard methods for hydraulic fills. Bulldozers will shape the fill template using temporary training dikes to direct the slurry discharge parallel to the shore. Section volumes will range from ~35 cy/ft to ~90 cy/ft as depicted in Sheets 4–10. Stationing is based on OCRM monuments (2200-series) and groin cell numbers. The groin cell number (1 or 2 digits) is followed by a plus sign and a three-digit number. The latter represents the distance in feet from the next upcoast groin. Cells and groins are numbered from north to south as shown on Sheet 2.

Fill section volumes decline from north to south in anticipation of higher erosion rates at the updrift end of the project. Sand from the project is expected to shift downcoast (south) and feed remaining (unnourished) sections of Edisto Beach along the South Edisto Inlet shoreline.

The volume of fill to be placed exceeds the trapping capacity of the existing groins by ~2 to 5 times. Many of the groins will initially be buried by the project and rendered nonfunctional until such time as erosion reaches the structures.

The design grades and slopes of the fill follow natural contours of the beach (see Sheets 4–10). Slope above 0 ft NGVD will be 1 on 15 (typical). Slope below 0 ft NGVD will be 1 on 30 (typical) after adjustment. The initial berm width at +8 ft NGVD varies from ~25 ft to ~130 ft according to the section volume.

The total nourishment volume proposed is approximately ten times greater than the 1995 project (P/N 94–1T–009), and ~1.5 times greater than the 1954 project. It is expected to provide benefits for a minimum of ten years (in terms of increased beach width compared with present conditions).

## 12. OVERALL PROJECT PURPOSE AND THE BASIC PURPOSE OF EACH ACTIVITY IN OR AFFECTING U.S. WATERS

The purpose of the project is for erosion control and beach restoration, including:

- Restore the recreational beach and protect associated infrastructure (access road, campsites, restrooms, and park office) at Edisto Beach State Park.
- Restore the recreational beach and protect public infrastructure (public access walkovers, Palmetto Boulevard) along the Town of Edisto Beach shoreline.
- Restore a protective beach seaward of houses such that dune enhancement may be initiated by the town and individual property owners. (Dune construction or revegetation is not part of the present application.)
- Bury a majority of exposed groins and, thereby, improve the visual appeal of the public beach.
- Maintain park revenues which are dependent on a viable beach and campsite area.
- Provide a protective buffer between interior wetlands and the ocean.
- Provide increased habitat for shorebirds and nesting turtles where little currently exists.
- Improve the overall aesthetics of the beach by burying many of the groins.

The state park is fully accessible to the public. The Town of Edisto Beach maintains over 20 public beach accesses with nearby parking along its entire three-mile oceanfront. The project is locally sponsored and will not involve any federal funds.

### History

Edisto Beach has a long history of erosion as a result of the limited sand supply from Edingsville Beach and the strong tendency for sand to migrate from the north (updrift) end of the island to the shoreline along South Edisto River Inlet.

Major shore protection measures to date include:

- Construction of 34 groins between 1948 and 1975.
- Nourishment of the northern half of Edisto Beach in 1954 (~830,000 cubic yards) using sediment from the lagoon/marsh.
- Construction of isolated bulkheads and revetments by individual property owners 1950s to 1980s.
- Major repairs to 21 groins in 1995.
- Nourishment of the repaired groin cells\* in 1995 (~150,000 cy) using sediment from an offshore shoal near the "point" (cells 24–27).

Other than Hurricane *David* in 1979, no major storms have directly impacted Edisto Beach in the past 40 years. [Note: *Hugo* in 1989 made landfall north of Charleston, leaving Edisto on the favorable side of its storm track.] Despite the general lack of damaging storms, chronic and localized erosion has caused considerable property damage. Houses were undermined by erosion between 1969 and 1974 around the "point" (Point Street area) and in 2001 in the 700 block of Palmetto Boulevard (between Portia Street and Dawhoo Street).

Fewer than 33 percent of oceanfront properties have "ten-year" protection\*\* as defined by FEMA. Over half of the oceanfront properties along Edisto Beach have grossly inadequate setbacks for purposes of protection during a major storm. No oceanfront houses in cells 1 through 14 are set back more than 75 ft from the normal high watermark (~+7 ft NGVD).

Edisto Beach property is more vulnerable to storm damage compared to other South Carolina beaches because its beach slope is steeper. This lessens the width of the wet beach and allows more damaging runup and comparatively higher waves during storms. Combined with low dune elevations, the result is frequent overtopping of the foredune and washovers into Palmetto Boulevard. The main access road for the community, Palmetto Boulevard, is less than 100 ft from the high watermark in many areas. If damaged during a major storm, water lines and other infrastructure would be destroyed.

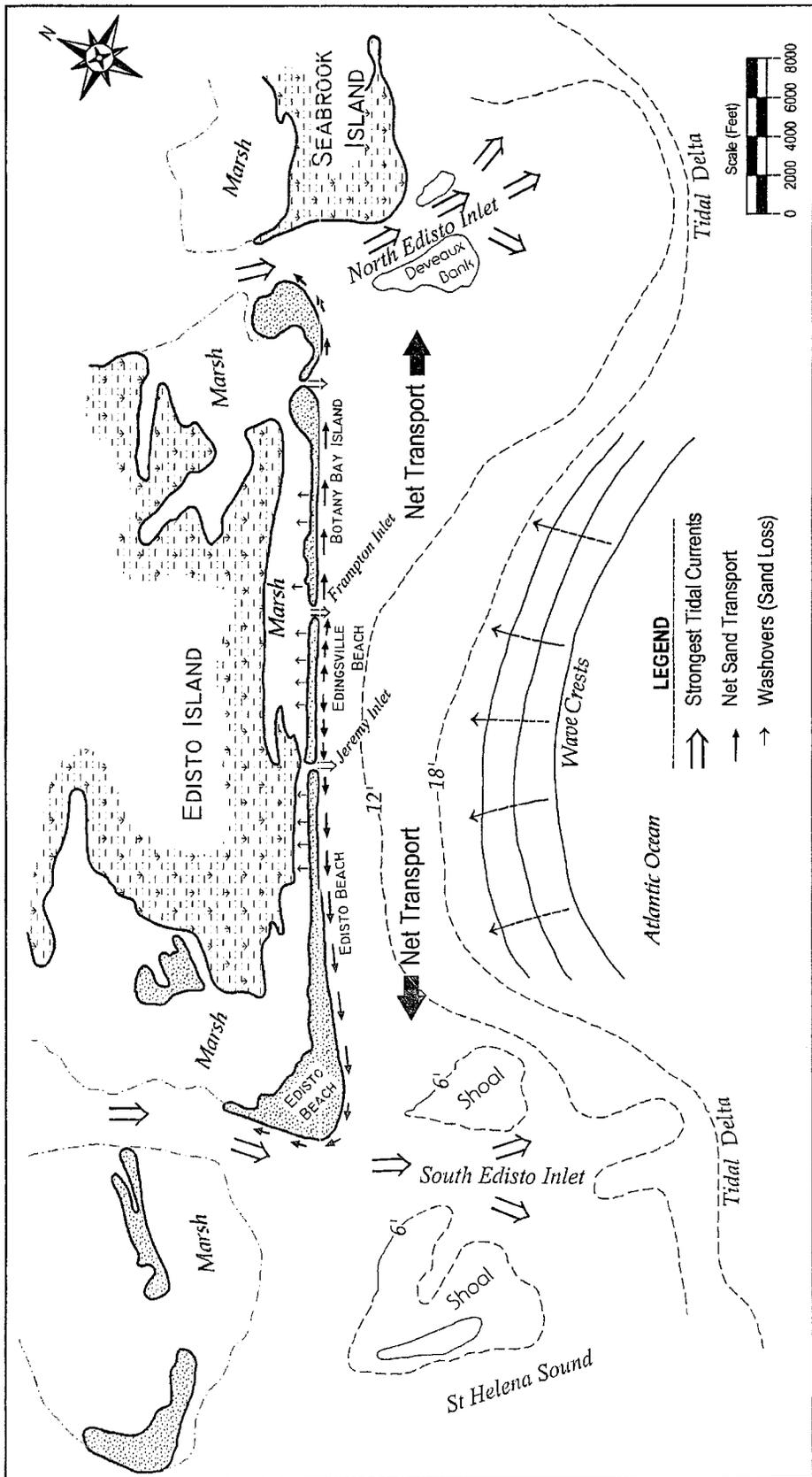
### **Prior Studies & Projects**

There have been numerous studies of erosion and shore-protection of Edisto Beach. These include early studies by the US Army Corps of Engineers (1949, 1969), the University of South Carolina (eg, Stephen et al 1975), CSE (1990, 1992, 1993), and others. These references should be consulted for detailed explanation of erosion-causing processes.

Erosion along Edisto Beach during the past century has resulted mainly from a general divergence of sand transport away from Edingsville Beach (Fig 1). Waves move sand north toward Deveaux Bank (off Seabrook Island), south toward Edisto Beach, and inland across the low barrier of Edingsville Beach. This has reduced the natural replenishment of Edisto Beach. Edingsville Beach is eroding at over 15 feet per year (ft/yr) (OCRM, official long-term erosion rate data).

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\* Groin cells are the lengths of beach between adjacent groins beginning with cell 1 at the pavilion between groins 1 and 2.  
\*\* "Ten-year" protection under FEMA criteria consists of a volume of sand (>6 cubic yards per foot) situated above the ten-year return-period surge level (~12 ft NGVD).



**FIGURE 1.** General diagram of primary wave and current directions and net sand-transport patterns affecting Edisto Beach during the past century. Lack of available sand from Edingsville Beach and losses to the major inlets and washovers are fundamentally responsible for erosion along Edisto's oceanfront. [Bathymetry based on NOS Chart No 11521; from CSE 2001a]

Based on best-available data, long-term erosion rates prior to nourishment in 1954 and construction of groins varied from ~15 ft/yr along Edingsville Beach, to about 10 ft/yr along the state park, to near zero around Marianne Street (groin 18). South of Marianne Street, the century-long historical trend had been accretion. Sediment accumulated around the “point” and along the South Edisto Inlet shoreline. These trends account for the wider setbacks of houses and Palmetto Boulevard from north to south. Groins have reduced the rate of erosion along the northern half of Edisto Beach. However, insufficient new sand from Edingsville Beach is reaching the groin cells. This has also caused a reduction in sand supply along the South Edisto Inlet shoreline. One purpose of the proposed project is to augment the supply of sand for the entire island such that normal sand transport processes can resume.

### **Environmental Impacts**

The proposed project will be constructed during the standard winter environmental window for South Carolina beach nourishment projects (November through April) with cut-off dates as specified by resource and regulatory agencies. Construction will take place over a 60–75 day period, working 24 hours per day. Turbidity associated with the project will be localized and short-term, given the coarse nature of the borrow area sediments and experience during the 1995 nourishment project. Ecological impacts are expected to be minor and temporary as found by SCDNR and others in studies following the 1995 project (cf, CSE Baird 1996, Van Dolah et al 1998). Van Dolah et al (1998) found that the 1995 borrow area refilled within 1.75 years. They reported that rapid refilling was likely due to the small size of the area as well as its depositional setting within a high energy shoal area.

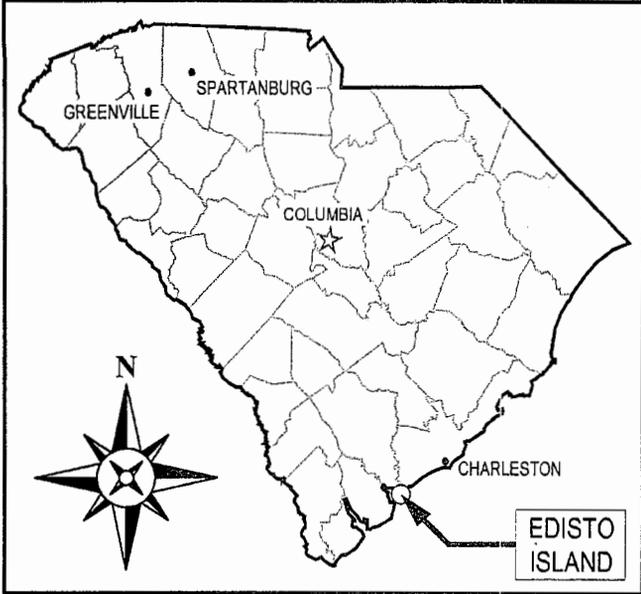
Van Dolah et al (1998) recommended “. . . locating future borrow sites in areas that are likely to fill with beach compatible sands during the time period between nourishment projects. . .” (pg 72). Borings obtained in connection with the proposed project confirm that the 1995 borrow area refilled with beach quality sands and negligible mud.

The proposed project will result in excavation and mortality of ~75 acres of surficial benthic organisms in the borrow area (mollusks, crustaceans, and annelids adapted to high-energy sand shoals). Filling operations will bury up to 200 acres of shallow beach and inshore habitat (ocean shoreline), resulting in mortality or displacement of existing benthic populations. The resulting fill will provide an additional ~20 acres of dry sand beach (turtle nesting habitat, seabeach amaranth habitat, and ghost crab habitat). A wider dry beach will allow natural expansion of the foredune and its associated vegetation. An equal or greater area of wet sand beach and shallow surf zone habitat will be created (compared with the areas buried by fill). It is expected that these areas will recolonize naturally and rapidly with a similar suite of species.

Some existing seawalls will be buried or removed from direct impact by waves. Existing groins and the rocky substrate habitat associated with them will be buried, causing mortality to attached organisms (mostly barnacles and mollusks). Burial of many of the groins will create safer conditions for swimmers and bathers.

#### References Cited

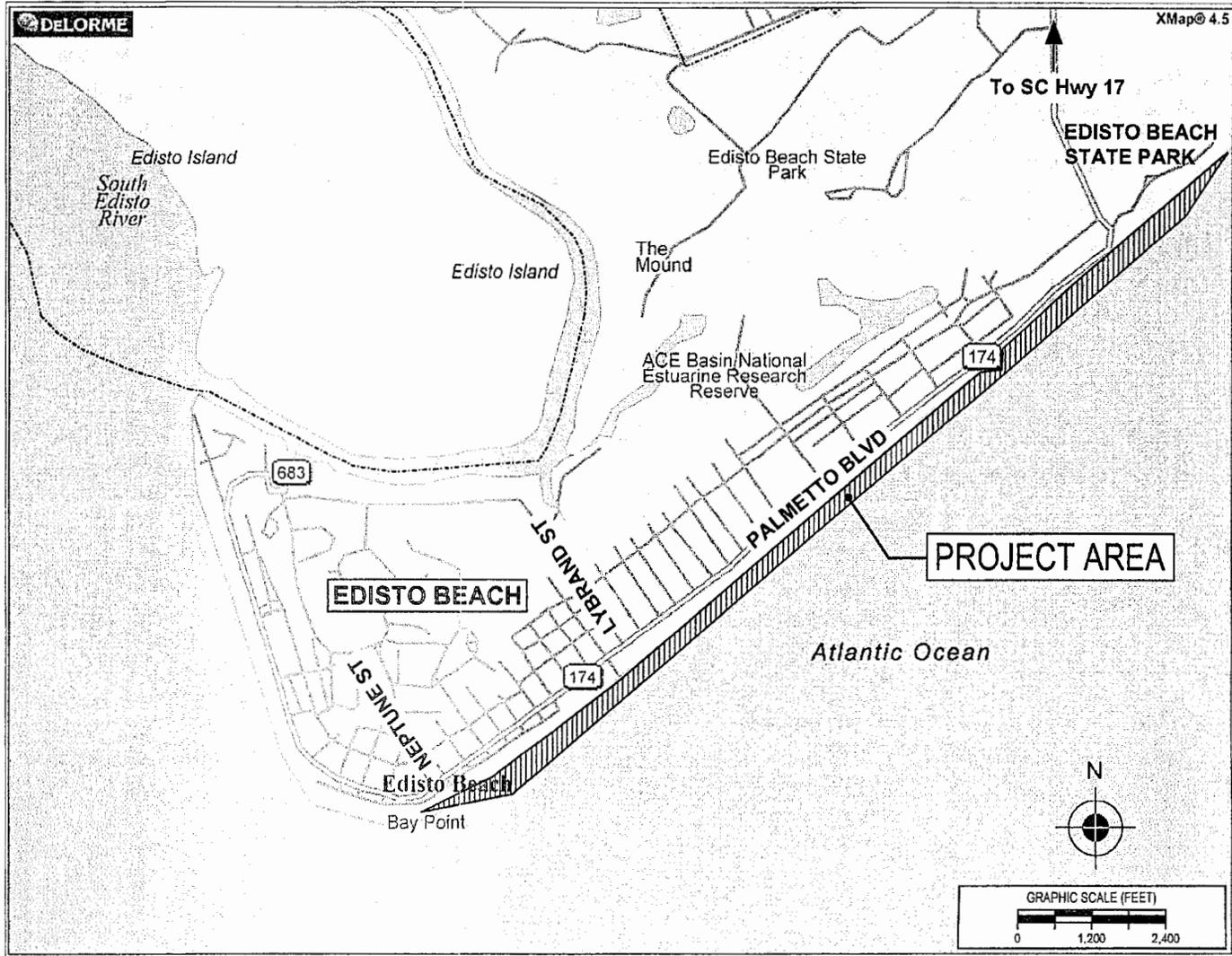
- CERC. 1984. *Shore Protection Manual*. 4<sup>th</sup> Edition, US Army Corps of Engineers, Coastal Engineering Research Center, Ft Belvoir, VA; US Government Printing Office, Washington, DC, 2 vols.
- CSE. 1990. Erosion assessment and beach restoration alternatives for Edisto Beach State Park, South Carolina. Feasibility Study for South Carolina Department of Parks, Recreation and Tourism, Columbia; Coastal Science & Engineering (CSE), Columbia, SC, 61 pp. + appendices.
- CSE. 1992. Edisto Beach nourishment project — engineering report: geotechnical studies, bathymetric and beach surveys, wave modeling studies. Draft Report for South Carolina Department of Parks, Recreation & Tourism, Columbia; CSE, Columbia, SC, 120 pp. + appendices.
- CSE. 1993. Edisto Beach groin study. Report for Town of Edisto Beach; CSE, Columbia, SC, 132 pp. + data appendices.
- CSE Baird. 1996. Edisto Beach 1995 beach nourishment project, Edisto Beach, South Carolina. Survey Report No. 1 to Town of Edisto Beach, SC. CSE-Baird, Columbia, SC, 9 pp. + app.
- Stephen, M.F., P.J. Brown, D.M. FitzGerald, D.K. Hubbard, and M.O. Hayes. 1975. Beach erosion inventory of Charleston County, South Carolina: a preliminary report. South Carolina Sea Grant, Tech. Rept. No. 4, prepared by the University of South Carolina, 79 pp.
- USACE. 1949. Cooperative beach erosion study: State of South Carolina. Interim Report, U.S. Army Corps of Engineers, Charleston District, 23 pp. + app.
- USACE. 1969. Edisto Beach, Charleston County, South Carolina. Detail Project Report on Beach Erosion Control. U.S. Army Corps of Engineers, Charleston District, Serial No. 43, 15 pp. + plates + appendices + attachments.
- Van Dolah, R.F., V.J. Digre, P.T. Gayes, P. Donovan-Ealy, and M.W. Dowd. 1998. An evaluation of physical recovery rates in sand borrow sites used for beach nourishment projects in South Carolina. Final Report to SC Task Force on Offshore Resources and Minerals Management Service Office of International Activities and Marine Minerals; SCDNR, Charleston, SC, 76 pp. + appendices.



P/N 2005-1W-182-P

**DIRECTIONS FROM SC HWY 17:**

TAKE SC HWY 174 TOWARD EDISTO BEACH. FOLLOW HWY 174 TO PALMETTO BLVD. PROJECT EXTENDS NORTH ~3,000 FEET INTO EDISTO BEACH STATE PARK AND SOUTH ~15,000 FEET, JUST SOUTH OF NEPTUNE STREET.



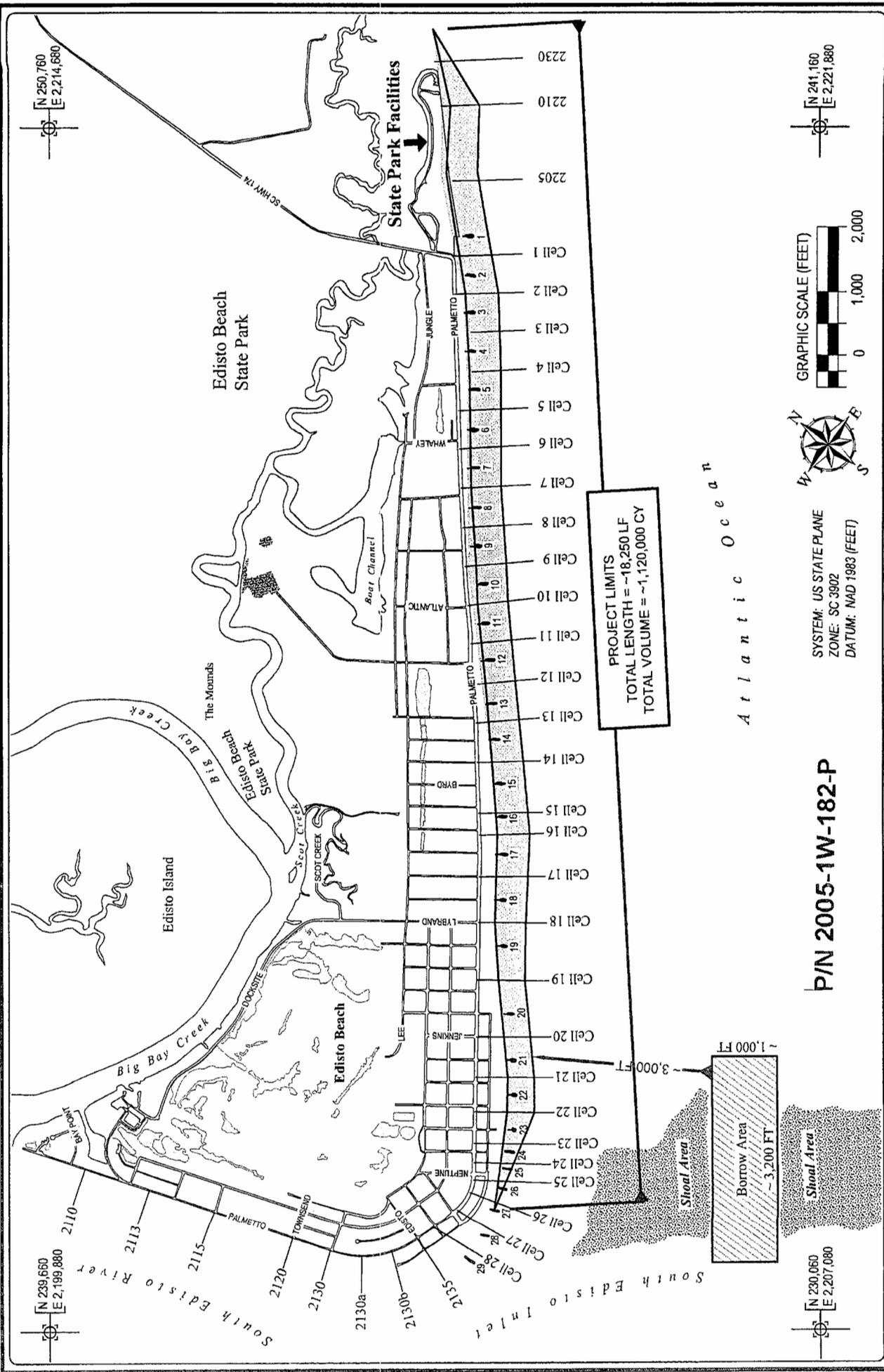
PROJECT TITLE:  
EDISTO BEACH  
NOURISHMENT PROJECT

PREPARED FOR:  
TOWN OF EDISTO BEACH  
2414 MURRAY ST  
EDISTO ISLAND, SC 29438

DRAWING TITLE:  
VICINITY MAP

SCALE: AS SHOWN  
DATE: MAY 2005  
DRAWN BY: JJH  
PROJECT #: 2092

SHEET #:  
**01**  
OF: 16

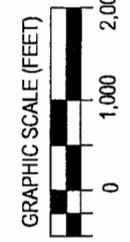
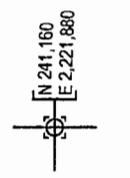


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 DRAWN BY: JIH  
 PROJECT #: 2092  
 SHEET #: **02**  
 OF: 16

DRAWING TITLE:  
**NOURISHMENT PLAN**

PREPARED FOR:  
 TOWN OF EDISTO BEACH  
 2414 MURRAY ST  
 EDISTO ISLAND, SC 29438

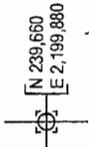
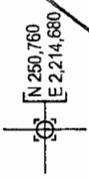
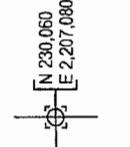
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 EDISTO BEACH NOURISHMENT PROJECT

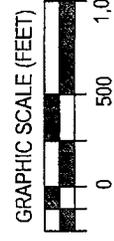
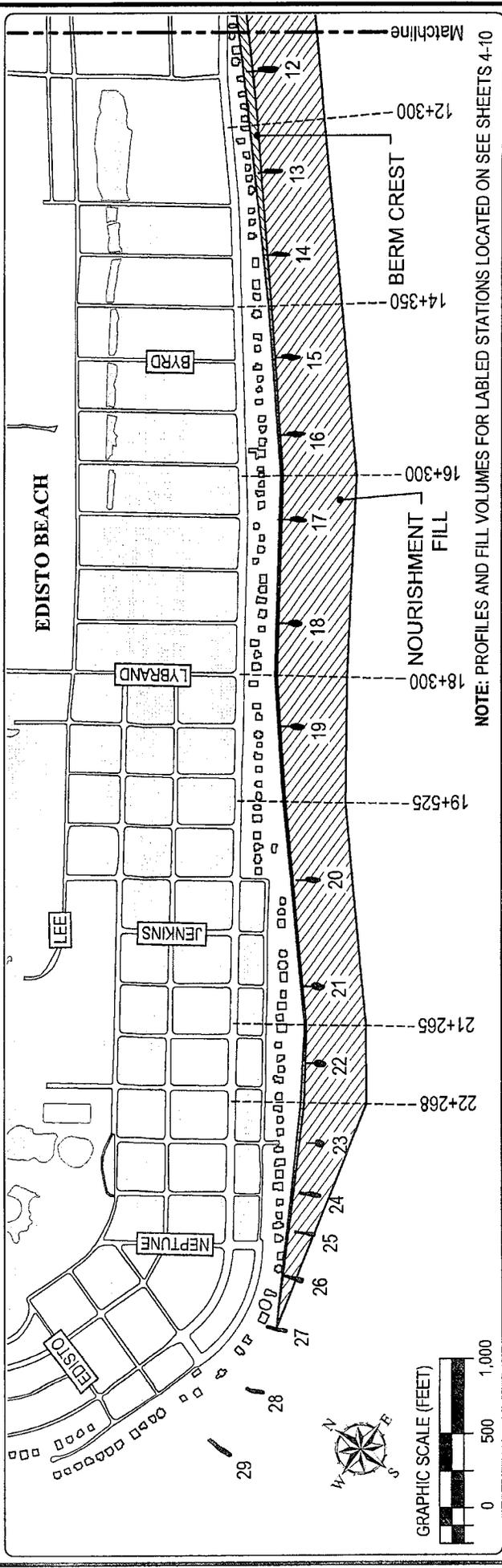
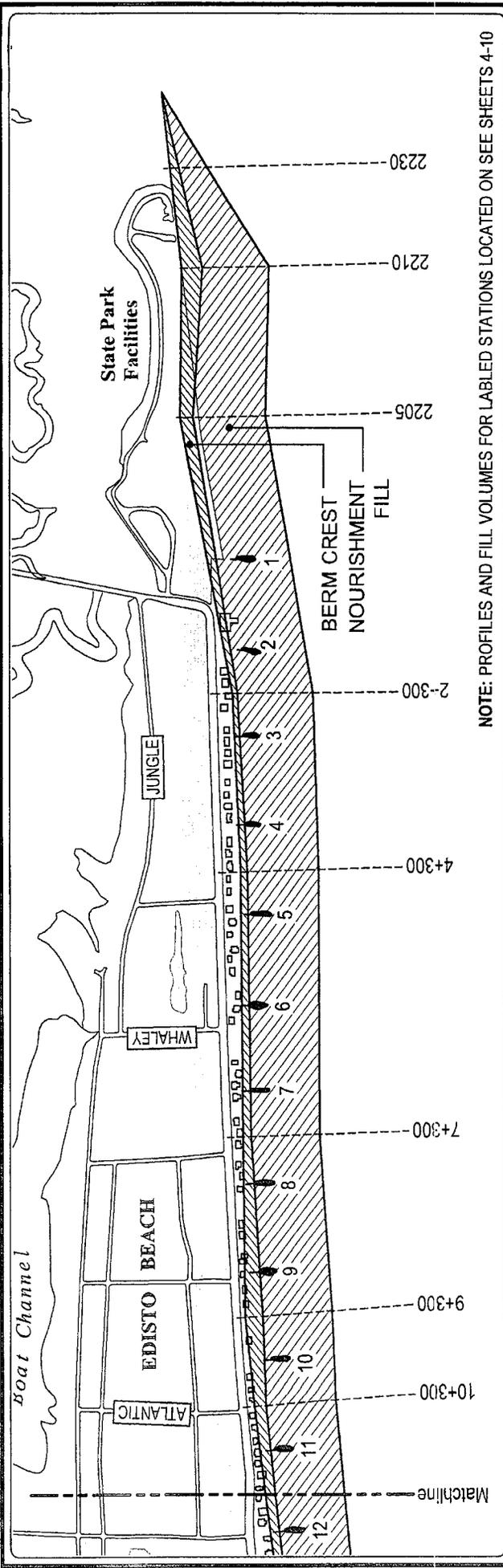


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 ZONE: SC 3902  
 DATUM: NAD 1983 (FEET)

**P/N 2005-1W-182-P**

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SHEET #:		<b>03</b>	
SCALE:	AS SHOWN	DATE:	MAY 2005
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OF: 16			

DRAWING TITLE:

**PROJECT PLAN**

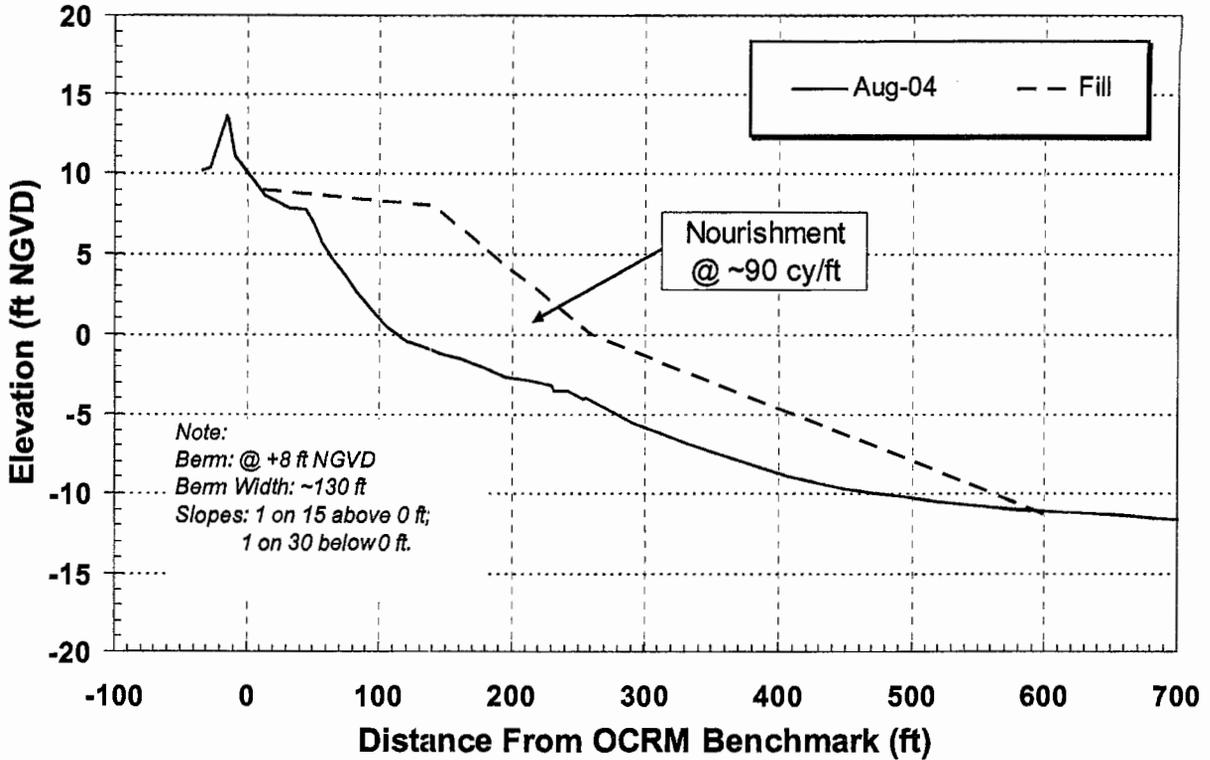
PREPARED FOR:

TOWN OF EDISTO BEACH  
2414 MURRAY ST  
EDISTO ISLAND, SC 29438

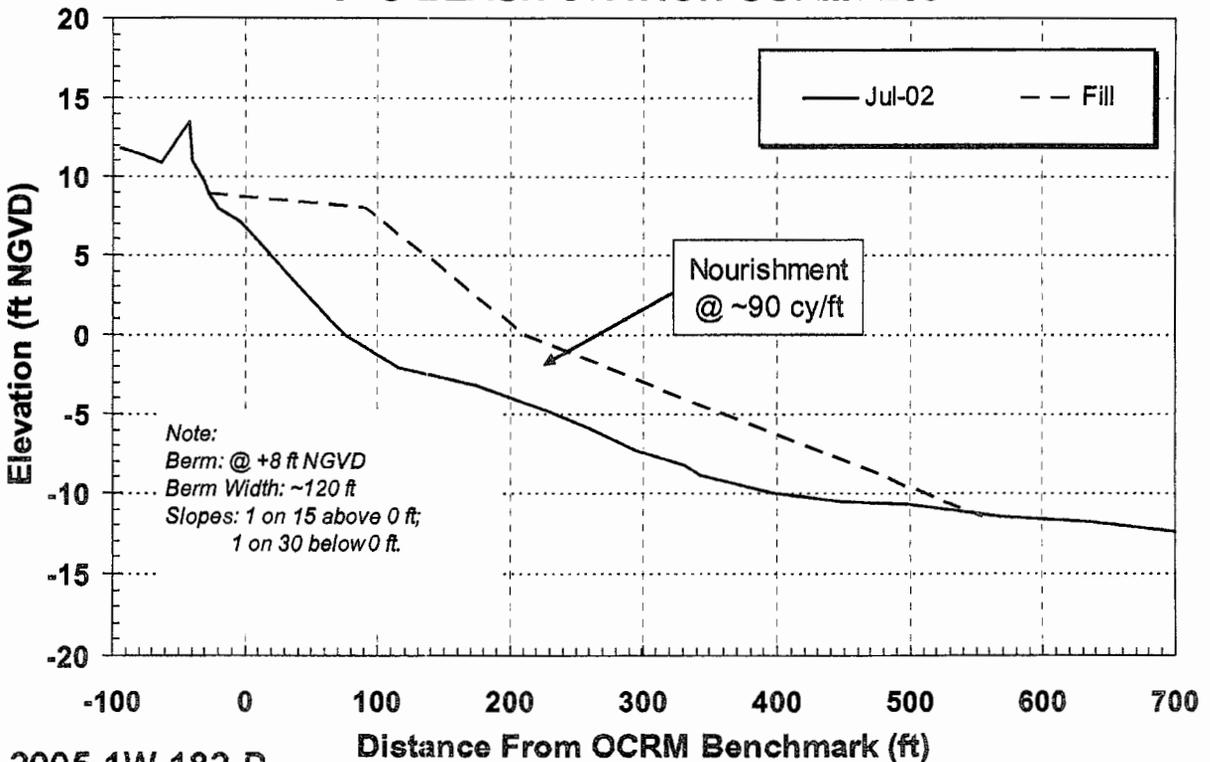
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EDISTO BEACH NOURISHMENT PROJECT

### EDISTO BEACH STATION OCRM 2210



### EDISTO BEACH STATION OCRM 2205



P/N 2005-1W-182-P

PROJECT TITLE:

EDISTO BEACH  
NOURISHMENT PROJECT

PREPARED FOR:

TOWN OF EDISTO BEACH  
2414 MURRAY ST  
EDISTO ISLAND, SC 29438

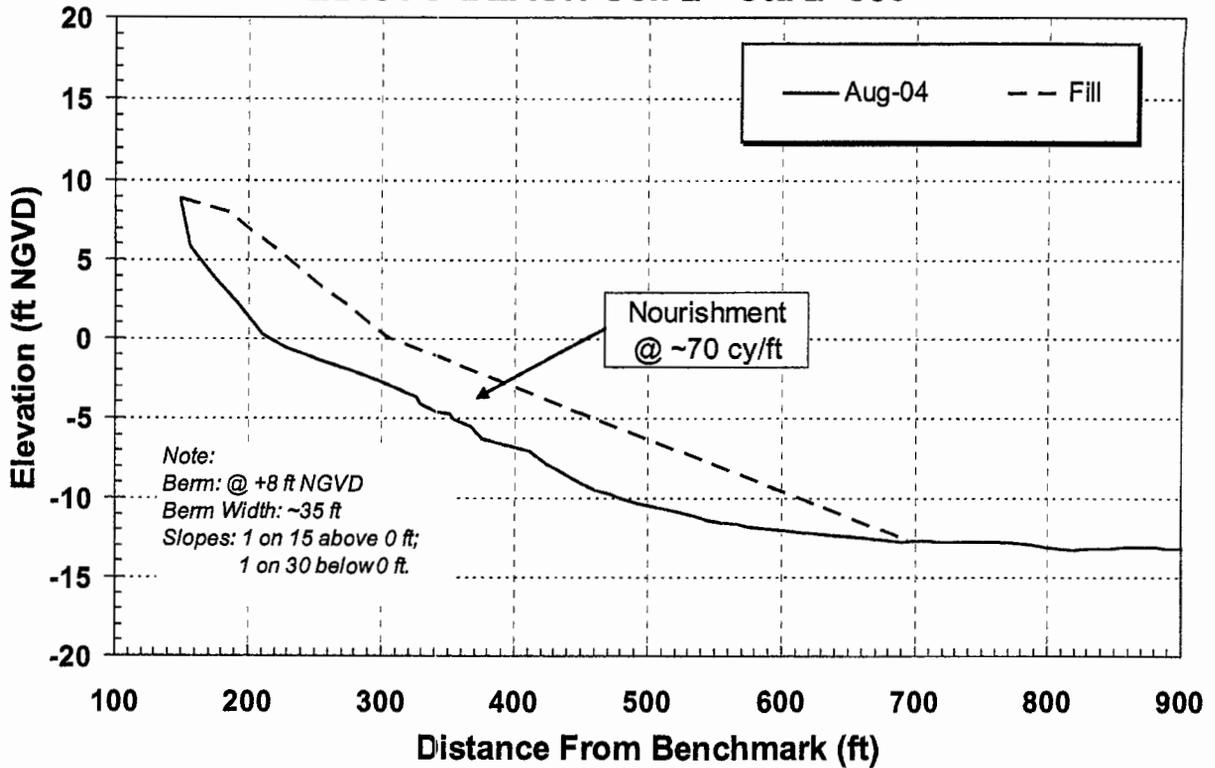
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DESIGN FILL SECTIONS  
(OCR 2210 and OCR 2205)

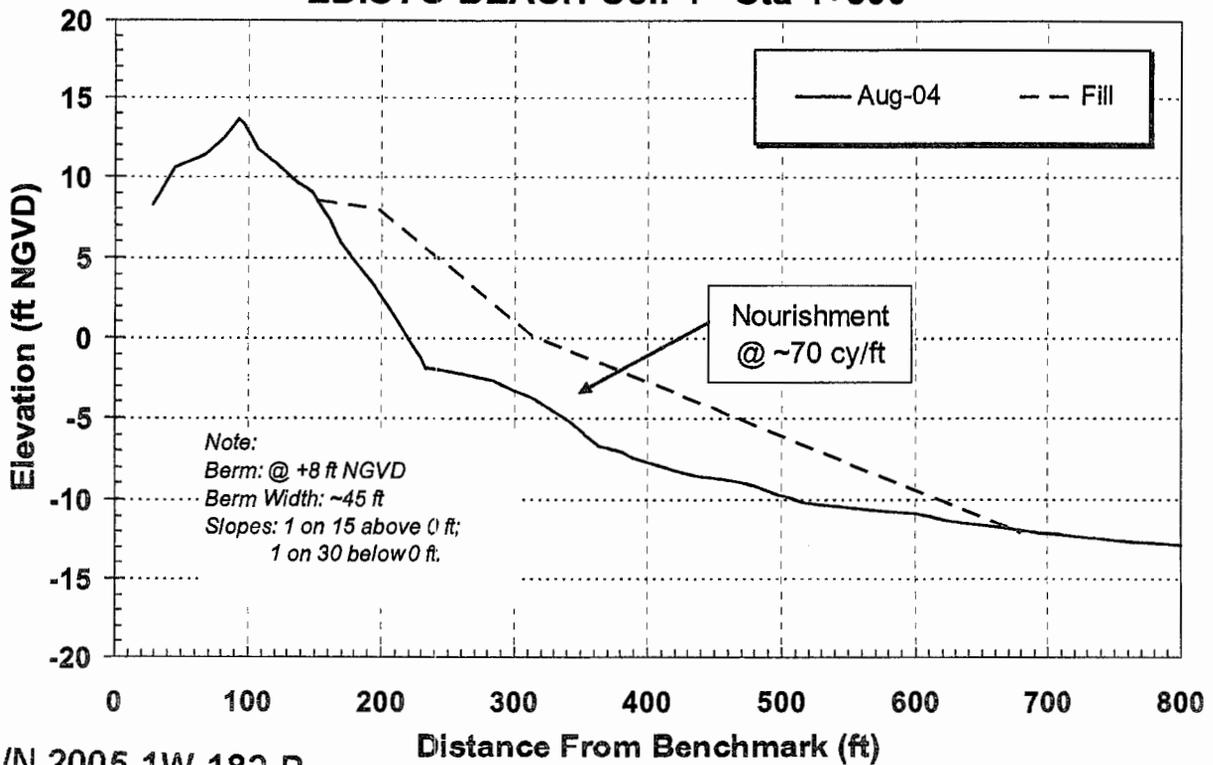
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 PROJECT #: 2092

SHEET #:  
**04**  
 OF: 18

### EDISTO BEACH Cell 2 - Sta 2+300



### EDISTO BEACH Cell 4 - Sta 4+300



P/N 2005-1W-182-P

PROJECT TITLE:

EDISTO BEACH  
 NOURISHMENT PROJECT

PREPARED FOR:

TOWN OF EDISTO BEACH  
 2414 MURRAY ST  
 EDISTO ISLAND, SC 29438

DRAWING TITLE:

DESIGN FILL SECTIONS  
 (2+300 and 4+300)

SCALE:

AS SHOWN

SHEET #:

DATE:

MAY 2005

DRAWN BY:

JJH

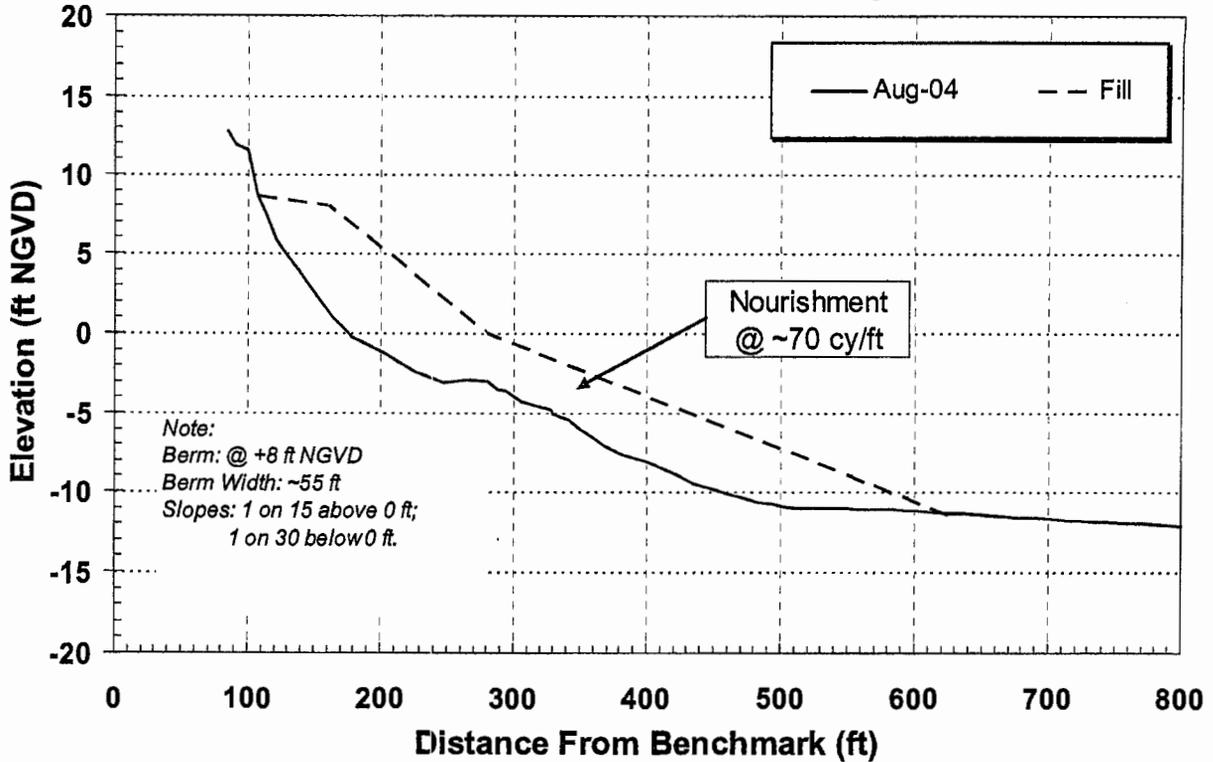
PROJECT #:

2092

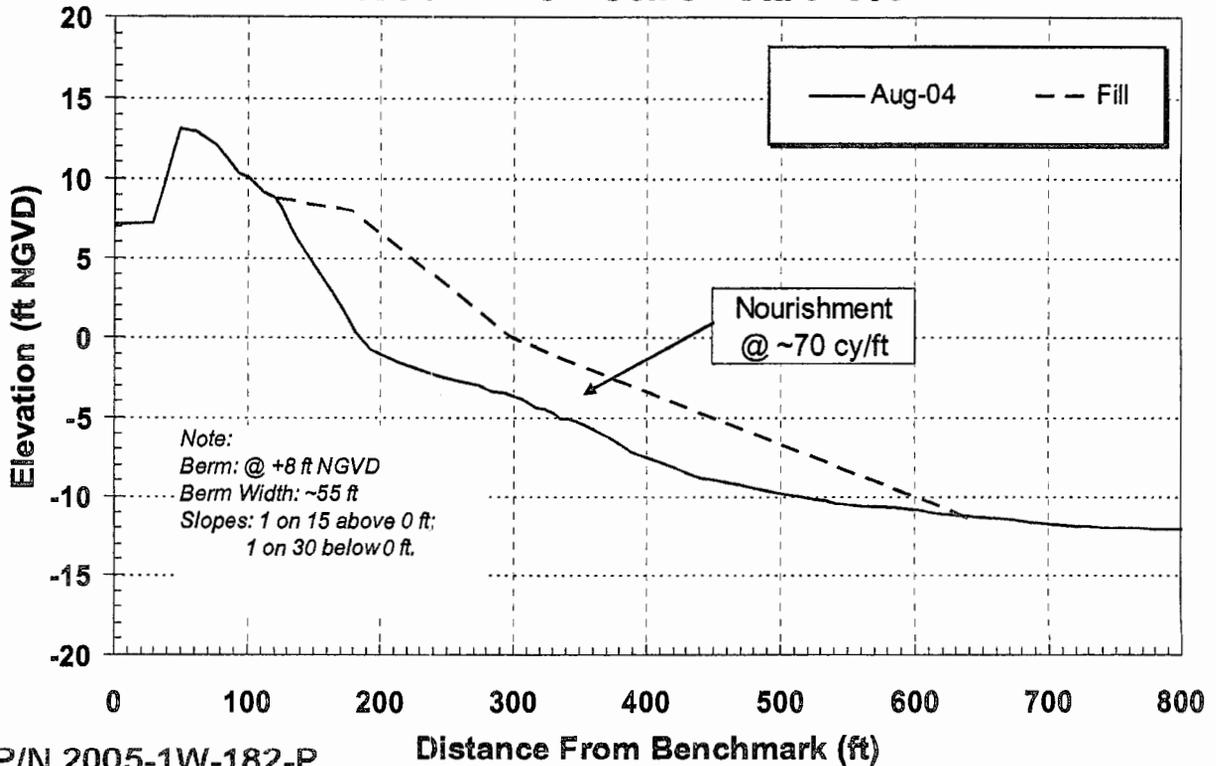
OF 16

05

### EDISTO BEACH Cell 7 - Sta 7+300



### EDISTO BEACH Cell 9 - Sta 9+300



P/N 2005-1W-182-P

PROJECT TITLE:

EDISTO BEACH  
 NOURISHMENT PROJECT

PREPARED FOR:

TOWN OF EDISTO BEACH  
 2414 MURRAY ST  
 EDISTO ISLAND, SC 29438

DRAWING TITLE:

DESIGN FILL SECTIONS  
 (7+300 and 9+300)

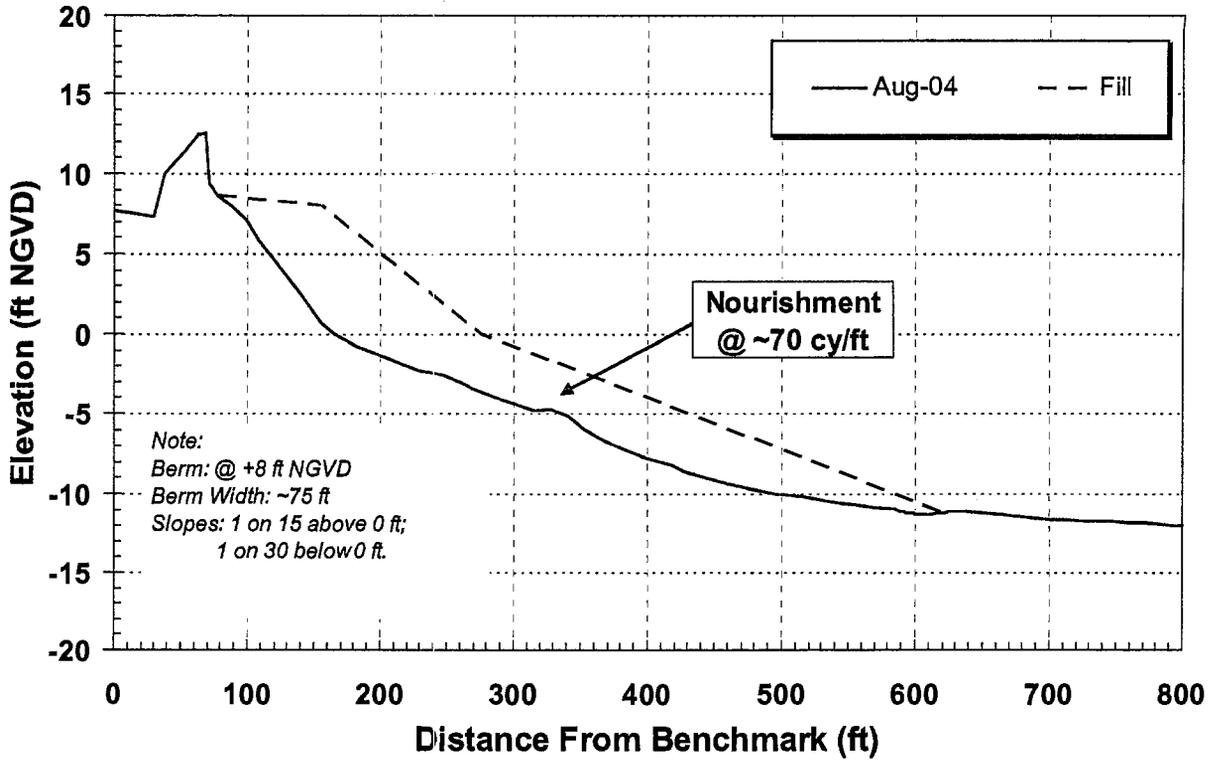
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 DATE: MAY 2005  
 DRAWN BY: JJH  
 PROJECT #: 2092

SHEET #:

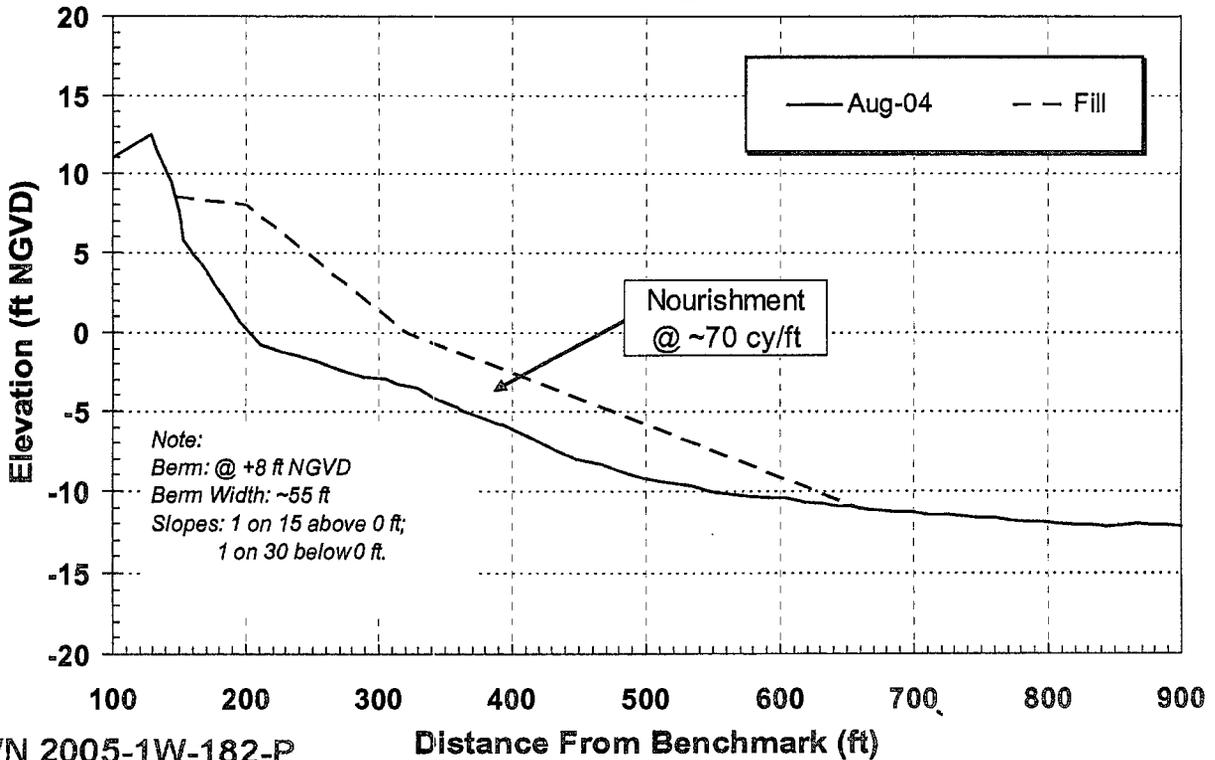
06

OF: 16

### EDISTO BEACH Cell 10 - Sta 10+300



### EDISTO BEACH Cell 12 - Sta 12+300



P/N 2005-1W-182-P

PROJECT TITLE:  
 EDISTO BEACH  
 NOURISHMENT PROJECT

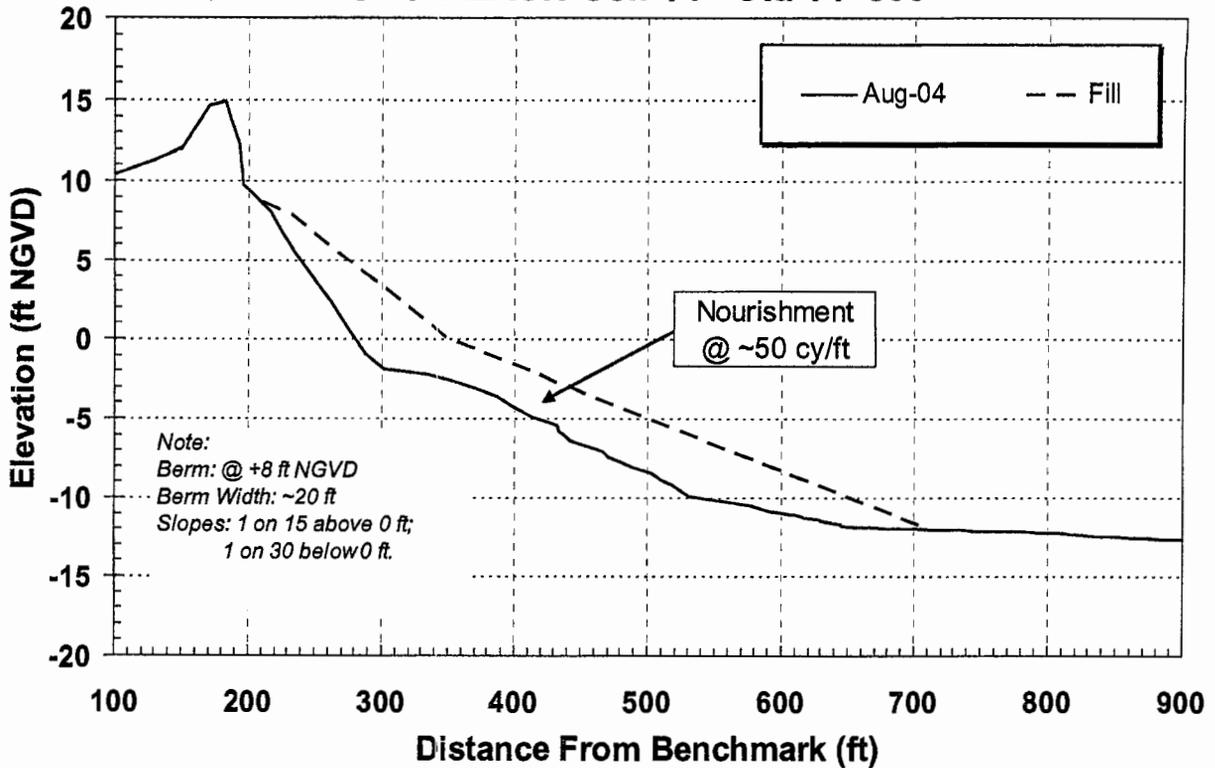
PREPARED FOR:  
 TOWN OF EDISTO BEACH  
 2414 MJRRAY ST  
 EDISTO ISLAND, SC 29438

DRAWING TITLE:  
 DESIGN FILL SECTIONS  
 (10+300 and 12+300)

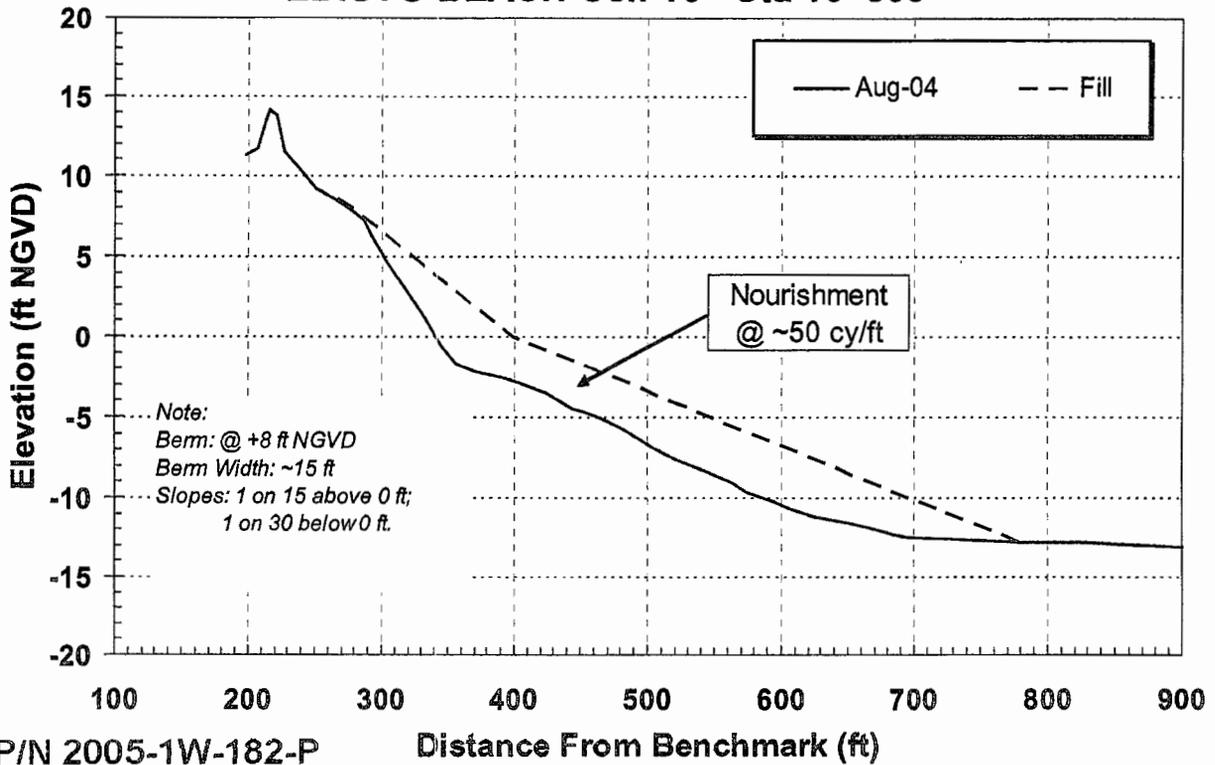
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 DATE: MAY 2005  
 DRAWN BY: JJH  
 PROJECT #: 2092

SHEET #:  
**07**  
 OF: 16

### EDISTO BEACH Cell 14 - Sta 14+300



### EDISTO BEACH Cell 16 - Sta 16+300



P/N 2005-1W-182-P

PROJECT TITLE:  
 EDISTO BEACH  
 NOURISHMENT PROJECT

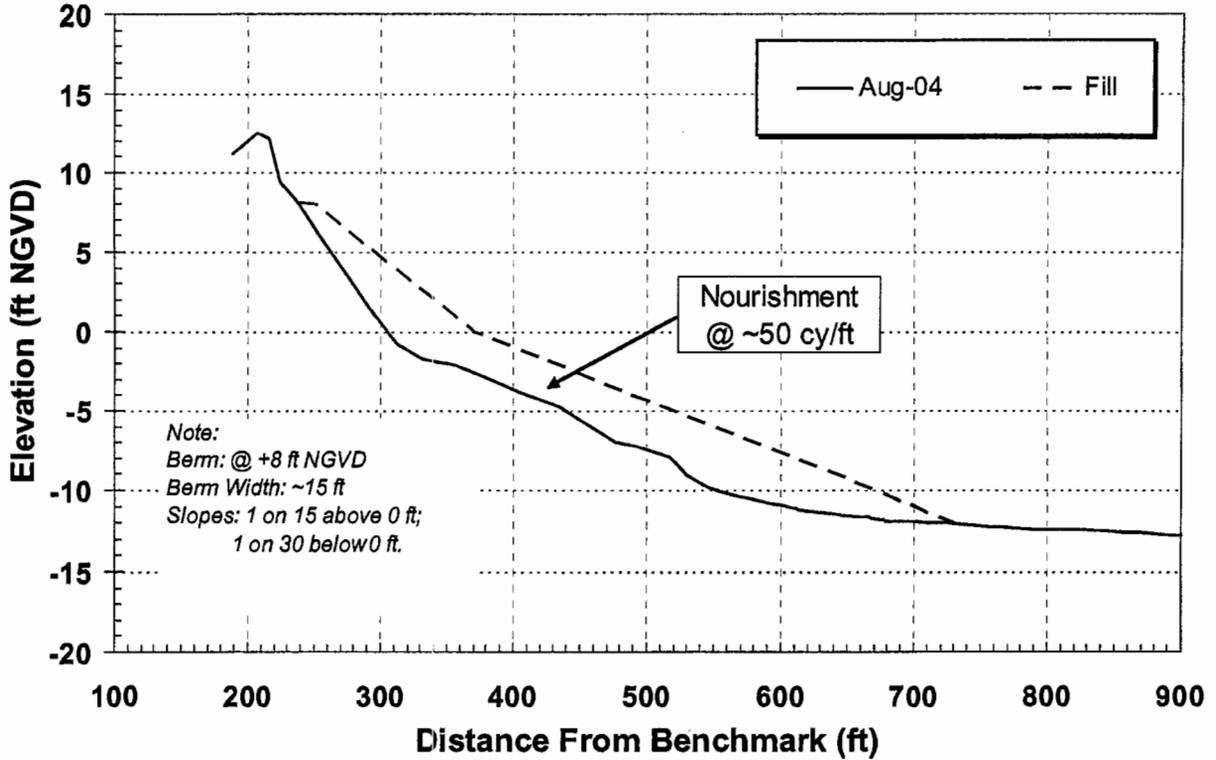
PREPARED FOR:  
 TOWN OF EDISTO BEACH  
 2414 MURRAY ST  
 EDISTO ISLAND, SC 29438

DRAWING TITLE:  
 DESIGN FILL SECTIONS  
 (14+300 and 16+300)

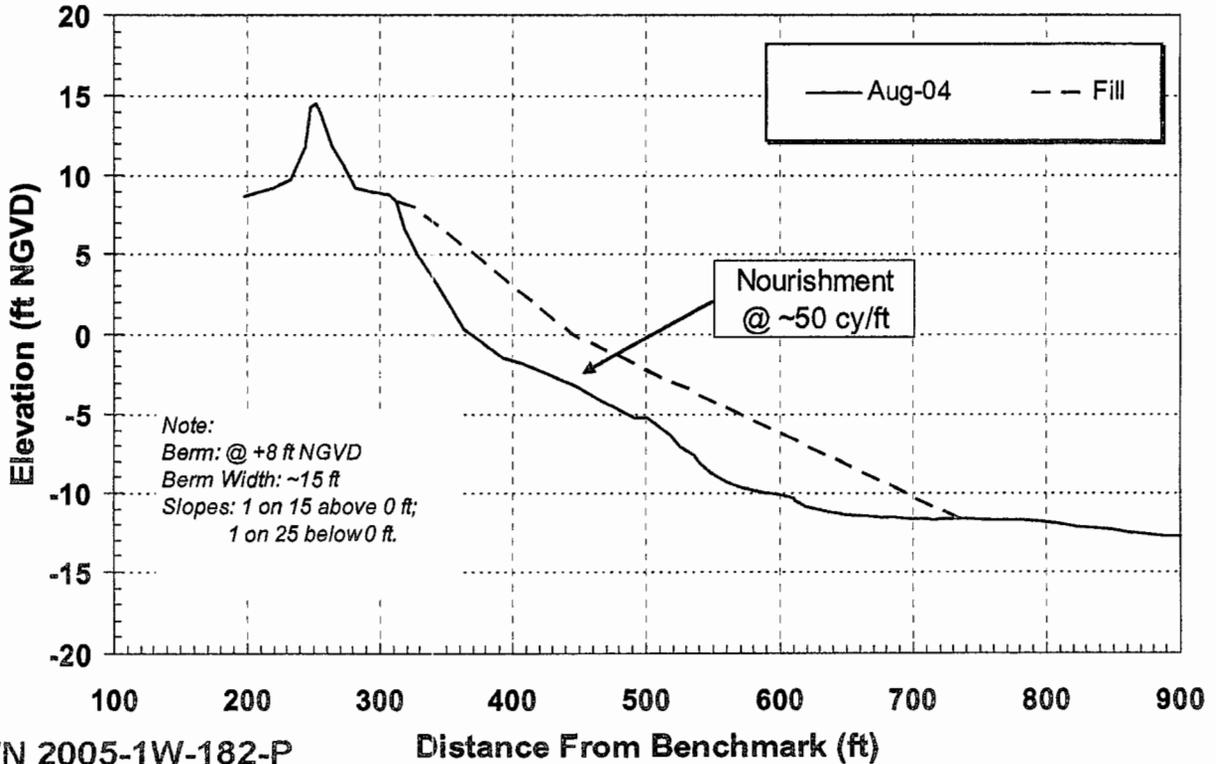
SCALE: AS SHOWN  
 DATE: MAY 2005  
 DRAWN BY: J.J.H.  
 PROJECT #: 2092

SHEET #:  
**08**  
 OP: 16

### EDISTO BEACH Cell 18 - Sta 18+300



### EDISTO BEACH Cell 19 - Sta 19+525



P/N 2005-1W-182-P

PROJECT TITLE:  
 EDISTO BEACH  
 NOURISHMENT PROJECT

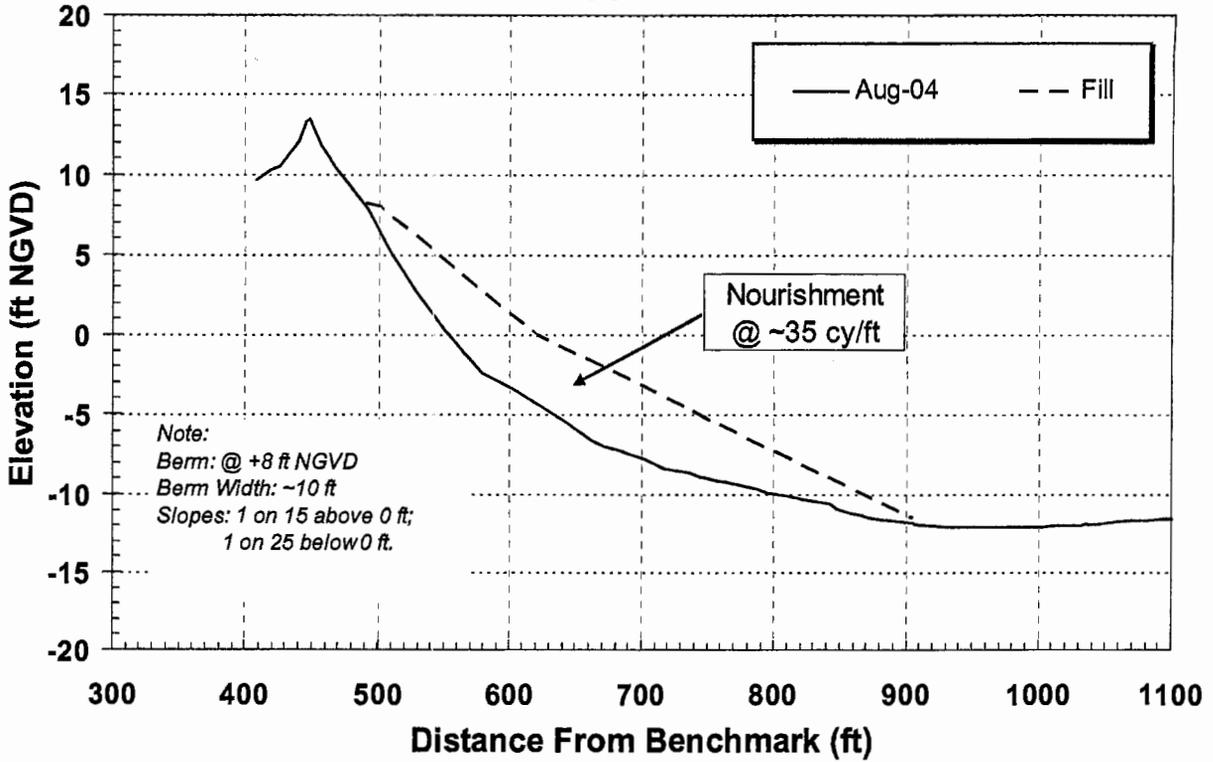
PREPARED FOR:  
 TOWN OF EDISTO BEACH  
 2414 MURRAY ST  
 EDISTO ISLAND, SC 29438

DRAWING TITLE:  
 DESIGN FILL SECTIONS  
 (18+300 and 19+525)

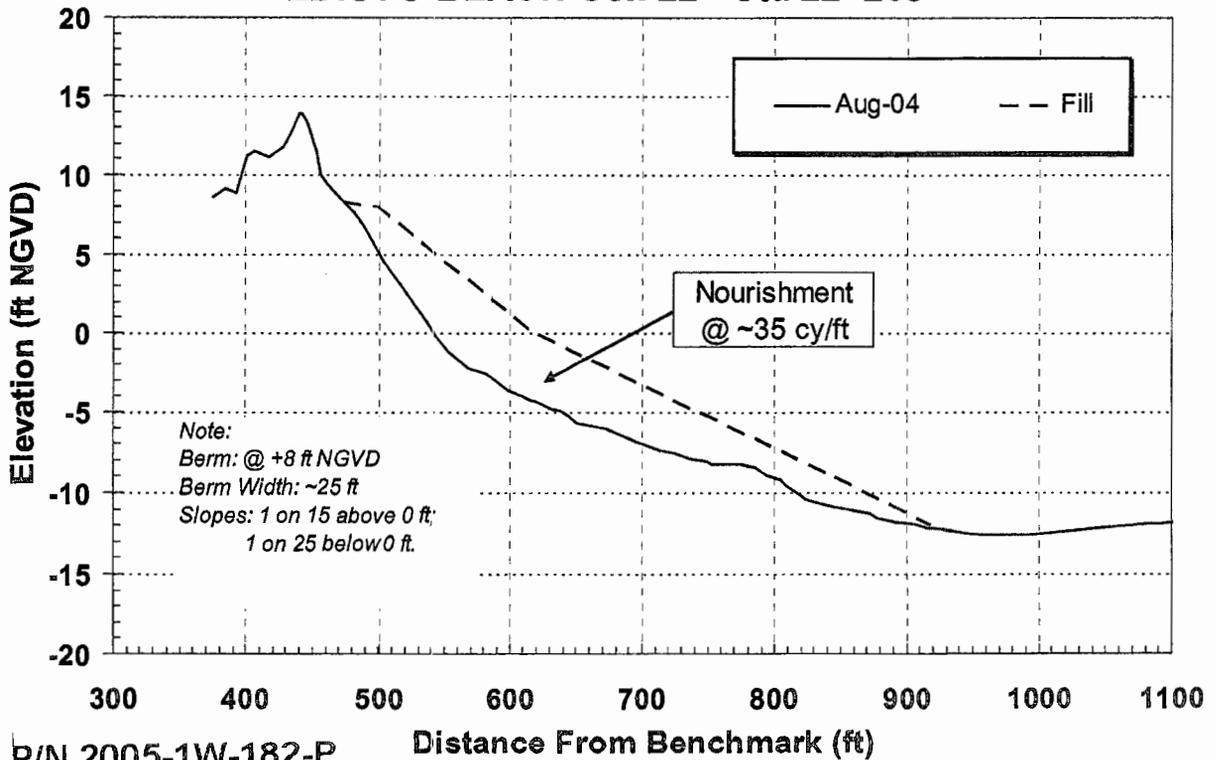
SCALE: AS SHOWN  
 DATE: MAY 2005  
 DRAWN BY: JJH  
 PROJECT #: 2092

SHEET #:  
**09**  
 OF 16

### EDISTO BEACH Cell 21 - Sta 21+265



### EDISTO BEACH Cell 22 - Sta 22+268



P/N 2005-1W-182-P

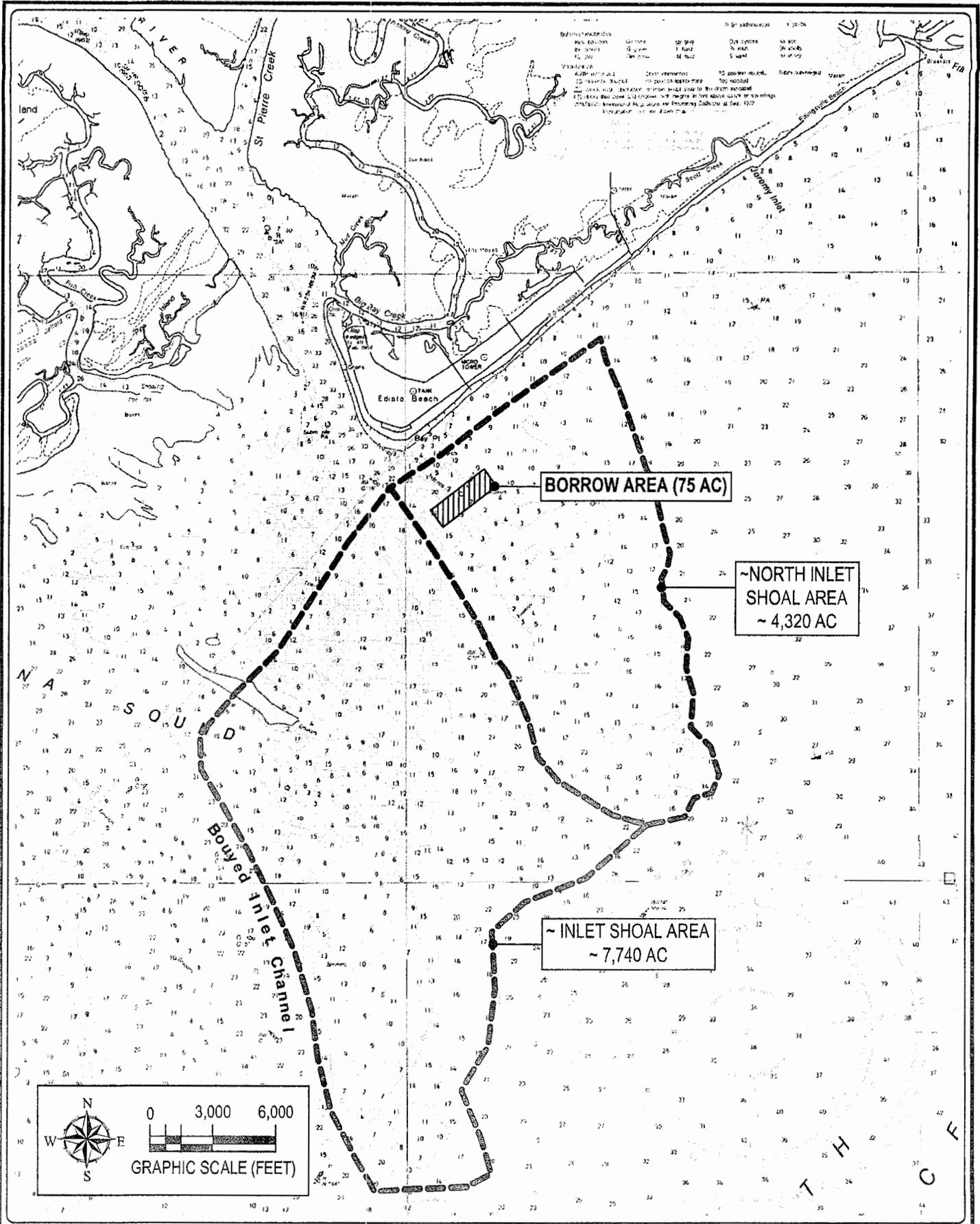
PROJECT TITLE:  
 EDISTO BEACH  
 NOURISHMENT PROJECT

PREPARED FOR:  
 TOWN OF EDISTO BEACH  
 2414 MURRAY ST  
 EDISTO ISLAND, SC 29438

DRAWING TITLE:  
 DESIGN FILL SECTIONS  
 (21+265 and 22+268)

SCALE: AS SHOWN  
 DATE: MAY 2005  
 DRAWN BY: JJH  
 PROJECT #: 2092

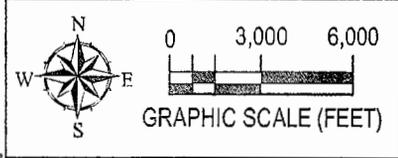
SHEET #:  
**10**  
 OF: 16



**BORROW AREA (75 AC)**

**~NORTH INLET SHOAL AREA  
~ 4,320 AC**

**~ INLET SHOAL AREA  
~ 7,740 AC**

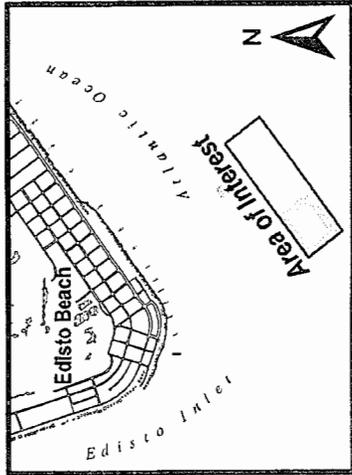


**P/N 2005-1W-182-P**  
 EDISTO BEACH  
 NOURISHMENT PROJECT

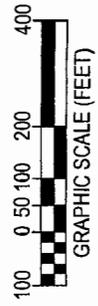
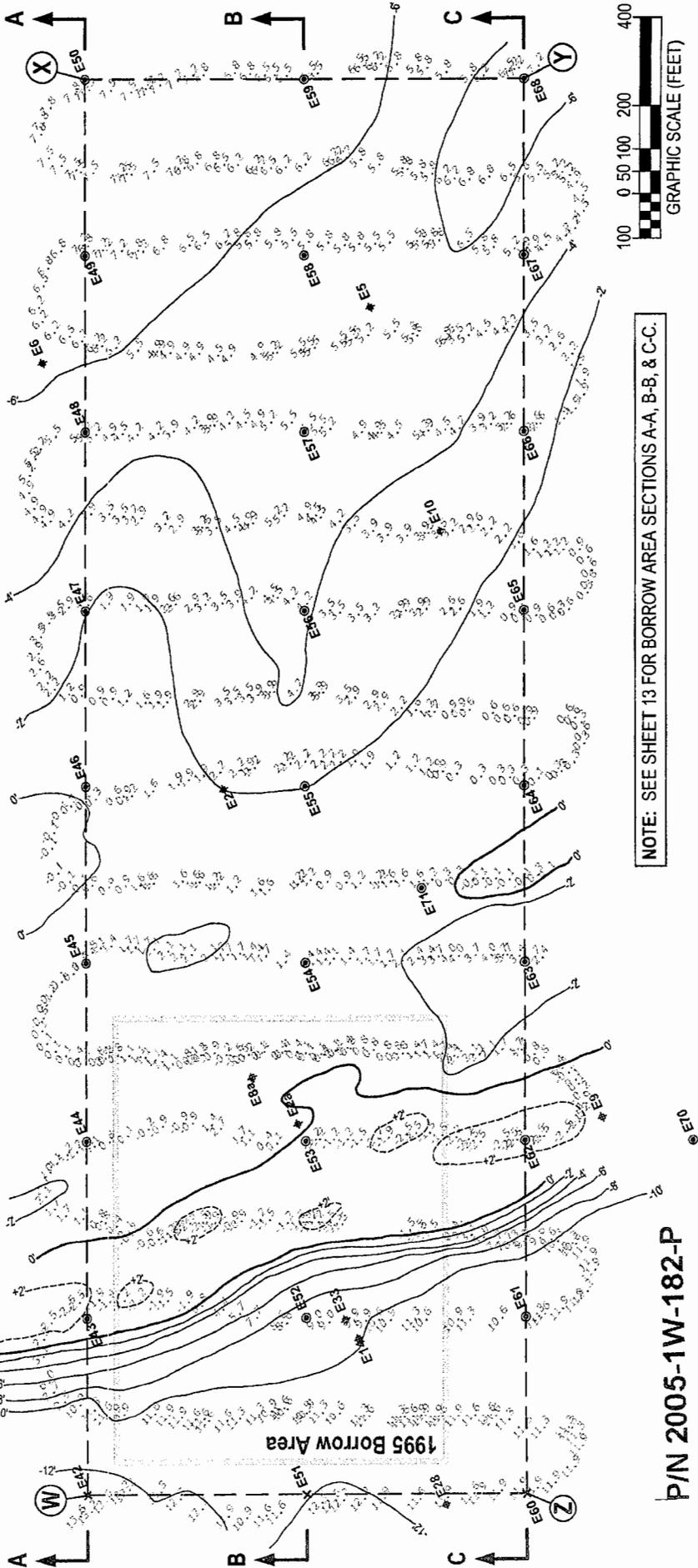
PREPARED FOR:  
 TOWN OF EDISTO BEACH  
 2414 MURRAY ST  
 EDISTO ISLAND, SC 29438

DRAWING TITLE:  
**REGIONAL SETTING  
 BORROW BATHYMETRY**  
 (NOAA CHART 11517)

SCALE:	AS SHOWN	SHEET #:	<b>11</b>
DATE:	MAY 2005		
DRAWN BY:	JJH		
PROJECT #:	2092	OF: 16	



AREA LOCATION



**Key**

- 1995 Borrow Area (P/N 94-11-009)
- E25 Cores (Obtained Sept.-Dec. 2002)
- ✕ E60 Cores (Not Sampled)
- ◆ E5 Existing Cores

*All Depths in MLLW - December 2002*

TABLE OF COORDINATES FOR BORROW AREA					
NAME	SPCS NAD '83 (FEET)		WGS '84 (DD.MMLSS)		
	NORTHING	EASTING	LAT	LONG	
W	232,008.067	2,209,899.061	32-28-09	80-19-45	
X	233,928.067	2,209,459.061	32-28-28	80-19-15	
Y	231,208.067	2,207,499.061	32-28-20	80-19-08	
Z	233,128.067	2,210,059.061	32-28-01	80-19-38	

NOTE: SEE SHEET 13 FOR BORROW AREA SECTIONS A-A, B-B, & C-C.

P/N 2005-1W-182-P

PROJECT TITLE:  
EDISTO BEACH NOURISHMENT PROJECT

PREPARED FOR:  
TOWN OF EDISTO BEACH  
2414 MURRAY ST  
EDISTO ISLAND, SC 29438

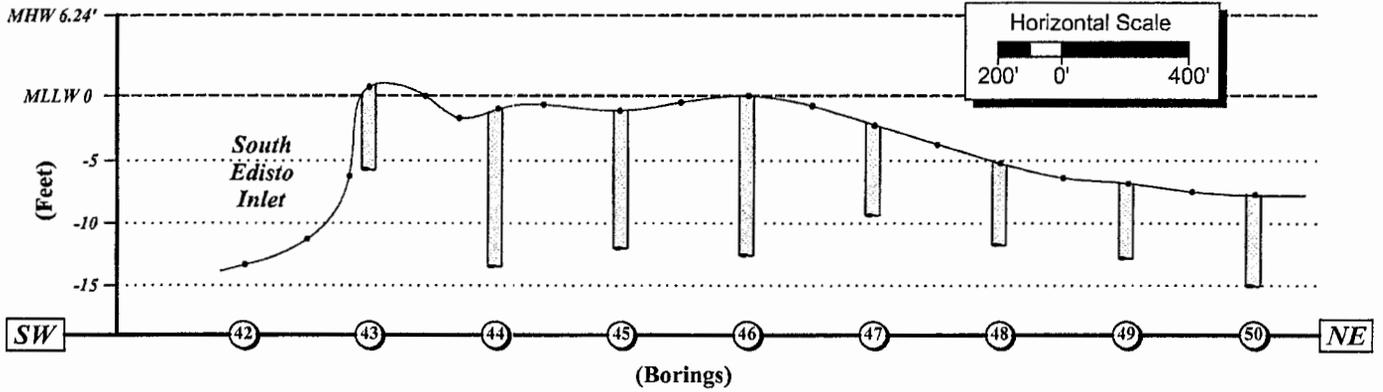
DRAWING TITLE:  
**BORROW AREA  
BATHYMETRY &  
CORE LOCATIONS**

SCALE: AS SHOWN  
DATE: MAY 2005  
DRAWN BY: J/JH  
PROJECT #: 2092

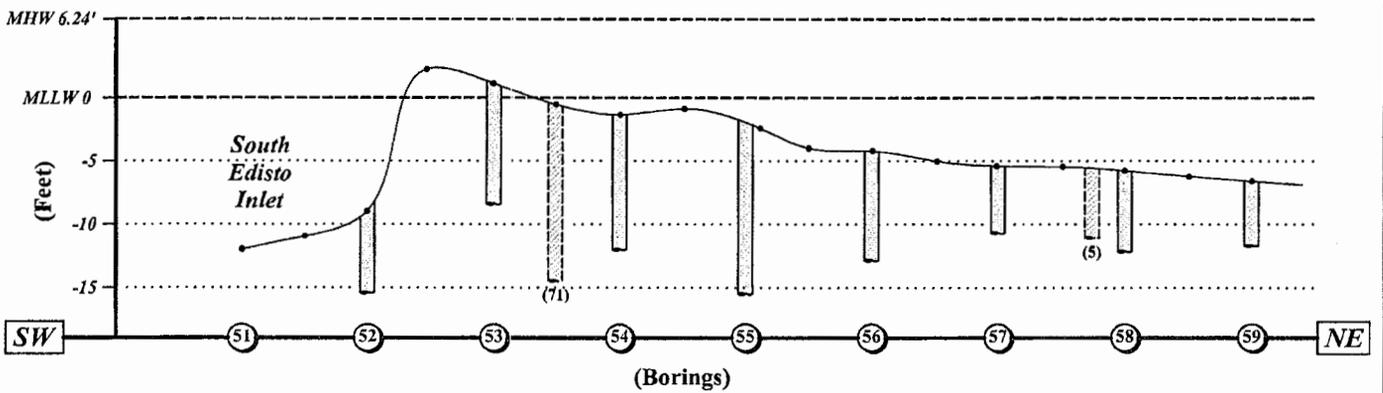
12

SHEET:  
OF: 16

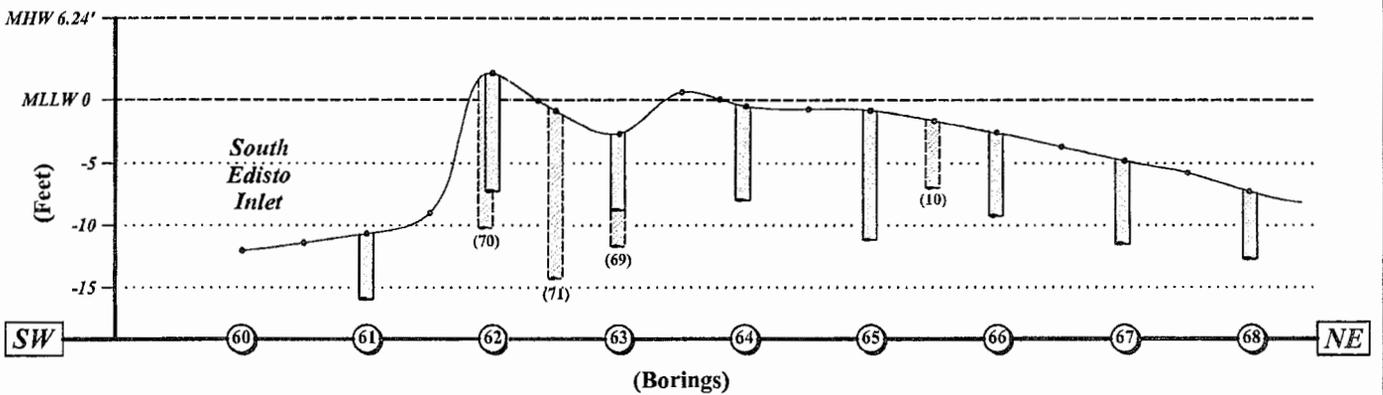
**SECTION A-A**



**SECTION B-B**



**SECTION C-C**



NOTE: SEE SHEET 12 FOR SECTION AND BORING LOCATIONS.

P/N 2005-1W-182-P

PROJECT TITLE:

EDISTO BEACH  
NOURISHMENT PROJECT

PREPARED FOR:

TOWN OF EDISTO BEACH  
2414 MURRAY ST  
EDISTO ISLAND, SC 29438

DRAWING TITLE:

**BORROW AREA SECTION**

SCALE: AS SHOWN

DATE: MAY 2005

DRAWN BY: JJH

PROJECT #: 2092

SHEET #:

**13**

OF: 16

<b>Edisto Beach, SC</b>	<b>Native Beach and Sediment Characteristics</b>
	<i>September to December 2002 Conditions</i>

Beach Sample Locality	Sample	ID	Grain Size Distributions			% Coarser	% Mud	% Shell	Sediment Description*
			Mean (mm)	Std Dev. (mm)	Skewness				
OCRM 2230 - State Park	Toe Dune	2230td	0.503	0.604	-0.058	0.7	0.0	25.5	MS,ms,sym
"	Berm	2230bc	0.494	0.408	-0.158	13.3	0.0	46.6	CS,ps,c-s
"	Beach Face	2230bf	0.442	0.382	-0.163	11.7	0.0	36.3	MS,ps,c-s
"	Low Tide Terrace	2230tt	0.298	0.337	-0.281	7.4	0.0	31.2	MS,ps,sc-s
Cell 1 - Pavillion	Toe Dune	Cell 1 td	0.438	0.542	-0.194	2.7	0.0	30.3	MS,ms,sym
"	Berm	Cell 1 bc	0.214	0.867	-0.464	0.0	0.0	10.5	FS,mws,sc-s
"	Beach Face	Cell 1 bf	0.448	0.503	-0.020	1.7	0.0	30.8	MS,ps,sym
"	Low Tide Terrace	Cell 1 tt	0.147	0.471	-1.196	3.0	0.0	9.1	VFS,ms,sc-s
Cell 5	Toe Dune	Cell 5 td	0.517	0.556	-0.145	2.8	0.0	22.4	CS,ms,sym
"	Berm	Cell 5 bc	0.383	0.599	-0.133	0.6	0.0	26.0	MS,ms,sym
"	Beach Face	Cell 5 bf	0.823	0.509	0.473	7.1	0.0	40.5	CS,ms,f-s
"	Low Tide Terrace	Cell 5 tt	0.262	0.405	-0.428	2.3	0.0	18.3	MS,ps,sc-s
Cell 9	Toe Dune	Cell 9 td	0.494	0.512	-0.145	4.7	0.0	32.7	MS,ps,sym
"	Berm	Cell 9 bc	0.357	0.525	-0.124	0.2	0.0	22.3	MS,ms,sym
"	Beach Face	Cell 9 bf	0.932	0.509	0.439	15.0	0.0	50.5	VCS,ps,f-s
"	Low Tide Terrace	Cell 9 tt	0.324	0.464	-0.221	0.7	0.0	24.3	MS,ps,sc-s
Cell 12	Toe Dune	Cell 12 td	0.289	0.573	0.013	0.2	0.0	19.9	MS,ms,f-s
"	Berm	Cell 12 bc	0.223	0.626	-0.461	0.0	0.0	12.6	FS,mws,sc-s
"	Beach Face	Cell 12 bf	0.541	0.504	0.060	2.7	0.0	37.1	CS,ps,sym
"	Low Tide Terrace	Cell 12 tt	0.362	0.354	-0.177	7.7	0.0	24.5	MS,ps,sc-s
Cell 16	Toe Dune	Cell 16 td	0.297	0.626	-0.132	0.1	0.0	20.4	MS,mws,sym
"	Berm	Cell 16 bc	0.455	0.456	-0.050	3.1	0.0	29.3	MS,ps,sym
"	Beach Face	Cell 16 bf	0.953	0.438	0.403	27.3	0.0	50.4	VCS,ps,f-s
"	Low Tide Terrace	Cell 16 tt	0.639	0.500	0.184	6.0	0.0	41.7	CS,ps,sym
Cell 22	Toe Dune	Cell 22 td	0.506	0.481	-0.204	7.7	0.0	35.0	CS,ps,c-s
"	Berm	Cell 22 bc	0.301	0.566	-0.195	0.1	0.0	19.7	MS,ms,c-s
"	Beach Face	Cell 22 bf	0.769	0.548	0.125	8.0	0.0	43.4	CS,ms,sym
"	Low Tide Terrace	Cell 22 tt	0.735	0.394	0.277	19.4	0.0	47.8	CS,ps,f-s
Cell 27	Toe Dune	Cell 27 td	0.299	0.585	-0.299	0.1	0.0	18.2	MS,ms,c-s
"	Berm	Cell 27 bc	0.263	0.641	-0.173	0.0	0.0	14.9	MS,mws,c-s
"	Beach Face	Cell 27 bf	0.800	0.414	-0.132	12.4	0.0	36.0	CS,ps,sym
"	Low Tide Terrace	Cell 27 tt	0.846	0.394	0.257	12.7	0.0	39.0	CS,ps,f-s
OCRM 2135	Toe Dune	2135td	0.157	0.717	0.017	0.0	0.0	6.1	FS,ws,f-s
"	Berm	2135bc	0.199	0.685	-0.441	0.0	0.0	9.3	FS,mws,c-s
"	Beach Face	2135bf	0.595	0.424	0.125	8.7	0.0	44.3	CS,ps,f-s
"	Low Tide Terrace	2135tt	0.334	0.317	-0.204	7.8	0.0	30.5	MS,ps,sc-s
OCRM 2110	Toe Dune	2110td	0.180	0.646	-1.220	0.9	0.0	10.0	FS,ws,sym
"	Berm	2110bc	0.180	0.633	-1.274	0.6	0.0	10.6	FS,ws,sym
"	Beach Face	2110bf	0.226	0.513	-1.006	3.5	0.0	16.3	FS,ms,sc-s
"	Low Tide Terrace	2110tt	0.382	0.452	-0.312	5.8	0.0	35.2	MS,ps,c-s

**Composites - Oceanfront**

Toe Dune (2230 to Cell 22)	Toe Dune	Dune-Comp7	0.424	0.526	-0.169	2.7	0.0	26.6	MS,ms,sym
Berm	Berm	Berm-Comp7	0.332	0.495	-0.359	2.5	0.0	23.9	MS,ps,c-s
Beach Face	Beach Face	BF-Comp7	0.669	0.448	0.177	10.5	0.0	41.3	CS,ps,f-s
Low Tide Terrace	Low Tide Terrace	LTT-Comp7	0.351	0.359	-0.157	6.7	0.0	28.1	MS,ps,sc-s
Composite - Oceanfront		Comp-7	0.427	0.427	-0.069	5.6	0.0	30.0	MS,ps,sym

**Composites - All Stations**

Toe Dune (2230 to 2110)	Toe Dune	Dune-CompAll	0.344	0.500	-0.208	2.0	0.0	22.1	MS,ms,sym
Berm	Berm	Berm-CompAll	0.290	0.511	-0.462	1.8	0.0	20.2	MS,ms,sc-s
Beach Face	Beach Face	BF-CompAll	0.588	0.421	0.102	9.8	0.0	38.6	CS,ps,f-s
Low Tide Terrace	Low Tide Terrace	LTT-CompAll	0.375	0.359	-0.121	7.3	0.0	30.2	MS,ps,c-s
Composite - Oceanfront & Sound		All-Comp10	0.386	0.420	-0.176	5.3	0.0	27.7	MS,ps,c-s

\*CS-Coarse Sand; MS-Medium Sand; FS-fine sand

ms-moderately sorted; mws-moderately well sorted; ws-well sorted; ps-poorly sorted

c-s coarse skewed; sc-s strongly coarse skewed; f-s fine skewed; sym - symmetrical size distribution

**P/N 2005-1W-182-P**

PROJECT TITLE:  
**EDISTO BEACH  
NOURISHMENT PROJECT**

PREPARED FOR:  
**TOWN OF EDISTO BEACH  
2414 MURRAY ST  
EDISTO ISLAND, SC 29438**

DRAWING TITLE:  
**SEDIMENT  
CHARACTERISTICS**

SCALE: AS SHOWN  
DATE: MAY 2005  
DRAWN BY: JIH  
PROJECT #: 2092

SHEET #:

**14**

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Edisto Beach SC

Beach and Potential Borrow Area Sediment Characteristics - Summary

September to December 2002 Conditions

Beach Samples Locality	ID	Sample Position	Stations	Locality	Grain Size Distributions			% Mud	% Shell	Sediment Description*
					Mean (mm)	Std Dev. (mm)	Skewness			
Oceanfront	Dune-Comp7	Toe Dune	OCRM 2230 to Cell 22	State Park	0.424	0.526	-0.169	0.0	25.6	MS.ms.sym
-	Berm-Comp7	Berm	-	to Loring St	0.332	0.495	-0.359	0.0	23.9	MS.ps.c-s
-	BF-Comp7	Beach Face	-	7 Stations	0.669	0.448	0.177	0.0	41.3	CS.ps.fs
-	LTT-Comp7	Low Tide Terrace	-	-	0.351	0.359	-0.157	0.0	28.1	MS.ps.sc-s
All Ocean Beach	Comp-7	All	-	-	0.427	0.427	-0.089	0.0	30.0	MS.ps.sym

Beach Samples Oceanfront & Sound	ID	Sample Position	Stations	Locality	Grain Size Distributions			% Mud	% Shell	Sediment Description*
					Mean (mm)	Std Dev. (mm)	Skewness			
-	Dune-CompAll	Toe Dune	OCRM 2230	State Park	0.344	0.500	-0.208	0.0	22.1	MS.ms.sym
-	Berm-CompAll	Berm	to OCRM 2110	to Big Bay Creek	0.290	0.511	-0.462	0.0	20.2	MS.ms.sc-s
-	BF-CompAll	Beach Face	-	10 Stations	0.588	0.421	0.102	0.0	38.6	CS.ps.fs
-	LTT-CompAll	Low Tide Terrace	-	-	0.375	0.359	-0.121	0.0	30.2	MS.ps.c-s
-	All-Comp10	All	-	-	0.386	0.420	-0.176	0.0	27.7	MS.ps.c-s

Offshore Borrow Area

1991 Borings	ID	Limits Feet	Water Depth Ft-mhw	Confirmation Depth - Ft mhw	Grain Size Distributions			% Mud	% Shell	Sediment Description*
					Mean (mm)	Std Dev. (mm)	Skewness			
Core E-2	E-2	0-2.7	-2.2	-4.9	0.267	0.358	-0.450	9.4	nd	MS.ps.sc-s
Core E-3	E-3	0-2.1	-5.5	-11	0.477	0.475	-0.203	8.6	nd	MS.ps.c-s
Core E-6	E-6	0-3.8	-6.2	-10	0.441	0.482	-0.141	1.5	nd	MS.ps.c-s
Core E-10	E-10	0-3.5	-3.5	-7	0.288	0.510	-0.556	0.8	nd	MS.ms.sc-s
Core E-11	E-11	0-3.9	-6.8	-10.7	0.350	0.463	-0.287	1.5	nd	MS.ps.sc-s

2002 Borings

Core E-43	E-43	0-8.3	2.5	-5.8	0.579	0.318	-0.054	30.4	5.9	CS.ps.sc-s
Core E-44	E-44	0-14.6	1.2	-13.4	0.600	0.469	-0.103	13.3	-	MS.ps.c-s
Core E-45	E-45	0-11.6	-0.4	-12	0.640	0.442	0.140	8.1	-	CS.ps.sym
Core E-46	E-46	0-12.2	-0.3	-12.5	0.394	0.397	-0.037	3.9	-	CS.ps.sym
Core E-47	E-47	0-5.5	-2.6	-9.2	0.643	0.420	0.193	12.0	-	MS.ps.c-s
Core E-48	E-48	0-6.6	-5.2	-11.8	0.601	0.379	0.169	14.7	-	CS.ps.fs
Core E-49	E-49	0-5.7	-7.2	-12.9	0.414	0.344	-0.169	17.2	-	CS.ps.sc-s
Core E-50	E-50	0-7.2	-7.8	-15	0.539	0.318	-0.054	30.4	36.2	MS.ps.sc-s
Core E-52	E-52	0-6.2	-9	-15.2	0.385	0.459	-0.180	2.9	-	MS.ps.c-s
Core E-53	E-53	0-8.9	0.6	-8.3	0.693	0.463	0.146	5.0	-	MS.ps.c-s
Core E-54	E-54	0-10.6	-1.4	-12	0.483	0.463	-0.037	3.9	-	MS.ps.sym
Core E-55	E-55	0-13.2	-2.2	-15.4	0.474	0.459	-0.046	5.9	-	MS.ps.c-s
Core E-56	E-56	0-8.7	-4.2	-12.9	0.348	0.454	-0.311	4.6	-	MS.ps.c-s
Core E-57	E-57	0-5.3	-5.5	-10.8	0.776	0.400	0.284	25.3	-	CS.ps.sym
Core E-58	E-58	0-6.3	-5.8	-12.1	0.605	0.395	0.200	11.2	-	CS.ps.fs
Core E-59	E-59	0-5.2	-6.5	-11.7	0.558	0.439	0.132	7.6	-	CS.ps.sym
Core E-61	E-61	0-5	-10.9	-15.9	0.664	0.464	0.040	12.7	-	CS.ps.sym
Core E-62	E-62	0-9.6	2.5	-7.1	0.607	0.451	0.098	6.2	-	CS.ps.sym
Core E-63	E-63	0-5.6	-3.1	-8.7	0.740	0.474	0.199	13.3	-	CS.ps.sym
Core E-64	E-64	0-7.7	-0.3	-6	0.640	0.410	0.143	14.1	-	CS.ps.sym
Core E-65	E-65	0-10.2	-0.9	-11.1	0.344	0.473	-0.369	3.2	-	MS.ps.sc-s
Core E-66	E-66	0-6.5	-2.6	-9.1	0.590	0.397	0.075	10.6	-	CS.ps.fs
Core E-67	E-67	0-6.3	-5.2	-11.5	0.271	0.432	-0.549	4.3	1.4	CS.ps.sc-s
Core E-68	E-68	0-5.5	-7.2	-12.7	0.273	0.442	-0.512	3.3	1.8	MS.ps.sc-s
Core E-69	E-69	0-8.7	-3	-11.7	0.344	0.446	-0.309	3.8	-	MS.ps.sc-s
Core E-70	E-70	0-12.6	2.5	-10.1	0.451	0.410	-0.229	11.4	-	MS.ps.sc-s
Core E-71	E-71	0-12.7	-1.6	-14.3	0.573	0.486	0.055	5.1	-	CS.ps.sym

All Borings

Averages	0.518	0.409	-0.013	10.1	<<1	31.2	CS.ps.sym
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\*CS-Coarse Sand; MS-Medium Sand; FS-Fine Sand  
ms-moderately-sorted; mvs-moderately well sorted; ws-well sorted; ps-finely sorted  
cs-coarse silt; ms-medium silt; fs-fine silt; sc-silt; sym-symmetrical size distribution

Note: Nearly all cores had only trace mud based on visual examination. The three cores tested for mud had minor fines bedding (ft in mud lenses) in portions of the core.

P/N 2005-1W-182-P  
EDISTO BEACH NOURISHMENT PROJECT

PREPARED FOR:  
TOWN OF EDISTO BEACH  
2414 MURRAY ST  
EDISTO ISLAND, SC 29438

DRAWING TITLE:  
SEDIMENT  
CHARACTERISTICS

SCALE:	AS SHOWN
DATE:	MAY 2005
DRAWN BY:	JJH
PROJECT #:	2092

Overflow Ratios Based On December 2002 Post Nourishment Beach Sediment

Native Beach	Mean(mm)	0.427	Mean (phi)	1.228
Composite-7-All	Std.Dev(mm)	0.427	Std.Dev(phi)	1.228

Offshore Core 1991 Borings	Sample ID	Limits (feet)	Sediment Description**	% Mud to Indicated samp Interval	Moment Measures		X		Y	
					M-phi-b	Sigma-b	(Mb-Mn)/SDn	(SDB/SDn)		
Core E-2	E-2	0-2.7	MS,ps,sc-s	0.0	1.904	1.483	0.55	1.21	1.75	
Core E-5	E-5	0-2.1	MS,ps,c-s	0.0	1.068	1.075	-0.13	0.88	1.02	
Core E-6	E-6	0-3.8	MS,ps,c-s	0.0	1.182	1.052	-0.04	0.86	1.10	
Core E-10	E-10	0-3.5	MS,ms,sc-s	0.0	1.797	0.972	0.46	0.79	3.20	
Core E-11	E-11	0-3.9	MS,ps,sc-s	0.0	1.517	1.11	0.24	0.90	1.80	
<b>2002 Borings</b>										
Core E-43	E-43a	0-1.6	FS,mws,c-s	0.0	2.012	0.617	0.64	0.50	10.00	
"	E-43b	1.6-7.2	CS,ps,sym		0.549	1.188	-0.55	0.97	1.02	
"	E-43c	7.2-8.3	CS,ps,sym		0.204	1.248	-0.83	1.02	1.02	
Core E-44	E-44a	0-6	CS,ps,sym	3.8	0.749	1.079	-0.39	0.88	1.02	
"	E-44b	6-14.6	CS,ps,sym	0.7	0.727	1.101	-0.41	0.90	1.02	
Core E-45	E-45a	0-6	CS,ps,sym	2.9	0.456	1.188	-0.63	0.97	1.02	
"	E-45b	6-11.6	CS,ps,sym	3.0	0.847	1.131	-0.31	0.92	1.02	
Core E-46	E-46a	0-3.9	CS,ps,fs	0.6	0.576	1.229	-0.53	1.00	1.02	
"	E-46b	3.9-7.6	MS,ps,sc-s	2.4	1.895	1.231	0.38	1.00	1.75	
"	E-46c	7.6-9.7	MS,ps,c-s		1.254	1.411	0.02	1.15	1.11	
"	E-46d	9.7-12.2	FS,ms,sc-s	2.2	2.11	0.832	0.72	0.88	10.00	
Core E-47	E-47	0-5.5	CS,ps,fs		0.637	1.252	-0.48	1.02	1.02	
Core E-48	E-48a	0-2	CS,ps,sym	neg	1.003	1.446	-0.18	1.18	1.04	
"	E-48b	2-8.6	CS,ps,fs	neg	0.819	1.362	-0.50	1.11	1.02	
Core E-49	E-49a	0-2.9	MS,ps,sc-s	5.8	1.496	1.349	0.22	1.10	1.27	
"	E-49b	2.9-5.7	CS,ps,sc-s	1.8	1.053	1.68	-0.14	1.37	1.12	
Core E-50	E-50a	0-4.8	VCS,ps,sym	1.1	0.268	1.559	-0.78	1.27	1.02	
"	E-50b	4.8-7.2	FS,ms,sc-s		2.126	1.015	0.73	0.83	5.20	
Core E-52	E-52a	0-2	FS,mws,sc-s	1.7	2.084	0.686	0.71	0.56	10.00	
"	E-52b	2-8.2	MS,ps,sym		1.042	1.13	-0.15	0.92	1.02	
Core E-53	E-53a	0-4	CS,ps,sym	7.2	0.304	0.948	-0.75	0.77	1.02	
"	E-53b	4-8.9	CS,ps,sym	neg	0.713	1.041	-0.42	0.85	1.02	
Core E-54	E-54a	0-3.5	MS,ms,sc-s		1.831	0.992	0.33	0.81	2.50	
"	E-54b	3.5-10.8	CS,ps,fs	3.5	0.785	1.055	-0.38	0.86	1.02	
Core E-55	E-55a	0-6	MS,ps,sym	1.7	1.019	1.058	-0.17	0.86	1.02	
"	E-55b	6-13.2	MS,ps,sym	1.4	1.124	1.175	-0.08	0.96	1.02	
Core E-56	E-56a	0-1.8	CS,ps,sym	1.5	0.821	1.316	-0.33	1.07	1.02	
"	E-56b	1.8-6.7	MS,ps,c-s		1.679	1.033	0.37	0.84	2.26	
Core E-57	E-57a	0-1.8	CS,ps,sym	2.0	0.864	1.285	-0.30	1.05	1.02	
"	E-57b	1.8-5.3	VCS,ps,sym		0.122	1.268	-0.80	1.03	1.02	
Core E-58	E-58	0-3.3	CS,ps,fs		0.725	1.339	-0.41	1.09	1.02	
Core E-59	E-59	0-5.2	CS,ps,sym		0.843	1.186	-0.31	0.97	1.02	
Core E-61	E-61a	0-2.5	MS,ps,sym		0.969	1.018	-0.21	0.83	1.02	
"	E-61b	2.5-5	CS,ps,sym		0.218	1.063	-0.82	0.87	1.02	
Core E-62	E-62a	0-7.5	CS,ps,sym		0.578	0.965	-0.53	0.79	1.02	
"	E-62b	7.5-9.8	MS,ps,sym		1.228	1.074	0.00	0.87	1.18	
Core E-63	E-63a	0-3	CS,ps,fs		0.689	1.008	-0.44	0.82	1.02	
"	E-63b	3-5.6	VCS,ps,sym		0.145	1.081	-0.88	0.88	1.02	
Core E-64	E-64a	0-3	MS,ps,c-s		1.352	1.279	0.10	1.04	1.18	
"	E-64b	3-7.7	CS,ps,sym		0.206	1.082	-0.83	0.88	1.02	
Core E-65	E-65a	0-8	MS,ps,sc-s		1.822	1.103	0.32	0.90	1.80	
"	E-65b	8-10.2	MS,ms,c-s		1.23	0.928	0.00	0.76	1.30	
Core E-66	E-66	0-3.5	CS,ps,fs		0.863	1.333	-0.30	1.08	1.02	
Core E-67	E-67a	0-2.1	MS,ps,c-s		1.083	1.307	-0.12	1.06	1.02	
"	E-67b	2.2-6.3	FS,ms,sc-s		2.32	0.692	0.89	0.73	>10	
Core E-68	E-68a	0-3.6	MS,ps,sym		1.054	1.201	-0.14	0.98	1.02	
"	E-68b	3.6-6.5	CS,ps,sym		0.315	1.46	-0.74	1.19	1.02	
Core E-69	E-69a	0-3	MS,ms,sym		1.8	0.914	0.30	0.74	1.02	
"	E-69b	3-7.0	MS,ps,c-s		1.43	1.27	0.16	1.03	1.25	
"	E-69c	7-8.7	MS,ps,sc-s		1.702	1.274	0.39	1.04	1.95	
Core E-70	E-70a	0-9	CS,ps,c-s		0.805	1.295	-0.34	1.05	1.02	
"	E-70b	9-12.6	FS,mws,sc-s		2.008	0.761	0.83	0.52	10.00	
Core E-71	E-71a	0-6	CS,ps,sym		0.836	1.043	-0.32	0.85	1.02	
"	E-71b	6-12.7	CS,ps,sym		0.772	1.038	-0.37	0.84	1.02	

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