



Ecological Impacts of Energy Infrastructure Installations in Aquatic Settings

ASMFC Meeting
Atlantic Beach, NC

KTG & E

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Ocean & Coastal Consultants

October 24, 2006

ASMFC, Atlantic Beach, NC



A Universal Truth

Most of the environmental
problems are related to
installation and maintenance

The Universal solution:

Require beneficial or passive presence



The Topics

- 1) Cables
- 2) Pipelines
- 3) Installation systems
- 4) Wind generators
- 5) Current generators
- 6) Wave generators
- 7) LNG facilities
- 8) Monitoring

Many / most impacts are to seabed

Water column impacts are “temporary,” generally.



Cables

Burial Options

- Self burial
- Open trench
- HDD
- Jetting (fines)
- Plowing (sands)
- natural

Issues

- 1) Migration obstruction
- 2) Burial system impacts

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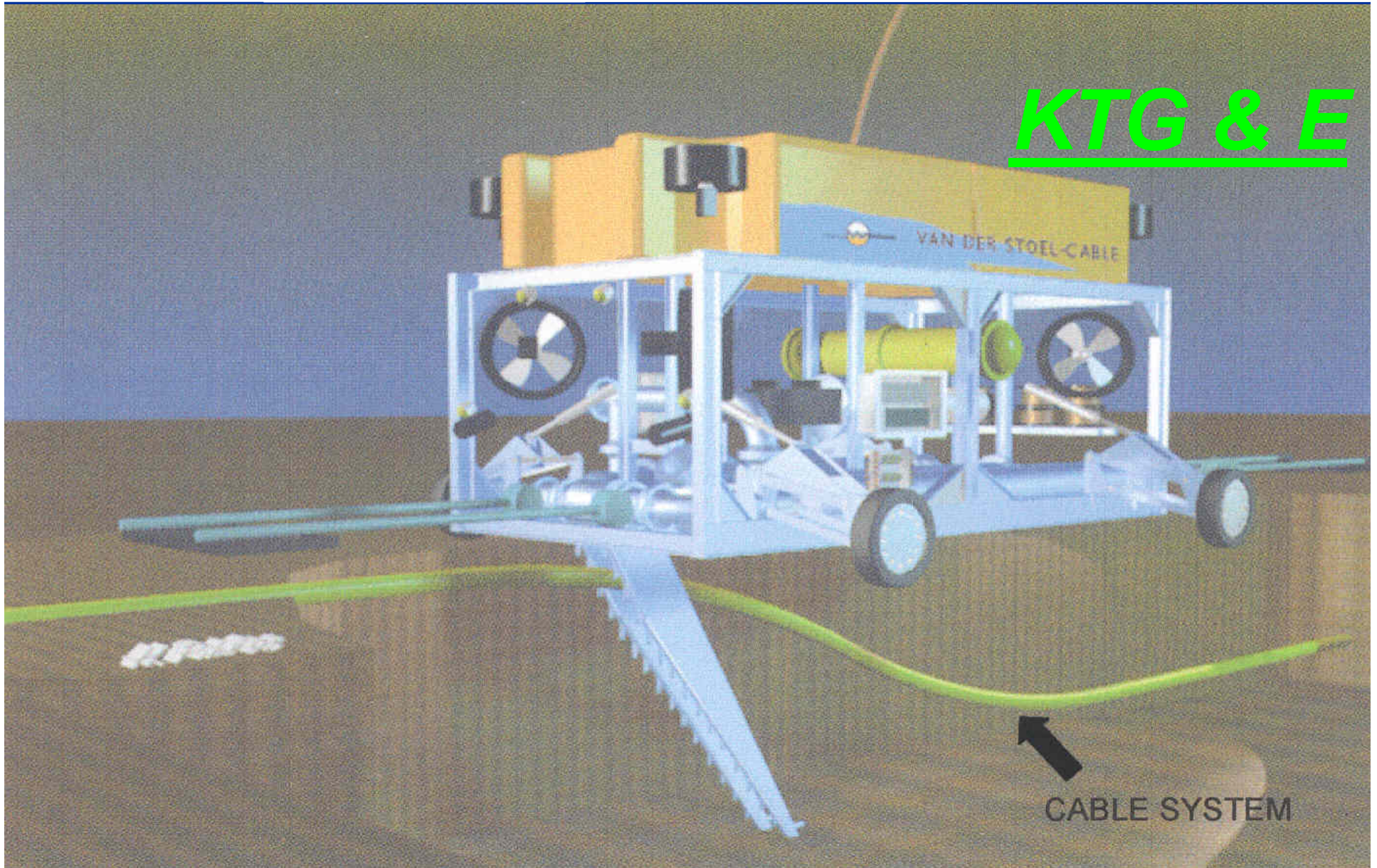
- 3) Burial impacts (cable)
EMFs
Thermal loading
maintenance
- 3) Residual habitat impacts
- 4) Recovery

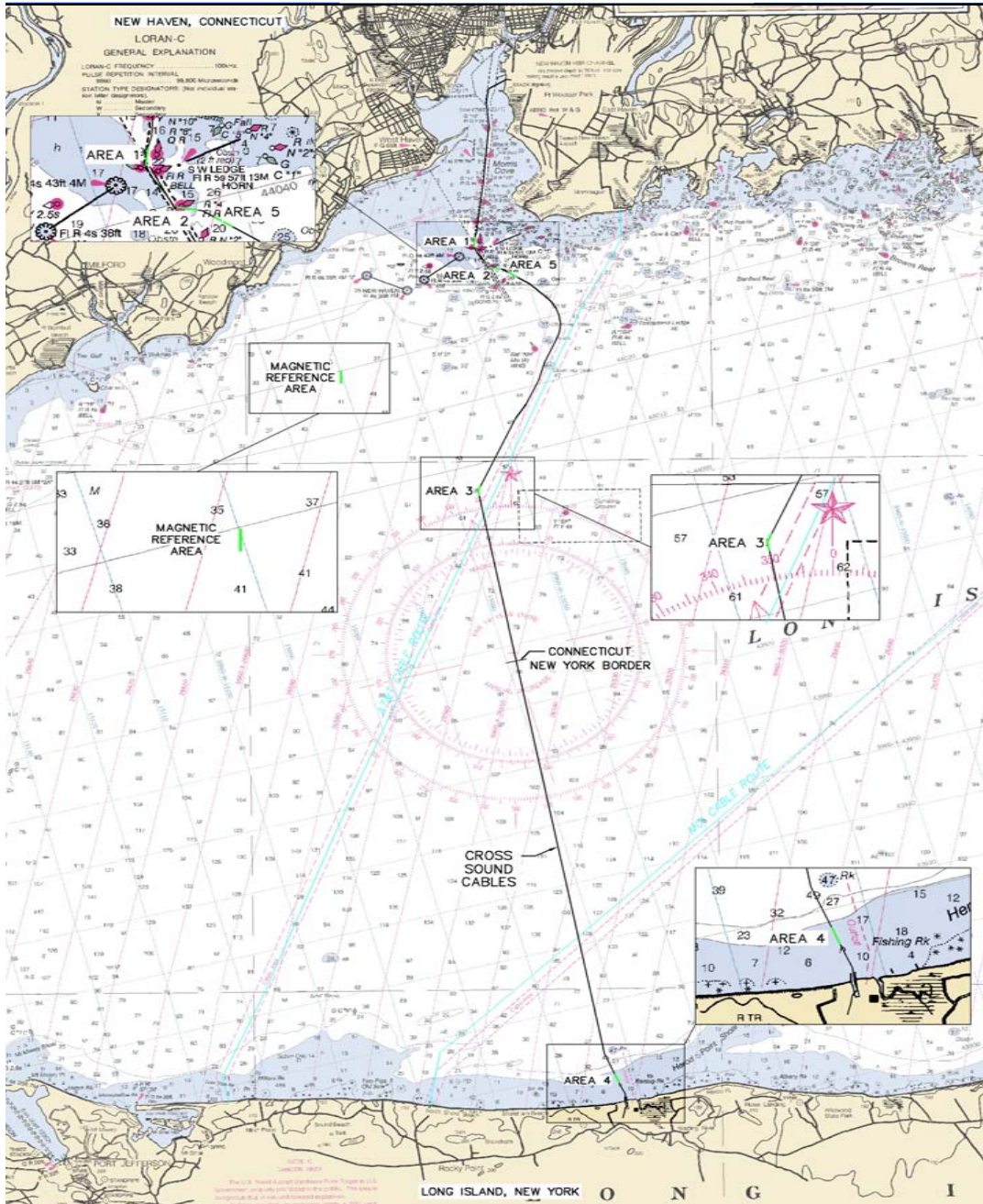






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5 monitoring sites were selected. Why?

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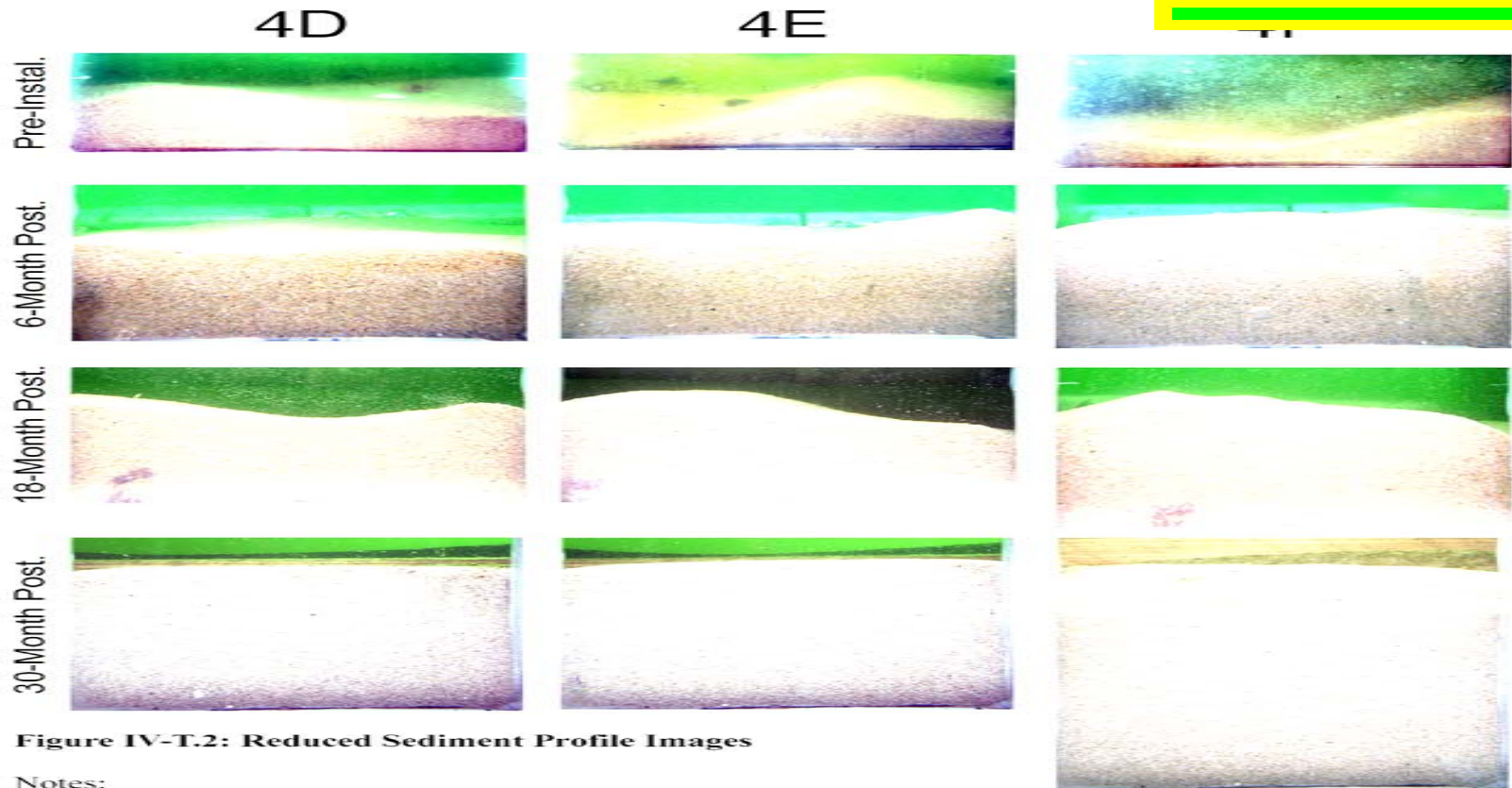


Figure IV-T.2: Reduced Sediment Profile Images

Notes:

1. To improve prism penetration, an additional 300 lbs of weight was added to the SPI camera during the November 2002, May 2003, November 2003, and March 2005 surveys.
2. A 5.1 Mega Pixel digital camera was used for the November 2002, May 2003, November 2003, and March 2005 surveys. Pre-installation survey images are slides.
3. SPI station locations are not exactly the same for all surveys. For the November 2002, May 2003, November 2003, and March 2005 surveys, the center stations in each transect were aligned over the installed location of the cable rather than over the proposed centerline.
4. The width of all images is 15.6cm.
5. All SPI images are provided on the enclosed CD-ROM.



3A

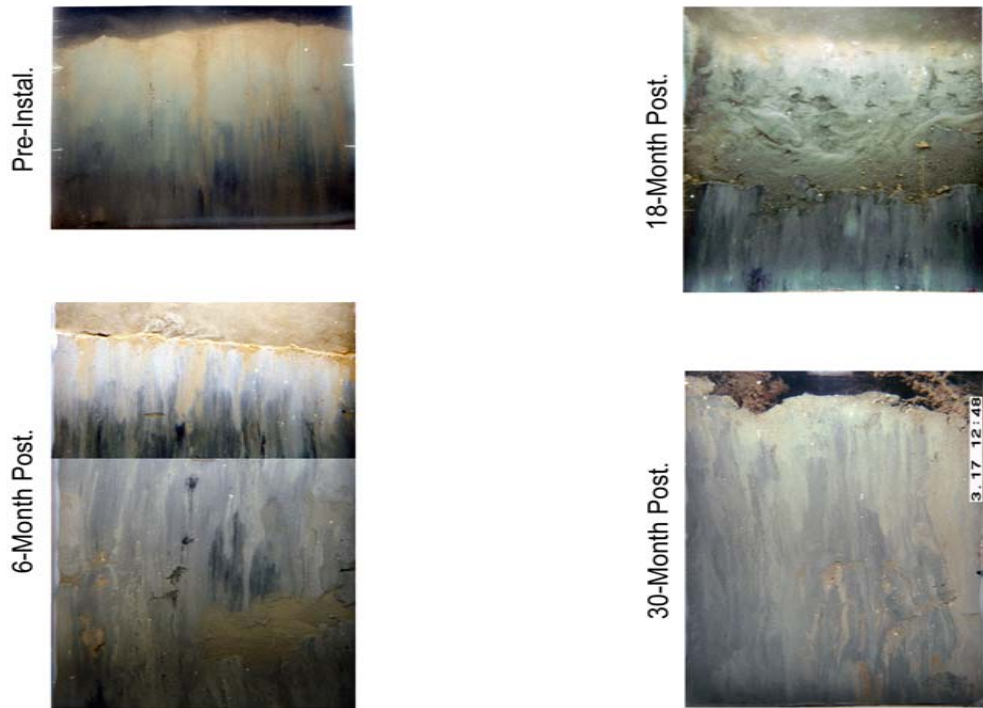


Figure III-T.1: Reduced Sediment Profile Images

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Central
LIS muds
(83 feet
of water)



Pipelines

Burial Options *

- Self burial
- Open trench
- HDD
- Jetting
- Plowing
- Dumping

*MMS says bury in < 200 ft

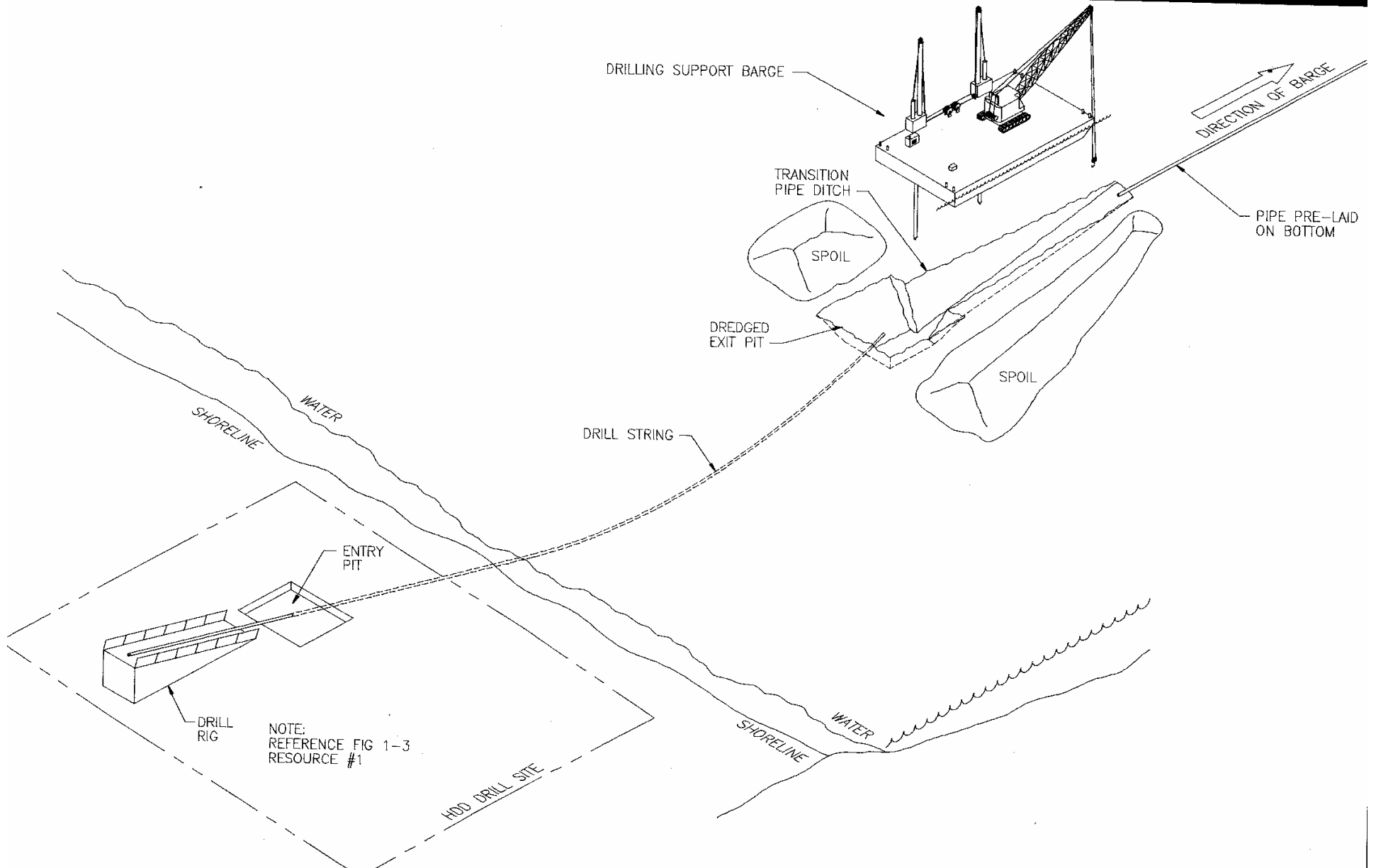
Issues

- 1) Migration obstruction
- 2) Burial impacts (systems)
- 3) Residual habitat impacts
- 4) Burial impacts (pipeline)
 - a) noise
 - b) thermal loading
- 5) Habitat recovery
- 6) System maintenance



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Common Reaming Tools



Flycutter



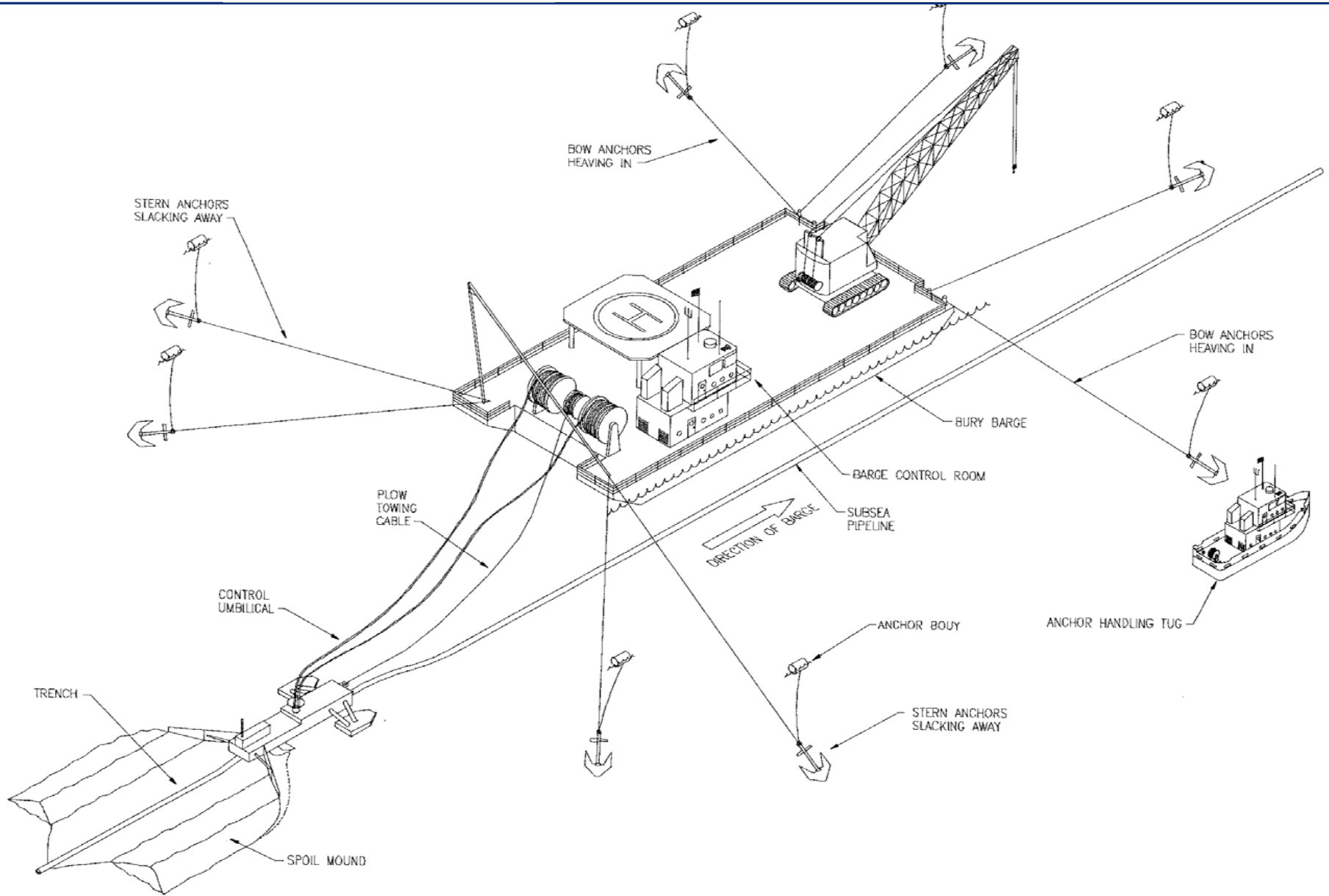
Barrel Reamer



Lo-torque Hole Opener



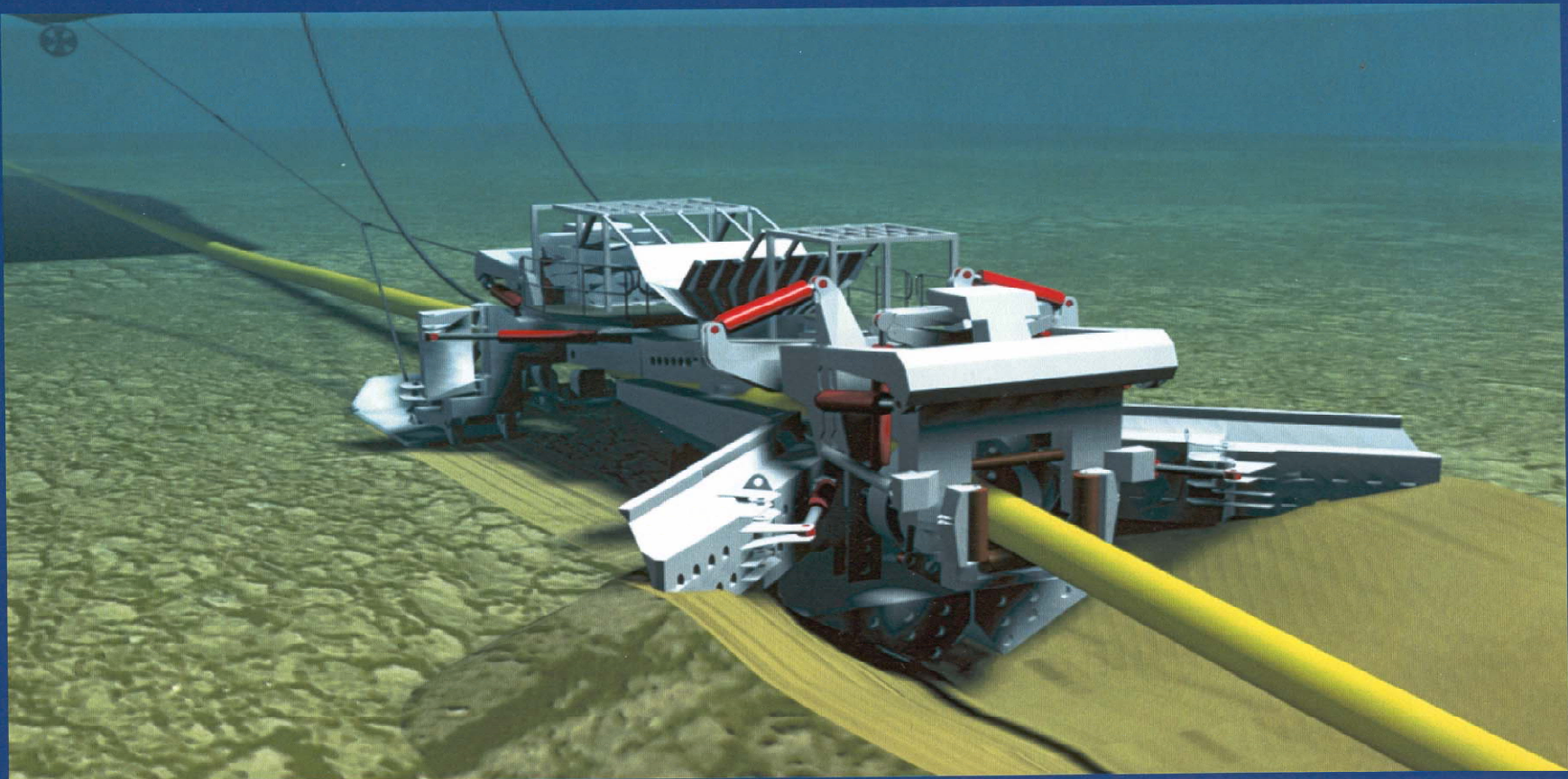
Standard Hole Opener







MARINE PIPELINE EQUIPMENT PLOW



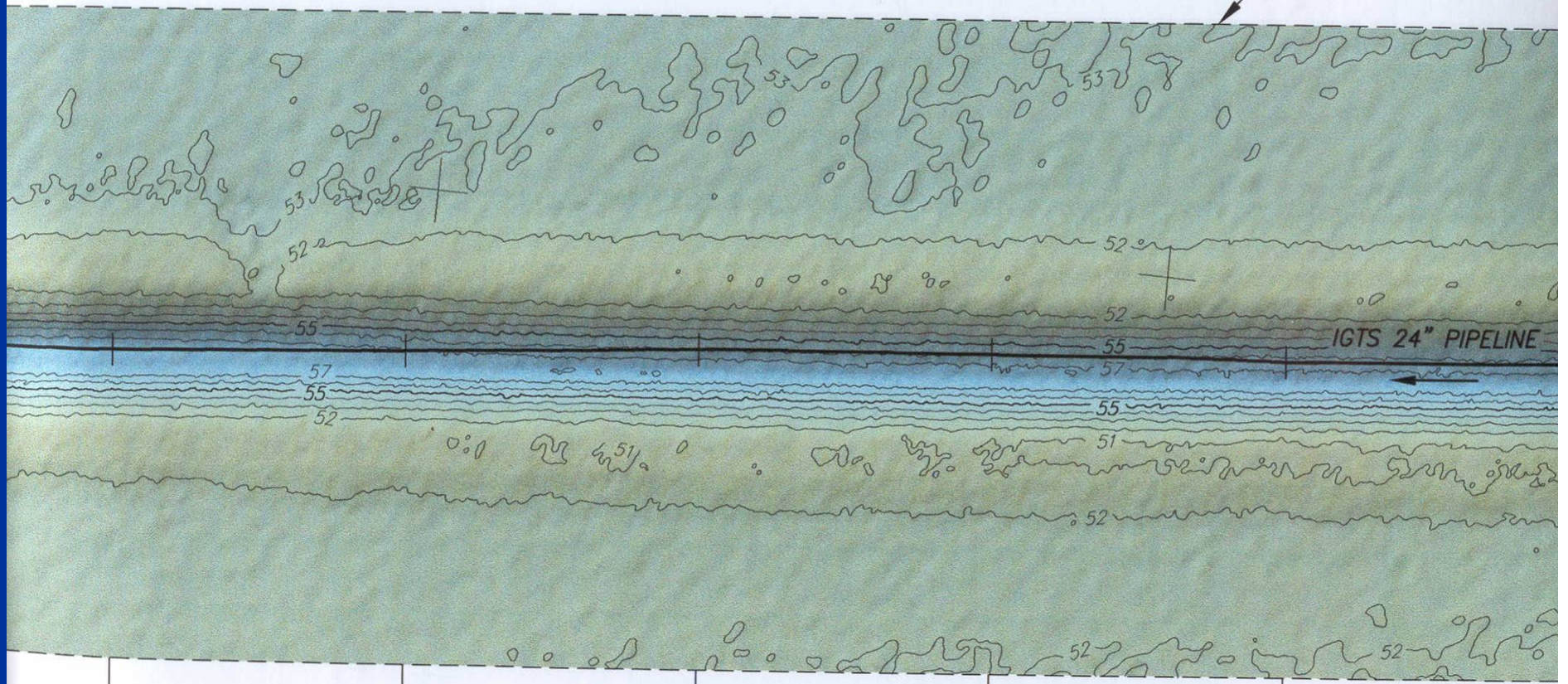


E 2,071,000

E 2,071,250

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SURVEY AREA



362+00

361+00

360+00

359+00

358+00

357+00

00

SUN

SUN POSITION

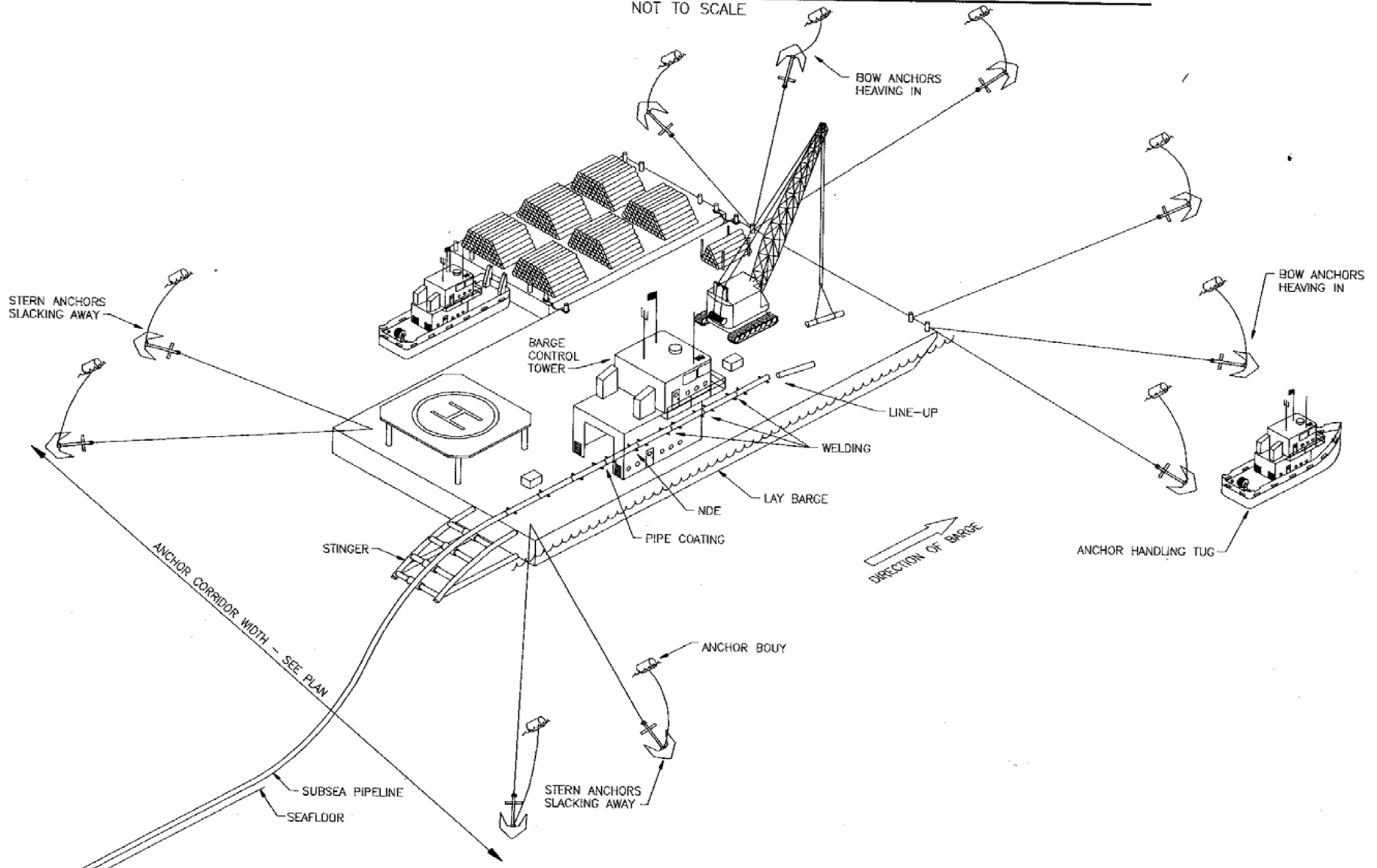


Installation systems

- Pipe pulling
- Pipe jacking
- floating
- Lay barges and spider moorings
- Lay barges and spuds
- Self-contained vessels w/ dynamic stabilization

TYPICAL OFFSHORE PIPELINE LAY BARGE SPREAD

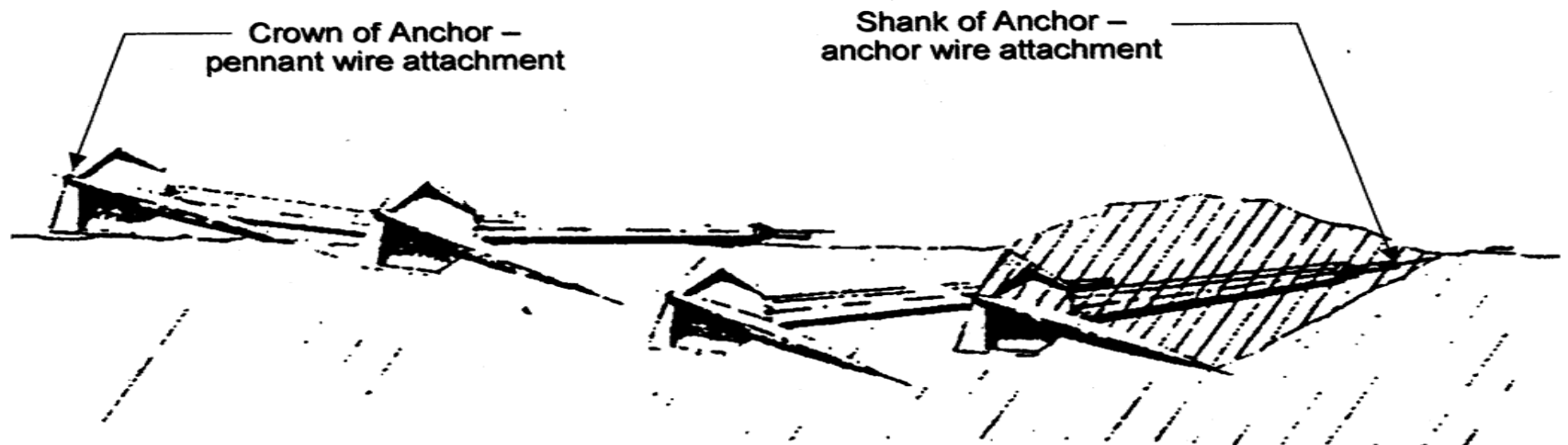
NOT TO SCALE



SMC dwp 3 8/84



Marine Pipeline Installation

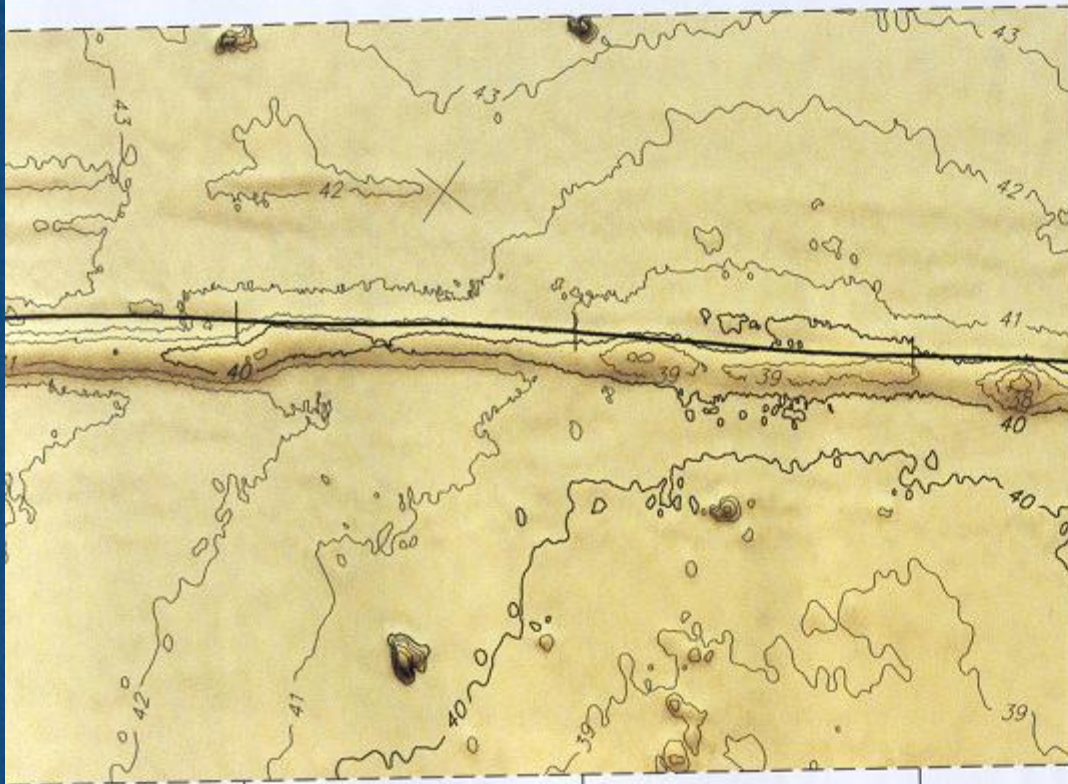


"Sea Floor Conflicts between Oil and Gas Pipeline and Commercial Trawl Fisheries on the California Outer Continental Shelf", July 1984, p.383

MMS



LONG ISLAND SOUND, SUFFOLK COUNTY, NEW YORK



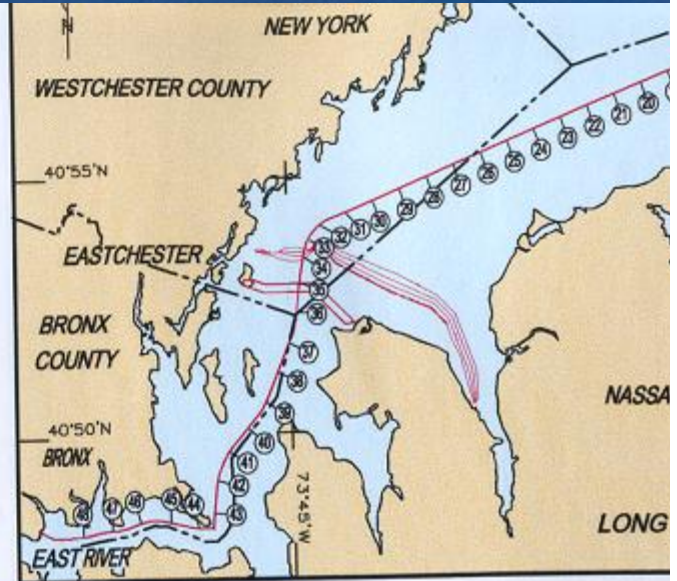
MATCH LINE - SHEET 3 PANEL C

N 14,879,500

E 2,091,000

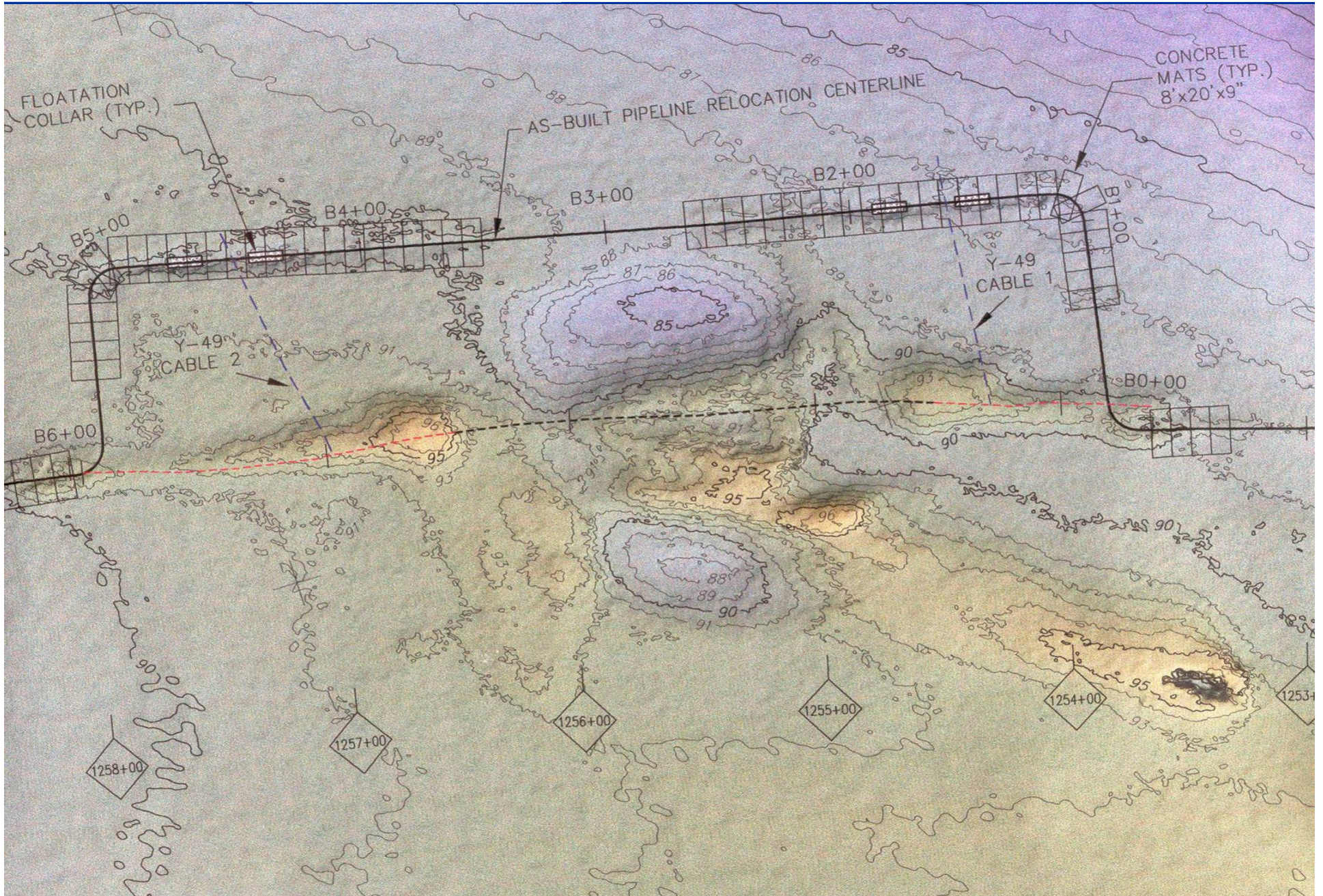
N 14,879,500

E 2,090,750



LEGEND:

- PIPELINE LOCATION PLOTTED FROM ASBUILT DRAWINGS (REF. 1, 2, & 3) AND BJ PIPELINE INSPECTION SERVICES GEOPIG GEOMETRY SURVEY, RUN DATE - 13 MAY 2004
- AS-BUILT PIPELINE STATIONING
- BYPASS AS-BUILT PIPELINE STATIONING
- ABANDONED ALIGNMENT REMAINING (REF. 1 & 3)
- ABANDONED ALIGNMENT REMOVED (REF. 1 & 3)
- Y-49 CABLE LOCATION PER STOLT OFFSHORE, INC. DIVER PROBED (17, 22, 23 & 27 DEC 2003, 17 JAN 2004)
- PRELIMINARY Y-50 CABLE LOCATION PER OSI TONE DETECTION SURVEY DATA (3 JUNE 2004)





Wind generators

- Installations (type & Technique)
 - Clustering cables
 - Transfer cables
 - Lubricates
 - Transformers
 - Maintenance
 - ALL Cable issues
- 1) EFH / ESA / FWCA
 - 2) Navigation obstructions
 - 3) MPA implications
 - 4) Radar obstruction
 - 5) Noise
 - 6) Vibration
 - 7) Shark attractor
 - 8) Bird murders



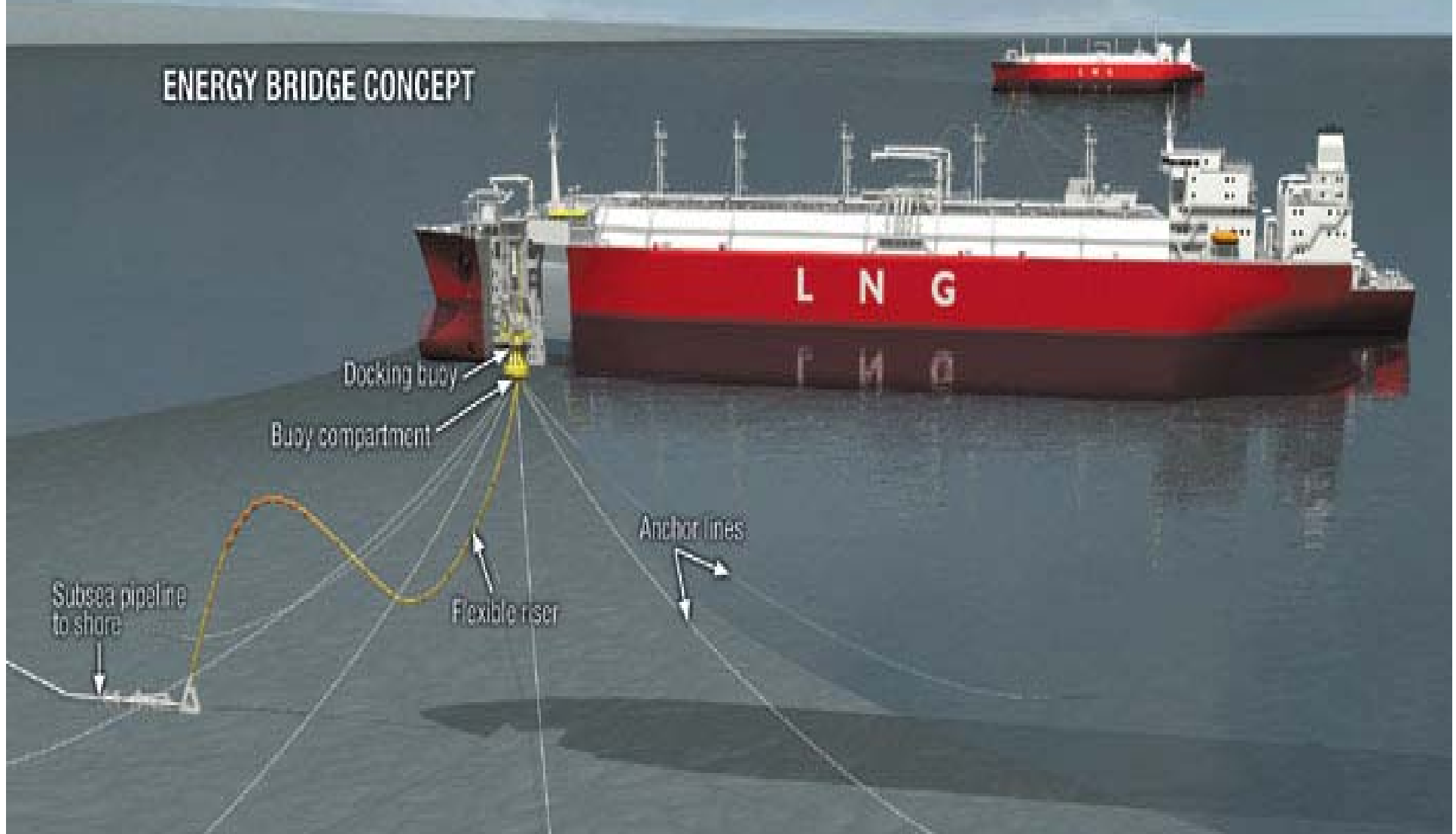


LNG Terminals

- Transport Vessels
- Receipt facility
- Security zones (M&S)
- Mooring system
- Regasification system
 - open / closed
- Ballast water
- Resources / EFH
- Piping
- Lighting
- Hull FADS / MPA
- Noise
- Whomp ↑



ENERGY BRIDGE CONCEPT







Current & Wave Generators

- Installation problematic
- Large footprint
- Compete for space
- Obstruct migration
- Eat beasties
- Cabling & protection
- Maintenance hard
- < Investment return



Axial flow rotor turbines

Helical turbine blade





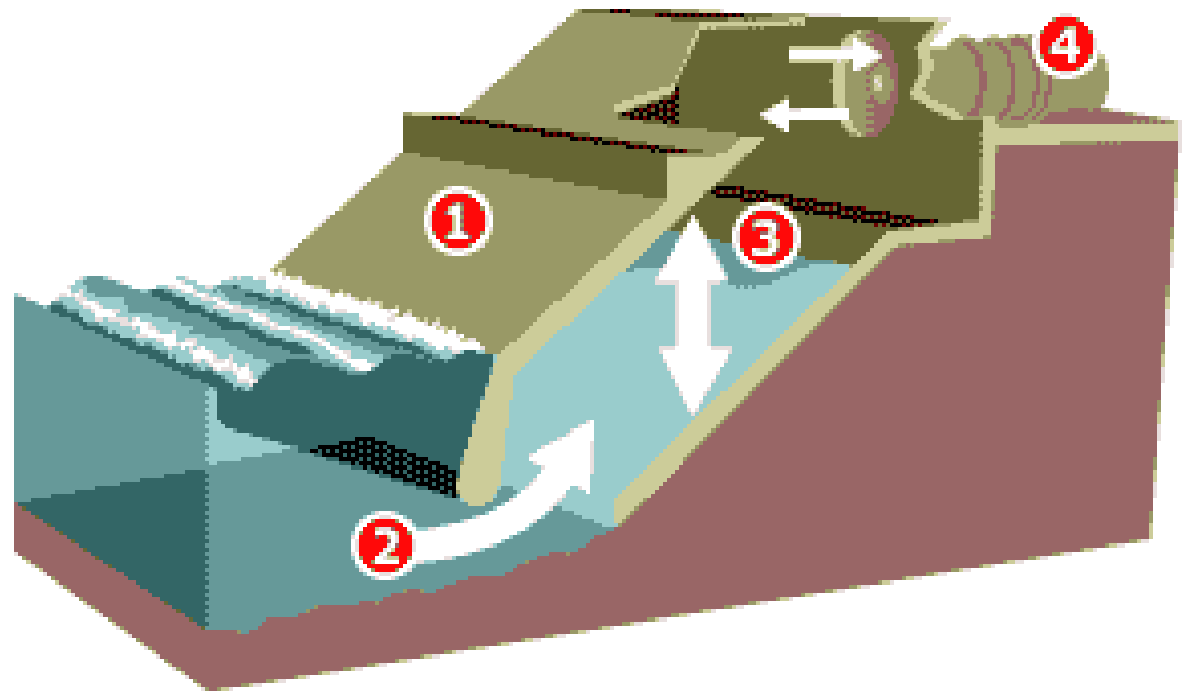
OCEAN AND COASTAL CONSULTANTS INC.





- 1) Not nice to air breathers
- 2) Flow mods
- 3) B/C ratio
- 4) Maintenance
- 5) Removal

ISLAY WAVE POWER STATION



- ① Wave capture chamber set into rock face
- ② Tidal power forces water into chamber
- ③ Air alternately compressed and decompressed by "oscillating water column"
- ④ Rushes of air drive the Wells Turbine, creating power



Monitoring

- Based on **KTG & E** & water column
- Use habitat & technology (Bios are difficult)
- Verify the hypothesizes
- Advance the knowledge
- Take pictures
- Disseminate the insights
- Protect **my** **resources**

Pneumaticus Radialis



***IT'S NOT WHAT YOU PLANT / PERMIT,
IT'S WHAT COMES UP / RESULTS !***