

SACRED FALLS, OAHU SECTION 227 DEMONSTRATION PROJECT

cosponsored by:
US Army Corps of Engineers
Honolulu District

and:
State of Hawaii
Department of Land and Natural Resources
Office of Conservation and Coastal Lands



US Army Corps
of Engineers®

Program Workshop
St. Louis, MO
4 August 2005



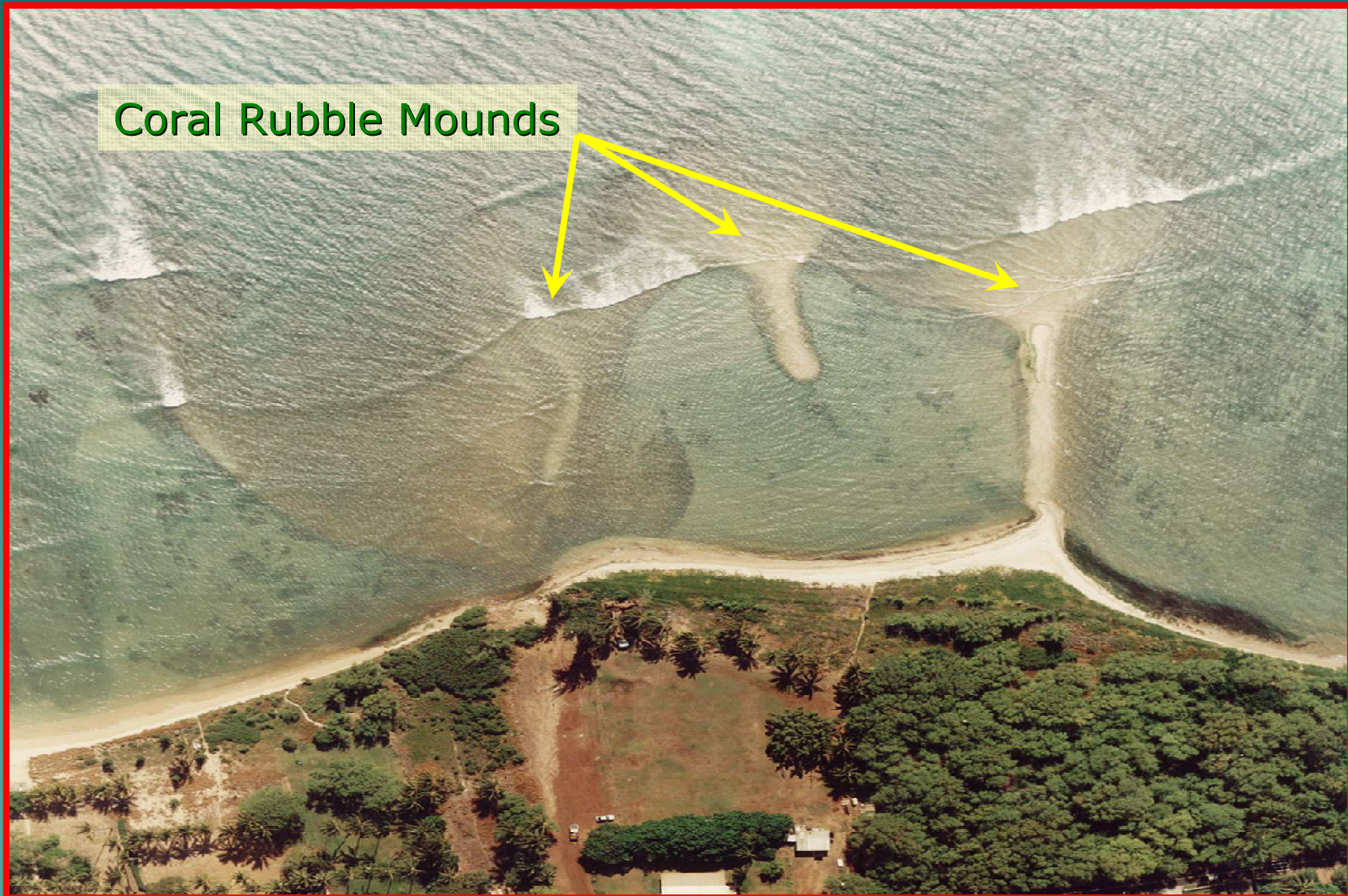
TOPICS

- ◆ Site Characterization
 - Kihei, Maui
 - Sacred Falls, Oahu
- ◆ Numerical Modeling
- ◆ Physical Model
 - Shape Evaluation
 - Shape Performance
 - Modular Design
- ◆ Next Steps

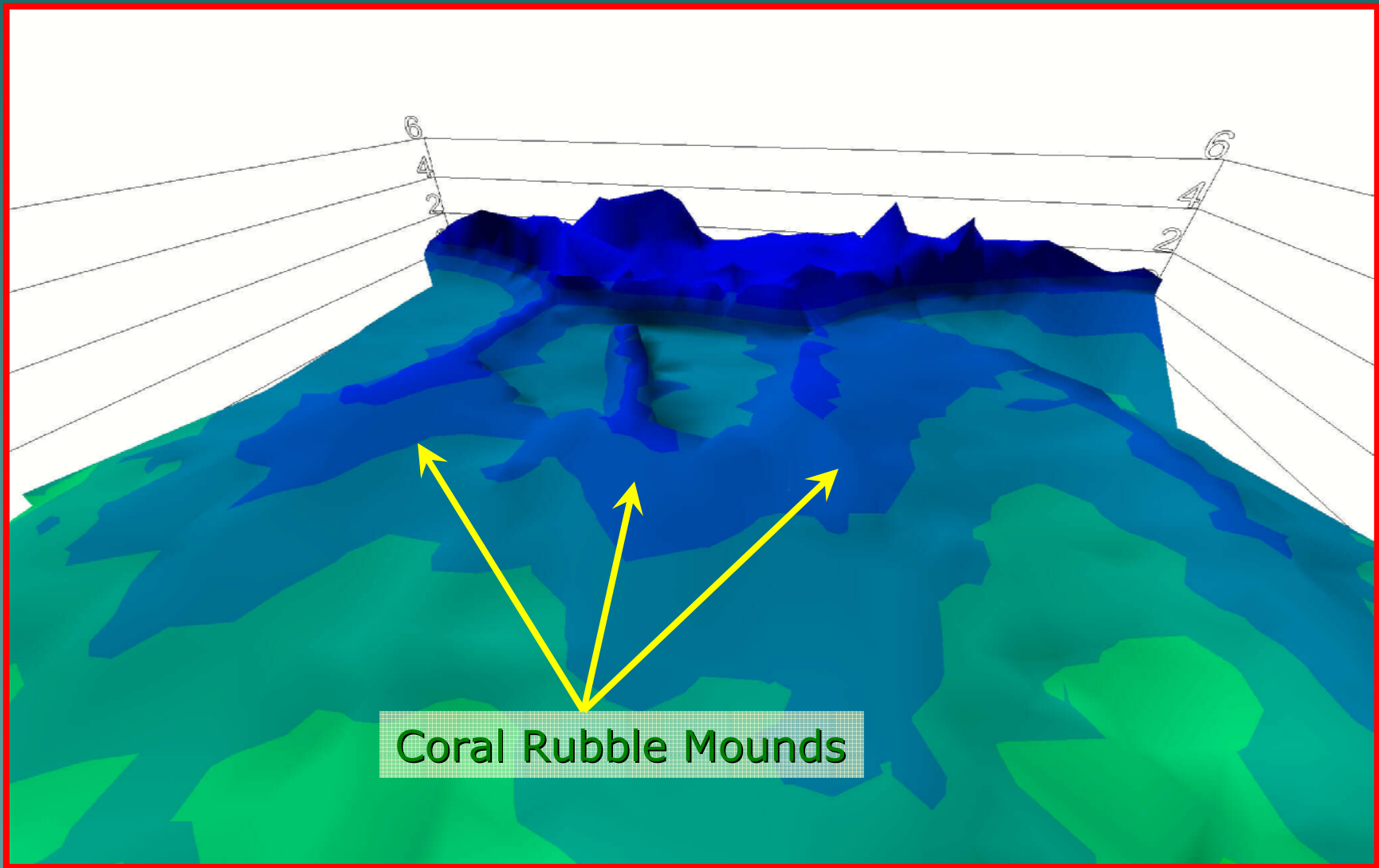
SITE CHARACTERIZATION



PROTOTYPE SITE: Kihei, Maui



PROTOTYPE SITE: Bathymetry



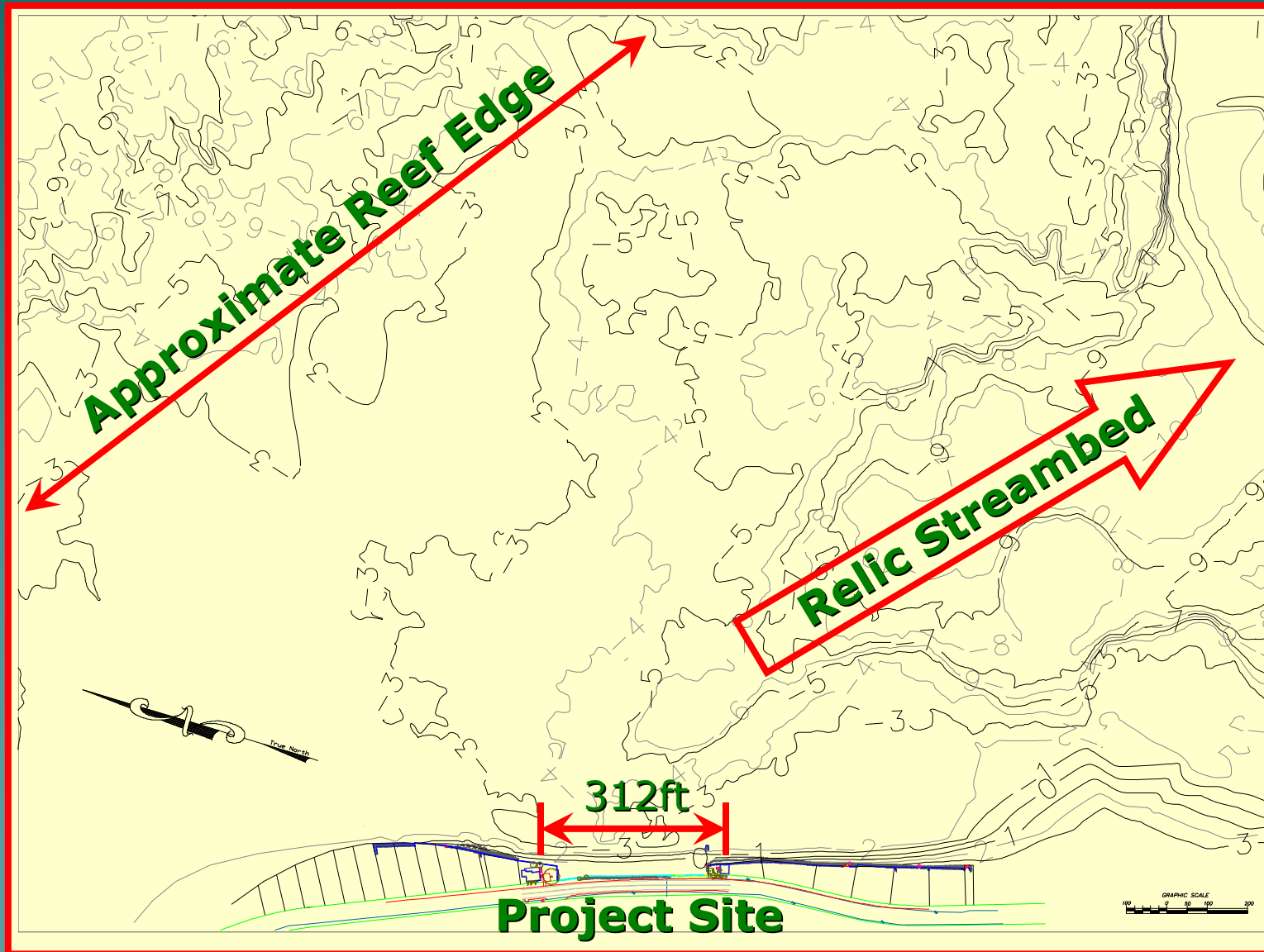
PROJECT SITE: Looking North



PROJECT SITE: Looking South



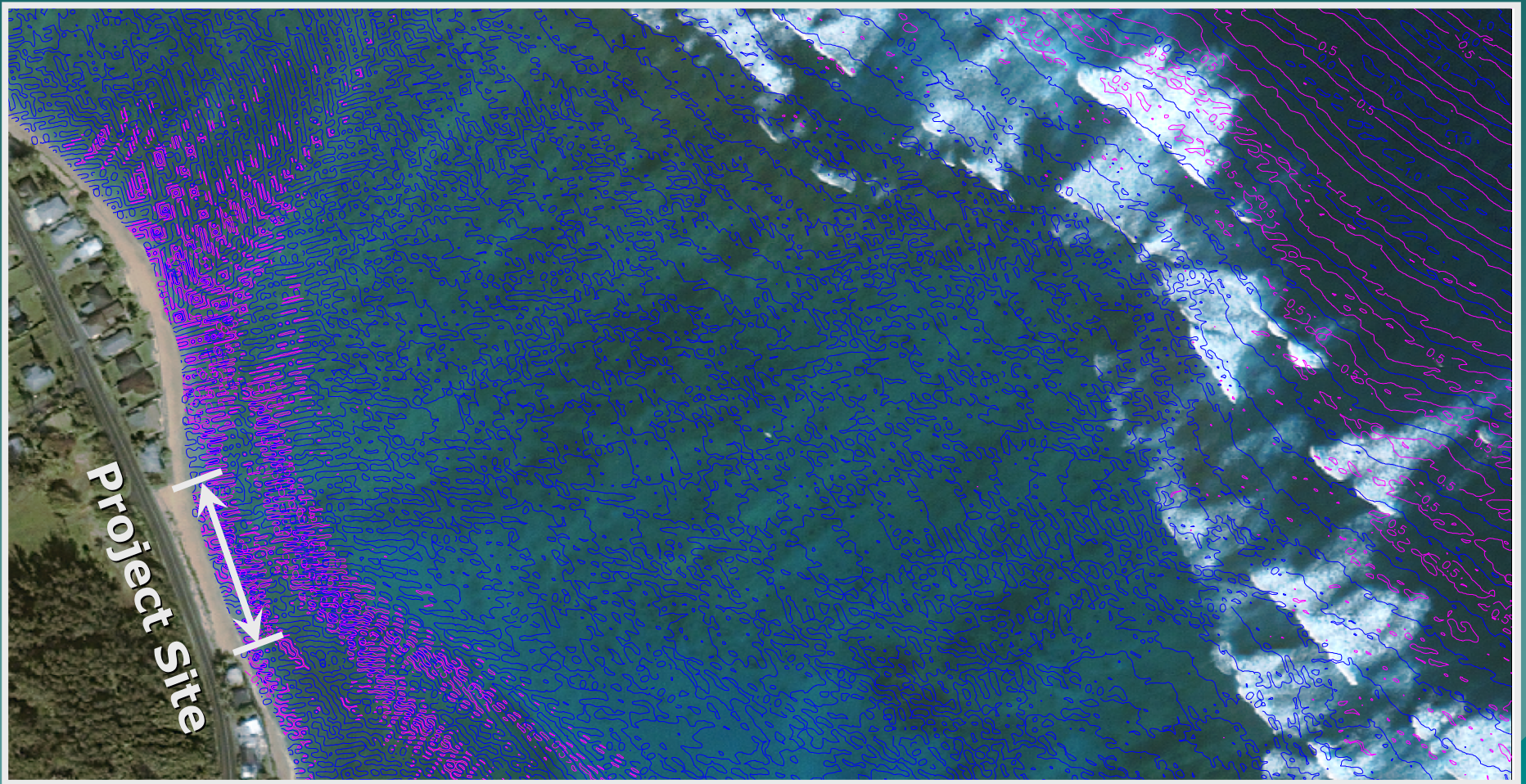
SACRED FALLS: Bathymetry



NUMERICAL MODELING

The image features a solid teal background. In the lower right corner, there is a stylized silhouette of a mountain range in a darker shade of teal. The text 'NUMERICAL MODELING' is centered horizontally and rendered in a bold, white, sans-serif font with a thin black outline.

WAVE TRANSFORMATION



RefDif model results overlaid on IKONOS imagery.

SHAPES CONSIDERED



RECTANGLE

The topographic map shows a rectangular area highlighted in blue. The map features contour lines with labels for elevations of -1.4 and -1.6. A small structure is visible on the right side of the map.



CRESENT

The topographic map shows a crescent-shaped area highlighted in blue. The map features contour lines with labels for elevations of -1.4 and -1.6. A small structure is visible on the right side of the map.



FAN

The topographic map shows a fan-shaped area highlighted in blue. The map features contour lines with labels for elevations of -1.4 and -1.6. A small structure is visible on the right side of the map.

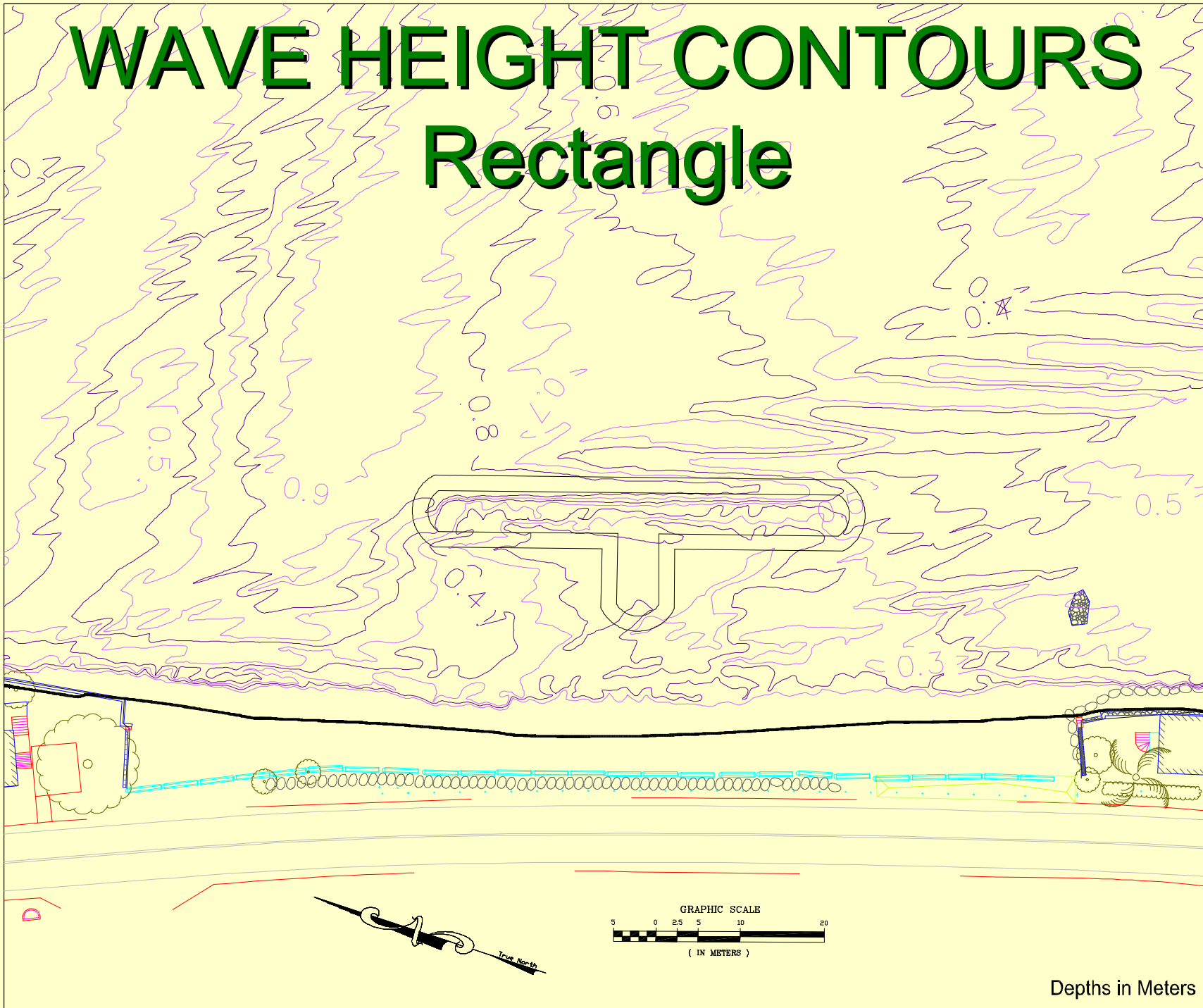
WAVE HEIGHT CONTOURS Rectangle



Sea Engineering, Inc.
 MAKA RESEARCH PIER
 WAIMANALO, HI 96739
 (808) 259-7666/FAX (808) 259-8143

KEYNOTES

1. Datum is MHW.
2. Depth accuracy ±0.1 m or better.
3. Soundings collected at discrete intervals. Bottom conditions may vary between soundings.
4. Horizontal Control
 Station:
 Hawaii State Plane - Zone #
 Description:
 X
 Y
5. Vertical Control
 Station Name:
 Elevation:
6. Survey Date:



04-18 Section 227
 Ref/Dif Results: Heights
 Block 24, MHW Tide
 September 7, 2004

REVISIONS

NO.	DATE	REVISION

XXX
 XXX
 PROJECT NUMBER XXX
 PROJECT ENGINEER XXX
 DRAWN BY XXX CHECKED BY XXX
 SCALE XXX DATE XXX
 FILE
 XXX

Depths in Meters

WAVE HEIGHT CONTOURS

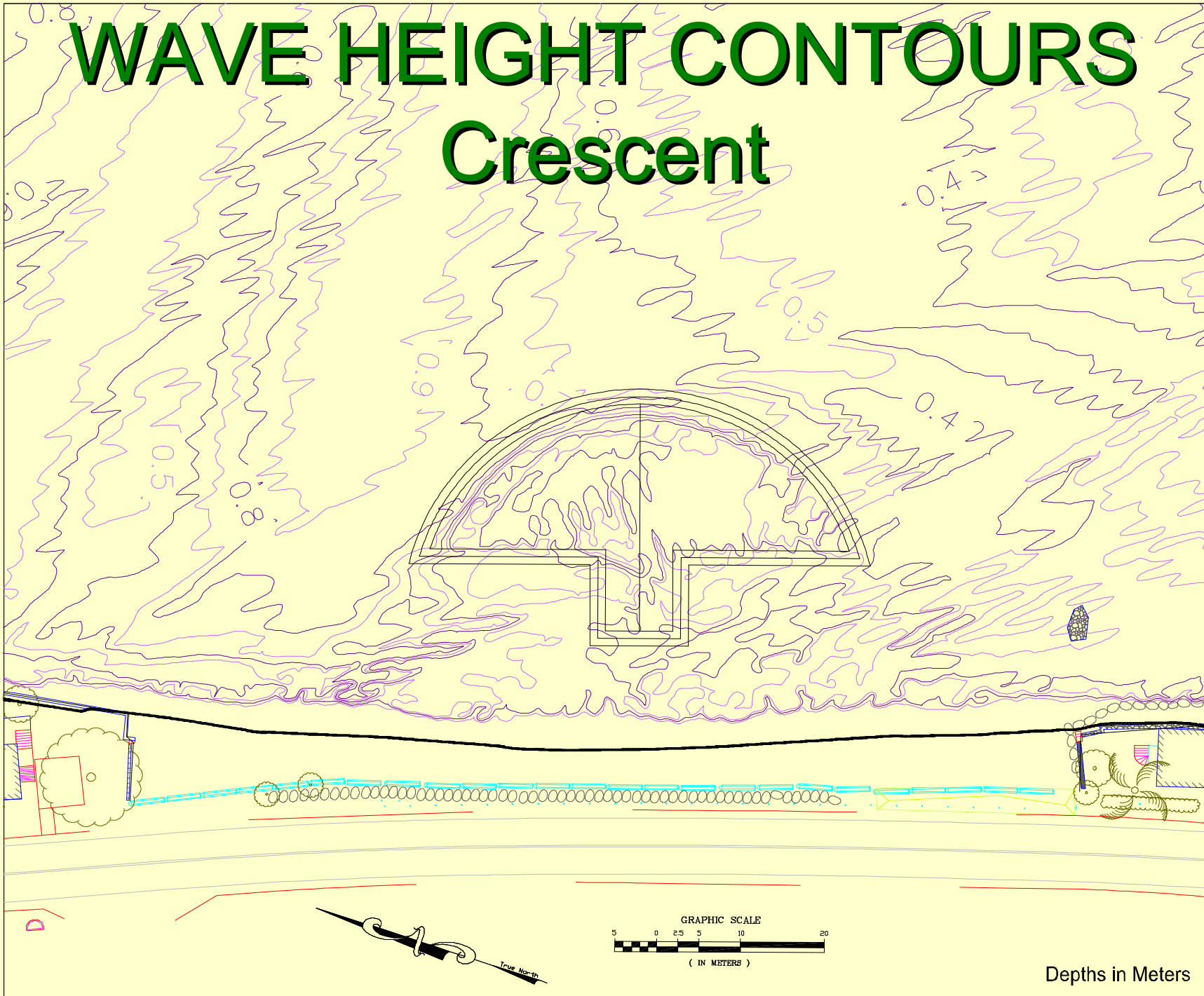
Crescent



Sea Engineering, Inc.
 MAKAHI RESEARCH PIER
 WAIMANALO, HI 96795
 (808) 258-7966/FAX (808) 258-8143

KEYNOTES

1. Datum is MHW.
2. Depth accuracy is ± 0.3 m or better.
3. Soundings collected at discrete intervals. Bottom conditions may vary between soundings.
4. Horizontal Control
 Station: Hawaii State Plane - Zone II
 Description:
 X
 Y
5. Vertical Control
 Station Name:
 Elevation:
 6. Survey Date:



04-18 Section 227
 Ref/Dif Results: Heights
 Block 20, MHW Tide
 September 7, 2004

REVISIONS

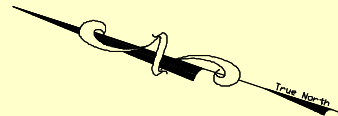
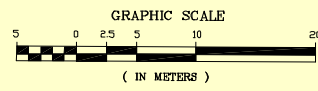
NO.	DATE	REVISION

XXX
 XXX

PROJECT NUMBER XXX
 PROJECT ENGINEER XXX
 DRAWN BY XXX CHECKED BY XXX
 SCALE XXX DATE XXX

FILE
 XXX

Depths in Meters



WAVE HEIGHT CONTOURS

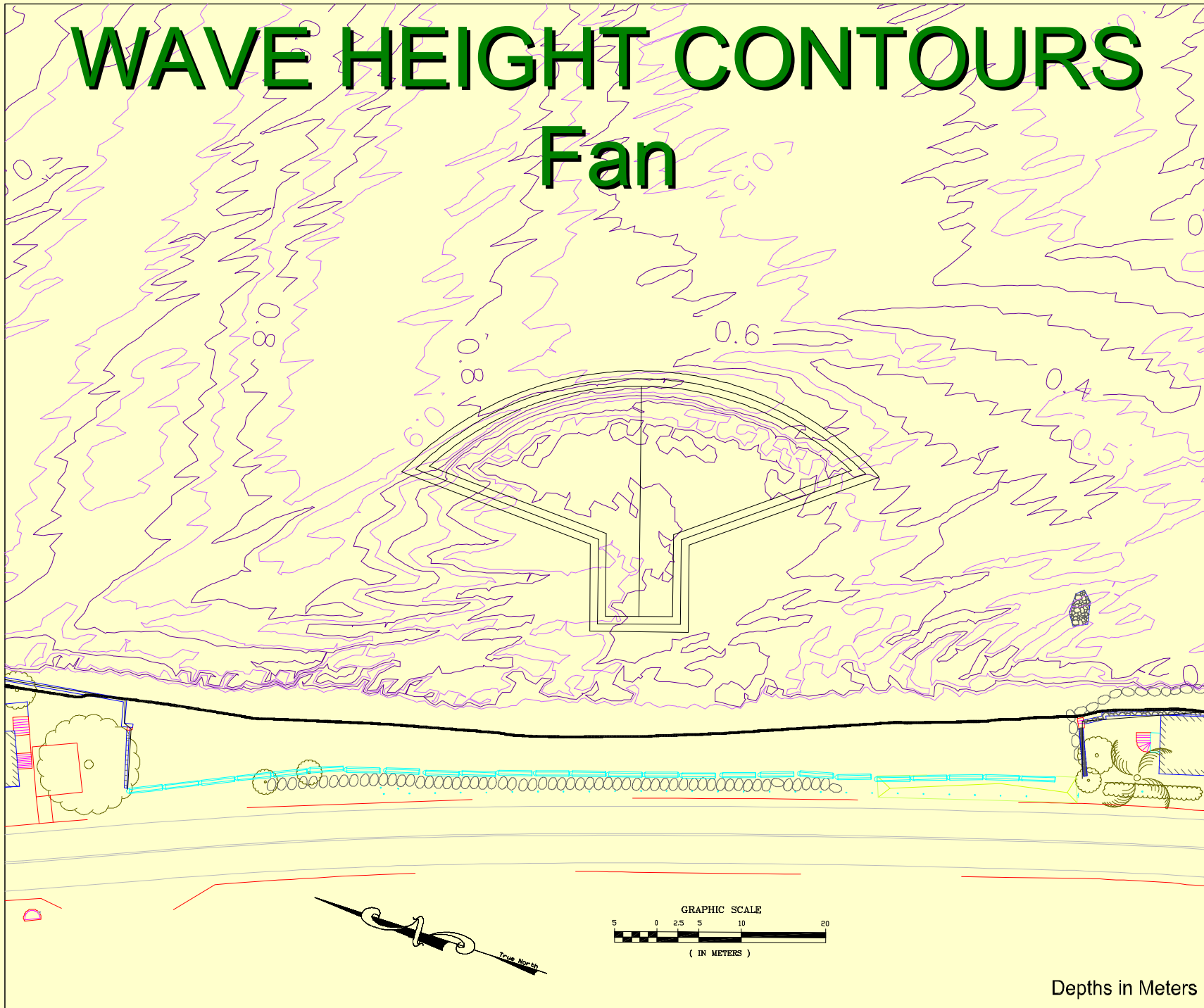
Fan



Sea Engineering, Inc.
 NAKAI RESEARCH PIER
 WAIKAMALO, HI 96795
 (808) 259-7966/FAX (808) 259-8143

KEYNOTES

1. Datum is MHW.
2. Depth accuracy +/- 0.1 m or better.
3. Soundings collected at discrete intervals. Bottom conditions may vary between soundings.
4. Horizontal Control
 Station:
 Hawaii State Plane - Zone #
 Description:
 X
 Y
5. Vertical Control
 Station Name:
 Elevation:
 6. Survey Date:



04-18 Section 227
 Ref/Dif Results: Heights
 Block 22, MHW Tide
 September 7, 2004

REVISIONS

NO.	DATE	REVISION

XXX
 XXX
 PROJECT NUMBER XXX
 PROJECT ENGINEER XXX
 DRAWN BY XXX CHECKED BY XXX
 SCALE XXX DATE XXX

FILE
 XXX

Depths in Meters

PHYSICAL MODEL Shape Evaluation



PHYSICAL MODEL

- ◆ Flume: 56ft long X 32ft wide
- ◆ Scale: 1/16
- ◆ Wave Parameters:
 - Height: Depth Limited over Reef
 - Period: 9 and 16 second
 - Direction: -7 degrees
- ◆ Longshore Current
- ◆ Sediment Transport

RECTANGLE



CRESCENT



FAN



CHEVRON



PHYSICAL MODEL

Shape Performance



RECTANGLE: Dye Study (1)



RECTANGLE: Dye Study (2)



RECTANGLE: Dye Study (3)



RECTANGLE: Dye Study (4)

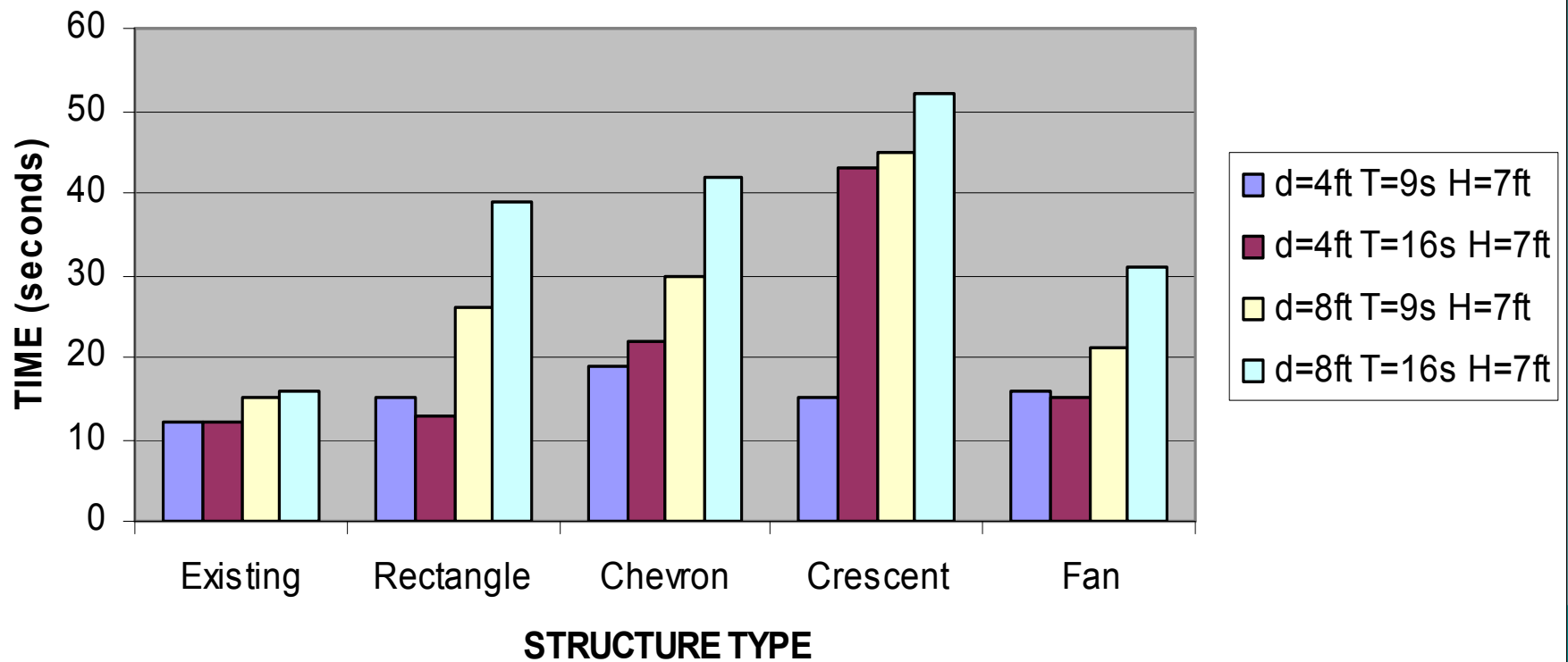


RECTANGLE: Dye Study (5)



SHAPE PERFORMANCE

DYE TRAVEL TIME IN LEE OF STRUCTURE



PHYSICAL MODEL

Modular Design

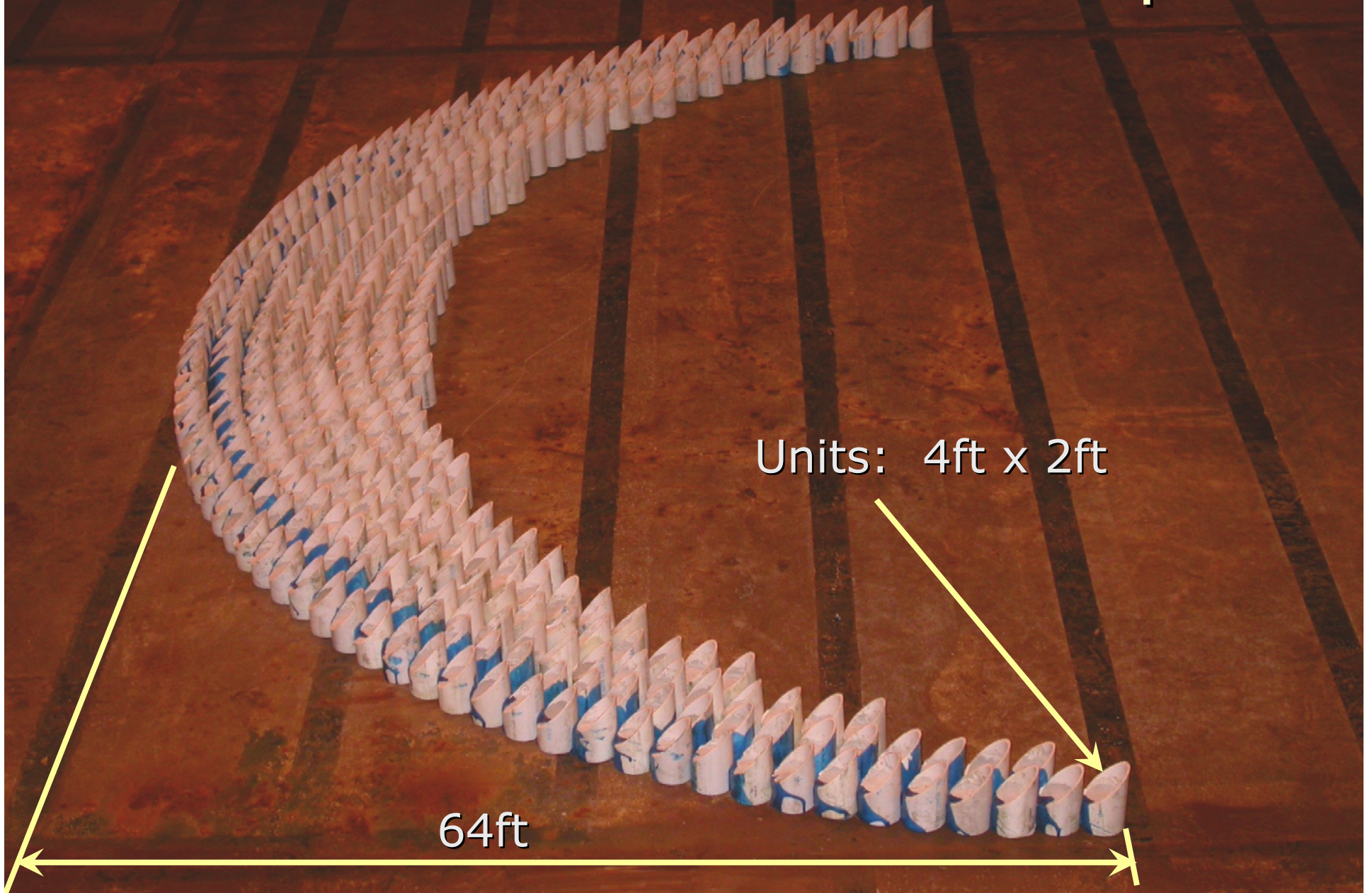
- ◆ PVC Pipes
- ◆ Plastic Traffic Barriers
- ◆ Cylindrical Storage Tanks
- ◆ Hawaiian Fish Pond Wall

CRESCCENT: Vertical PVC Pipe

128 feet

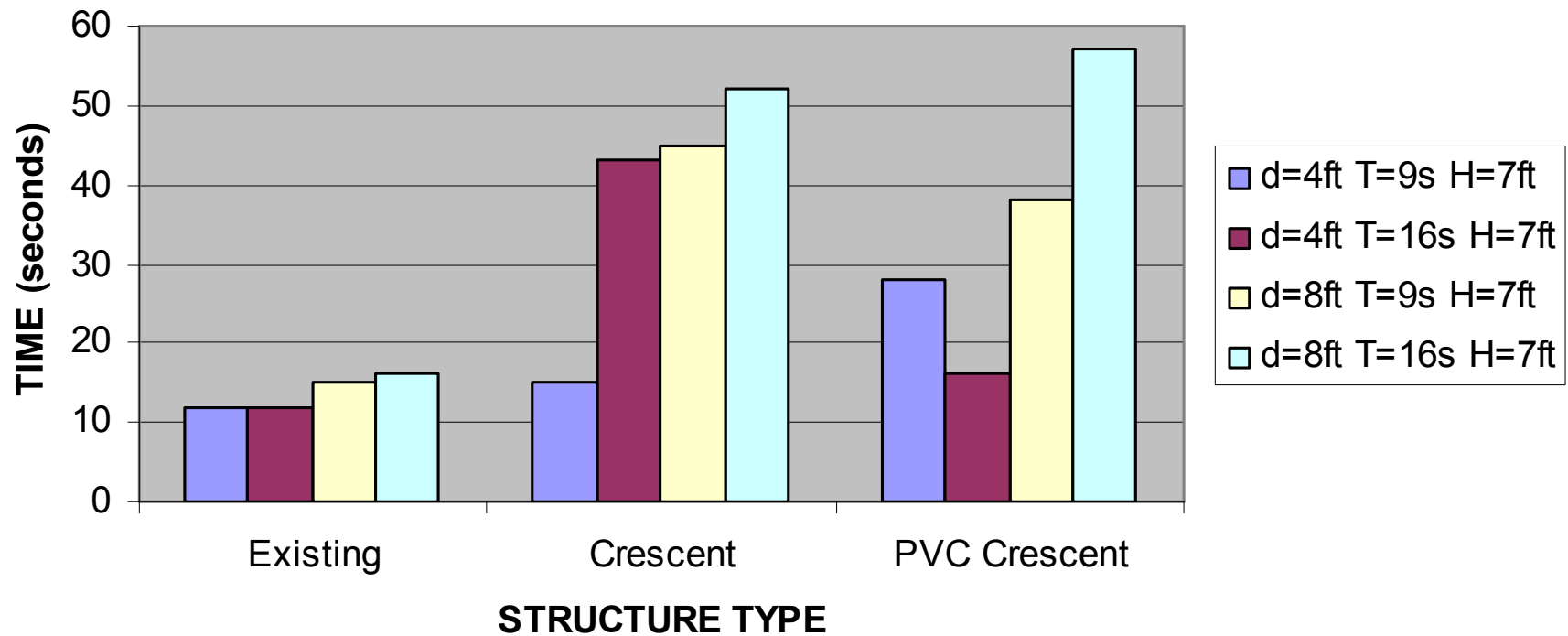


CRESCCENT: Vertical PVC Pipe



MODULAR PERFORMANCE

DYE TRAVEL TIME IN LEE OF STRUCTURE



NEXT STEPS

- ◆ Detailed Design (FY05)
- ◆ Sand Source Investigations (FY05)
- ◆ Environmental Coordination (FY05/06):
- ◆ Construction (FY06)
- ◆ Monitoring and Evaluation (FY07->)

THANK YOU