

Anna Maria Island Beach Nourishment Project - Hardbottom Mitigation and Monitoring Plan

March 2001

Mitigation for Natural Hardbottom Impacts

To mitigate for the 0.65 acres of hardbottom impact which is anticipated to occur between DEP monument R-35 and R-36 (Hardbottom Area 15 & 16), the permittee will construct 0.65 acres of artificial reef habitat at a mitigation ratio of parity (1:1). The material used to construct the artificial reef will consist of clean concrete. The material will be placed to create vertical relief habitat ranging from 1 to 2 feet, thereby approximating the relief exhibited by the impacted area of Hardbottom #16. The 0.65 acres of mitigative reef are to be placed within the existing Nearshore Artificial Reef Site, located 1,600 feet south of the southern project limit and 1,000 feet from shore in water depths of 15-16 feet. The new material will be placed adjacent to the scattered, low relief material on the western side of the reef. The 0.65 acres of material will be placed so as not to impact existing hardbottom habitats. Reef materials will be carefully set into place using a crane.

The mitigative reef will be constructed within two years after beach project completion. This construction timeframe will meet the Department's criteria for sequencing guidelines, which allows for a mitigation ratio of parity. The projected 0.65 acres of impact are secondary impacts due to spreading losses and are based upon the three-year equilibrium shoreline. Construction of the mitigative reef within two years of beach project completion will allow one-year for colonization of the newly placed material, thereby providing compensatory mitigation prior to anticipated hardbottom impacts. Examination of the post-construction monitoring results (from the previous project) of the Nearshore Artificial Mitigation Reef indicates that one-year will be sufficient for successful habitat replacement of the nearshore hardbottom formations. The results of the second, quarterly post-construction monitoring (November 1993) of the Nearshore Artificial Reef Site revealed that within one-year of placement of reef material, the species diversity and composition found at the Nearshore Artificial Reef compared favorably with the benthic communities observed at the natural formations in August 1990 (CPE, 1994, Anna Maria Island One Mile Artificial Reef and Nearshore Artificial Reef Fish and Benthic Species Survey #2).

The hardbottom impact analysis indicates that no impacts are anticipated south of R-36 (Southern portions of Hardbottom Area 14). However, biological monitoring of these nearshore formations will be required in order to determine if the projected hardbottom impact area was correctly estimated. Although not expected, if post-construction monitoring reveals that additional hardbottoms were impacted by beach fill equilibration, the permittee will be required to construct additional mitigation reefs by adding additional material to the proposed nearshore artificial reef mitigation location.

Monitoring of Mitigative Artificial Reef

Based upon the results of the monitoring of the artificial reefs during the initial beach restoration project, the 0.65 acre, mitigative reef is expected to provide suitable replacement habitat for the nearshore hardbottom formations within one-year after placement. Therefore, a one-year biological monitoring program is proposed to document colonization of the mitigative reef. Quarterly monitoring events will be performed during the first year post-construction to

examine seasonal trends in community composition. A total of four monitoring events will be performed during the duration of the study.

Monitoring will consist of two permanent video transects across the width of the placed material. The East End of each transect will be located at the East End of the existing, low relief material. Each transect will extend west through the existing hardbottom, then across the newly placed material. This will allow for comparison between existing and newly placed artificial reef habitats of similar relief. Visual fish census surveys will be performed during each quarterly monitoring, as well as video documentation of the benthic macro-invertebrates and macro-algal communities along the two transect lines. Still photography will also be used to document the benthic community at each transect line. Two, permanent, 1 meter square photographic stations will be established, one along each transect line.

Reporting

Results of the mitigative reef monitoring will be presented in a final, one-year post-construction report. The report will evaluate the species diversity and density of benthic organisms at the mitigative artificial reef compared to the natural hardbottom that it is intended to replace, and will also include a comparison to the biological communities associated with the low relief portion of the Nearshore Artificial Reef. An assessment of seasonal trends and comparison of the colonization process to the colonization of the previous Anna Maria Island mitigative reefs will also be presented. A copy of the quarterly video transects (VHS format) and a list of species observed will be submitted with the final report.

Success Criteria Determination

If after one year of monitoring it is found that the species diversity and density is not similar to the adjacent “low relief” mitigation reef, then a second year of monitoring will be performed. If after two years of monitoring it is found that the species diversity and density is not similar to the existing adjacent “low relief” mitigation reef, then a third year of monitoring will be performed. If after three years of monitoring it is found that the species diversity and density is not similar to the adjacent “low relief” mitigation reef, then a recommendation will be made and a revised mitigation plan will be submitted for review to the Department.

Sediment Deposition and Biological Monitoring of Existing Natural Nearshore Hardbottom Areas:

The “Sediment Deposition and Biological Monitoring” shall consist of sediment deposition monitoring on hardbottom formations located south of the project area between DEP monuments R-37 and R-35, 1 square meter photographic monitoring stations, and permanent video transect monitoring.

Sediment Deposition Monitoring

Eight (8) “fixed” sediment deposition monitoring stations (3-control station and 5-compliance stations) will be established. The control stations shall be located outside of the area of expected project influence, in approximately the same depth of water as the compliance

stations. A compliance station will be located on Hardbottom #1, Hardbottom #3 and at the extreme south end of Hardbottom #2. The five compliance stations shall be located on the following hardbottom areas: Area 2, Area 5, Area 13, Area 14, and Area 16. Metal bar stock will be driven into the substrate at each location to mark each station. Sediment deposition monitoring will be performed once before construction, once during construction, and then quarterly until three years after construction, thereby providing measurements of sediment accumulation at approximately 90 day intervals through the three-year post-construction period.

The depth of sediment on the reef areas will be measured at the eight “fixed” sediment deposition stations (three (3) control stations and five (5) compliance stations). Reef sediment depth measures will also be recorded from ten (10) “random” measures taken along each of the established five video transects.

- A. At each of the eight “fixed” sediment monitoring stations, the sediment depth will be assessed in the following manner:
 - 1. A measure of the sediment depth will be taken directly adjacent to the station marker (metal bar stock). Measures will be made with a ruler graduated in millimeters (mm). Measurements will be recorded to the nearest mm.

- B. At “random” intervals along each video transect sediment depth will be assessed in the following manner:
 - 1. Ten (10) random measures of the sediment depth will be taken on the reef surface along each of the five established video transects (measurements will exclude crevasses, depressions and gullies). Fifty (50) measurements total will be taken. Measures will be made with a ruler graduated in mm. Measures will be recorded to the nearest mm.

Biological Monitoring

Biological monitoring stations will be established at each of the sediment deposition monitoring stations (excluding the control stations) and consist of 1 square meter quadrats with the bar stock “marker” at the center of each quadrat. Monitoring at each of the five stations shall include color photographs, quantitative and qualitative data regarding species composition and density of sessile fauna and flora within each quadrat, and qualitative data on fish and macro invertebrates observed in and near each quadrat. Biological monitoring at the stations will be performed in conjunction with sedimentation monitoring, and occur once before construction, once during construction, and then quarterly until three years after construction. A final photographic station monitoring will be performed three years after construction.

Controlled video recordings shall be made of the benthic communities and fish along five, permanent transects, located on Hardbottom Areas 2, 5, 13, 14, and 16. The transects shall be established during the pre-construction monitoring and run parallel to shore along the inshore portion of the hardbottom areas. Each video transect line will intercept each biological monitoring station (a.k.a. sediment deposition “compliance” monitoring station). All benthic organisms and fishes observed in the video will be identified to the lowest taxon practicable.

Sediment deposition monitoring, biological monitoring and video transects will occur once prior to construction, once during construction, and then quarterly thereafter for three consecutive years.

Reporting

A first, second and third annual post-construction sedimentation and biological monitoring report will be prepared and submitted to the Department for review. A first annual report will be prepared after completion of the first year of post-construction monitoring and will present the results of the sediment deposition monitoring, biological monitoring and video transects through the pre-construction/one year post-construction period. A second annual report will be prepared after completion of the second year of post-construction monitoring and will present the results of the sedimentation deposition, biological monitoring and video transects through the pre-construction/two year post-construction period. A final report will be prepared at the end of the three-year post-construction monitoring period with comparison of pre-construction, first post-construction, second post-construction and three-year post-construction results. Copies of the video transects (VHS format) will be submitted with each report.

Annual monitoring reports will included:

1. Date and personnel conducting the monitoring.
2. A descriptive summary of the monitoring conducted.
3. Any deviations from the prescribed monitoring program.
4. Available reduced data for that quarterly monitoring.
5. Any data not previously submitted for prior reporting periods.
6. A descriptive summary of the sediment conditions at each monitoring station and the general health status of the benthic communities in the region as it relates to sedimentation.
7. Random sediment deposition measurements for each transect will be averaged to demonstrate an over all sediment depth for each transect.
8. A map of the monitoring area and adjacent hardbottoms showing:
 - a. the location of the fixed monitoring stations and the areas of hardbottom surveyed (transects),
 - b. location and depth of any elevated levels of sediment on the hardbottom.
9. Macro algae and macro invertibrate species density at each biological monitoring station (quadrat) will be presented in a tabulated form.
10. Statistacal analysis of macro algae and macro invertibrate species diversity (Shannon Weaver and Simpson Weaver) will be performed on data gathered from each biological monitoring station (quadrat) and will be presented in a tabulated form.
11. A comparison between each monitoring station will be made. Changes in species diversity and density within each quadrat will be evaluated as they relate to seasonal changes and observed sedimentation.
12. A summary discussion of the results of the macro algae and macro invertibrate species density and diversity analysis will be included.

Biological Degradation / Sediment Deposition Violations

In the event that impacts (i.e., organism or organism tissue death or species diversity changes) to hardbottom areas are identified, outside of the “predicted” 0.65-acre impact area, during any of the monitoring events, the FDEP will be notified immediately. Notification will be made in the form of a written report to be submitted within 24 hours, or on the next working day. A violation will be defined as a significant build-up of sediment sufficient to cause any one or more of the following conditions:

- A. A frequency of observed bleaching (partial or complete) of hard coral colonies (if any), significantly above the level found at the control stations.
- B. Excessive mucus produced by hard corals (if any) to remove sediment from their surface, resulting in binding of sediments and transport of bound sediments off the coral's surface and subsequent accumulation of the sediments at the base of the coral head. Such accumulations have been seen to initiate a "self burial" process, causing death of the lower tissue of the coral head.
- C. Mottling of color of benthic organisms (soft corals, algae, sponges, etc).
- D. A change in species diversity and density.

If a violation is found, the permittee will initiate an assessment (separate from the regularly scheduled quarterly monitoring) to determine the extent of impact to biological communities. A quantitative assessment will be made to determine the size in square feet or acreage of impact. A violation report will be submitted within 90-days of the assessment and recommendations will be made with regards to mitigation for the identified impacts.

COASTAL PLANNING & ENGINEERING, INC.

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8446.18

February 22, 2001

Michael Corrigan
Environmental Specialist III
Mail Station 310
Department of Environmental Protection
3900 Commonwealth Blvd.
Tallahassee, FL 32399-3000

Re: Revised Nearshore Hardbottom Monitoring Transect Lines and Proposed Nearshore Artificial Reef Monitoring Transects - Anna Maria Island Beach Renourishment Project, DEP JCP File No. 00393378-001-JC

Dear Michael:

In response to your request for comments on the transect line monitoring requirements for the subject project, Coastal Planning and Engineering (CPE) proposes alternate transect line alignment to monitor nearshore hardbottom habitats. The Department of Environmental Protection (DEP) transect lines presented in the Intent to Issue run parallel across the nearshore hardbottom formations. CPE proposes to establish alternate transect alignments as depicted on Figures 1 and 2. CPE recommends that the transect lines commence at the nearshore edge of the persistent pre-construction hardbottom formation. The transect will then extend seaward, or along the alignment of the hardbottom, a distance of 250 feet, or to the seaward edge of hardbottom, whichever is greater. Establishment of shore-perpendicular or angled alignments along the hardbottom habitats will provide better delineation of equilibrium toe of fill movement in relation to the hardbottom features identified for monitoring. Please note that the hardbottom associated with Site #14 (Figure 2) was originally characterized as an irregular sand / rubble area. CPE will attempt to establish a transect line in this area, but the nature of the substrate will dictate the location and length of the line.

In response to the DEP's request for two proposed transect lines over the mitigative nearshore artificial reef, CPE proposes establishment of the lines as delineated in Figure 3. Transect line placement at these sites will allow investigators to document recruitment and colonization of the newly placed material in relation to existing material placed in conjunction with the 1992/1993 project. The western terminus of each transect will be located at the edge of the newly placed material and proceed in a generally easterly direction, over the two new artificial reef installations, and will terminate at a point, not less than 25 feet, east of the new material in an area of the reef constructed in 1992/1993.

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February 22, 2001
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If you have any questions regarding this submittal, please contact Rick Spadoni or me.

Sincerely,

COASTAL PLANNING & ENGINEERING, INC.

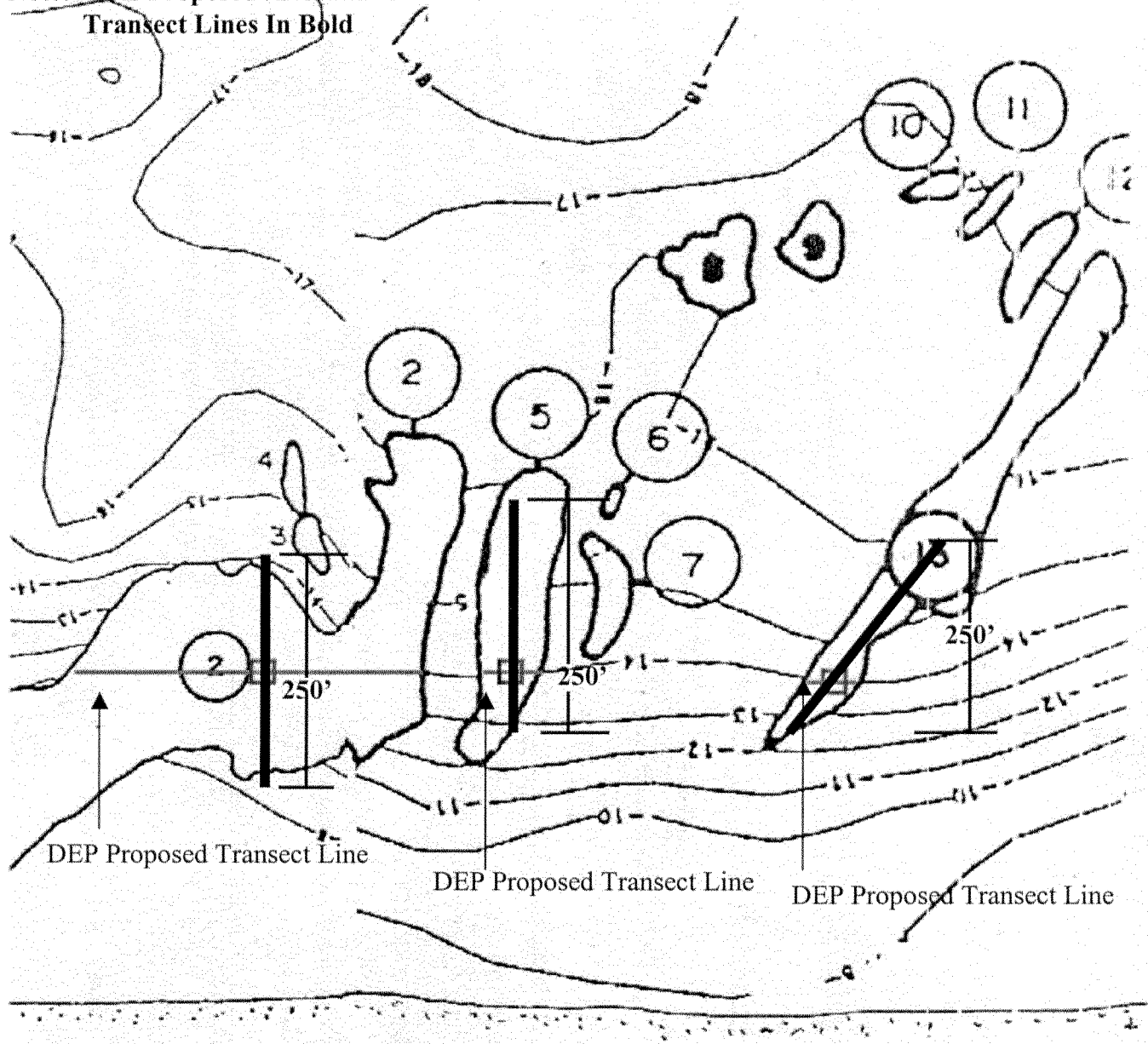


Craig J. Kruempel
Coastal Zone Specialist

cc: Charles Hunsicker, Manatee County
Rick Spadoni, CPE
Cheryl Miller, CPE
Jennifer Davis, CPE

P:\Manatee\FDEP-Anna_Maria_Data\transect lines.doc

Note: CPE Proposed Alternative
Transect Lines In Bold



▲ R 38

MISC. LEGEND

- No. DIVE SITES
- ▲ D.N.R. MONUMENTS
- INFAUNA SAMPLING SITES

NOTES:

1. DATE OF SIDE-SCAN SONAR SURVEY: 8/15-18/90.

- Sediment Deposition / Biological Monitoring Station (Compliance station)
- Video Transect

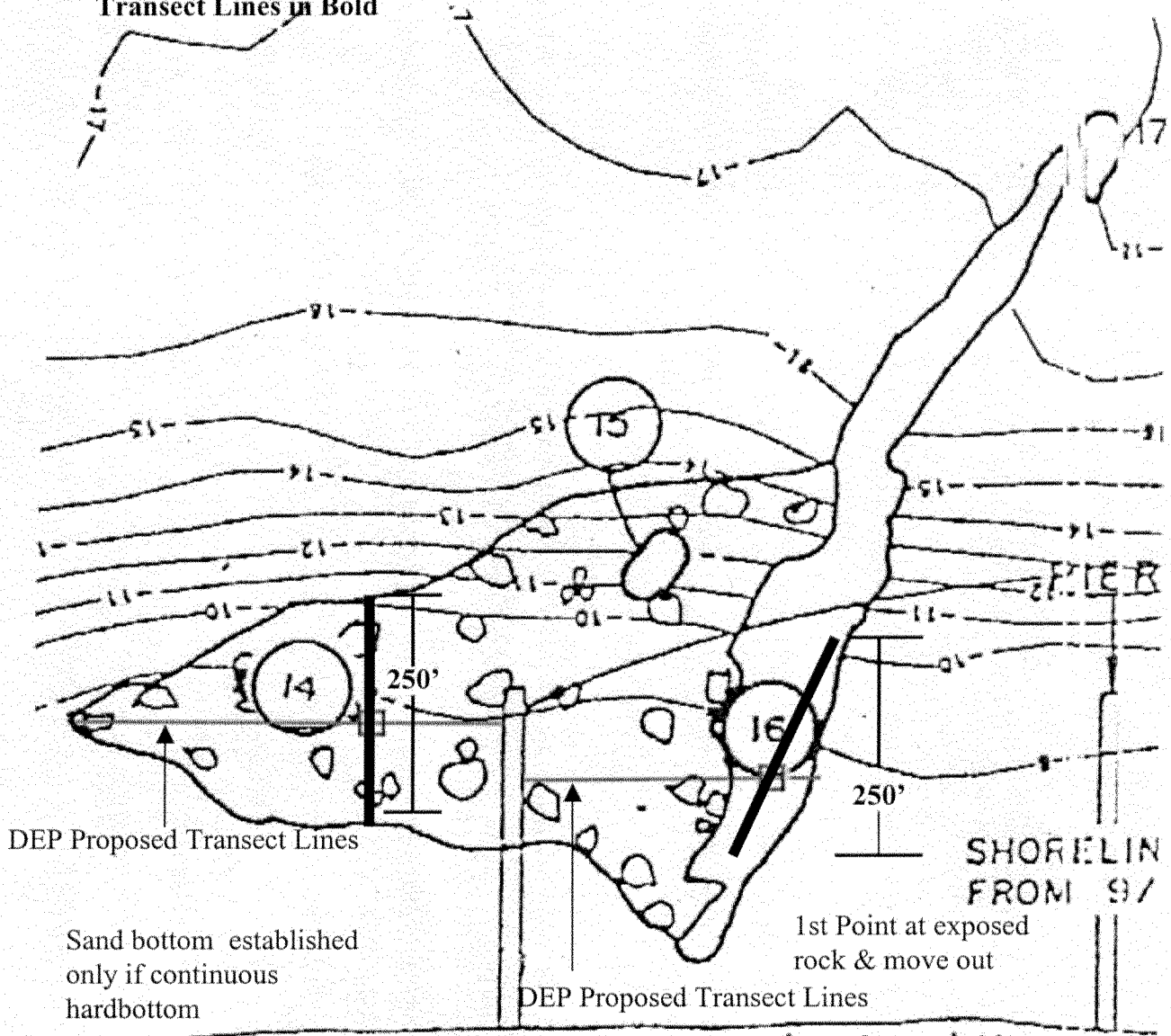
▲ R 37

HARDBOTTOM MAPPING LEGEND

- HARDBOTTOM AS MAPPED BY SIDE-SCAN SONAR
- ○ AREA OF OCCASIONAL SCATTERED ROCK AS MAPPED BY SIDE-SCAN SONAR (NOTE: ROCK SHOWN FOR REPRESENTATION ONLY AND IS NOT ACTUAL LOCATION OF ROCK)

Figure 1

Note: CPE Proposed Alternative
Transect Lines in Bold



DEP Proposed Transect Lines

Sand bottom established
only if continuous
hardbottom

DEP Proposed Transect Lines

1st Point at exposed
rock & move out

SHORELINE
FROM 9/

R 36

R 3.5

MISC. LEGEND

- (No.) DIVE SITES
- ▲ D.N.R. MONUMENTS
- INFAUNA SAMPLING SITES

NOTES:

- 1 DATE OF SIDE-SCAN SONAR SURVEY: 8/15-18/00.
- 2 DATE OF BATHYMETRIC SURVEY: 6/15-18/00.

- Sediment Deposition /
Biological Monitoring Station (Compliance station)
- Video Transect

HARDBOTTOM MAPPING
LEGEND

- HARDBOTTOM AS MAPPED BY
SIDE-SCAN SONAR
- ○ AREA OF OCCASIONAL SCAT-
TERED ROCK AS MAPPED BY
SIDE-SCAN SONAR
(NOTE: ROCK SHOWN FOR
REPRESENTATION ONLY AND
IS NOT ACTUAL LOCATION OF
ROCK)
- HARDBOTTOM MAPPED FROM

Figure 2

**Note: CPE Proposed Artificial Reef
Transect Lines in Bold**

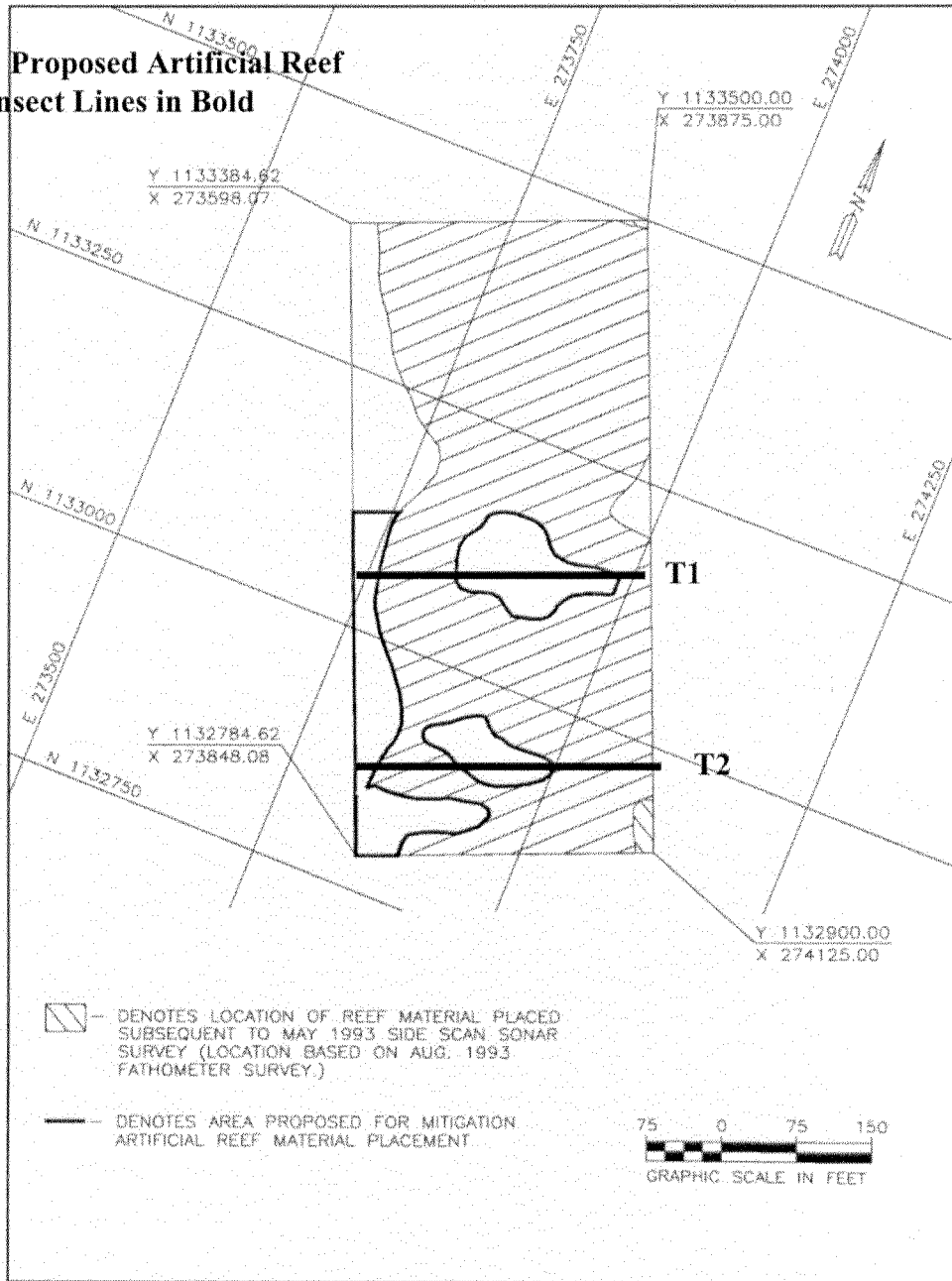


FIGURE 3

ANNA MARIA ISLAND
NEARSHORE ARTIFICIAL REEF SITE

COASTAL PLANNING & ENGINEERING, INC.

Figure 3