OCEAN AND COASTAL CONSULTANTS INC.

COASTAL ENGINEERING AND ENERGY

January 10, 2009

Presentation Outline

- OCC Capabilities
  - Coastal Engineering
- Coastal Structures
  - Traditional and Nontraditional construction Materials
- Energy

Ocean and Coastal Consultants, Inc.

Douglas A. Gaffney, P.E.

Regional Director

- 1984 BSME Kings Point
- 1989 MSMS U. of Delaware
- 1984 – 1987 Naval Ship Systems Engineering Station, Philadelphia
- 1990- 1997 USACE Philadelphia
- 1997 – 2001 Synthetic Industries
- 2002 – 2004 Hart Crowser
- 2004 – Present Ocean and Coastal Consultants

Capabilities

OCC has provided the waterfront community with expertise in condition investigation, design, permitting, and construction administration since 1983.

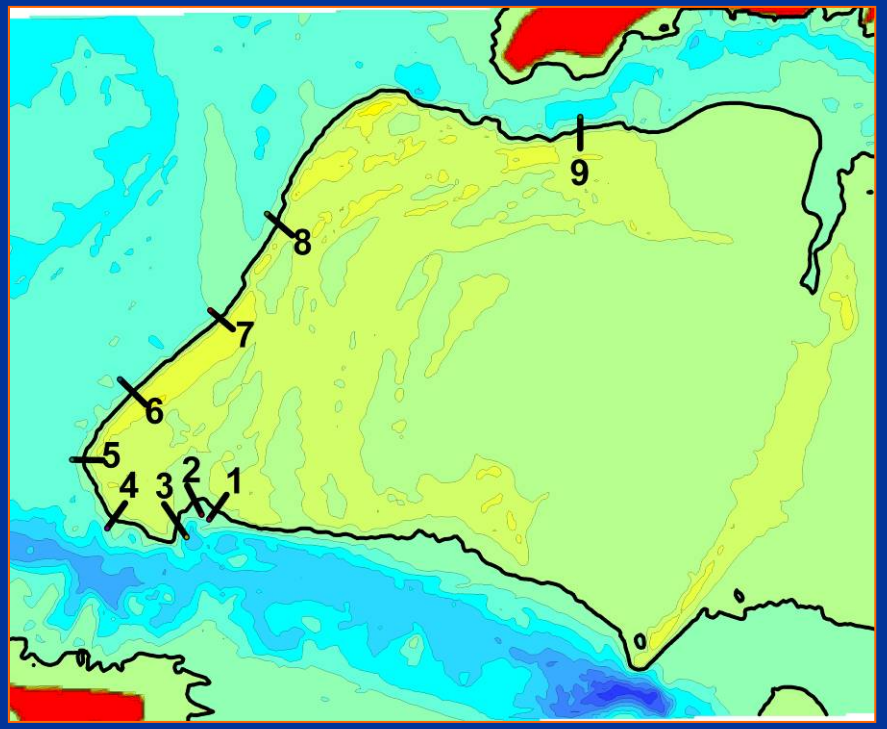
OCC has three offices in Trumbull, CT, Plymouth, MA and our newest in Gibbsboro, NJ added in 2004.

Recognized Industry Experts

- National Committees
- Hurricane Katrina ASCE Damage Assessment Team
- Southeast Asia Tsunami
- OCC Staff have recently presented at:
  - Coastal GeoTools
  - Ports 2004 and 2007
  - Civil Engineering in the Oceans 2005
  - GeoFrontiers 2005

International Experience

- COWI Denmark
- Recent Projects
  - Aruba (wharf and pier rehabilitation)
  - Qatar Bahrain Causeway
  - Bahamas (coastal erosion)
  - British Virgin Islands
  - Canada (Confined Disposal Facility)
  - Turks and Caicos



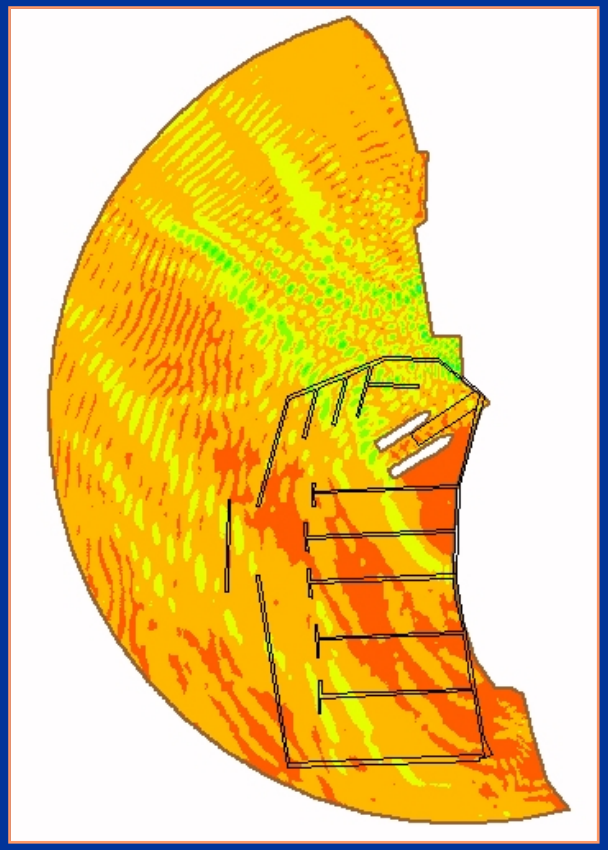
Professional Organizations

- Stan White is the past Chairman of the ASCE/COPRI Ports and Harbors Committee.
- OCC participates in the Engineer-diver committees of ADCI and ASCE
- Alex Mora is a member of the COPRI committee for developing seismic design standards for port facilities.
- Doug Gaffney is the U.S. Representative to the Permanent International Association of Navigation Congresses - Working Group No. 56.

ASCE
American Society of Civil Engineers

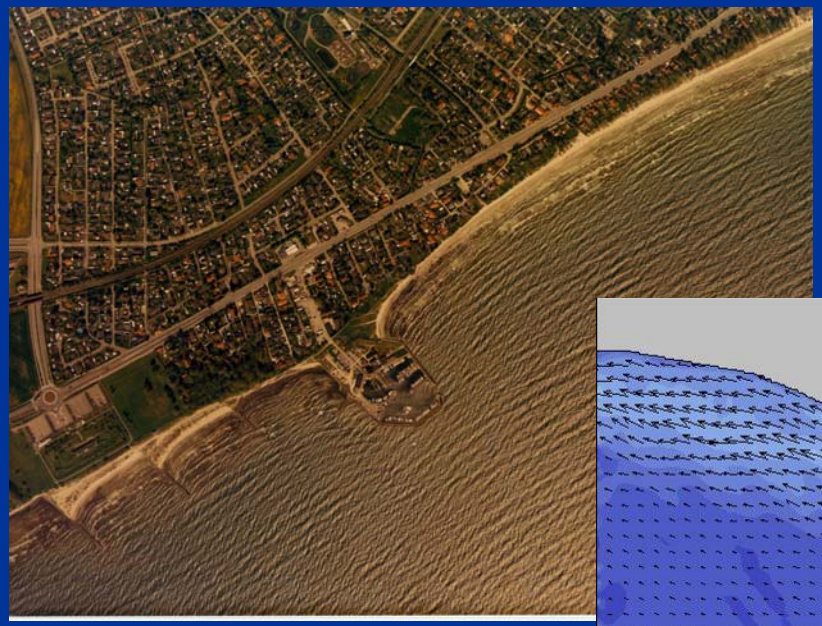
Coastal Engineering

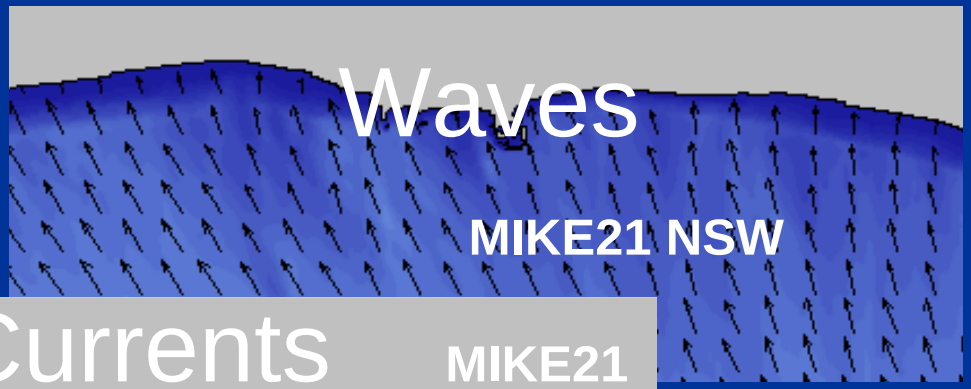
- Numerical Modeling
- Littoral Drift (sediment transport)
- Erosion
- Sedimentation
- Structure and Beachfill Design
- *In situ* Data Collection

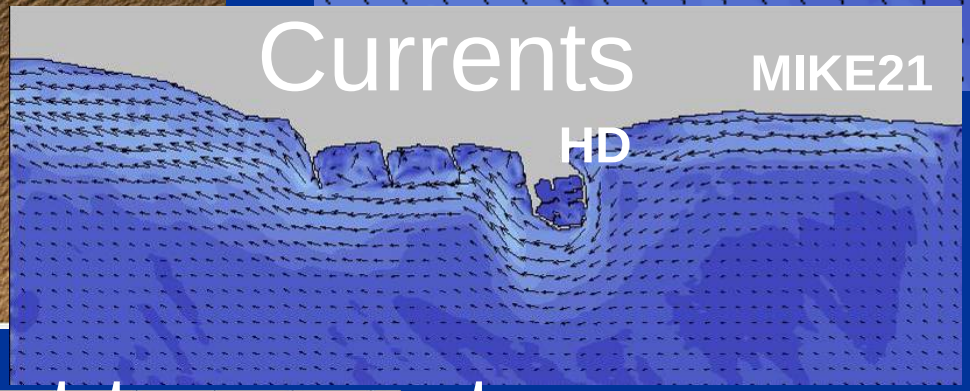


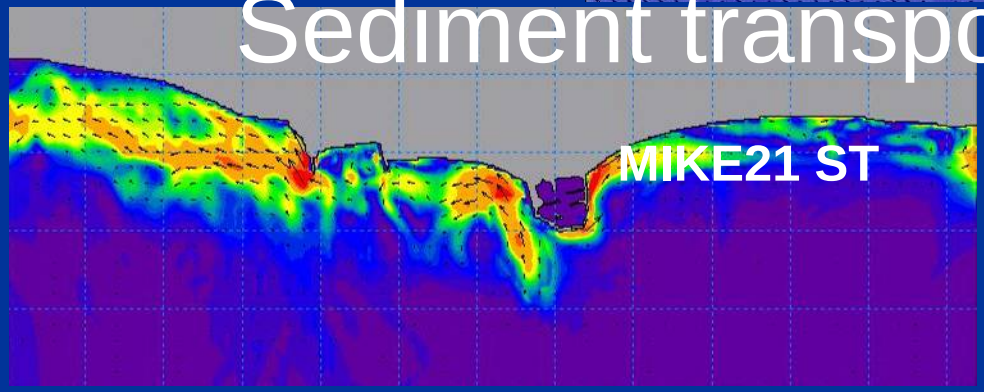
Data Collection

Coastal Data







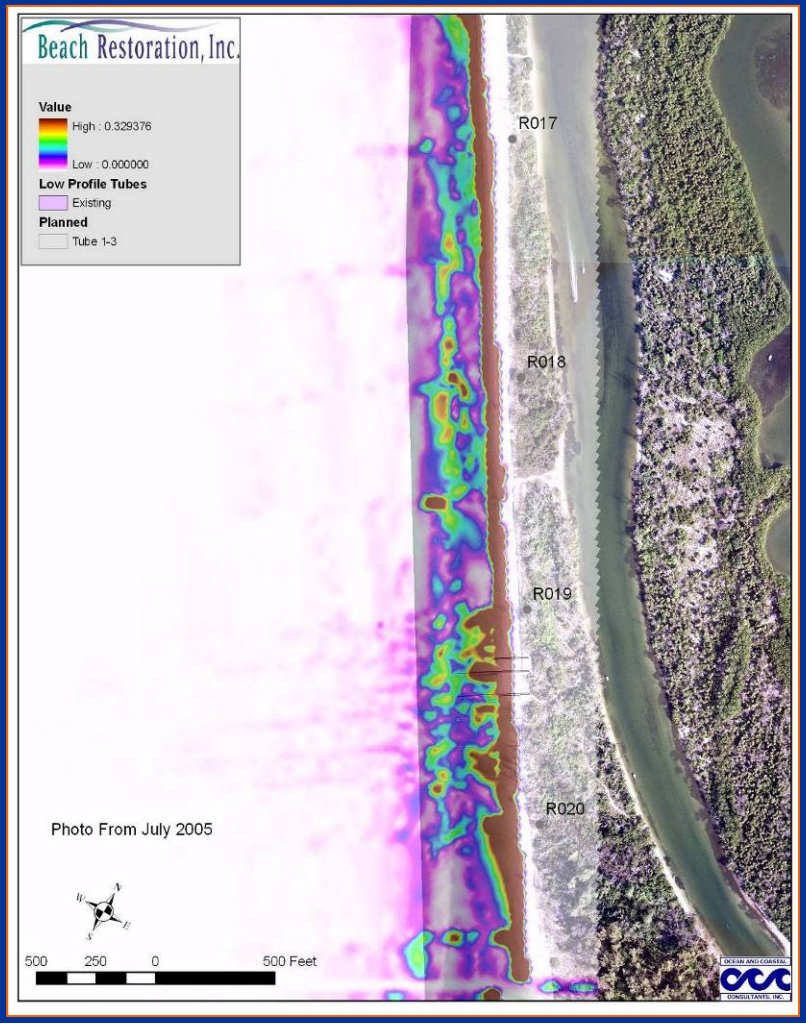


Application of MIKE System numerical hydraulic models

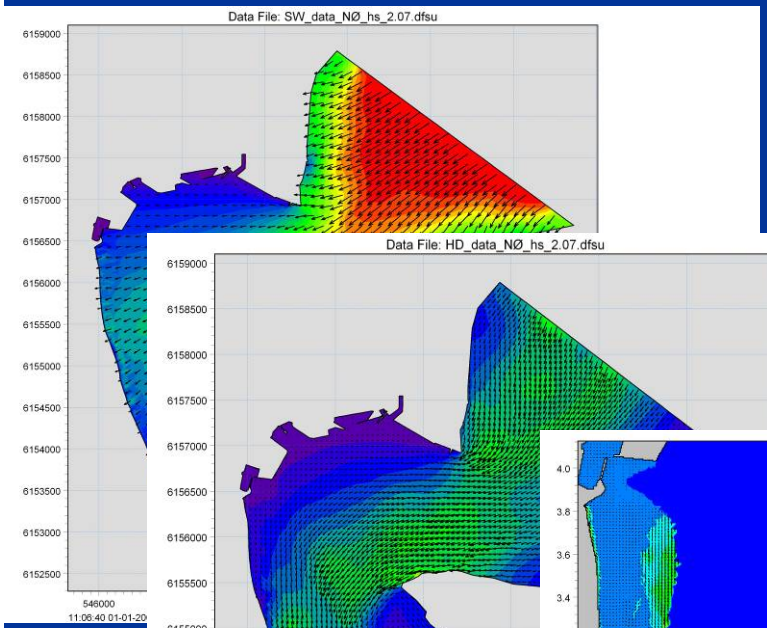
Tool for assessing coastal hydraulic problems

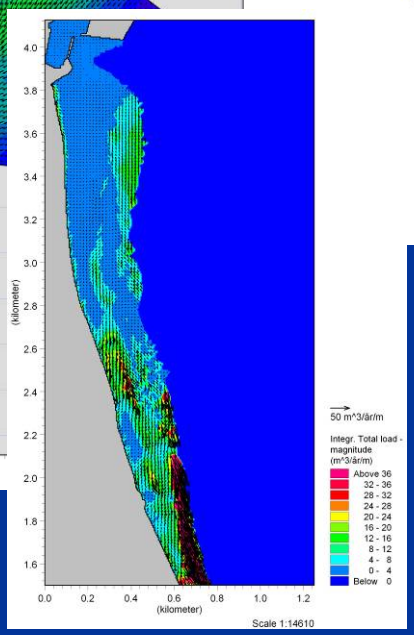
Sediment Transport Modeling

- STWAVE
- CERC Equation
  - Calculated cross-shore distribution of alongshore current for June 2005 bathymetry for Stump Pass from radiation stress output from STWAVE.

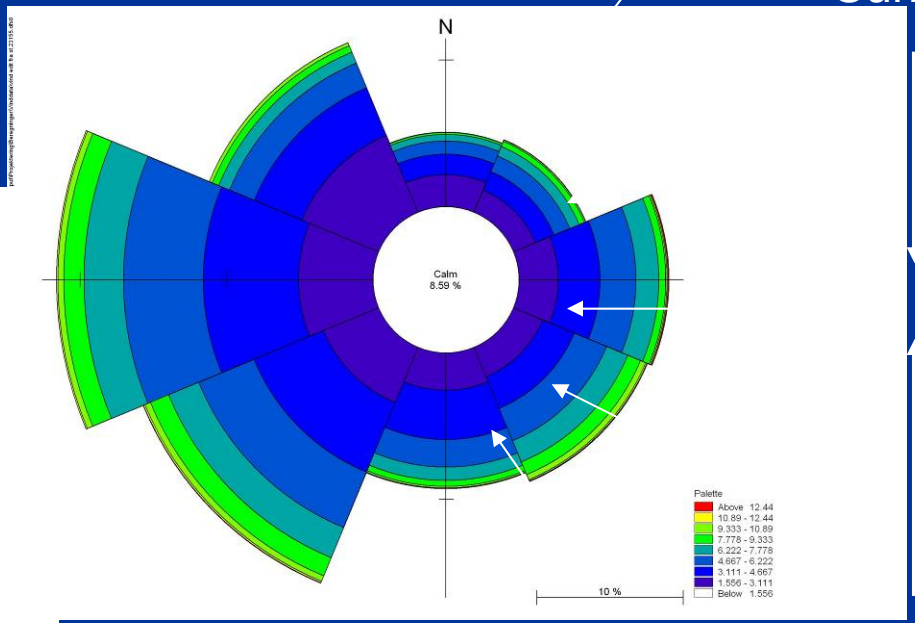


OCEAN AND COASTAL CONSULTANTS INC.



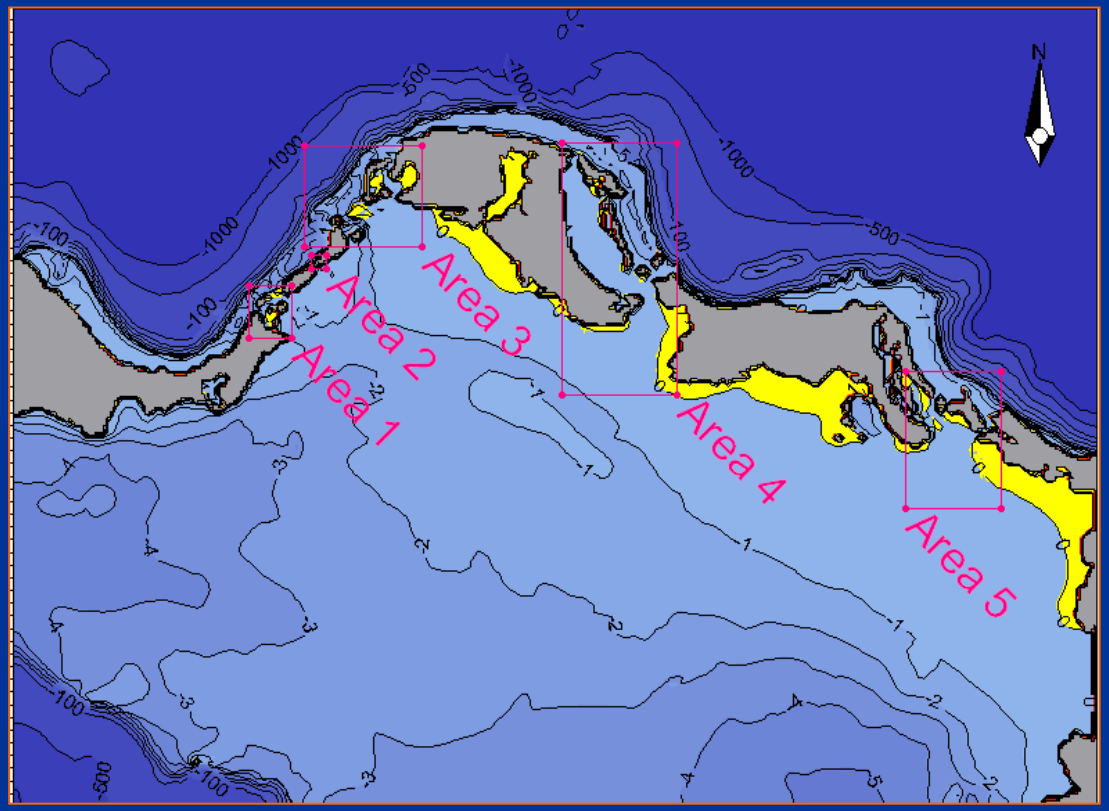


Current

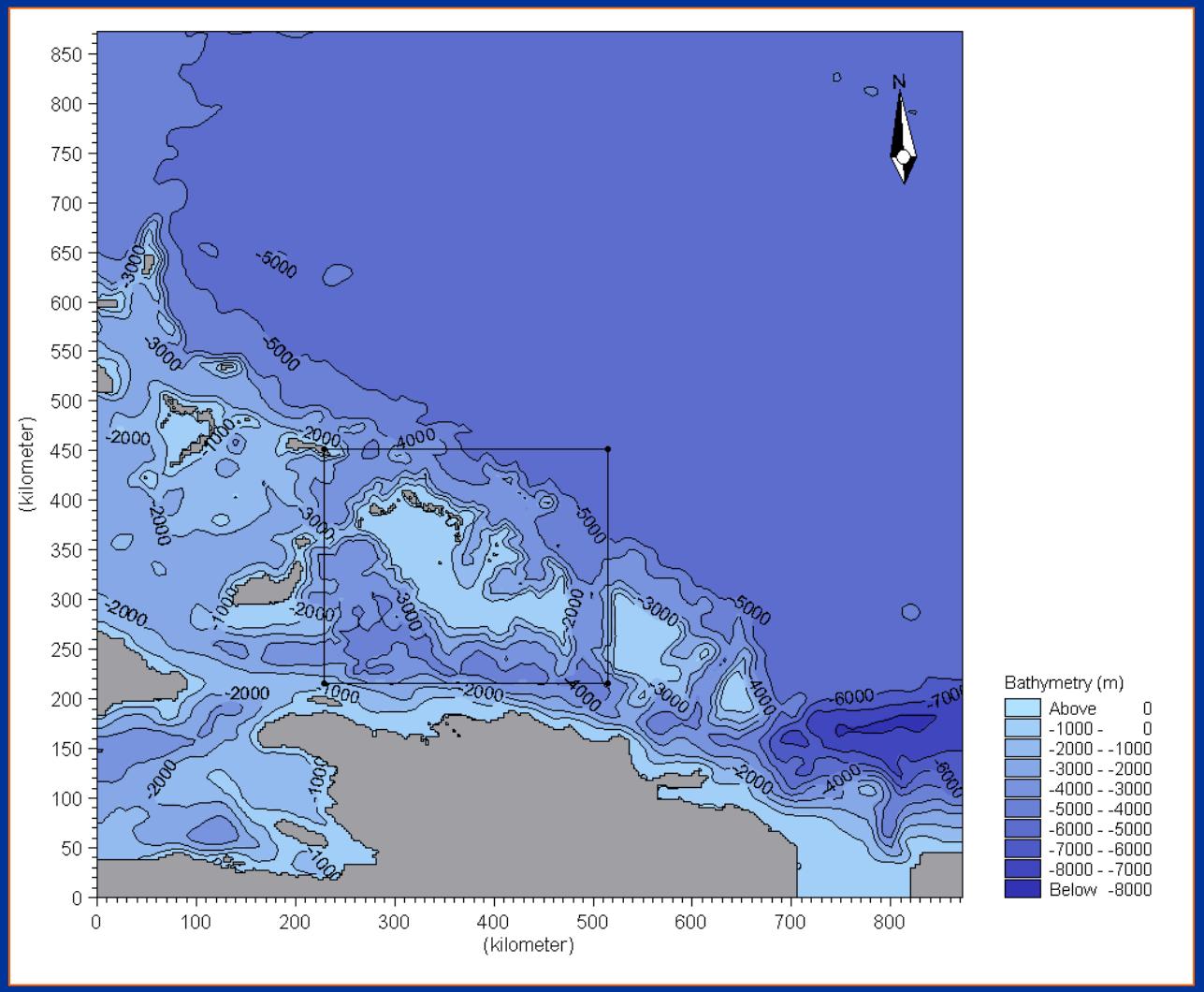


Coastal Impact of new marina

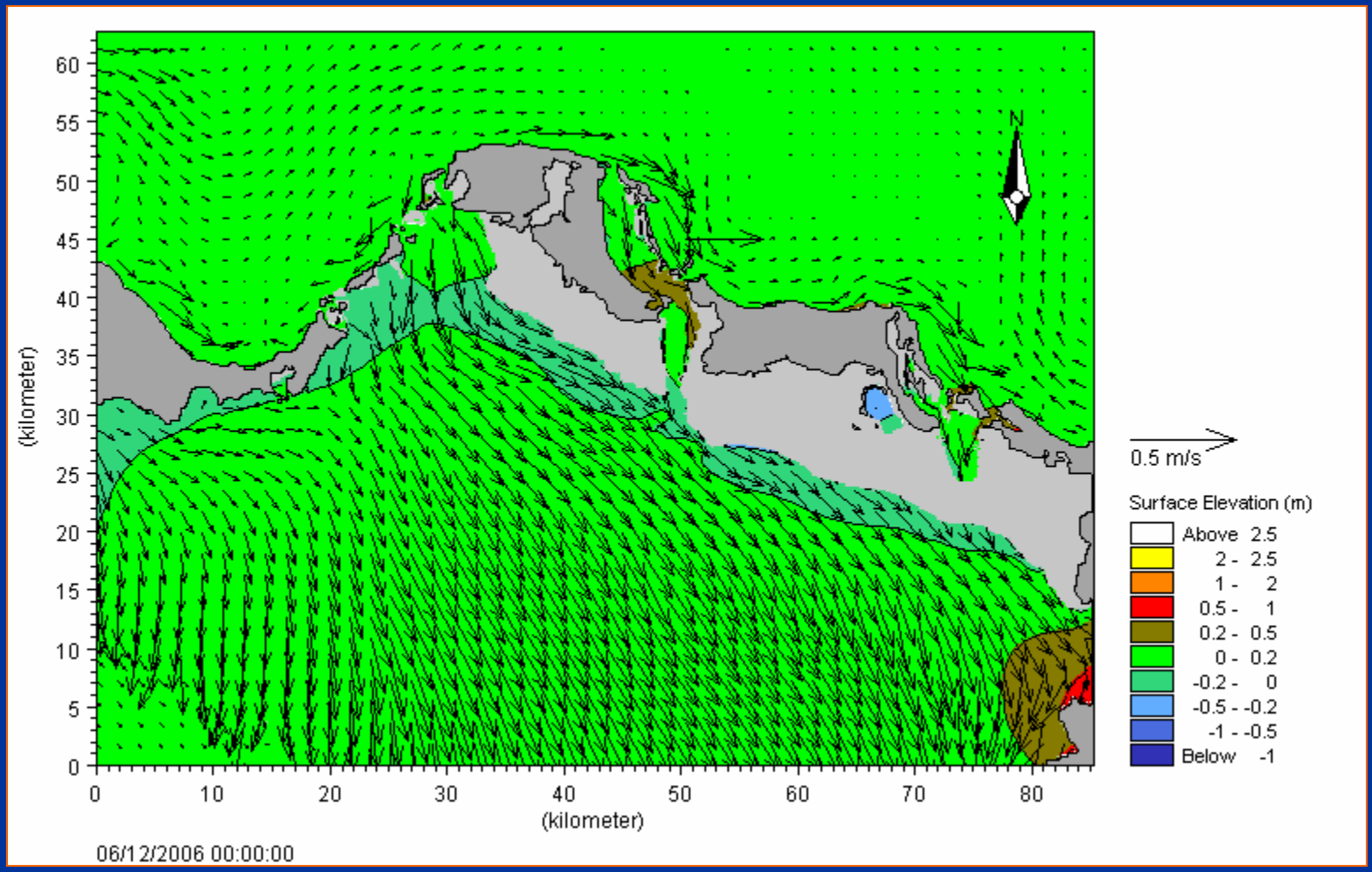
Dellis Cay Hurricane modelling



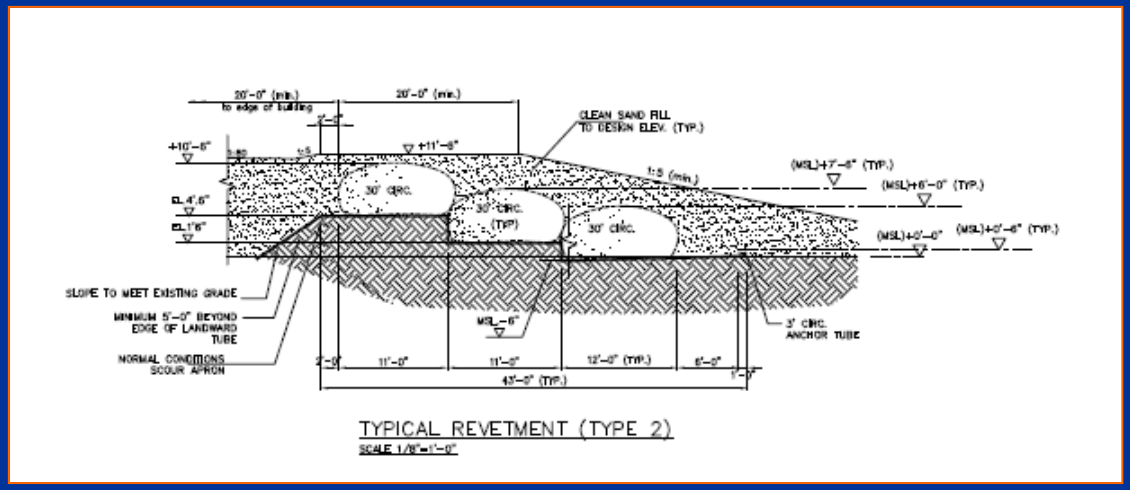
Dellis Cay Hurricane modelling



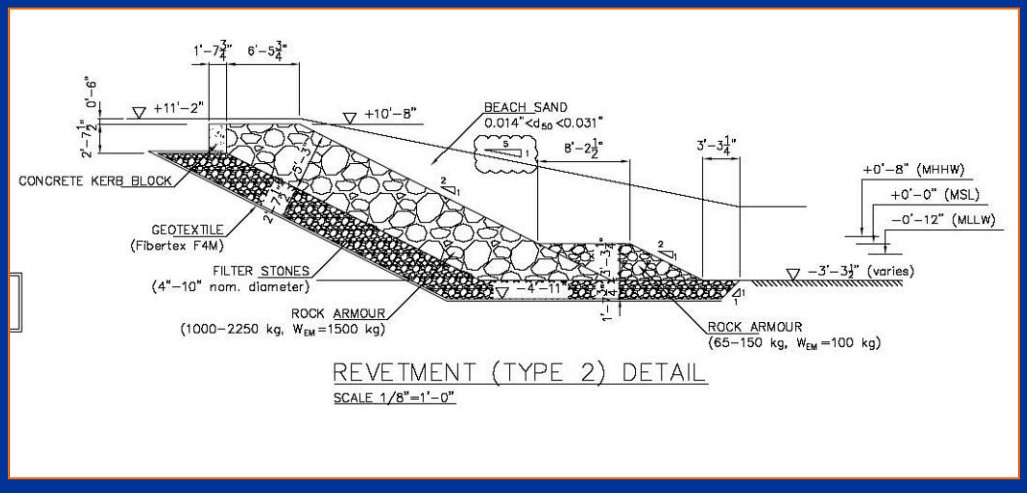
Dellis Cay Hurricane modelling



Dellis Cay Revetments



TYPICAL REVETMENT (TYPE 2)
SCALE 1/8"=1'-0"

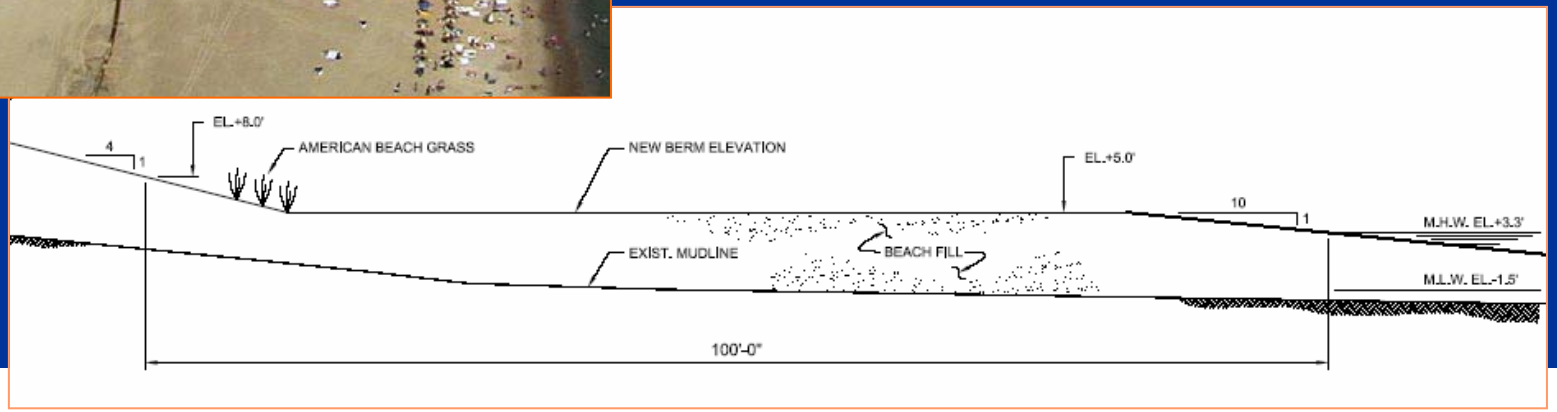


REVETMENT (TYPE 2) DETAIL
SCALE 1/8"=1'-0"

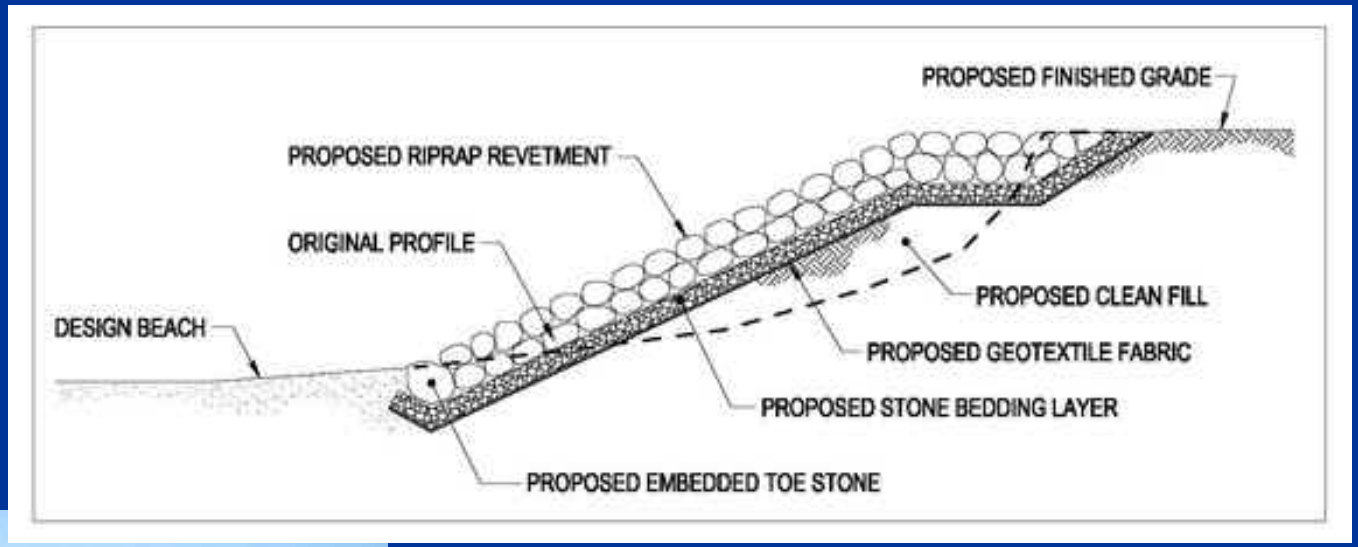
Coastal Structures

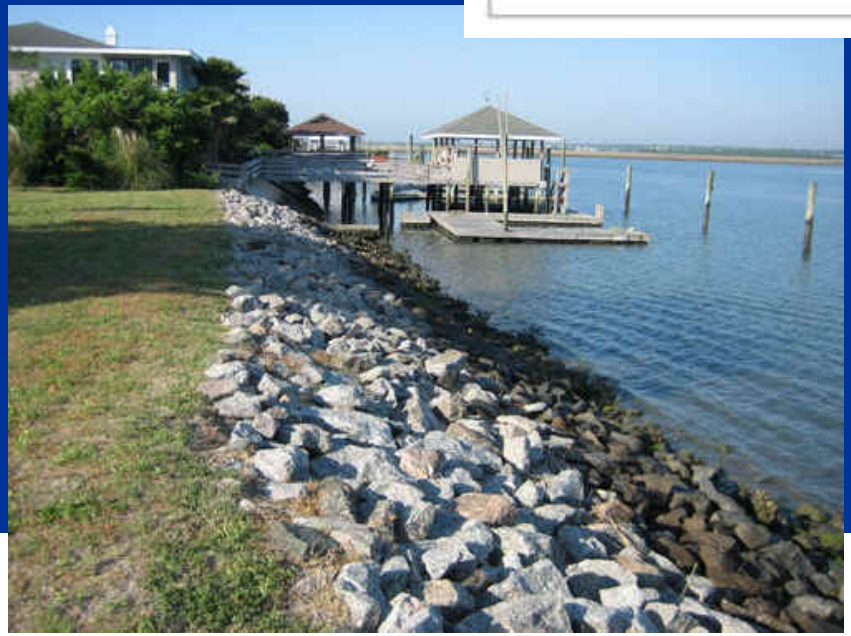
- Beach and Dune Restoration
- Shore Parallel Structures
  - Breakwaters, revetments, bulkheads
- Shore Perpendicular Structures
  - Groins and Jetties

Beachfill

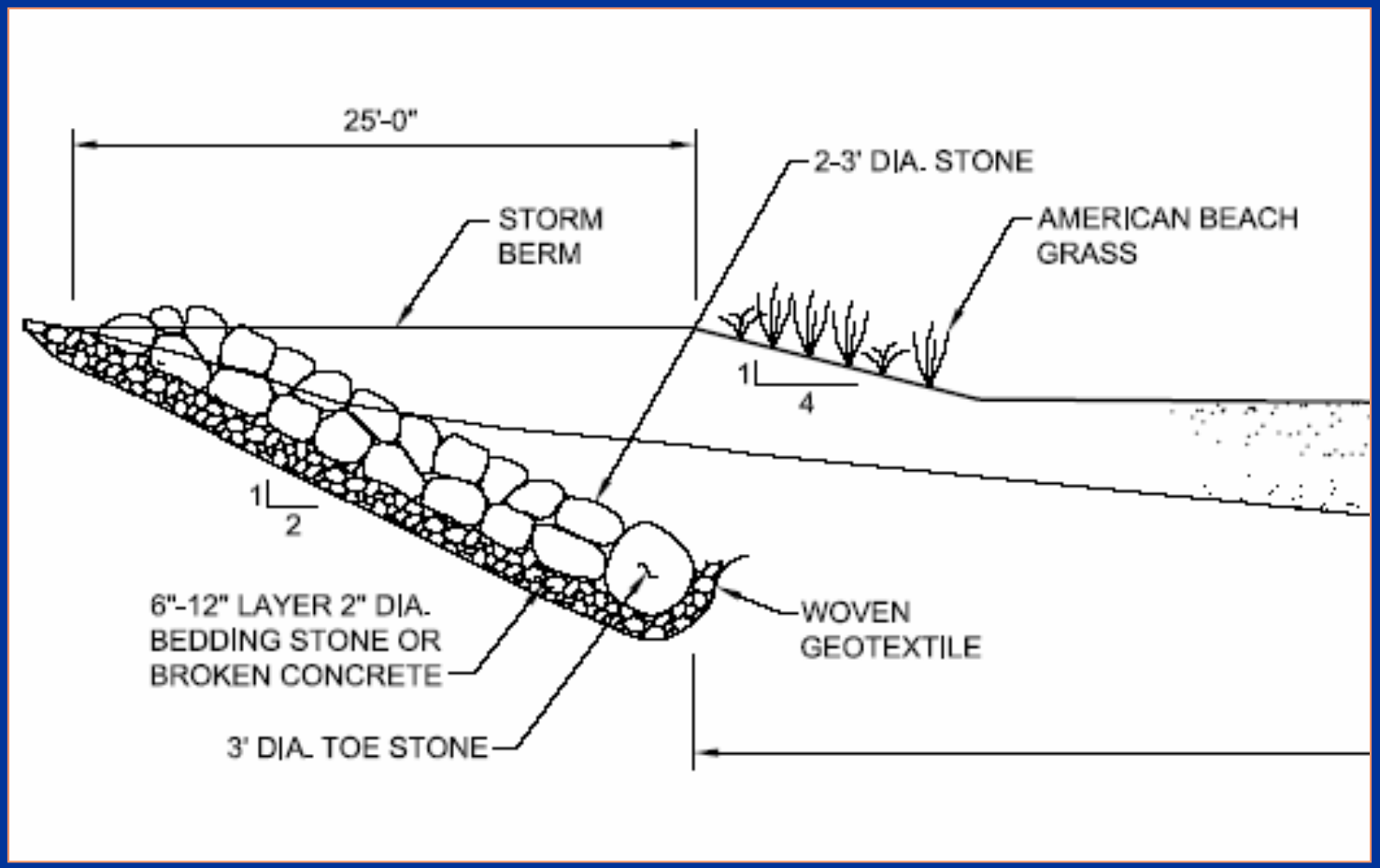

EL.+8.0'
4
1
AMERICAN BEACH GRASS
NEW BERM ELEVATION
EL.+5.0'
10
1
M.H.W. EL.+3.3'
EXIST. MUDLINE
BEACH FILL
M.L.W. EL.-1.5'
100'-0"

Revetments

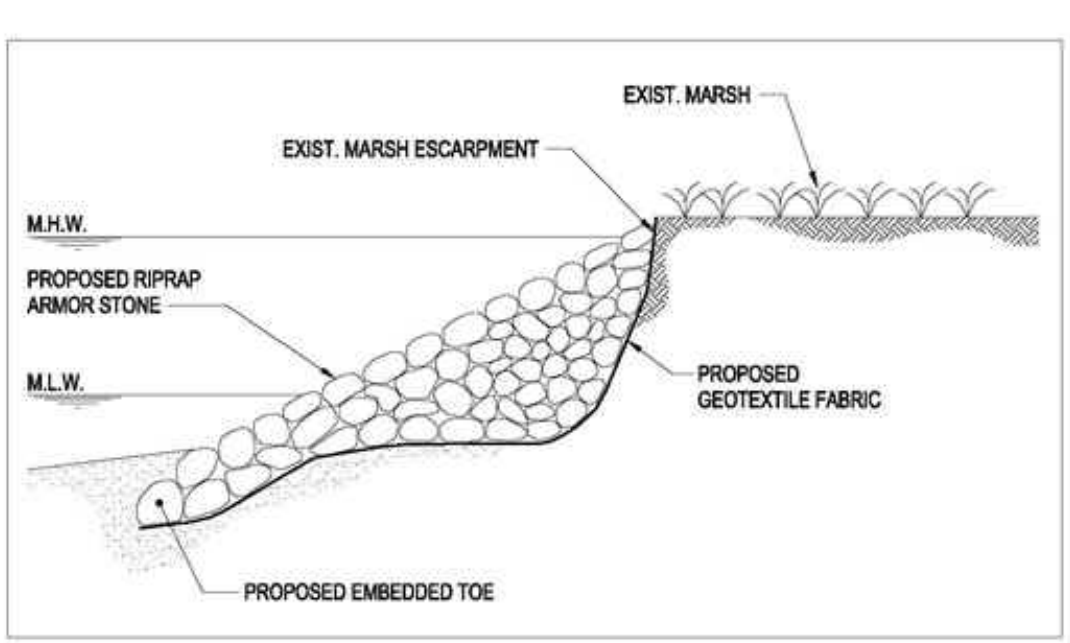

PROPOSED FINISHED GRADE
PROPOSED RIPRAP REVETMENT
ORIGINAL PROFILE
DESIGN BEACH
PROPOSED CLEAN FILL
PROPOSED GEOTEXTILE FABRIC
PROPOSED STONE BEDDING LAYER
PROPOSED EMBEDDED TOE STONE



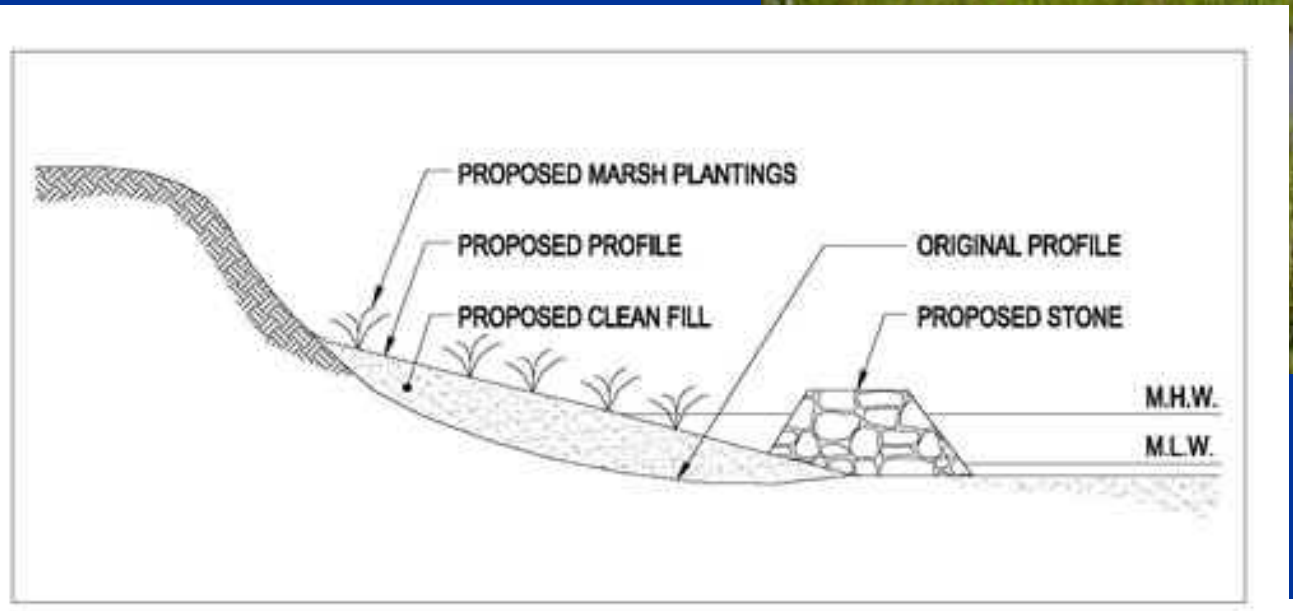
Revetments


25'-0"
STORM BERM
2-3' DIA. STONE
AMERICAN BEACH GRASS
1
4
1
2
6"-12" LAYER 2" DIA. BEDDING STONE OR BROKEN CONCRETE
WOVEN GEOTEXTILE
3' DIA. TOE STONE

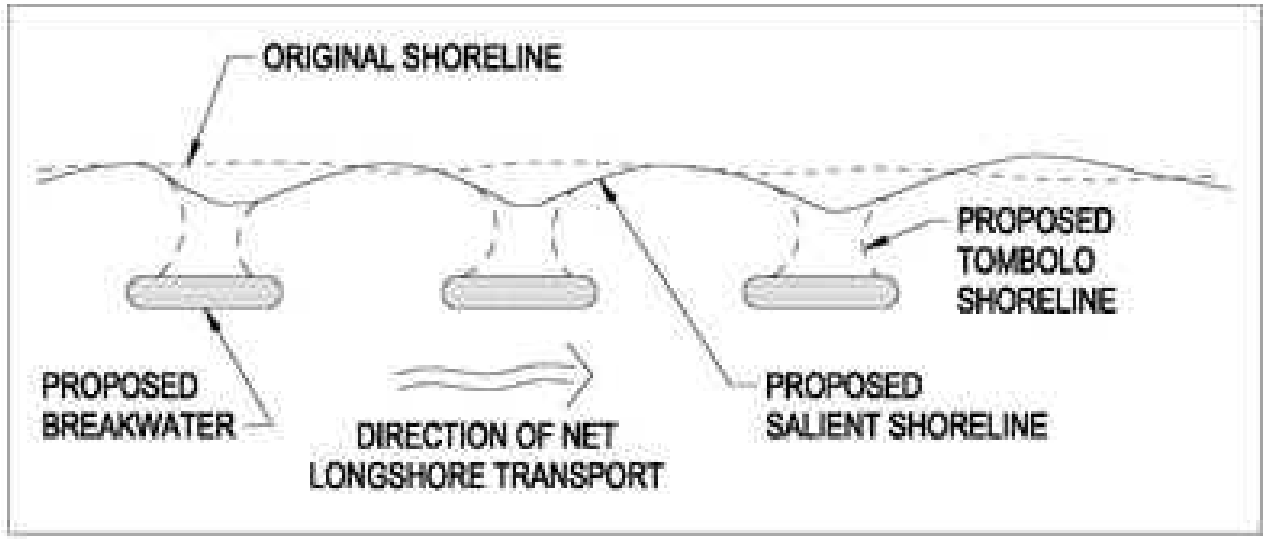
Revetments


EXIST. MARSH
EXIST. MARSH ESCARPMENT
M.H.W.
PROPOSED RIPRAP
ARMOR STONE
M.L.W.
PROPOSED
GEOTEXTILE FABRIC
PROPOSED EMBEDDED TOE

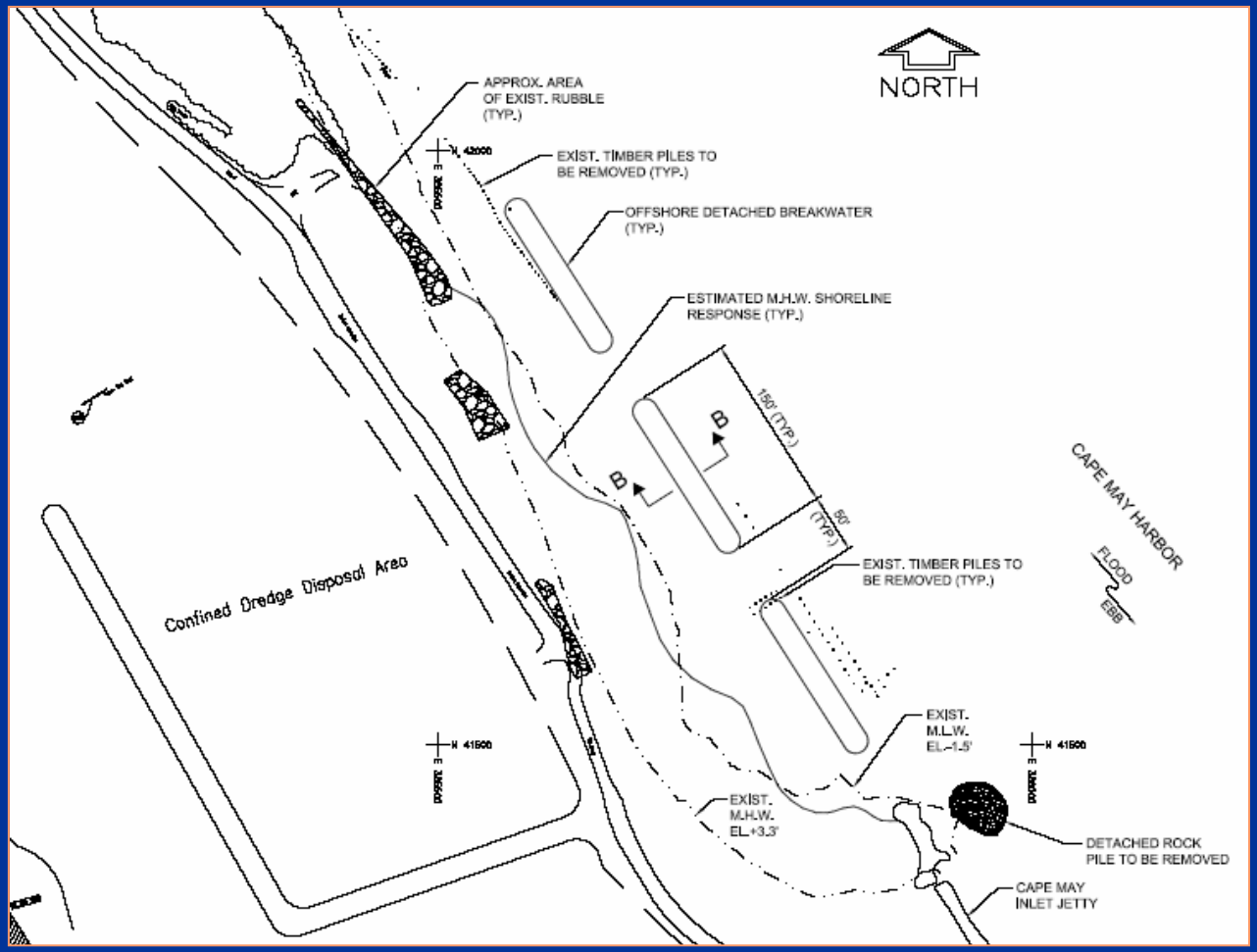
Breakwater Sill



Breakwaters



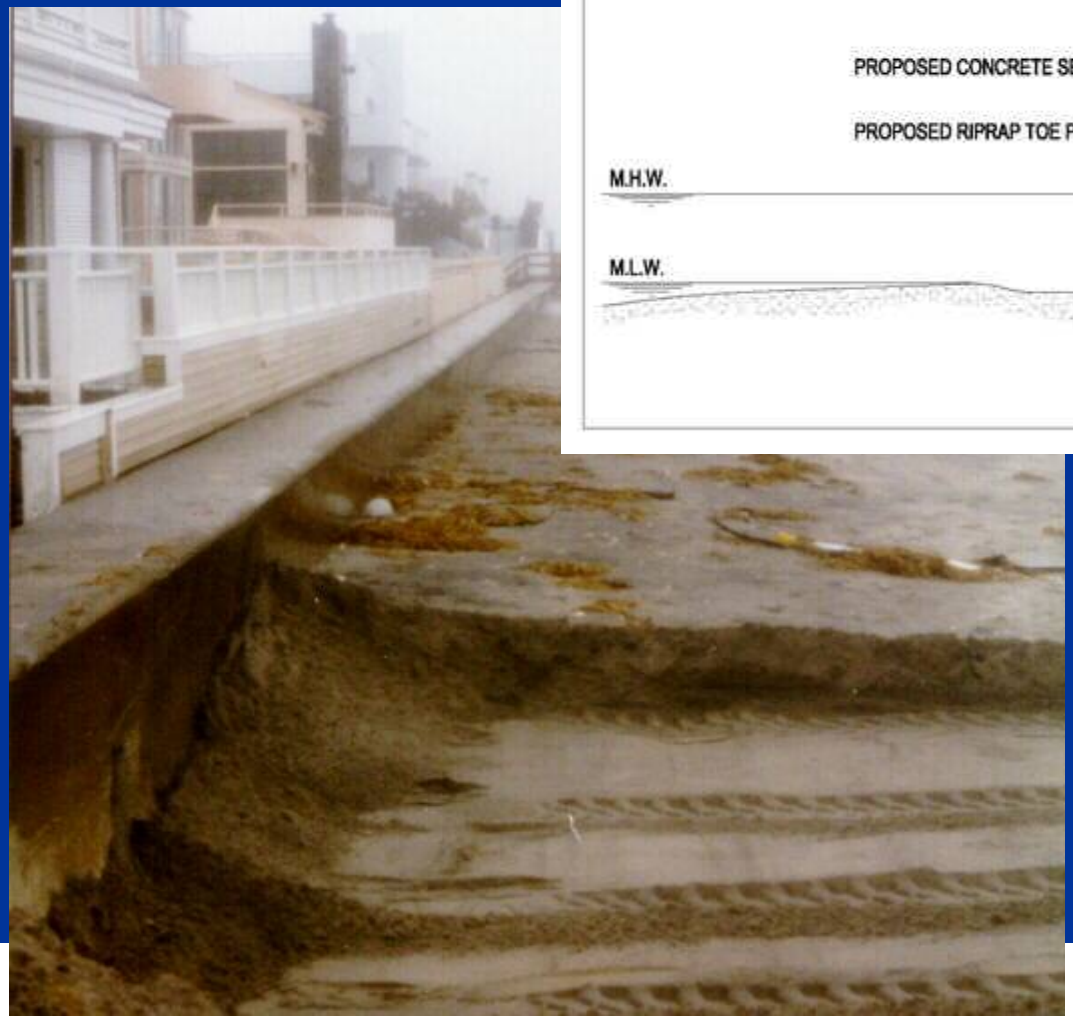
Breakwaters

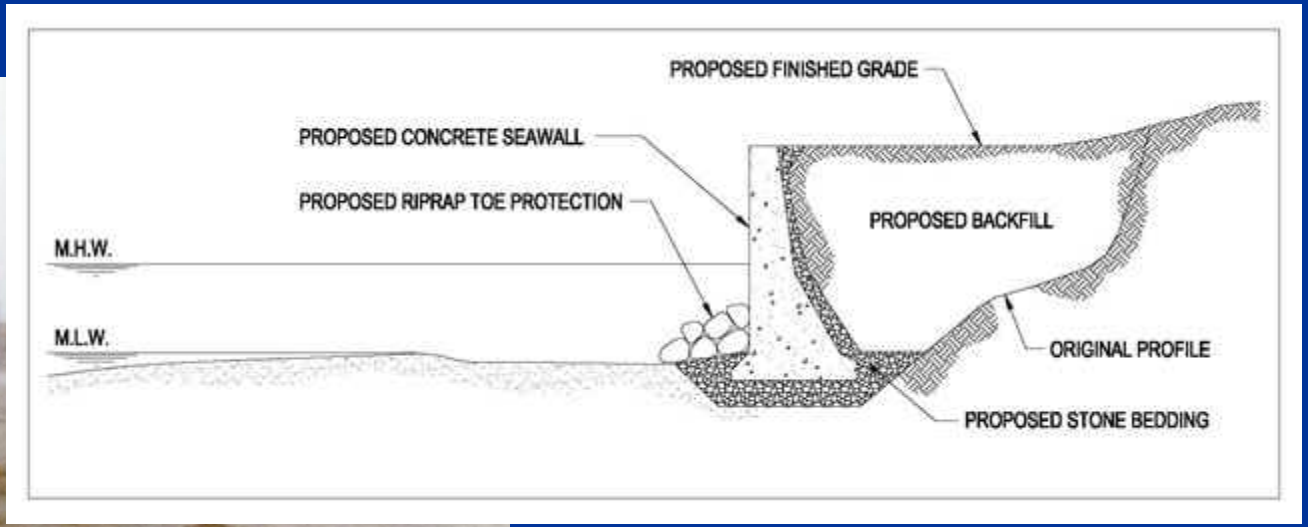


Breakwaters (stone)

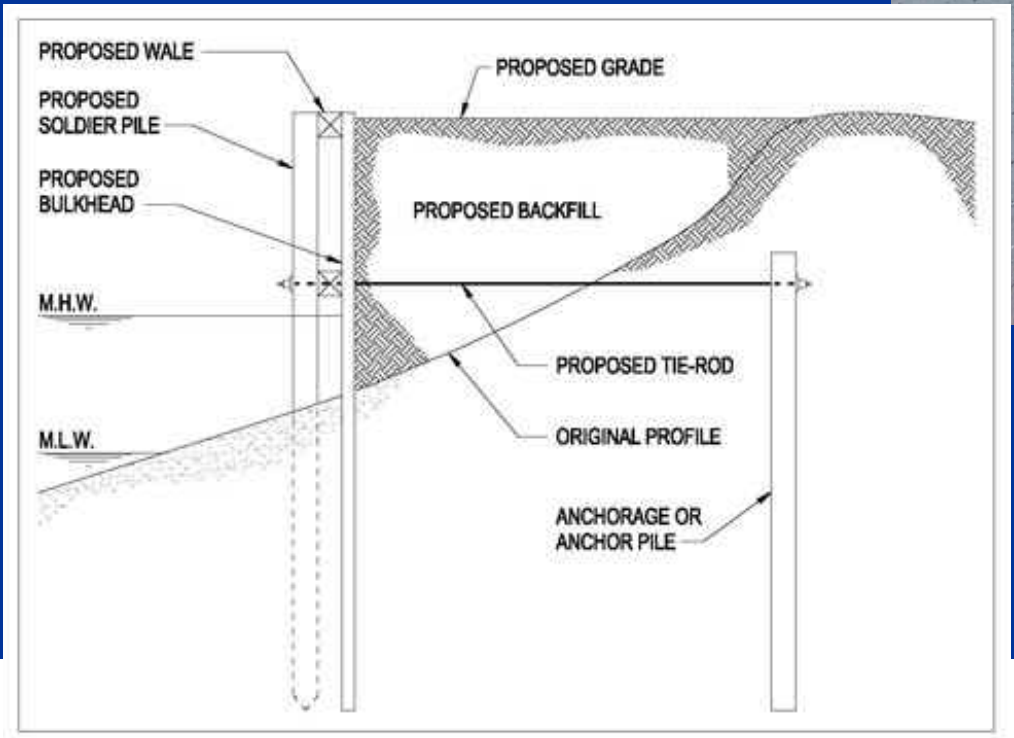
Breakwaters (Geotextile Tubes)

Seawalls

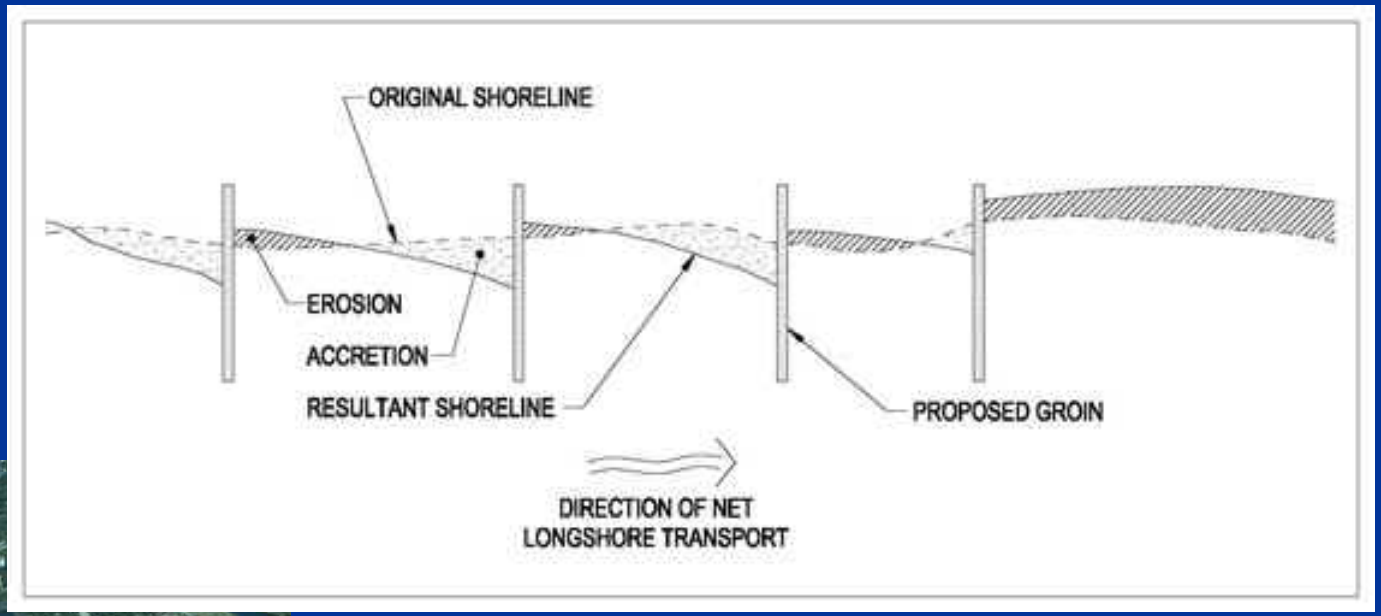



PROPOSED FINISHED GRADE
PROPOSED CONCRETE SEAWALL
PROPOSED RIPRAP TOE PROTECTION
PROPOSED BACKFILL
M.H.W.
M.L.W.
ORIGINAL PROFILE
PROPOSED STONE BEDDING

Bulkheads


PROPOSED WALE
PROPOSED SOLDIER PILE
PROPOSED BULKHEAD
M.H.W.
M.L.W.
PROPOSED GRADE
PROPOSED BACKFILL
PROPOSED TIE-ROD
ORIGINAL PROFILE
ANCHORAGE OR ANCHOR PILE

Groins (Jetties)

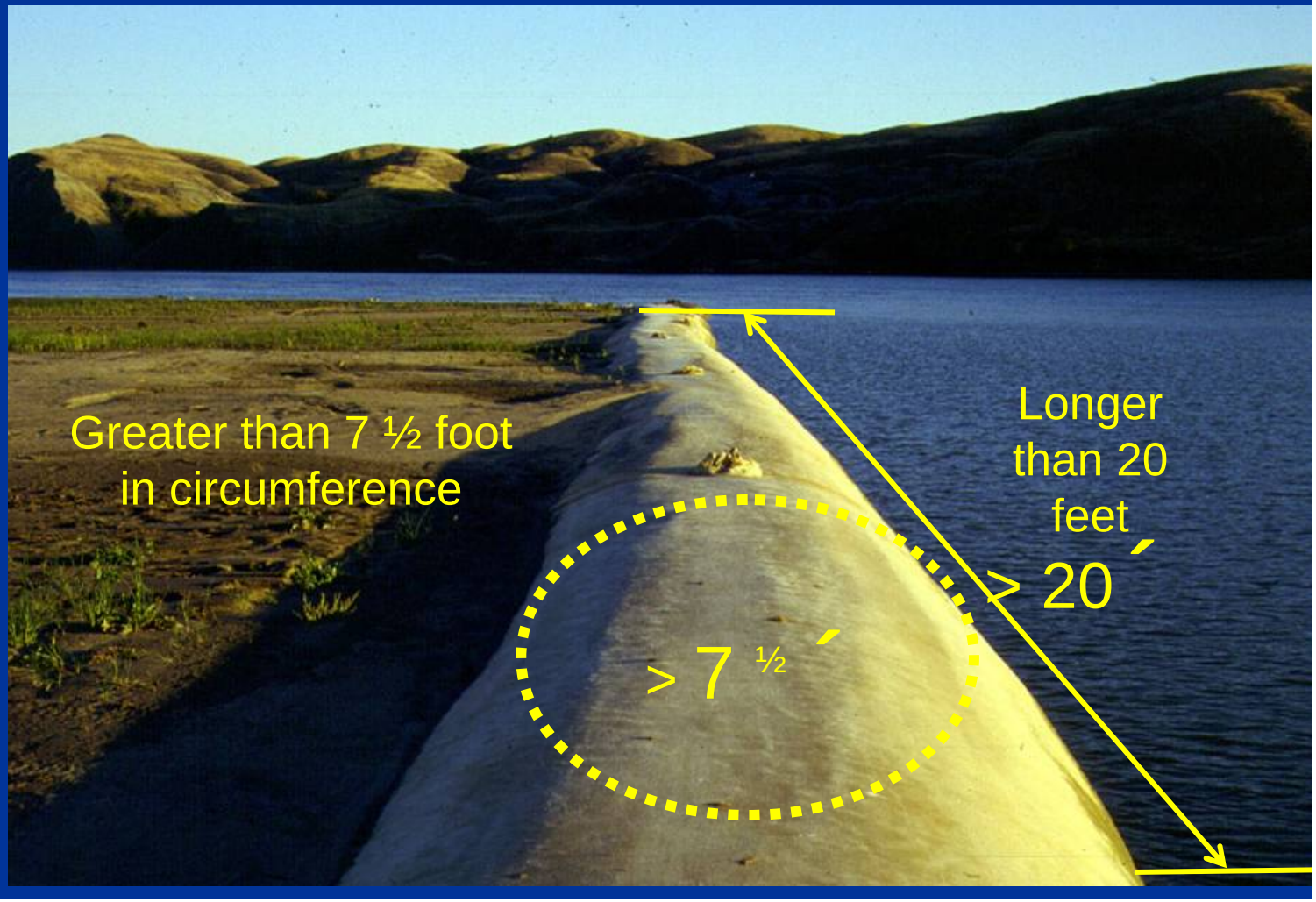


Very Low Profile Groins

What is a Geotextile Tube?

Permeable high strength woven Geotextile fabricated (sewn) into a tube,

generally hydraulically filled with a slurry of water and sand.



Beach Stabilization

- Easily deployed
- No heavy equipment
- Uses local or imported sand sources
- Flexible

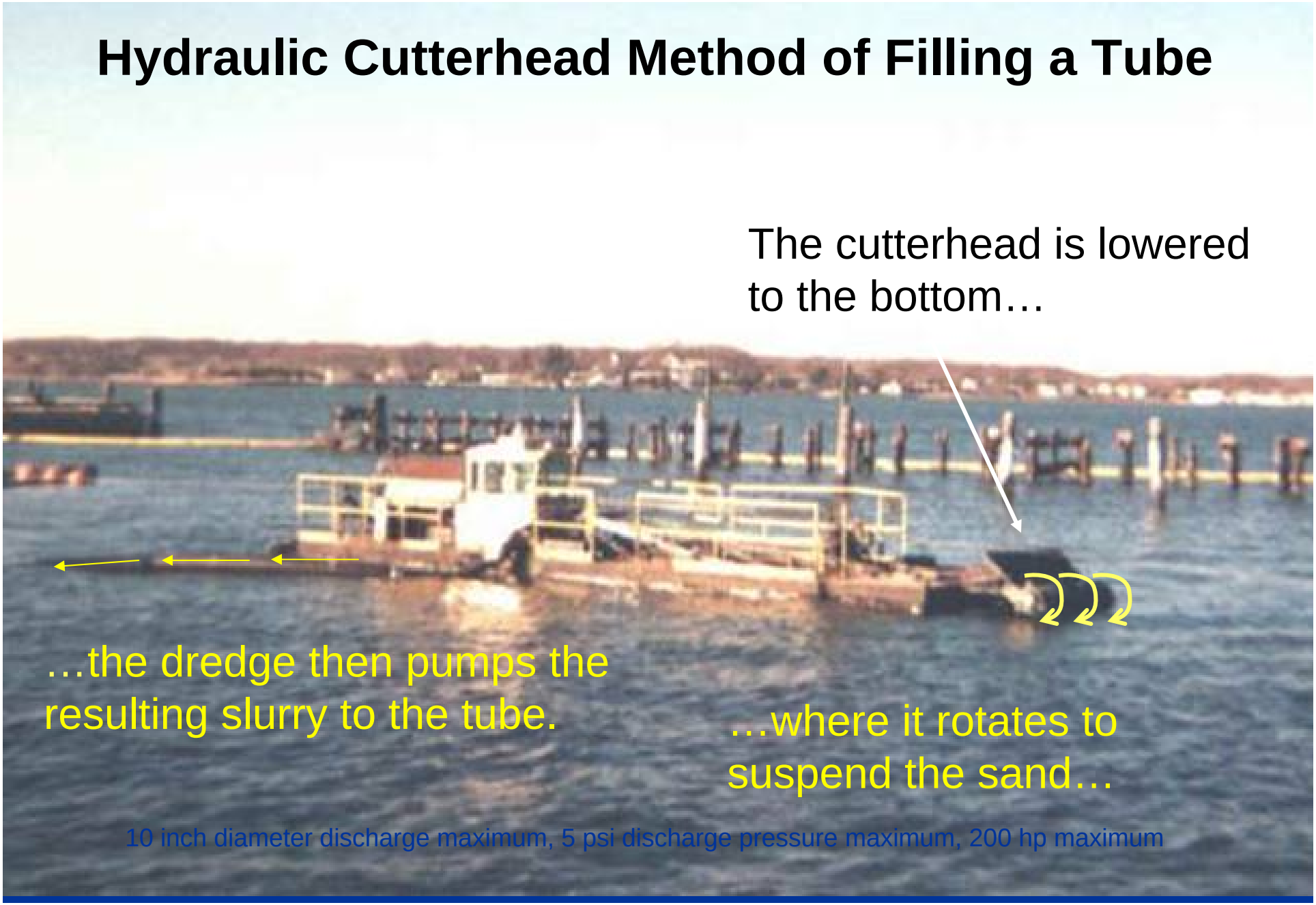
Bluff Stabilization

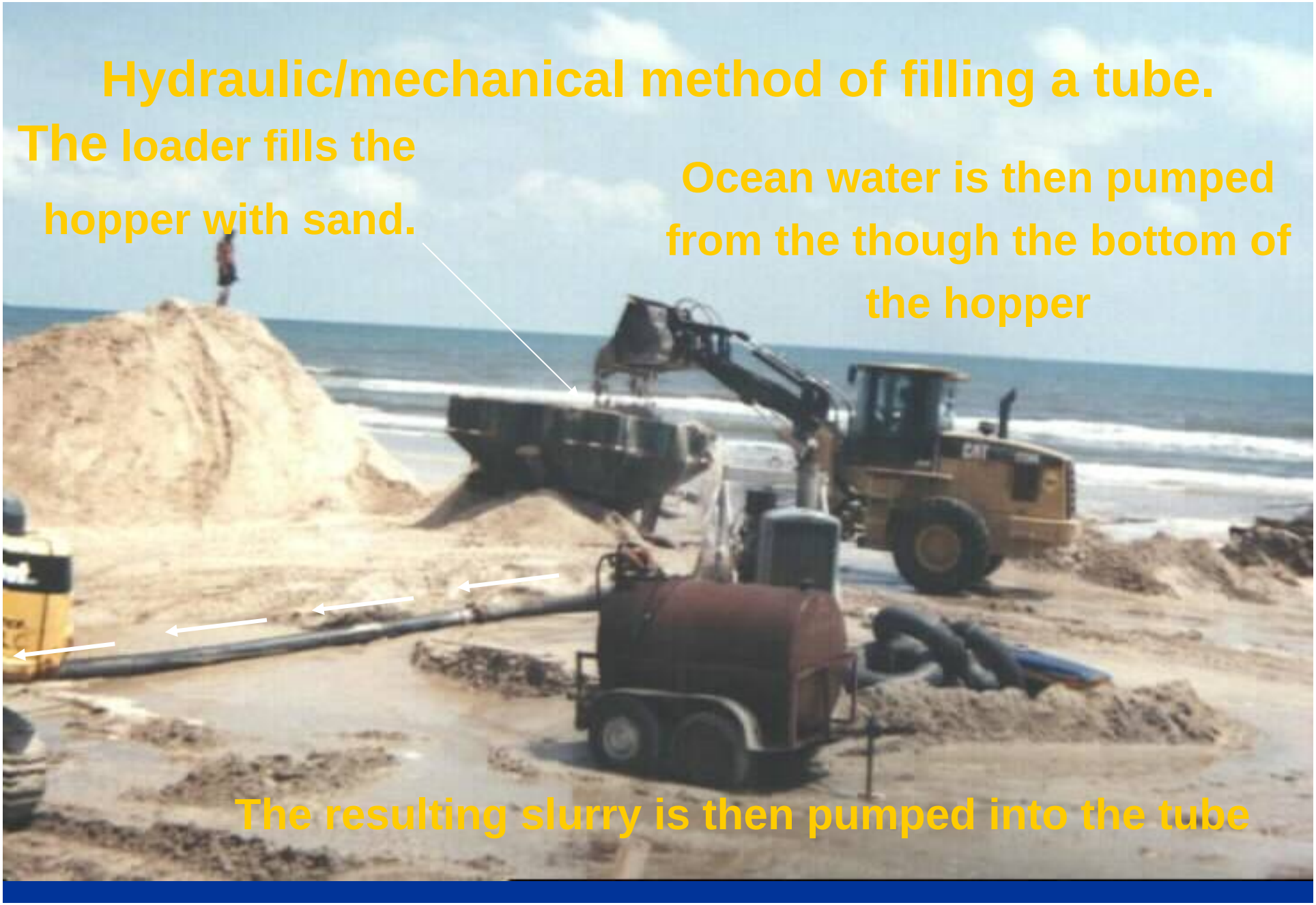
Biodegradable Tubes

Sand Bags

Drakes Creek

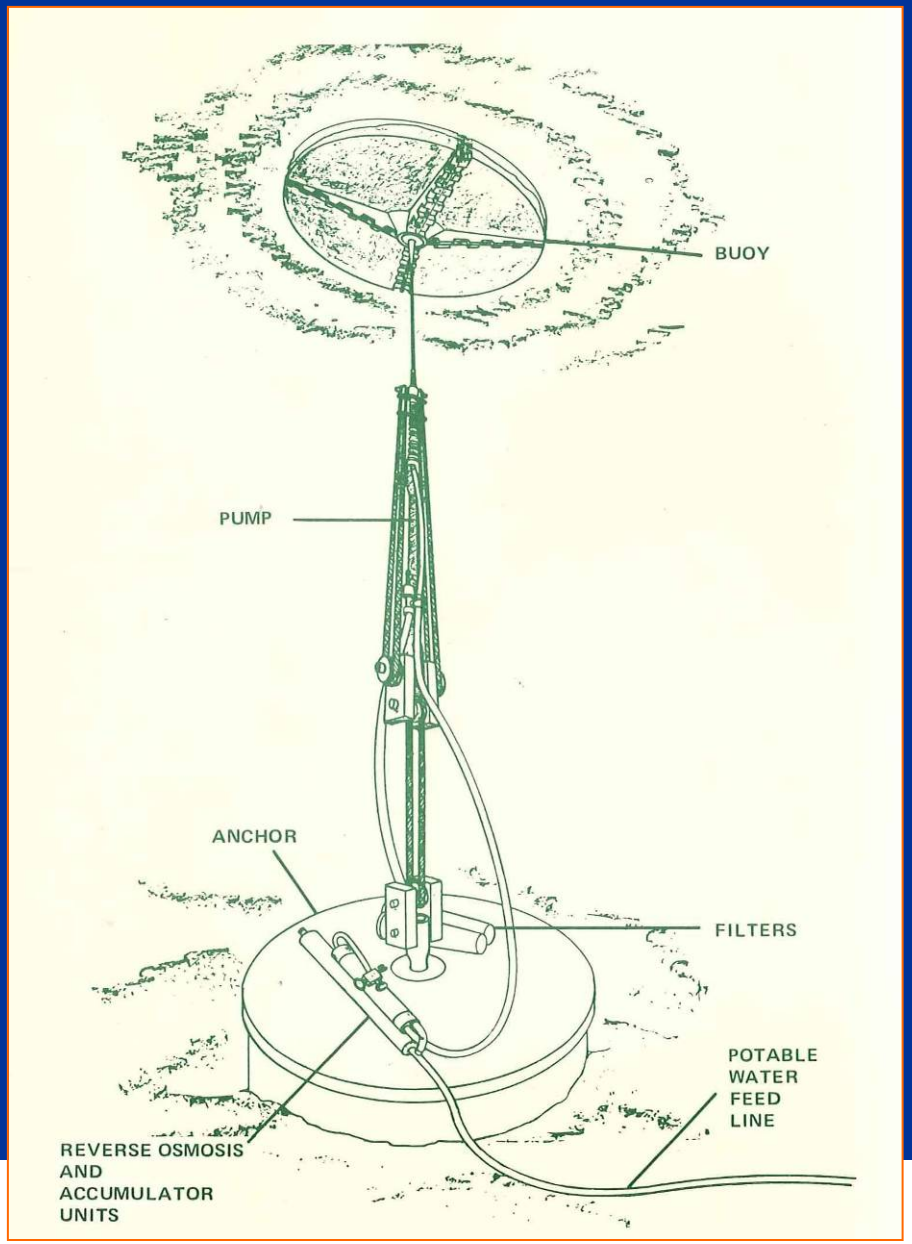
Hydraulic Cutterhead Method of Filling a Tube




Hydraulic/mechanical method of filling a tube.
The loader fills the hopper with sand.
Ocean water is then pumped from the though the bottom of the hopper
The resulting slurry is then pumped into the tube

Coastal Energy

- Very Large
- Very Small



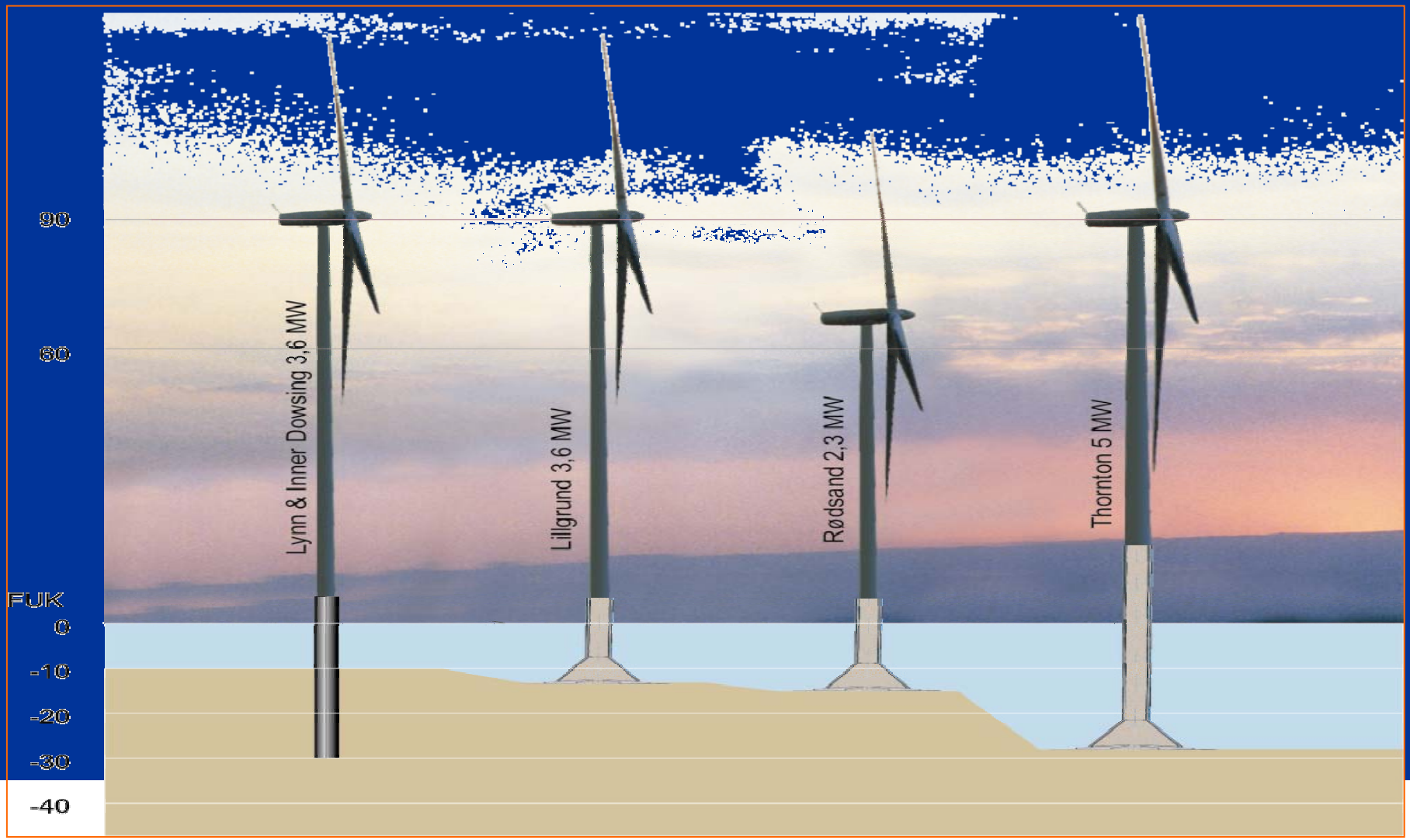
Seawave Power

Windmills (Land-based)

Offshore Wind Turbines

- Strong increase in number of installed offshore wind turbines over the last years
- Represents multiple key aspects of marine foundation design
- Currently wind turbines are in the range 2 MW to 5 MW
- 20 MW offshore turbines are expected in the future in ~15 years
- Increased size of foundation

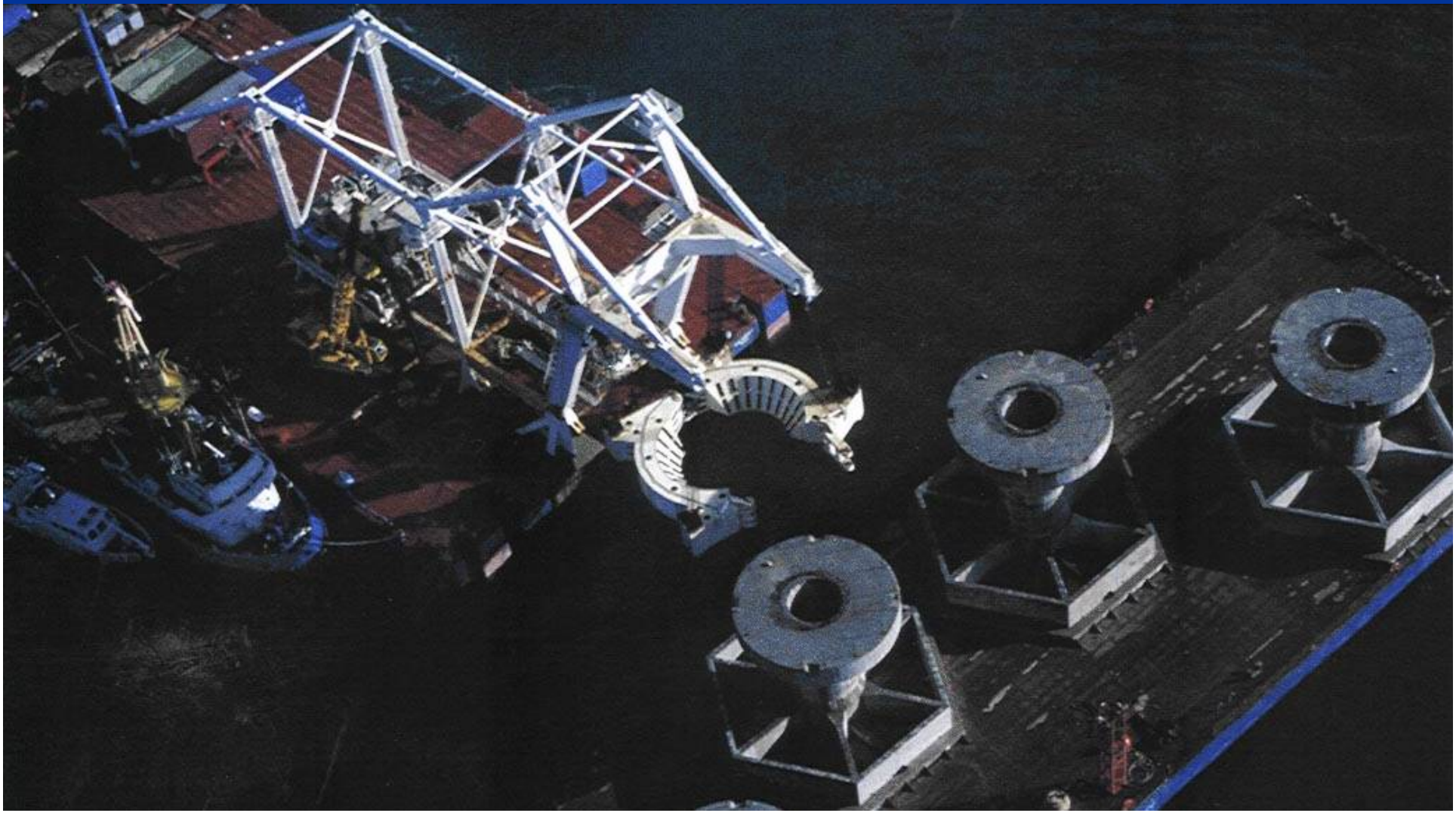
Trend: Bigger and deeper



Nysted Offshore Wind Farm
Foundation construction

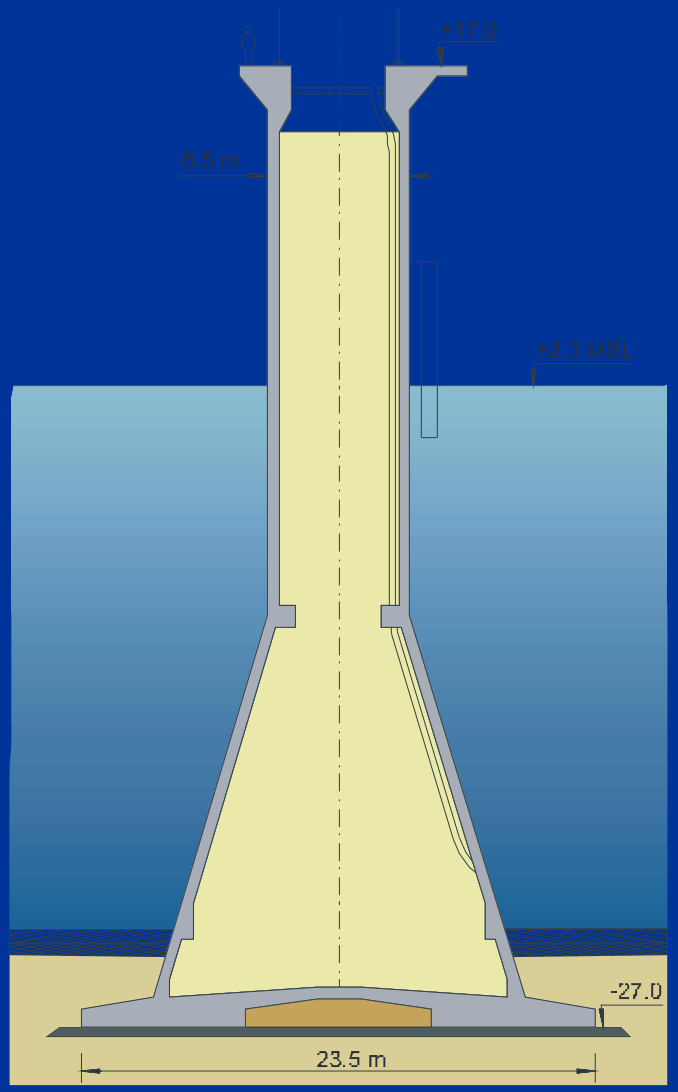
Nysted Offshore Wind Farm
Foundation installation

Nysted Offshore Wind Farm
Foundation installation



Nysted Offshore Wind Farm Foundation installation

Thornton Bank Offshore Wind Farm Belgium, Foundation concept



Thornton Bank Offshore Wind Farm Belgium, foundation construction

Thornton Bank Offshore Wind Farm Belgium, foundation construction

Photovoltaic Cells

Sea Isle City Landfill

PV Cell Economics

- 9.5 acres
- 1Megawatt
- Payoff in 10 years with existing tax incentives
- Equipment lasts 25 years
- Community can generate free electricity for 15 years!

BENEFITS

Close Sea Isle City Landfill

Beneficial Use of Clean Dredged Sand

Increase Capacity for Future Dredging

Allow Future Use of the Landfill Site