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NAS KEY WEST
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LETTER SUBMITTING PERMIT APPLICATION FOR INSTALLATION OF SHORELINE
PROTECTION AT FLEMING KEY WITH ATTACHMENT NAS KEY WEST
10/3/1996
BECHTEL ENVIRONMENTAL

Bechtel

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Telephone: (423) 220-2000

OCT 3 1996

Florida Department of Environmental Protection
South District
Environmental Resource Permitting
2295 Victoria Ave.; Suite 364
Fort Myers, FL 33901-3881

Attn: Gordon Romeis, Environmental Program Administrator
Submerged Lands and Environmental Resources Program

SUBJECT: Bechtel Job No. 22567
Department of the Navy Contract No. N62467-93-D-0936
**JOINT APPLICATION FOR ENVIRONMENTAL RESOURCE PERMIT / AUTHORIZATION TO USE
STATE OWNED SUBMERGED LANDS**
DO 0004, IR-8 SHORELINE PROTECTION SYSTEM, FLEMING KEY, NAS KEY WEST, FL
Subject Code: 7550

Dear Mr. Romeis:

As Agent for, and on behalf of the Naval Air Station, Key West, Florida, I am enclosing a permit application for installation of a shoreline protection system (SPS) along the southwest corner of Fleming Key. This construction is part of the Navy's Installation Restoration Program for environmental cleanup of Navy bases.

In addition to the discussions we have held with your office, we have discussed the project with the Florida Department of Community Affairs (DCA) and the U. S. Army Corps of Engineers (USCOE). The USCOE has assigned permit number 199604865 (PR-VA) to this project. We also conducted a site visit to acquaint Mr. Ed Barham of FDEP and Messrs. Ty Symroski and Alan Woolwich of DCA with the SPS. During this visit our installation subcontractor, Ocean Breeze Construction Co., Inc., showed a model and gave a briefing on the Armorflex cellular concrete block revetment system.

This project mitigates existing conditions at the edge of the inactive landfill on South Fleming Key. Presently, the landfill is subject to erosion from wave action and tidal fluctuations in Man of War Harbor. This action exposes debris within the landfill and subjects the harbor to potentially harmful effects from the debris. Additionally, the presence of the exposed debris along the shoreline prevents natural growth of native species which would protect the shoreline from erosion.

During construction, 130,000 square feet of land will be cleared of exotic species. Red mangroves will be planted along a 300-foot section on the northwest end of the SPS. Sea purslane will be planted along the top three rows of block over the entire length of the SPS. Maintenance of the SPS to prevent regrowth of exotics will be performed by the Naval Air Station after completion of construction.



Bechtel Environmental, Inc.

Gordon Romeis

2

The Armorflex system has been installed at numerous sites in the state of Florida since 1983. Ocean Breeze Construction Co. has installed more than 2.5 million square feet of Armorflex in the Southeastern United States and the Caribbean area, including nearly 30 installations in Florida. Example projects include:

- Herbert Hoover Dike Revetment on Lake Okeechobee, Clewiston, FL, for the U. S. Army Corps of Engineers
- Pineda Causeway on the Indian River, Melbourne, FL, for the Florida Department of Transportation
- Biscayne Bay, Coconut Grove, FL, for the Howard Hughes Medical Institute

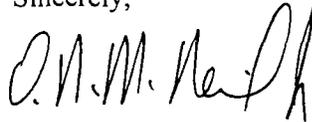
By separate correspondence, I am sending to Mr. John Jones, City of Key West Engineer, copies of the survey and other drawings and material. I have already discussed our project with him. It is our understanding that the rip-rap system being installed at the city's waste water treatment facility ends about 300 feet to the east of the starting point of the Navy's SPS and, therefore, the two systems will not affect each other's performance.

I am aware that FDEP sends copies to all agencies involved in the approval process, but for information purposes, I am sending an advance copy directly to Ms. Margaret Diaz of the U. S. Army Corps of Engineers, Miami Field Office, and to Mr. Ty Symroski of Florida DCA, Marathon Office.

We have sealed and signed only one set of drawings accompanying the original of this letter. If you need additional sealed copies or additional copies of the color photographs and Armorflex brochure, please let me know. I have attached an original and four copies of the application plus a check made out to Florida Department of Environmental Protection in the amount of \$500.00.

I am available for discussion of any questions at (423) 220-2745

Sincerely,



O. N. McNeil, Jr.
Project Manager
Agent for NAS Key West

ONM:cw:LR0931

cc (w/encl):

D. Patrick, SDIV

P. Williams, NASKW Public Works

M. Ewing, ROICC KW

M. Diaz USCOE

T. Symroski (DCA)

B. Traudt (FDEP)

SECTION A

FOR AGENCY USE ONLY

ACOÉ Application # _____ DEP/WMD Application # _____
 Date Application Received _____ Date Application Received _____
 Proposed Project Lat. _____ Fee Received \$ _____
 Proposed Project Long. _____ Fee Receipt # _____

PART 1:

Are any of the activities described in this application proposed to occur in, on, or over wetlands or other surface waters? Yes No

Is this application being filed by or on behalf of a government entity or drainage district? Yes No

PART 2:

A. Type of Environmental Resource Permit Requested (check at least one). See Attachment 2 for thresholds and descriptions.

- Noticed General - include information requested in Section B.
- Standard General (Single Family Dwelling) - include information requested in Sections C and D.
- Standard General (all other Standard General projects) - include information requested in Sections C and E.
- Individual (Single Family Dwelling) - include information requested in Sections C and D.
- Individual (all other Individual projects) - include information requested in Sections C and E.
- Conceptual - include information requested in Sections C and E.
- Mitigation Bank Permit (construction) - include information requested in Section C and F.
 (If the proposed mitigation bank involves the construction of a surface water management system requiring another permit defined above, check the appropriate box and submit the information requested by the applicable section.)
- Mitigation Bank (conceptual) - include information requested in Section C and F.

B. Type of activity for which you are applying (check at least one)

- Construction or operation of a new system, other than a solid waste facility, including dredging or filling in, on or over wetlands and other surface waters.
- Construction, expansion or modification of a solid waste facility.
- Alteration or operation of an existing system which was not previously permitted by a WMD or DEP.
- Modification of a system previously permitted by a WMD or DEP. Provide previous permit numbers. _____
 Alteration of a system Extension of permit duration Abandonment of a system
 Construction of additional phases of a system Removal of a system

C. Are you requesting authorization to use Sovereign Submerged Lands. Yes No
 (See Section G and Attachment 5 for more information before answering this question.)

D. For activities in, on or over wetlands or other surface waters, check type of federal dredge and fill permit requested:

- Individual Programmatic General General Nationwide Not Applicable

E. Are you claiming to qualify for an exemption? Yes No
 If yes, provide rule number if known. _____

T 3:	
A. OWNER(S) OF LAND	B. ENTITY TO RECEIVE PERMIT (IF OTHER THAN OWNER)
NAME Naval Air Station Key West, FL	NAME
TITLE AND COMPANY Attn: Ron Demes, Code 188 Engineering Director	TITLE AND COMPANY
ADDRESS P.O. Box 9007 Naval Air Station	ADDRESS
CITY, STATE, ZIP Key West, FL 33040-9001	CITY, STATE, ZIP
TELEPHONE AND FAX (T)(305) 293-2194 (F)(305) 293-2542	TELEPHONE AND FAX
C. AGENT AUTHORIZED TO SECURE PERMIT	D. CONSULTANT (IF DIFFERENT FROM AGENT)
NAME Oscar N. McNeil, Jr., P.E.	NAME
TITLE AND COMPANY Project Manager Bechtel Environmental, Inc.	TITLE AND COMPANY
ADDRESS P.O. Box 350 151 Lafayette Drive	ADDRESS
CITY, STATE, ZIP Oak Ridge, TN 37831-0350	CITY, STATE, ZIP
TELEPHONE AND FAX (T) (423) 220-2745 (F) (423) 220-2748	TELEPHONE AND FAX

PART 4 (Please provide metric equivalent for federally funded projects):

- IR-8, Shoreline Protection System,
 A. Name of project, including phase if applicable: Fleming Key
- B. Is this application for part of a multi-phase project? Yes No
- C. Total applicant-owned area contiguous to the project: 20 ac.; 8.2 ha.
- D. Total area served by the system: 20 ac.; 8.2 ha.
- E. Impervious area for which a permit is sought: N/A ac.; _____ ha.
- F. Volume of water that the system is capable of impounding: N/A ac. ft.; _____ m³
- G. What is the total area of work in, on, or over wetlands or other surface waters?
0.3 ac.; 0.12 ha. _____ sq. ft.; _____ sq. m.
- H. Total volume of material to be dredged: 883yd³ yd³; 675m³ m³
- I. Number of new boat slips proposed: 0 wet slips; 0 dry slips

PART 5:

Subject location (use additional sheets, if needed):

County(ies) Monroe

Section(s) _____ Township _____ Range _____

Section(s) _____ Township _____ Range _____

Section(s) _____ Township _____ Range _____

Land Grant name, if applicable N/A

Tax Parcel Identification Number N/A

Street address, road, or other location Mustin Road, Fleming Key

City, Zip Code if applicable Key West, FL 33040

PART 6: Describe in general terms the proposed project, system, or activity.

Construct a shoreline protection system (SPS) around the southwest corner
of Fleming Key, Key West, Florida. The purpose of the SPS is to protect
a landfill from erosion by tidal fluctuation and wave action. The landfill
was used by the Navy.

The SPS will be installed starting at the edge of the property belonging to
the City of Key West Waste Water Treatment Plant and running 1,800 linear
feet to the west. The elevation of the SPS will be 10.0 feet MSL for most
of its length. The structure of the SPS will be Armorflex Cellular Concrete
Block Revetment System placed over a layer of bedding stone, geotextile
fabric and compacted limerock fill material.

During construction the existing shoreline will be cut back as necessary,
landfill debris removed from the construction area and placed on top of
the landfill interior. Temporary erosion, turbidity, and sediment control
measures will be used during construction. Exotic species will be removed
as necessary for construction. Upon completion, revegetation with native
species (red mangrove and sea purslane) will be accomplished along portions
of the SPS.

The SPS is expected to improve site aesthetics as well as protect
outstanding Florida waters from damage due to erosion of the landfill.

F 7:

A. If there have been any pre-application meetings, including on-site meetings, with regulatory staff, please list the date(s), location(s), and names of key staff and project representatives.

30 July 1996/Fleming Key/Ed Barham - FDEP (305) 289-2310;
Ty Symroski & Alan Woolwich - DCA (305) 289-2402; Dudley Patrick -
Southern Division Naval Facilities Engineering Command (804) 820-5541;
Philip Williams & Arnim Schuetz - NAS Key West (305) 293-2061;
Oscar McNeil - Bechtel Environmental, Inc., (423) 220-2745; Andrew Hackett -
Ocean Breeze Construction Co., Inc.

B. Please identify by number any MSSW/Wetland resource/ERP/ACOE Permits pending, issued or denied for projects at the location, and any related enforcement actions.

Agency	Date	No.\Type of Application	Action Taken
<u>FDEP</u>	<u>1/7/94</u>	<u>442298345 Rip Rap</u>	<u>Permit Issued</u>
<u>Unk</u>	<u>Unk</u>	<u>199601510 (IP-LS) Rip Rap</u>	<u>City of Key West Application for Adja- cent Waste Water Treatment Plant</u>
<u>ACOE</u>	<u>8/27/96</u>	<u>199604865 (PR-VA)</u>	<u>Letter Notification</u>

C. Note: The following information is required for projects proposed to occur in, on or over wetlands that need a federal dredge and fill permit or an authorization to use state owned submerged lands.

Please provide the names, addresses and zip codes of property owners whose property directly adjacent to the project (excluding applicant) and/or (for proprietary authorizations) is located within a 500-foot radius of the applicant's land. Please attach a plan view showing the owner's names and adjoining property lines. Attach additional sheets if necessary.

- | | |
|---------------|----------|
| 1. <u>N/A</u> | 2. _____ |
| _____ | _____ |
| _____ | _____ |
| 3. _____ | 4. _____ |
| _____ | _____ |
| _____ | _____ |
| 5. _____ | 6. _____ |
| _____ | _____ |
| _____ | _____ |
| 7. _____ | 8. _____ |
| _____ | _____ |
| _____ | _____ |

PART 8:

By signing this application form, I am applying, or I am applying on behalf of the applicant, for the permit and any proprietary authorizations identified above, according to the supporting data and other incidental information filed with this application. I am familiar with the information contained in this application and represent that such information is true, complete and accurate. I understand this is an application and not a permit, and that work prior to approval is a violation. I understand that this application and any permit issued or proprietary authorization issued pursuant thereto, does not relieve me of any obligation for obtaining any other required federal, state, water management district or local permit prior to commencement of construction. I agree, or I agree on behalf of the applicant, to operate and maintain the permitted system unless the permitting agency authorizes transfer of the permit to a responsible operation entity. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

Bechtel Environmental, Inc. on behalf of and as agent for Naval Air Station, Key West, FL
Typed/Printed Name of Applicant (If no Agent is used) or Agent (If one is so authorized below)

Oscar N. McNeil, Jr., P.E. Oscar N. McNeil, Jr. 9/23/96
Signature of Applicant/Agent Date

Project Manager
(Corporate Title if applicable)

AN AGENT MAY SIGN ABOVE ONLY IF THE APPLICANT COMPLETES THE FOLLOWING:

B. I hereby designate and authorize the agent listed above to act on my behalf, or on behalf of my corporation, as the agent in the processing of this application for the permit and/or proprietary authorization indicated above; and to furnish, on request, supplemental information in support of the application. In addition, I authorize the above-listed agent to bind me, or my corporation, to perform any requirement which may be necessary to procure the permit or authorization indicated above. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

R. A. DEMES [Signature] 8-21-96
Typed/Printed Name of Applicant Signature of Applicant Date

SIGNED BY DIRECTION OF THE COMMANDING OFFICER
NAVAL AIR STATION, KEY WEST, ENGINEERING DIRECTOR
(Corporate Title if applicable)

Please note: The applicant's original signature (not a copy) is required above.

PERSON AUTHORIZING ACCESS TO THE PROPERTY MUST COMPLETE THE FOLLOWING:

C. I either own the property described in this application or I have legal authority to allow access to the property, and I consent, after receiving prior notification, to any site visit on the property by agents or personnel from the Department of Environmental Protection, the Water Management District and the U.S. Army Corps of Engineers necessary for the review and inspection of the proposed project specified in this application. I authorize these agents or personnel to enter the property as many times as may be necessary to make such review and inspection. Further, I agree to provide entry to the project site for such agents or personnel to monitor permitted work if a permit is granted.

Oscar N. McNeil, Jr., P.E. Oscar N. McNeil, Jr. 9/23/96
Typed/Printed Name Signature Date

Project Manager
(Corporate Title if applicable)

SECTION C Environmental Resource Permit Notice of Receipt of Application

Note: this form does not need to be submitted for noticed general permits.

This information is required in addition to that required in other sections of the application. Please submit five copies of this notice of receipt of application and all attachments with the other required information. Please submit all information on 8 1/2" x 11" paper.

Project Name: IR - 8 Shoreline Protection System, Fleming Key
County: Monroe
Owner: NAS Key West
Applicant: Bechtel Environmental, Inc. as agent for NAS Key West
Applicant's Address: 151 Lafayette Drive, P.O. Box 350
Oak Ridge, TN 37831-0350 Phone (423) 220-2745

1. Indicate the project boundaries on a USGS quadrangle map. Attach a location map showing the boundary of the proposed activity. The map should also contain a north arrow and a graphic scale; show Section(s), Township(s), and Range(s); and must be of sufficient detail to allow a person unfamiliar with the site to find it. (Attachment 1)
2. Provide the names of all wetlands, or other surface waters that would be dredged, filled, impounded, diverted, drained, or would receive discharge (either directly or indirectly), or would otherwise be impacted by the proposed activity, and specify if they are in an Outstanding Florida Water or Aquatic Preserve:
Man of War Harbor, Atlantic Ocean (Outstanding Florida Water)
3. Attach a depiction (plan and section views), which clearly shows the works or other facilities proposed to be constructed. Use multiple sheets, if necessary. Use a scale sufficient to show the location and type of works. (Attachments 3 & 6)
4. Briefly describe the proposed project (such as "construct dock with boat shelter", "replace two existing culverts", "construct surface water management system to serve 150 acre residential development"):
Construct a shoreline protection system to protect landfill from erosion.
Utilize Armorflex Cellular Concrete Block Revetment System.
5. Specify the acreage of wetlands or other surface waters, if any, that are proposed to be filled, excavated, or otherwise disturbed or impacted by the proposed activity:
filled 0 ac.; excavated 0 ac.; other impacts 0.3 ac.

See explanation on next page.
6. Provide a brief statement describing any proposed mitigation for impacts to wetlands and other surface waters (attach additional sheets if necessary):
See Attached Mitigation Statement

FOR AGENCY USE ONLY
Application Name: _____
Application Number: _____
Office where the application can be inspected: _____

Note to Notice recipient: The information in this notice has been submitted by the applicant, and has not been verified by the agency. It may be incorrect, incomplete or may be subject to change.

SECTION C ADDITIONAL INFORMATION

5. Impact Explanation

The proposed improvements to the eroded banks of the existing landfill on Fleming Key will include a small area of disturbance along the water's edge below the mean low water (MLW) elevation of -0.7. This area has been estimated by calculating a strip of approximately 7.5 feet wide by 1,800 feet long below MLW. This is approximately 0.3 acres of disturbance that is not exclusively filled or excavated.

Note that all elevations are referenced to the National Geodetic Vertical Datum (NGVD).

6. Mitigation Statement

The purpose of this project is to provide permanent erosion protection from wave attack and the effects of erosion on an existing landfill along the shores of an Outstanding Florida Water. This mitigation also includes removal of exotic plants such as Australian Pine and Brazilian Pepper in the approximately 130,000 square foot construction area, the planting of Sea Purslane along the top three rows of the Armorflex block system, and the planting of Red Mangroves between stations 15+00 and 18+00 (300 linear feet) at a spacing of approximately 3 feet between plants. These mangroves will be planted in three rows with the first at elevation 0.0, and succeeding rows spaced 3 ft. further landward. These mangroves are expected to provide a seed base from which other areas along Fleming Key can benefit.

In addition to the above mentioned mitigation, the design of the revetment and the construction plan considered protection of native species. Turtle grass, for example, will be protected during construction by placing floating turbidity barriers along the edge of the grass. Moreover, the design of the revetment places its edge above and landward of the grass edge. Any impact to the Turtle Grass should be minimal, if at all.

Maintenance of the plantings will include daily waterings of the sea purslane for seven days after installation, then three times a week for three weeks. Mitigation is considered successful if 80 percent of the mangroves and sea purslane are established thirty days after planting.

After installation of the shoreline protection system, maintenance of native species plantings and prevention of exotic growth will be the responsibility of NAS Key West. On an annual basis for five years after construction the site will be inspected for exotic plant species. Any exotic plant species that root on the Shore Protection System will be removed.

This entire project is considered mitigation because it protects Outstanding Florida Waters from harm due to erosion of the landfill; it improves site aesthetics; removes exotic species, and adds native species to the site.

Section E - Additional Information

I. Site Information

- A. A portion of the USGS Key West Quadrangle map is attached. See Attachment 1.

USDA/SCS soil types have not been provided. The site has been used as a landfill and this information would not be accurate.
- B. See Attachment 2.
- C. See Attachment 3 - Site Plan, & 6 - Cross-Section. Information shown on the Site Plan and the cross-sections was obtained from a survey by Frank & Elliot Surveyors, dated August 1995.
- D. Since this site is adjacent to the Atlantic Ocean, wet season high water table is not applicable.

II. Environmental Considerations

- A. Not applicable.
- B. Not applicable.
- C. The purpose of this project is to provide permanent erosion protection from wave attack and the effects of erosion on an existing landfill along the shores of an Outstanding Florida Water. This mitigation also includes removal of exotic plants such as Australian Pine and Brazilian Pepper in the approximately 130,000 square foot construction area, the planting of Sea Purslane along the top three rows of the Armorflex block system, and the planting of Red Mangroves between stations 15+00 and 18+00 (300 linear feet) at a spacing of approximately 3 feet between plants. These mangroves will be planted in three rows with the first at elevation 0.0, and succeeding rows spaced 3 ft. further landward. These mangroves are expected to provide a seed base from which other areas along Fleming Key can benefit.

In addition to the above mentioned mitigation, the design of the revetment and the construction plan considered protection of native species. Turtle grass, for example, will be protected during construction by placing floating turbidity barriers along the edge of the grass, and the design of the revetment places its edge above and landward of the grass edge. Any impact to the Turtle Grass should be minimal, if at all.

Maintenance of the plantings will include daily waterings of the sea purslane for seven days after installation, then three times a week for three weeks. Mitigation is considered successful if 80 percent of the mangroves and sea purslane are established thirty days after planting.

After installation of the shoreline protection system, maintenance of native species plantings and prevention of exotic growth will be the responsibility of NAS Key West. On an annual

basis for five years after construction the site will be inspected for exotic plant species. Any exotic plant species that root on the Shore Protection System will be removed.

This entire project is considered mitigation because it protects Outstanding Florida Waters from harm due to erosion of the landfill; it improves site aesthetics; removes exotic species, and adds native species to the site.

- D. Not applicable.
- E. Tables 1, 2, 3, and 4 are not applicable. Table 5 is provided as Attachment 4.

III. Plans

Detailed plans and specifications are provided as Attachments 3, 5, 6, 7, and 8. All elevations shown on the drawings are referenced to National Geodetic Vertical Datum (NGVD).

- A. See Attachments 1, 2, & 3.
- B. Fleming Key is owned by the federal government, and current land use at the project site is an inactive landfill. The landfill covers approximately 20 acres on the southern end of Fleming Key, and the southeastern portion of the site area is bordered by the City of Key West, Waste Sewage Treatment Plant. A munitions storage area is located along the east boundary of the site.

Dense vegetation covers most of the proposed project site, primarily Australian pine. The southwestern area of the site contains piles of metal debris, and there is visible erosion of the beach areas, and waste material (primarily concrete construction debris is exposed to the surface waters along the shorelines. There are no wetlands or other surface waters and no natural or aquatic communities on the landfill.

- C. See Attachments 3, 8.1, 8.2, and 8.3.
- D. Not applicable.
- E. Not applicable.
- F. Land use at Fleming Key will remain unchanged for the foreseeable future. There are no plans to either reopen the landfill or remove its contents. In addition, the Sewage Treatment Plant will remain operating. Construction of the Shore Protection System will involve the removal of debris along the shoreline and placing it on top of the landfill toward the interior; protection of the landfill from future erosion, and removal of exotic vegetation species in favor of mangroves and Sea Purslane.

The limits of disturbed land to implement this project are minimal. No changes in land use, surface waters, aquatic communities, or uplands will occur as a result of constructing the Shore Protection System.

- G. The only impact to wetlands by this project is along the toe of the Shore Protection System.

The design includes swales along the back side of the proposed berm for short sections. This swale will be used to protect the berm from erosion and to direct water away from the berm. Any water behind the berm will infiltrate into the soil just as it does now. Erosion protection will be provided along the entire length of the berm and swale, as shown on Attachment 5. The swale will be covered by Pyramat erosion protection fabric as shown on Attachment 6.

- H. Not applicable.
- I. See Attachment 5.
- J. Not applicable.
- K. Location and description of benchmarks are shown on Attachment 3.
- L. See Attachments 3 & 6.
- M. See Attachment 5.
- N. Rights-of-way and easements are not required for successful completion of this project, since the property is entirely owned by NAS Key West.
- O. Man of War Harbor (Outstanding Florida Waters). However, under normal circumstances, water captured behind the berm will remain there and infiltrate into the soil behind the berm, rather than be discharged to the harbor.
- P. See Attachment 3 for the location of temporary sediment and turbidity control measures during construction. Permanent erosion and sediment control measures include the Armorflex revetment system, Pyramat protection of the berm top and backslope, mitigation planting, and maintenance of these features until established as shown on Attachment 6. (Refer also to Q. IV: Construction Techniques)
- Q. Mitigation planting will include Sea Purslane planted in the top 3 rows of block on the face of the revetment. They will be spaced approximately 3 feet apart along the entire length of the Red Mangroves will be planted from station 15+00 to station 18+00 as described elsewhere. See also Attachment 3d and 6a.
- R. See Attachments 8.1, 8.2, and 8.3. (Refer also to Q. IV: Construction Techniques)
- S. Temporary and permanent disposal of all excavated materials will be placed on the existing landfill directly adjacent to the project site.
- T. Not applicable.
- U. Not applicable.

V. The project site is a somewhat remote location. The only adjacent facility is the Key West Waste Water Treatment Plant. The plant is fenced and will not be affected by construction of this project.

W. Not applicable.

IV. Construction Schedule and Techniques

Construction Techniques

See Attachment 10 for Construction Schedule.

Phase 1 - Construction baseline, toe excavation limits, and 30-foot off-set for construction control points and bench marks will be laid out. Install floating turbidity barriers along the entire length of the project 10 feet beyond the toe excavation limits or to the edge of Turtle Grass if present. If Turtle Grass is present, care shall be taken to avoid damage to the Turtle Grass. The floating turbidity barriers will have vertical posts every 100 feet and be anchored to the bottom every 50 feet. The floating turbidity barriers will return back to the shoreline at each end of the project.

Existing vegetation will be cleared from the embankment to the required distance necessary to install the proposed revetment system and appurtenances. Small trees and shrubs less than 4-inches in diameter will be chipped and the mulch used for erosion control and maintenance of site construction roads. Roots, stumps, and large trees will be placed onto the existing landfill area. Stumps of exotic plants that are left in place will be treated with herbicide.

Phase 2 - The proposed embankment slope will be degrubbed by removing all debris to a minimum depth of two feet below the bottom of block revetment system surface elevation.

Limerock base material will be placed in approximately two-foot lifts and compacted with a vibratory roller.

Armorflex revetment system mat fabrication will occur on land in the temporary storage and laydown area shown on Attachment 2.

The geotextile will be field sewn into 100-foot-wide panels. The overfilled embankment material will be excavated to the proper lines and grades and the toe trench excavated. The geotextile will be laid on top of the embankment material and pinned at the top and joints, as necessary to hold in place. Joints will be overlapped a minimum of two feet. The 6-inch bedding stone layer will be placed.

Phase 3 - Bedding stone will be graded to final lines and grades. Fabricated Armorflex mats will be placed on the slope. The connecting "key" blocks will be placed to lock the mats together. Special mats will be field measured, fabricated, and placed for radii locations. Any seams larger than two inches in width will be grouted.

Anchor trench will be excavated. Reinforcement bars will be placed running through the mat loops. The Pyramat rolls will be placed on the embankment crest with the tail in the trench. Anchor concrete will be placed into the trench directly from the truck. Rebar and loops will be checked for alignment.

Backfilling and final dressing will begin. The berm area will be filled to the proposed lines and grades. Voids in the crest blocks and three rows down the slope will be filled with sand. Voids in the rest of the blocks will be filled with No. 57 Stone. Rip rap will be placed in the toe trench and at end rolls. The drainage swale and check dams will be excavated and/or filled. Pyramat will be rolled out and pinned as specified by manufacturer. Pyramat will be backfilled with a one-inch layer of topsoil.

Section D (station 15+00 to station 18+00) will be planted with Red Mangroves. See Attachment 3.

Sea Purslane will be planted as shown on Attachment 6.

Top of berm, swale, and all disturbed areas will be seeded and mulched.

Maintenance of the plantings will include daily waterings of the sea purslane for seven days after installation, then three times a week for three weeks. Planting will be considered successful if 80 percent of the mangroves and sea purslane is established thirty days after planting.

After installation of the shoreline protection system, maintenance of native species plantings and prevention of exotic growth on the revetment will be the responsibility of NAS Key West. On an annual basis for five years after construction the site will be inspected for exotic plant species. Any exotic plant species that root on the Shore Protection System will be removed.

Phase 4 - An as-built survey of the revetment system will be completed. Once the plantings are established, the floating turbidity barriers and any other temporary erosion and sediment control measures provided during construction will be removed. All equipment will be removed from the site.

- A. Not applicable.
- B. Previously discussed in Construction Techniques.
- C. The excavation along the shoreline for the toe embedment will be performed with a trackhoe.
- D. As previously discussed, Armorflex revetment system will be placed using mechanized equipment on top of a 6-inch limerock base material and geotextile fabric.
- E. Not applicable.

- F. Equipment and materials will be trucked to the site from the mainland to Key West. Some materials will be off-loaded along Mustin Street prior to reaching the project site, to be carried in smaller loads to avoid overloading the only bridge to the site rated at 32 tons. This off-loading area is shown on Attachment 2 as the Temporary Storage and Laydown Area.
- G. Not applicable.
- H. Ocean Breeze Construction Co., Inc. has performed the design and will perform the construction. Andrew K. Hackett, CPESC, President of Ocean Breeze, is responsible to monitor and inspect the work on a once a week basis to insure that it is performed in accordance with the design and permit requirements.

Daily, on-site construction supervision and updating of record drawings on a daily basis, will be performed by Allen McMullen, Project Manager at Ocean Breeze Construction Co., Inc.

Once this project is complete, as-built certification will be provided by Stephen W. Murray, P.E., CPESC, a registered engineer in the State of Florida. Mr. Murray is the project design engineer.

Ocean Breeze Construction Co., Inc. is a subcontractor to Bechtel Environmental, Inc. which is performing the work for the Southern Division, Naval Facilities Engineering Command. The project manager for Bechtel is Oscar N. McNeil, Jr. Bechtel will provide full time, on-site oversight of the construction by an experienced Project Superintendent.

Navy technical oversight and inspection of the work will be performed by Mark Ewing of the NAS Key West Resident Officer in Charge of Construction.

V. Drainage Information

The proposed project is intended to improve an existing erosion problem along the shores of a landfill. Drainage calculations have not been completed for this project because the runoff characteristics such as area, runoff coefficient, and time of concentration have not been changed.

- A. Not applicable.
- B. Not applicable.
- C. Not applicable.
- D. Not applicable.
- E. Not applicable.
- F. Not applicable.

VI. Operation and Maintenance and Legal Documentation

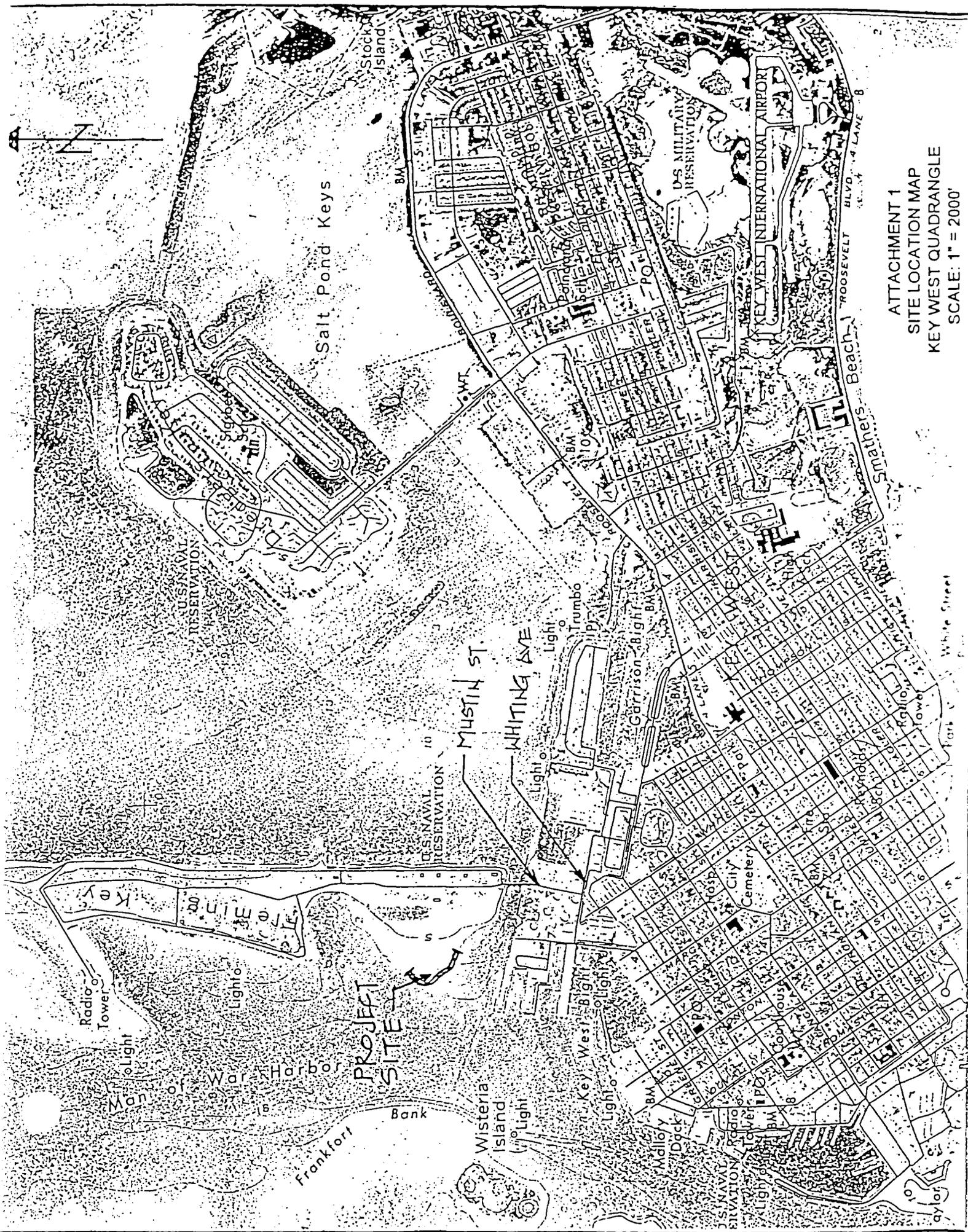
- A. NAS Key West will operate and maintain the Shore Protection System after completion of construction. NAS will perform a structural inspection of the Shore Protection System annually and after storm events exceeding the criteria of a 10-year storm event. On an annual basis for five years after construction the site will be inspected for exotic plant species. Any exotic plant species that root on the Shore Protection System will be removed. After five years it is expected that the native species planted during construction (red mangroves and sea purslane) will be capable of resisting exotic encroachment.
- B. NAS Key West is the owner and permittee.

VII. Water Use

- A. Not applicable.
- B. Not applicable.
- C. Not applicable.
- D. Not applicable.

Attachment List

<u>Attachment</u>	<u>Description</u>
1	Quadrangle Map
1a	CERCLA and RCRA Site Map
2	Aerial Photo
3	Site Plan
4	Table 5
5	Drainage Patterns
6	Typical X Section
7	Armorflex Specification
8	Cross-Sections
9	Not Used
10	Construction Schedule
11	Not Used
12	Existing Site Condition Photographs
13	Typical Construction Process for Armorflex
14	Revegetation with Red Mangroves in Armorflex



ATTACHMENT 1
SITE LOCATION MAP
KEY WEST QUADRANGLE
SCALE: 1" = 2000'

Radio Tower

Man of War Light

Light

Frankfort Bank

PROJECT SITE

Wisteria Island Light

MUSTIN ST.

WHITING AVE

Light

Malloy Dock

Light

SHORE LINE PROTECTION

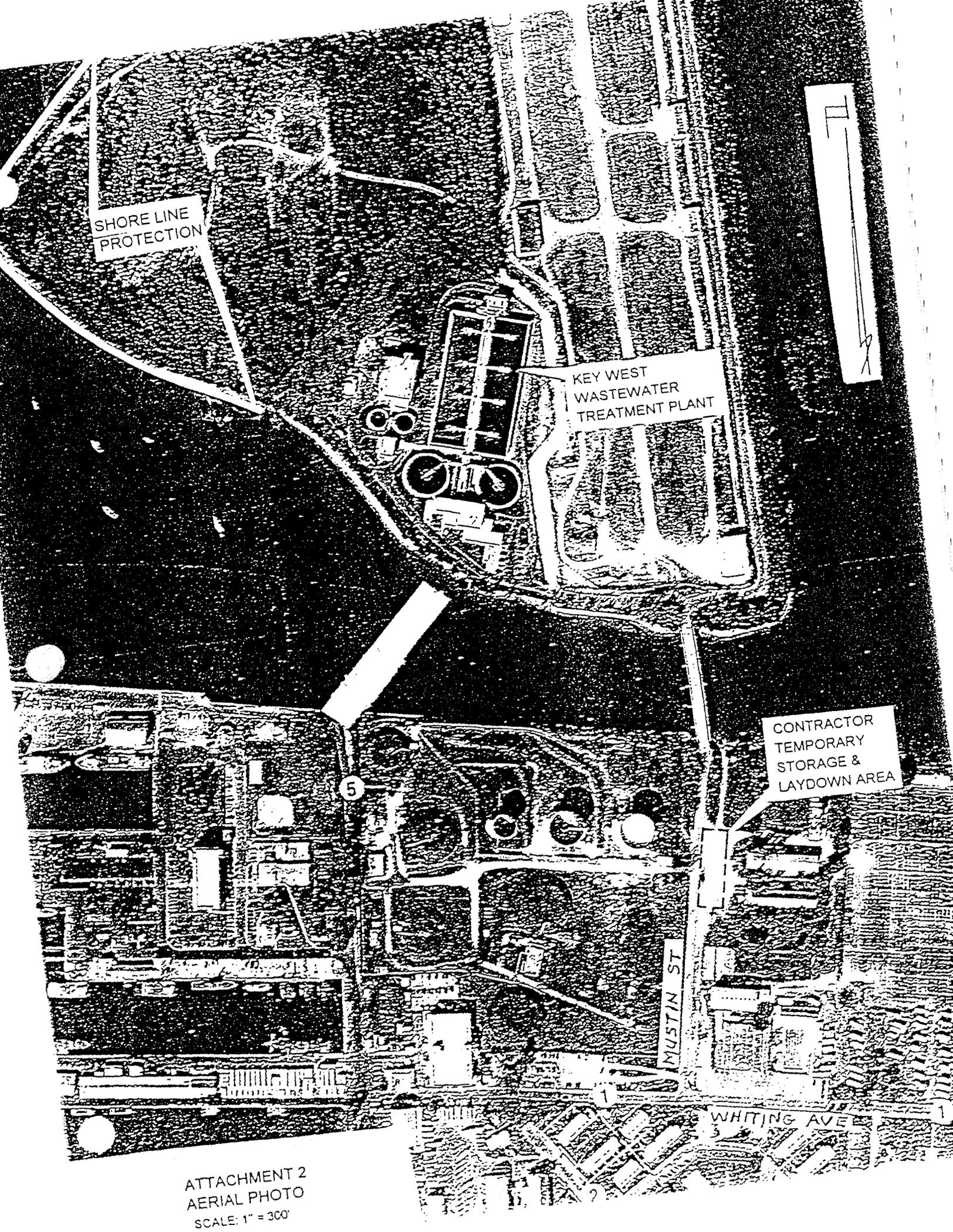
KEY WEST WASTEWATER TREATMENT PLANT

CONTRACTOR TEMPORARY STORAGE & LAYDOWN AREA

MUSTIN ST

WHITING AVE

ATTACHMENT 2
AERIAL PHOTO
SCALE: 1" = 300'





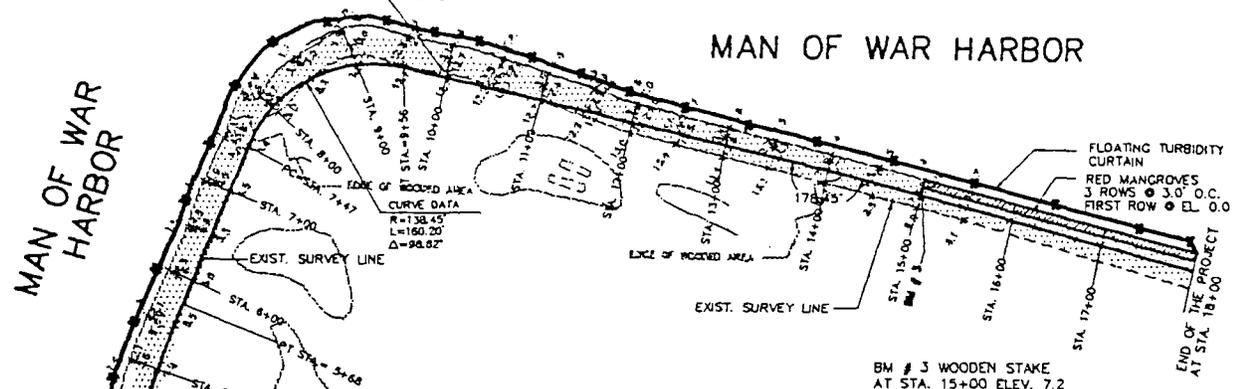
BM # 2 WOODEN STAKE
AT STA. 10+00 ELEV. 12.7

BM # 2

MAN OF WAR HARBOR

MAN OF WAR HARBOR

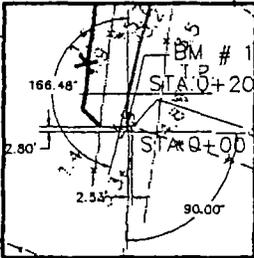
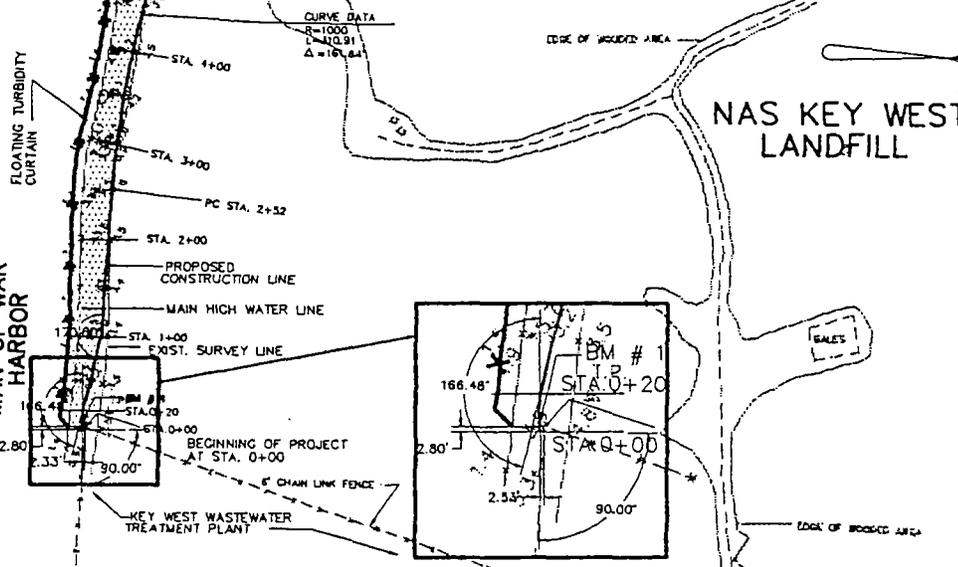
MAN OF WAR HARBOR



BM # 3 WOODEN STAKE
AT STA. 15+00 ELEV. 7.2



NAS KEY WEST LANDFILL



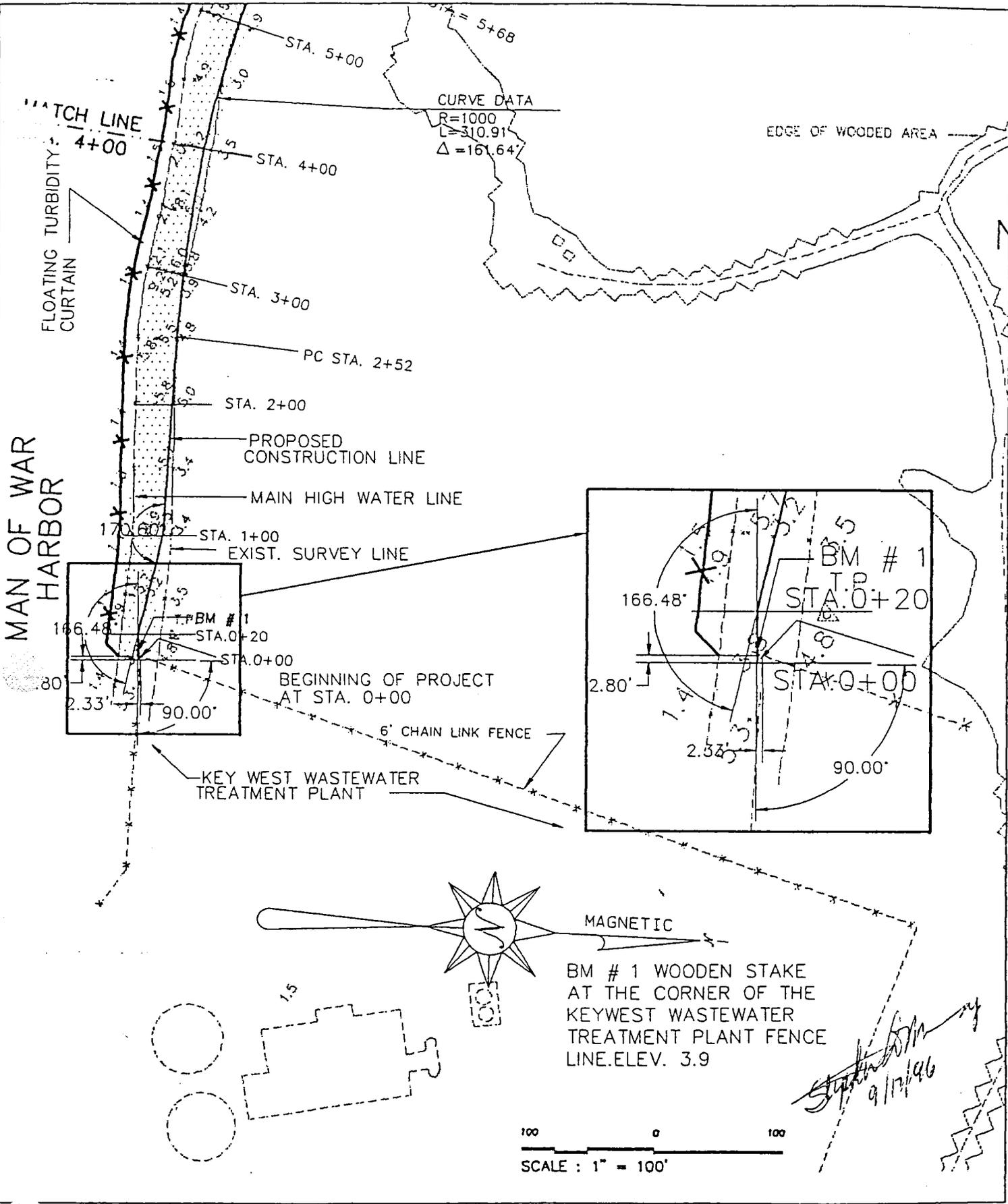
BM # 1 WOODEN STAKE
AT THE CORNER OF THE
KEY WEST WASTEWATER
TREATMENT PLANT FENCE
LINE. ELEV. 3.9

Stephen J. May
10/2/96

200 0 200

SCALE : 1" = 200'

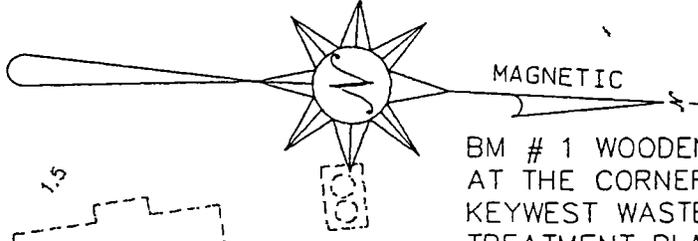
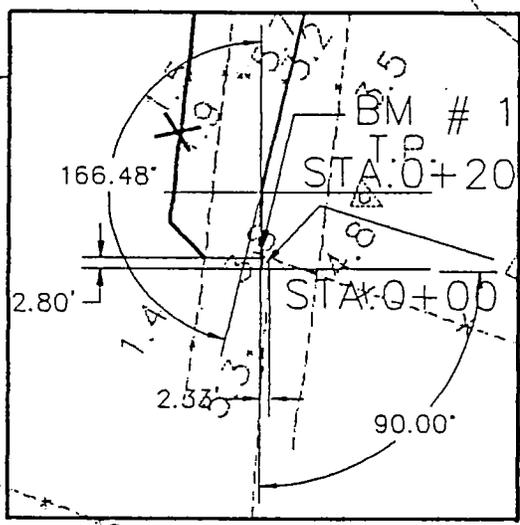
DESIGNER'S PROJECT NO.: 0853	 DELON HAMPTON & ASSOCIATES 600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL: (404) 872-6314 FAX: (404) 872-5883	DRAWING TITLE: ATTACHMENT 3a	SKETCH NO.:
DRAWN BY: S.		SITE PLAN	
ISSUE DATE: 09/13/98		KEY WEST NAVAL STATION	



MAN OF WAR HARBOR

CURVE DATA
 $R=1000$
 $L=310.91$
 $\Delta=161.64^\circ$

EDGE OF WOODED AREA

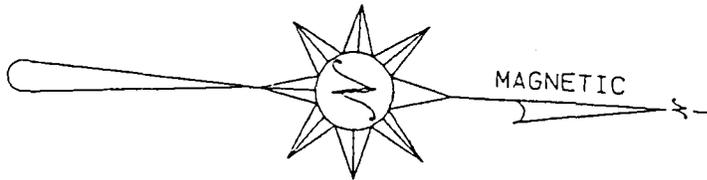


BM # 1 WOODEN STAKE
 AT THE CORNER OF THE
 KEY WEST WASTEWATER
 TREATMENT PLANT FENCE
 LINE. ELEV. 3.9

Signature
 9/17/96

100 0 100
 SCALE : 1" = 100'

DESIGNER'S PROJECT NO.: 0953 DRAWN BY: M.S. ISSUE DATE: 09/13/96	DHA DELON HAMPTON & ASSOCIATES 600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL: (404) 872-5514 FAX: (404) 872-5883	DRAWING TITLE:	ATTACHMENT 3.b	SKETCH NO.:
			SITE PLAN	
			KEY WEST NAVAL STATION	

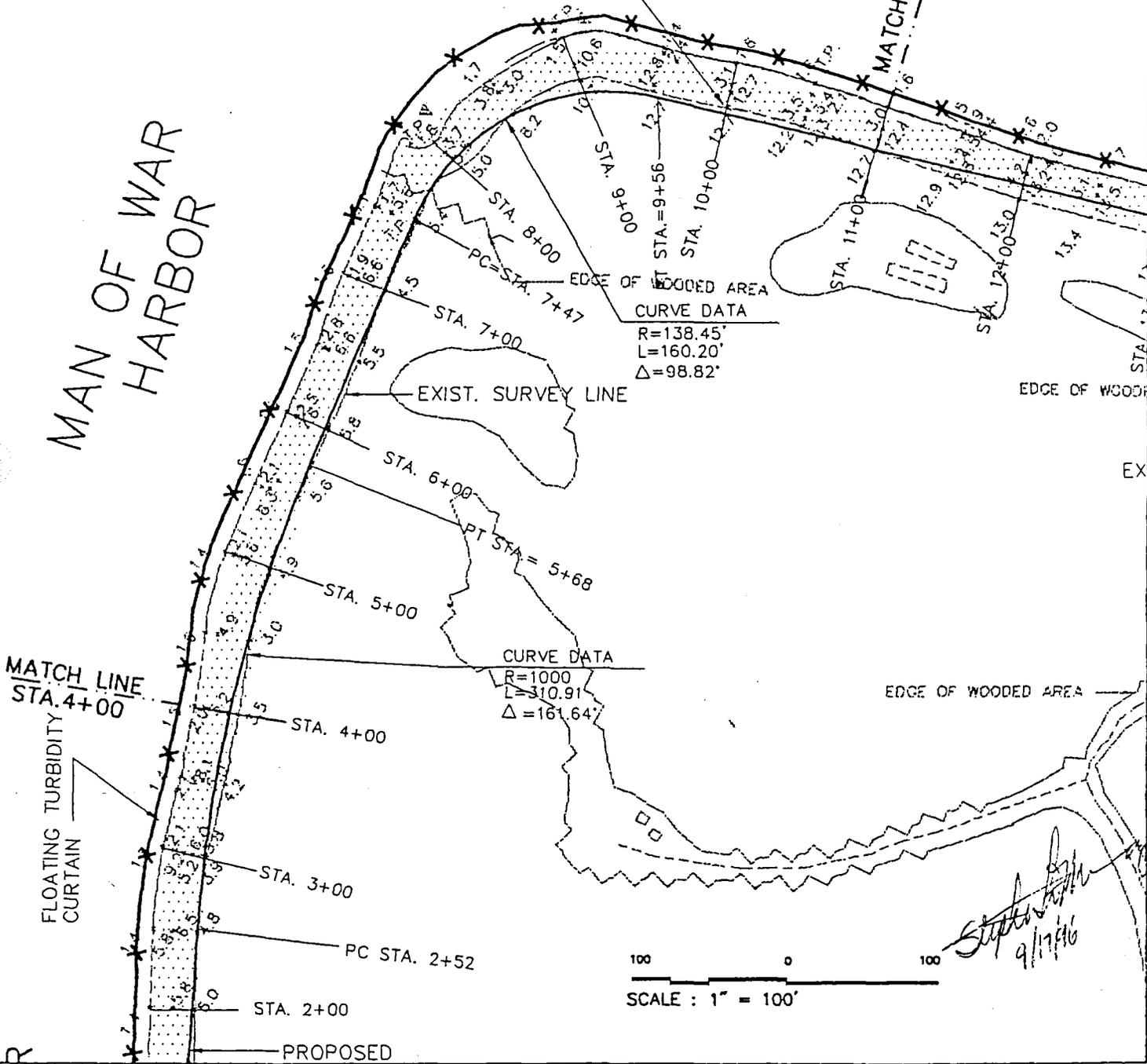


BM # 2 WOODEN STAKE
AT STA. 10+00 ELEV. 12.7

BM # 2

MATCH LINE STA. 11+00

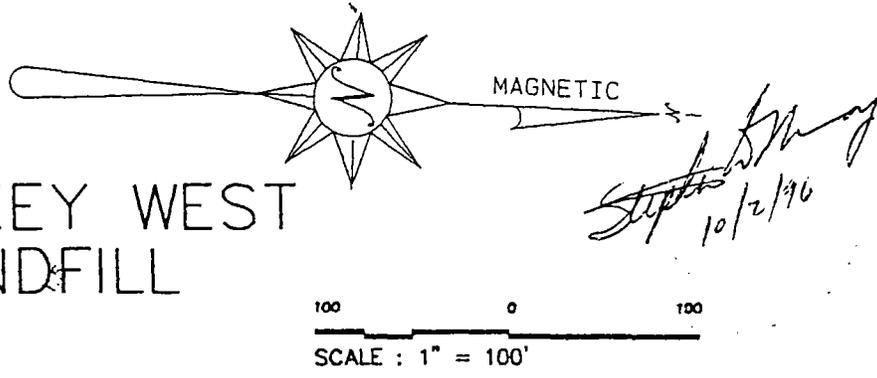
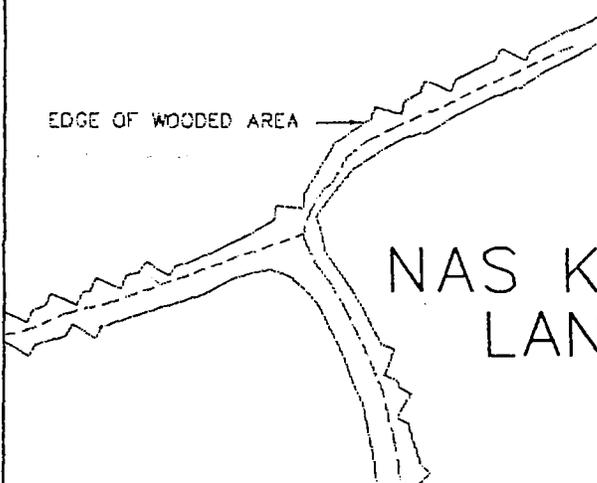
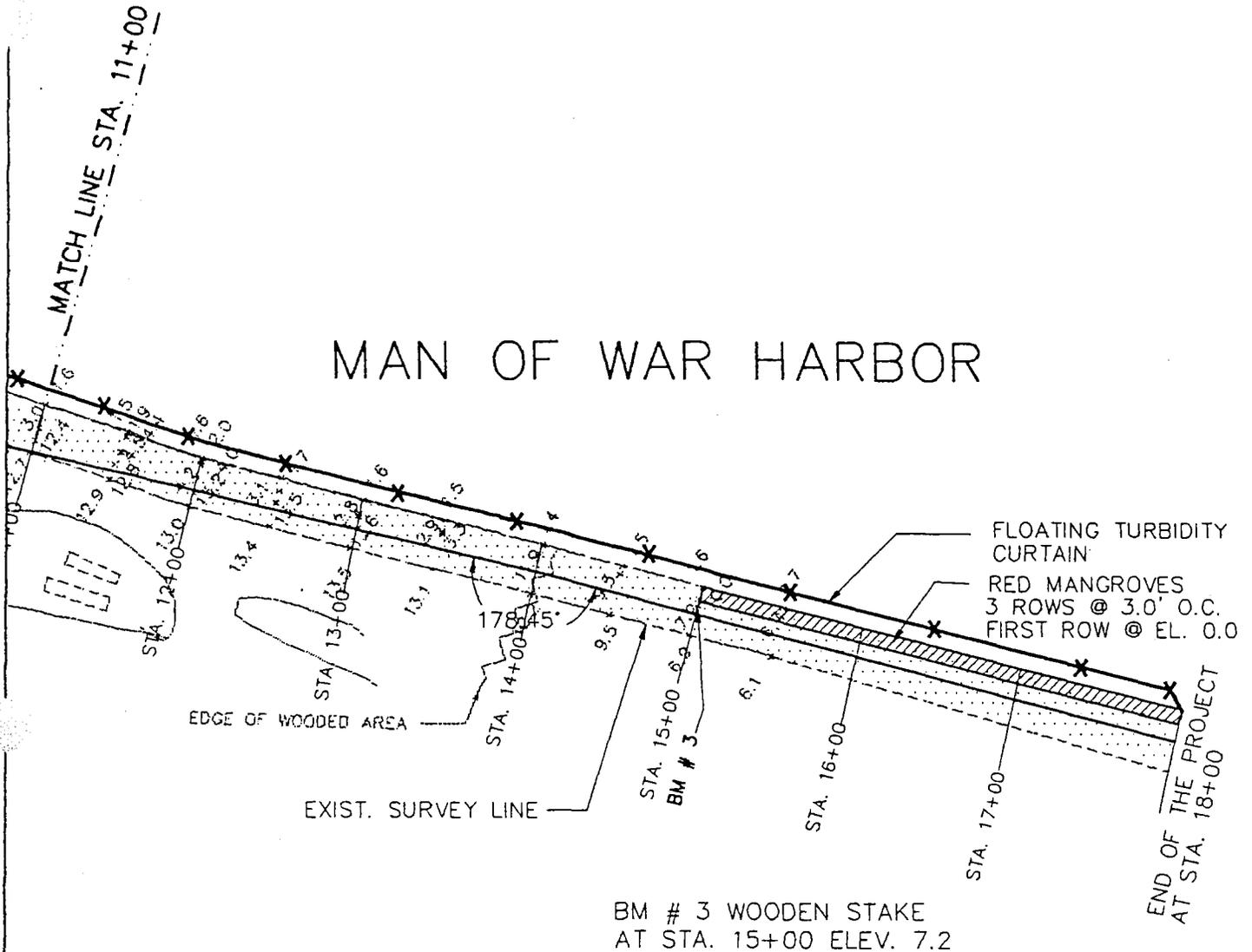
MAN OF WAR
HARBOR



100 0 100
SCALE : 1" = 100'

DESIGNER'S PROJECT NO.: 553 DRAWN BY: M.S. ISSUE DATE: 08/13/98	 DELON HAMPTON & ASSOCIATES 600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL: (404) 872-5514 FAX: (404) 872-5863	DRAWING TITLE:	ATTACHMENT 3C	SKETCH NO.:
			SITE PLAN	
			KEY WEST NAVAL STATION	

MAN OF WAR HARBOR



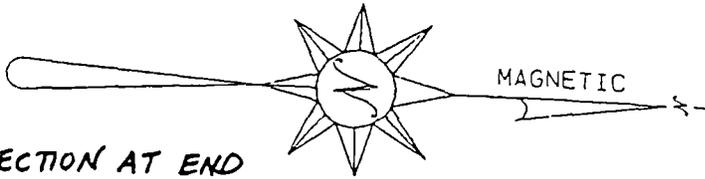
DESIGNER'S PROJECT NO.: 0953	 DELON HAMPTON & ASSOCIATES 600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL: (404) 872-5514 FAX: (404) 872-5883	DRAWING TITLE: ATTACHMENT 3d	SKETCH NO.:
DRAWN BY: M.S.		SITE PLAN	
ISSUE DATE: 09/13/96		KEY WEST NAVAL STATION	

Table 5: SHORELINE STABILIZATION IF YOU ARE CONSTRUCTING A SHORELINE STABILIZATION PROJECT, PLEASE PROVIDE THE FOLLOWING:

Stabilization	Linear Ft. New	Linear Ft. Replaced	Linear Ft. Repaired	Linear Ft. Removed	Slope H: 2 V: 1	Toe Width (Ft.)
Vertical Seawall						
Seawall + Rip Rap						
Rip Rap						
Rip Rap + Vegetation				800		
Other Shoreline Stabilization Type <u>Articulated Block</u>	1800					

Size of Rip Rap Block size - 17.4" x 15.5" x 7.5" high ; Block weight - 99-113 lbs

Type of Rip Rap Armorflex Articulated Concrete Block



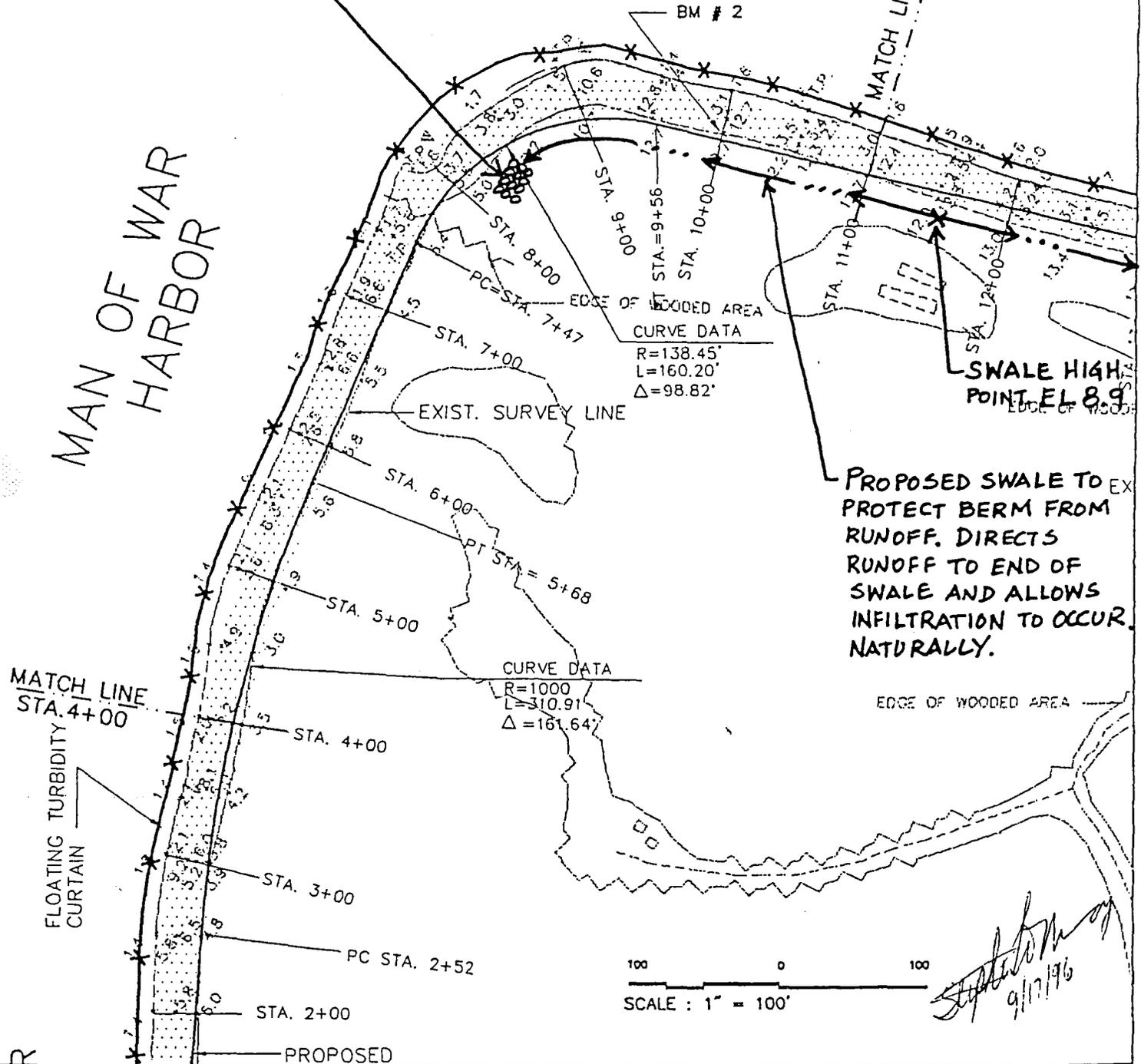
RIP RAP
EROSION PROTECTION AT END
OF SWALE WHERE PYRAMAT
STOPS.

BM # 2 WOODEN STAKE
AT STA. 10+00 ELEV. 12.7

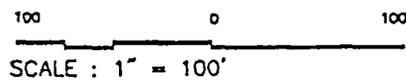
BM # 2

MATCH LINE STA. 11+00

MAN OF WAR
HARBOR



PROPOSED SWALE TO EX
PROTECT BERM FROM
RUNOFF. DIRECTS
RUNOFF TO END OF
SWALE AND ALLOWS
INFILTRATION TO OCCUR
NATURALLY.



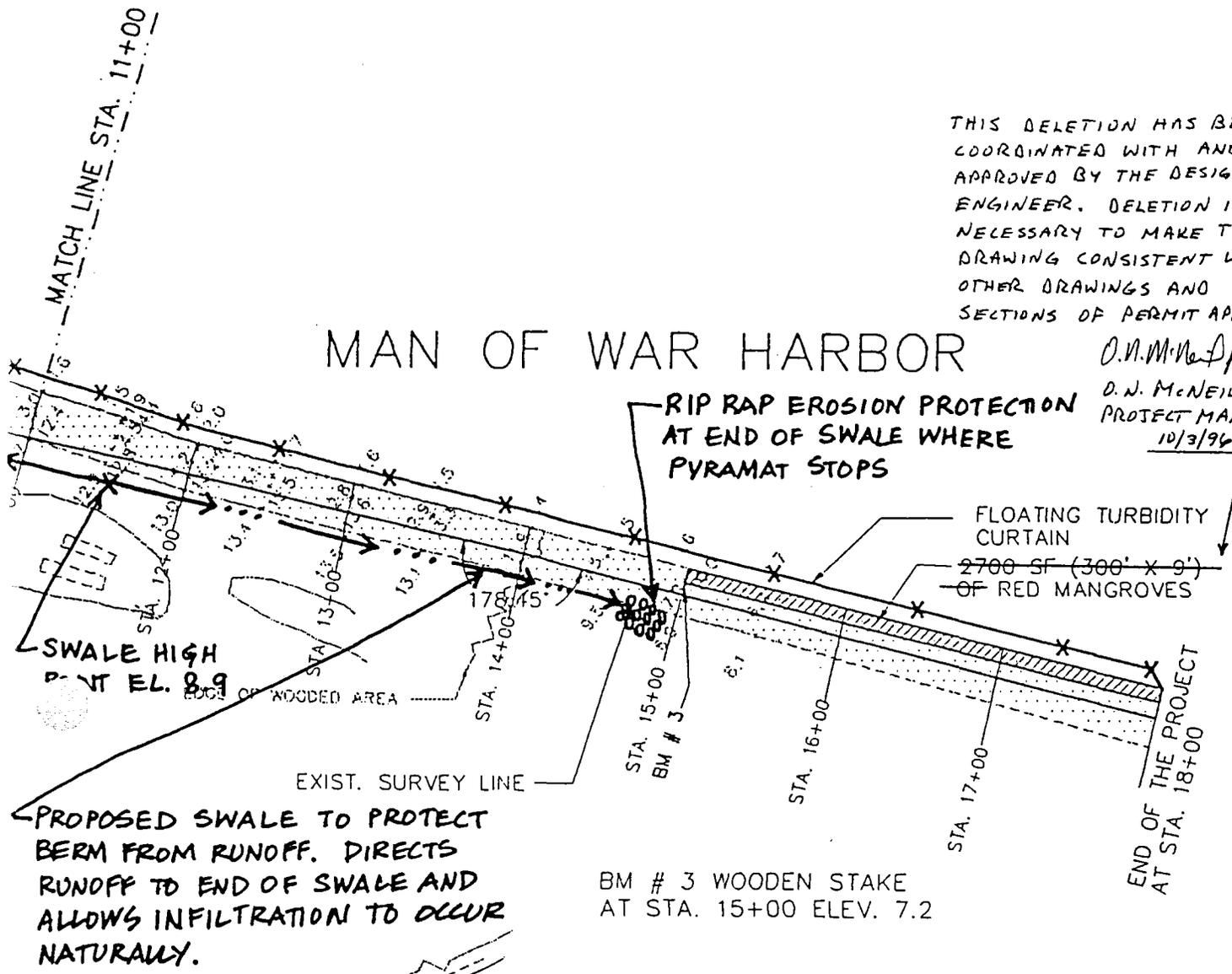
Signature
9/17/96

DESIGNER'S PROJECT NO.: 0453 DRAWN BY: M.S. ISSUE DATE: 08/13/96	<p style="text-align: center;">DHA</p> <p style="text-align: center;">DELON HAMPTON & ASSOCIATES</p> <p style="text-align: center;">600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308</p> <p style="text-align: center;">TEL: (404) 872-5514 FAX: (404) 872-5883</p>	DRAWING TITLE: <p style="text-align: center;">ATTACHMENT 5a</p> <p style="text-align: center;">DRAINAGE PLAN</p> <p style="text-align: center;">KEY WEST NAVAL STATION</p>	SKETCH NO.:
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MAN OF WAR HARBOR

THIS DELETION HAS BEEN COORDINATED WITH AND APPROVED BY THE DESIGN ENGINEER. DELETION IS NECESSARY TO MAKE THIS DRAWING CONSISTENT WITH OTHER DRAWINGS AND SECTIONS OF PERMIT APPLICATION

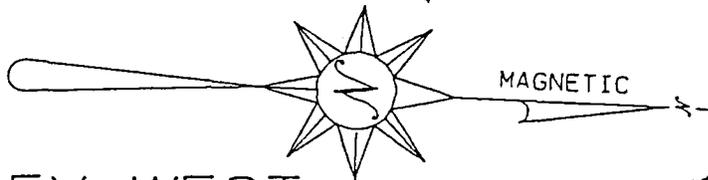
D.N. McNeil, Jr.
 D.N. McNEIL, JR.
 PROJECT MANAGER
 10/3/96



BM # 3 WOODEN STAKE AT STA. 15+00 ELEV. 7.2

EDGE OF WOODED AREA

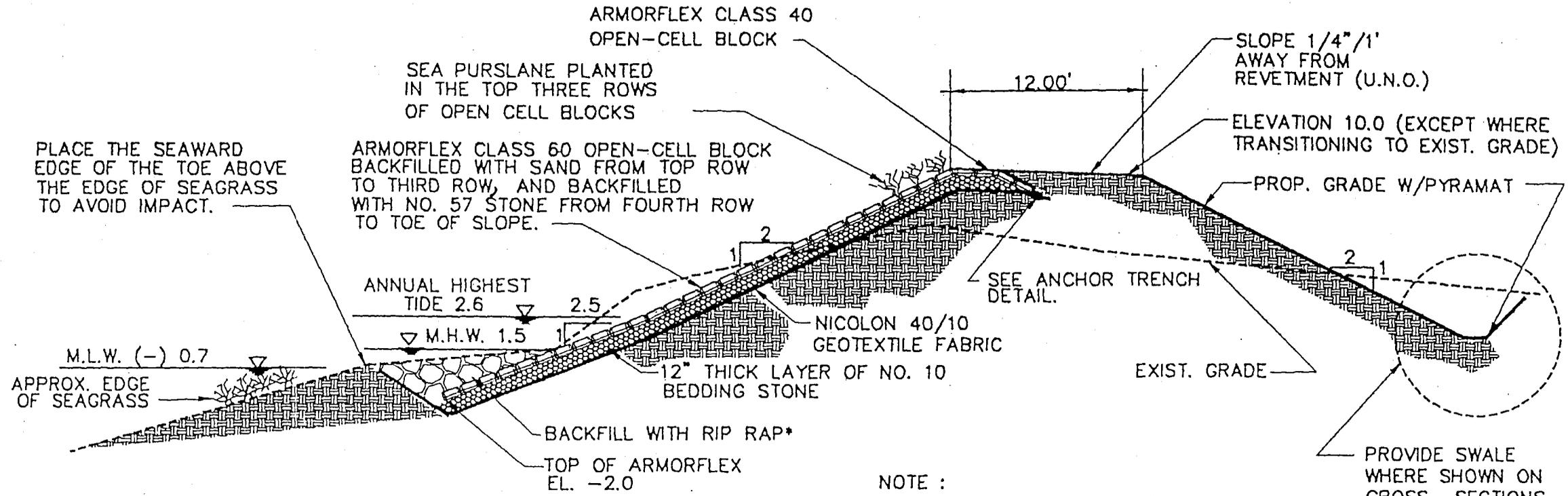
NAS KEY WEST LANDFILL



100 0 100
 SCALE : 1" = 100'

Stephen...
 9/17/96

DE'S PROJECT NO.: 00 DRAWN BY: M.S. ISSUE DATE: 09/13/96	DELON HAMPTON & ASSOCIATES 600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL: (404) 872-5514 FAX: (404) 872-5881	DRAWING TITLE: ATTACHMENT 5b DRAINAGE PLAN KEY WEST NAVAL STATION	SKETCH NO.:
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PLACE THE SEAWARD
EDGE OF THE TOE ABOVE
THE EDGE OF SEAGRASS
TO AVOID IMPACT.

ARMORFLEX CLASS 60 OPEN-CELL BLOCK
BACKFILLED WITH SAND FROM TOP ROW
TO THIRD ROW, AND BACKFILLED
WITH NO. 57 STONE FROM FOURTH ROW
TO TOE OF SLOPE.

ARMORFLEX CLASS 40
OPEN-CELL BLOCK

SEA PURSLANE PLANTED
IN THE TOP THREE ROWS
OF OPEN CELL BLOCKS

SLOPE 1/4" / 1'
AWAY FROM
REVTMENT (U.N.O.)

ELEVATION 10.0 (EXCEPT WHERE
TRANSITIONING TO EXIST. GRADE)

PROP. GRADE W/PYRAMAT

ANNUAL HIGHEST
TIDE 2.6

M.H.W. 1.5

M.L.W. (-) 0.7

APPROX. EDGE
OF SEAGRASS

SEE ANCHOR TRENCH
DETAIL.

NICOLON 40/10
GEOTEXTILE FABRIC

12" THICK LAYER OF NO. 10
BEDDING STONE

EXIST. GRADE

BACKFILL WITH RIP RAP*

TOP OF ARMORFLEX
EL. -2.0

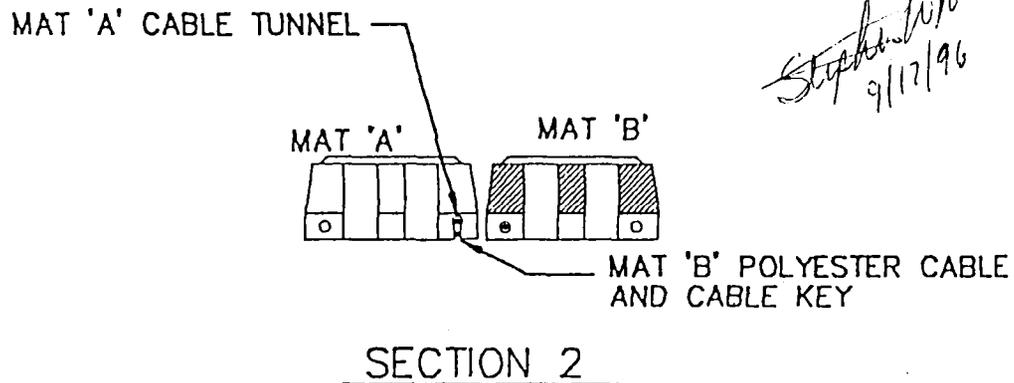
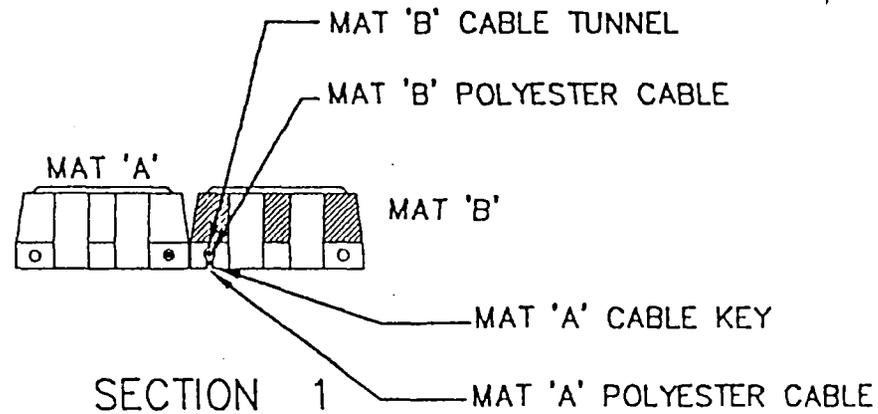
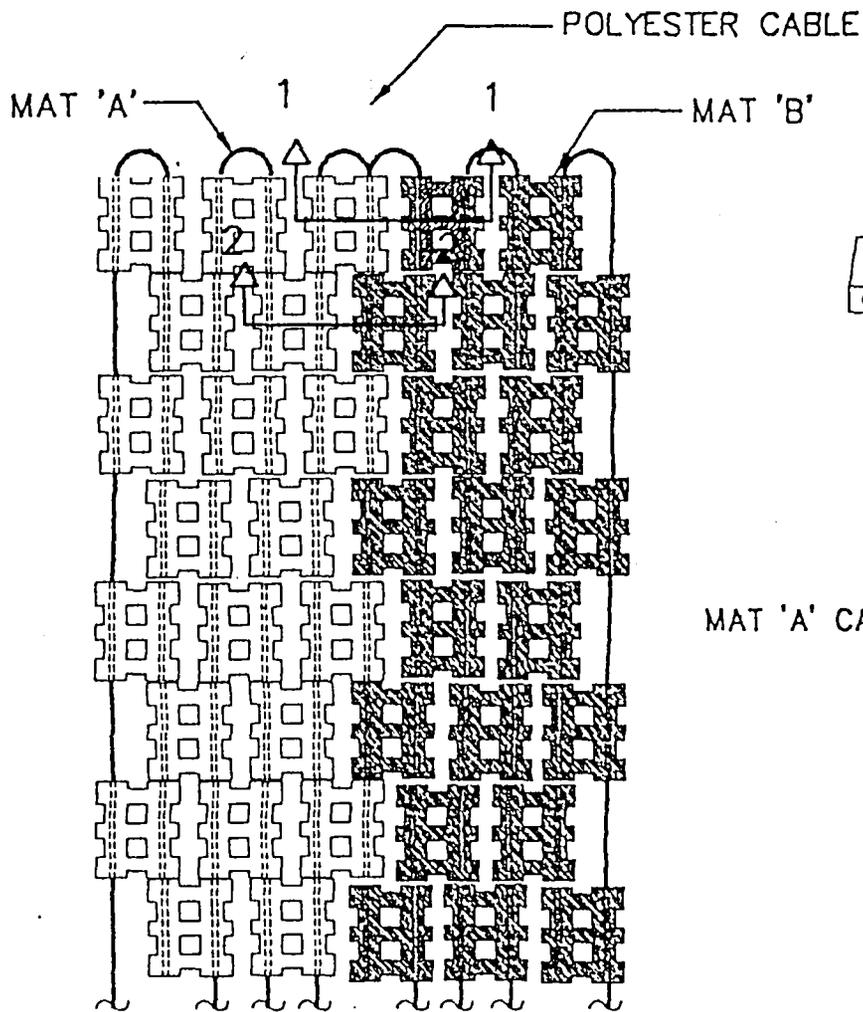
PROVIDE SWALE
WHERE SHOWN ON
CROSS- SECTIONS

NOTE :
ALL ELEVATIONS ARE BASED UPON NGVD.
* STA. 15+00 TO STA. 18+00 BACKFILL WITH RIP RAP
AND SAND, PLANT RED MANGROVES 3' O.C. 3 ROWS.

TYPICAL ARMORFLEX CROSS SECTION

N.T.S.

Stephen M. of
10/11/96



Steph...
9/17/96

PLAN VIEW

MAT CONNECTION CABLE KEY DETAIL

N.T.S.

SEED AND MULCH TO
LIMIT OF DISTURBED AREA

ARMORFLEX
CLASS 40

1" TOPSOIL (MAX.)

PYRAMAT

ARMORFLEX
CLASS 60

BEDDING STONE

GEOTEXTILE
NICOLON 40/10
OR EQUAL

#5 FIBERGLASS REBAR
WITH CONC. DEADMAN
3000 PSI

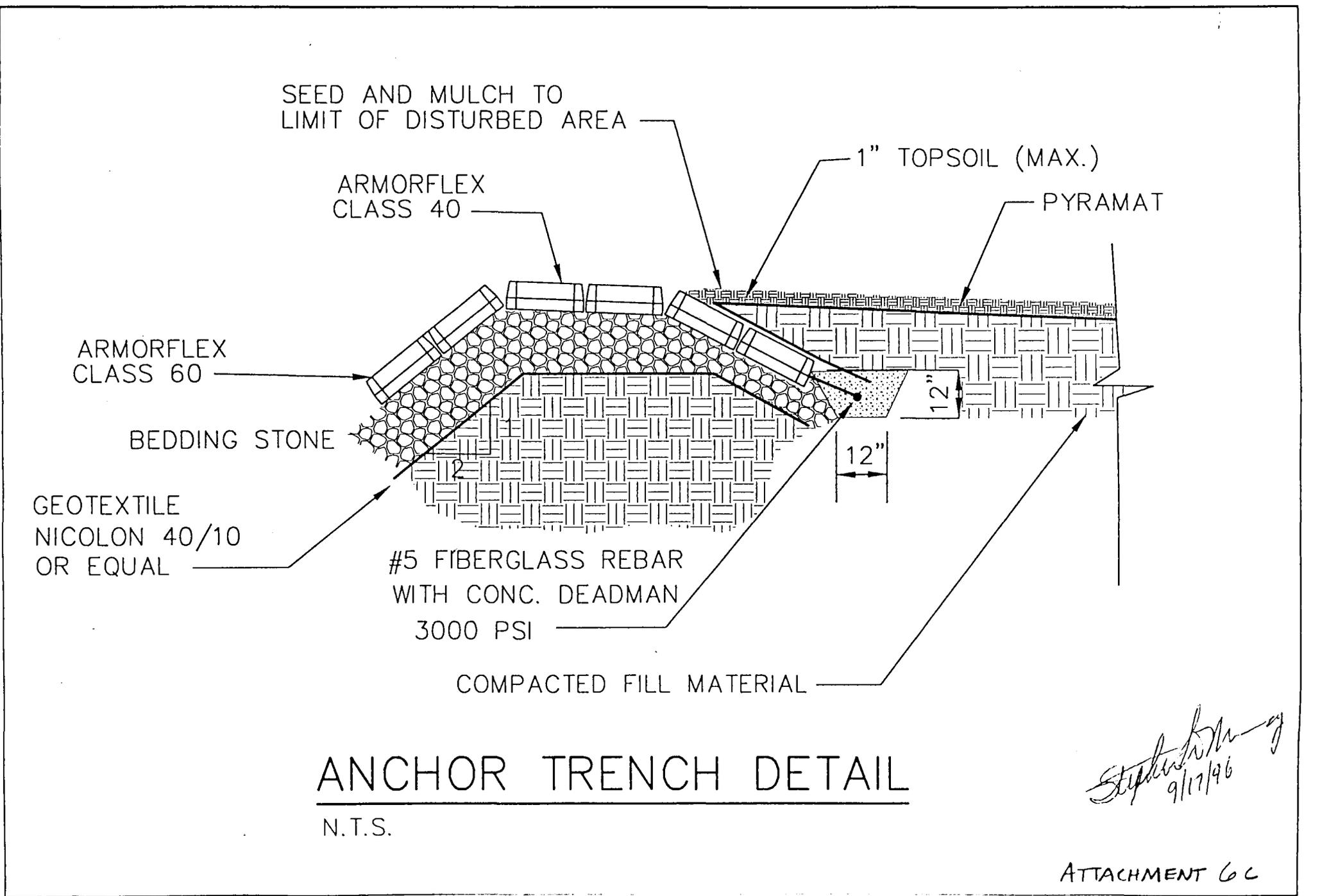
COMPACTED FILL MATERIAL

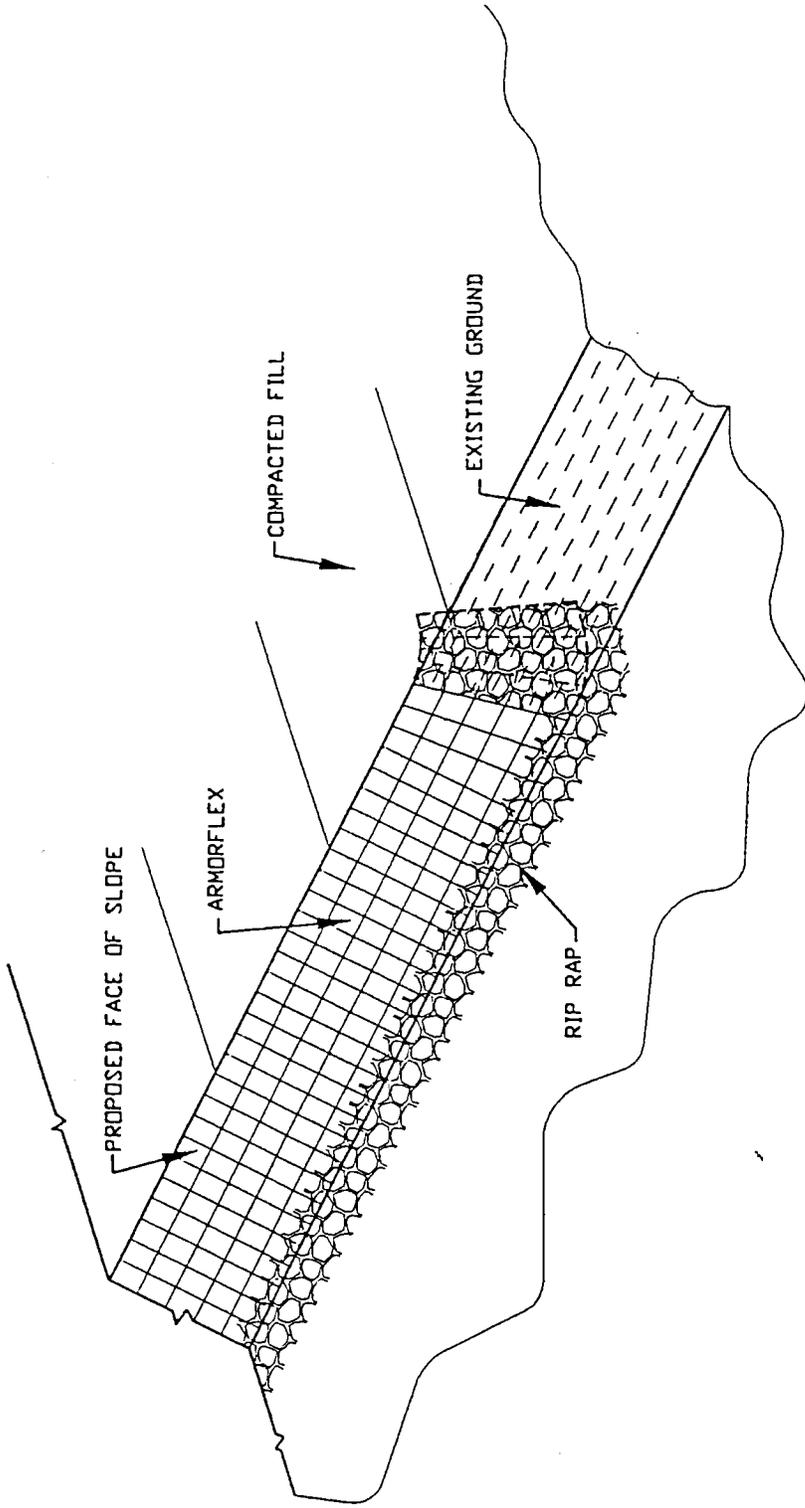
ANCHOR TRENCH DETAIL

N.T.S.

Stephen M. ...
9/17/96

ATTACHMENT 6C





ENDROLL/SCOUR PROTECTION DETAIL

N.T.S.

September 17, 1996

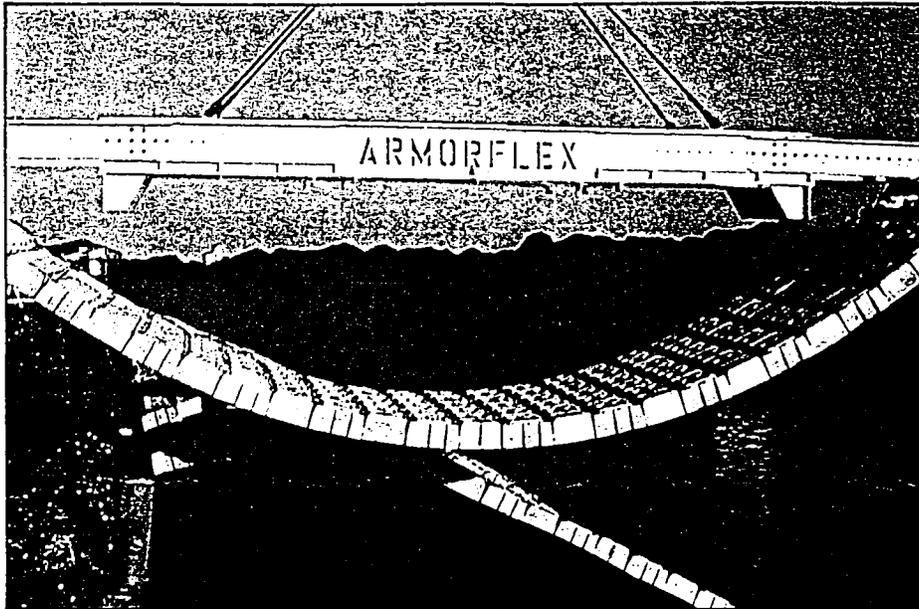
Erosion
Control
Systems



ARMORTEC FLEX

ARMORTEC

PERFORMANCE TESTED/COST EFFECTIVE ARMORFLEX[®] EROSION CONTROL SYSTEM



Armorflex articulating precast concrete mats erosion control system.

ARMORFLEX Erosion Control System provides the engineered alternative to conventional erosion control materials for revetment and channel protection.

ARMORFLEX combines its specially designed interlocking precast concrete grids, cables and filter system to provide stable, articulated and permeable erosion protection, which maintains its integrity in the event of subgrade deformation or severe dynamic loading.

ARMORFLEX is placed by conventional construction equipment directly on the prepared subgrade of the structure as a system of factory pre-assembled mats of interlocking grids interconnected with cables.

ARMORFLEX results in a stable erosion control system available in a range of classes to accommodate various wave climates and stream flow conditions with aesthetic and ecological advantages.

ARMORFLEX, whether vegetated or otherwise, provides durable, flexible and permeable erosion protection for:

- Coastal Shorelines
- Earthen Dams
- Storm Channels & Ditches
- Bulkhead, in lieu of
- Pipeline Crossings

- Lakes & Reservoirs
- Rivers, Streams, & Bayous
- Dikes & Levees
- Bridge Abutments
- Water Control Structures
- Ponds & Holding Basins
- Sand Dunes
- Embankments
- Spillways
- Subaqueous Pipelines
- Boat Launching Ramps

ARMORFLEX has been proven technically and economically superior to traditional protective materials. When conditions such as poor soils, limited access, aesthetic and environmental considerations or a short construction season or schedule are primary factors, ARMORFLEX has proven to be the design solution.

Characteristics.

STABILITY. ARMORFLEX provides a continuous erosion protection that acts as an articulated mattress to withstand the destructive forces of water. The proper ARMORFLEX class is determined by the design velocity or wave height to which it shall be subjected.

FLEXIBILITY. ARMORFLEX grids are interconnected by flexible cables which provide articulation between adjacent grids. The walls of the ARMORFLEX grid are designed with

beveled relief to allow for flexibility in all directions.

PERMEABILITY. ARMORFLEX is generally placed on filter fabric and/or conventional graded filter. The permeability of the filter system and grids relieves hydrostatic pressures while its capability for soil retention prevents leaching of sub-soils through the installation.

FLOW RESISTANCE. ARMORFLEX is available with open cell grids or with closed cell grids to provide a combination of unit weight and surface roughness. The ARMORFLEX Manning Roughness Coefficient, "n", has a value ranging from 0.026 to 0.044, depending upon the grid used, material filling the cells, and vegetative cover.

VEGETATION. When vegetation is desired, ARMORFLEX's open cells are filled with soil, then sown or planted. The open cells provide a perfect environment for the establishment of vegetation. Even roots of grass and small shrubs can penetrate the filter system, providing a permanent anchor for the installation while beautifying the landscape. ARMORFLEX, with closed cells or open cells filled with stone, ($d_{50} < .75"$), precludes vegetative cover.

ACCESS. ARMORFLEX is free of dangerous projections thus providing safe access for pedestrians, animals, vehicles, boats, and other small craft to the water's edge.

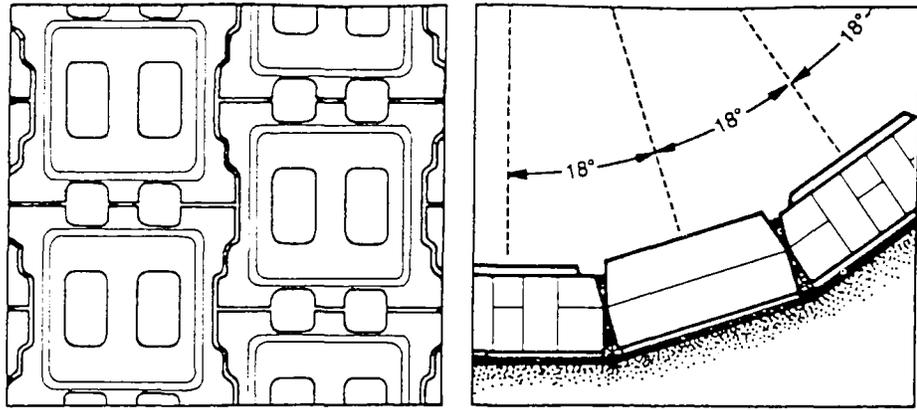
Preparation and installation.

ARMORFLEX is delivered on trailers or barges as prefabricated mats, of up to 480 ft.² per mat.

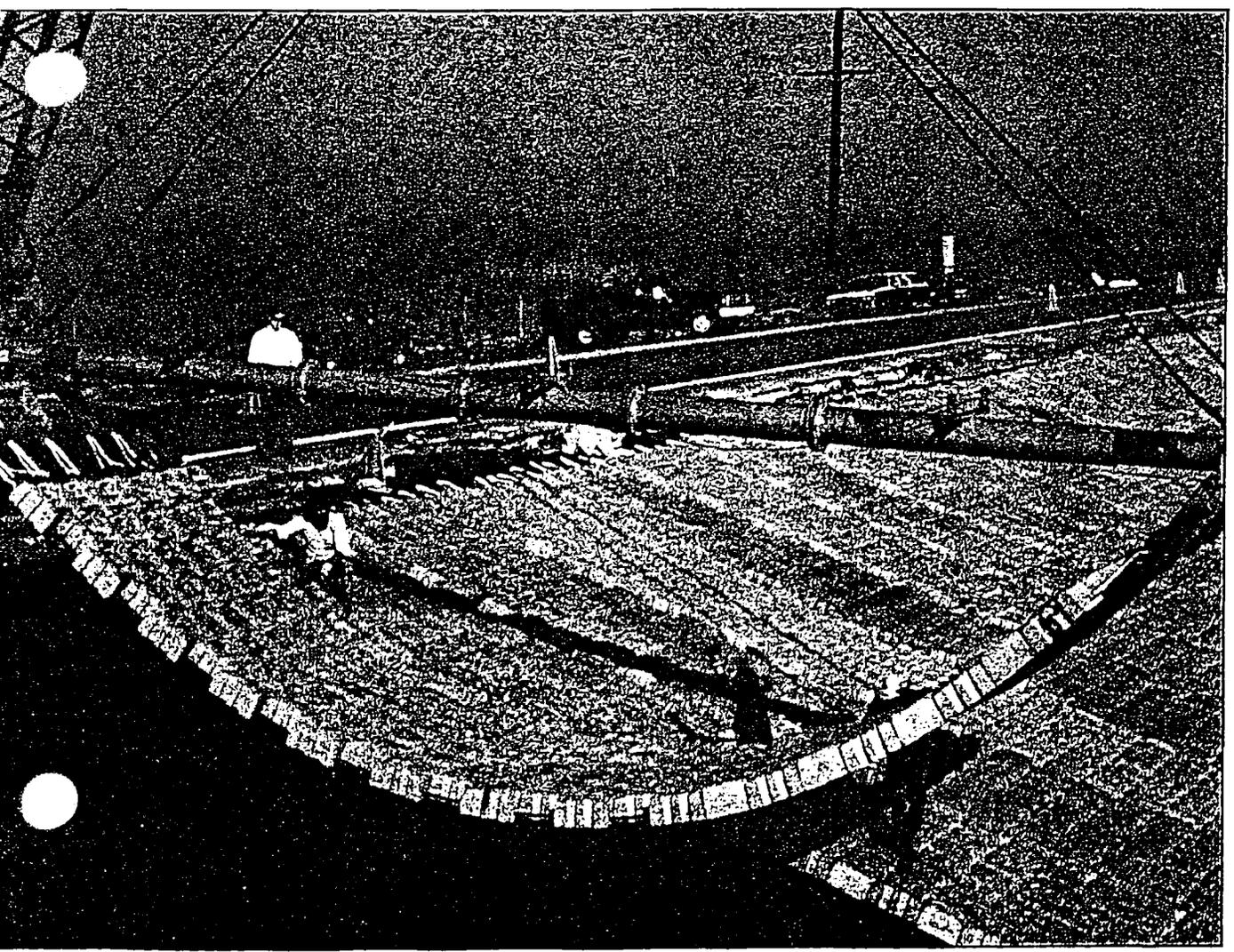
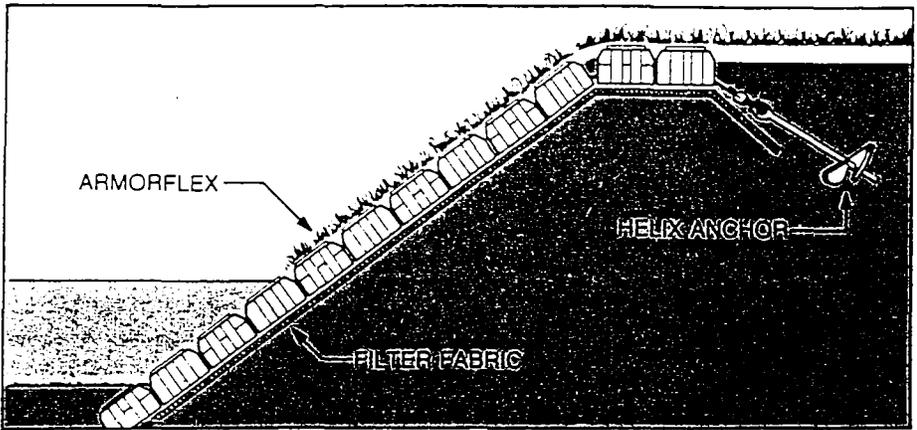
Construction begins with site preparation of the area to be protected. Vegetation and obstructions, such as roots and projecting stones are removed. Holes, soft areas and large cavities are filled and compacted with suitable materials.

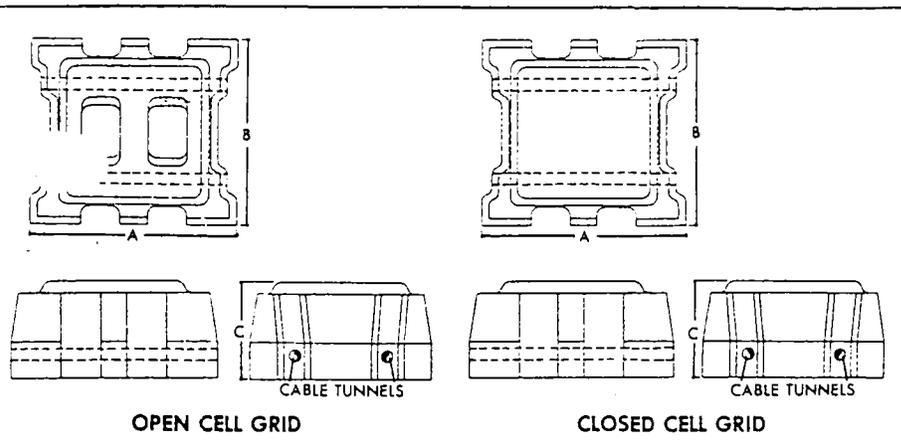
- Excavate toe, terminals and upper bank protection trenches as required.
- Filter fabric and/or graded filter material, is placed over the prepared subgrade.
- The first row of mats are placed side by side on the structure by attaching the cable loops at both ends of the mat to a spreader bar for placement by a crane or backhoe.
- Adjacent mats are connected by pouring side connecting keys and/or by fastening side connecting cables and end loops.
- Optional anchors are placed at the top of the slope.

- Backfill and compact the trenches as mat placement proceeds.
- Additional sections of mats are placed and connected until the desired line of protection are reached.
- Backfill is spread over the mats and into the open cells, then sown or planted as desired.

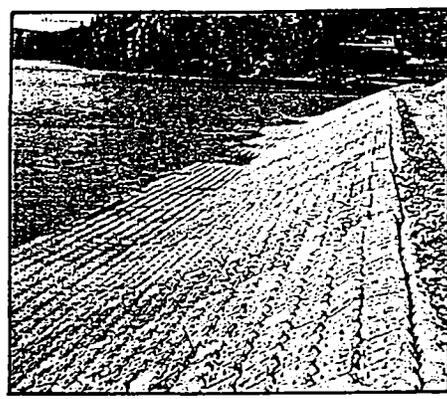
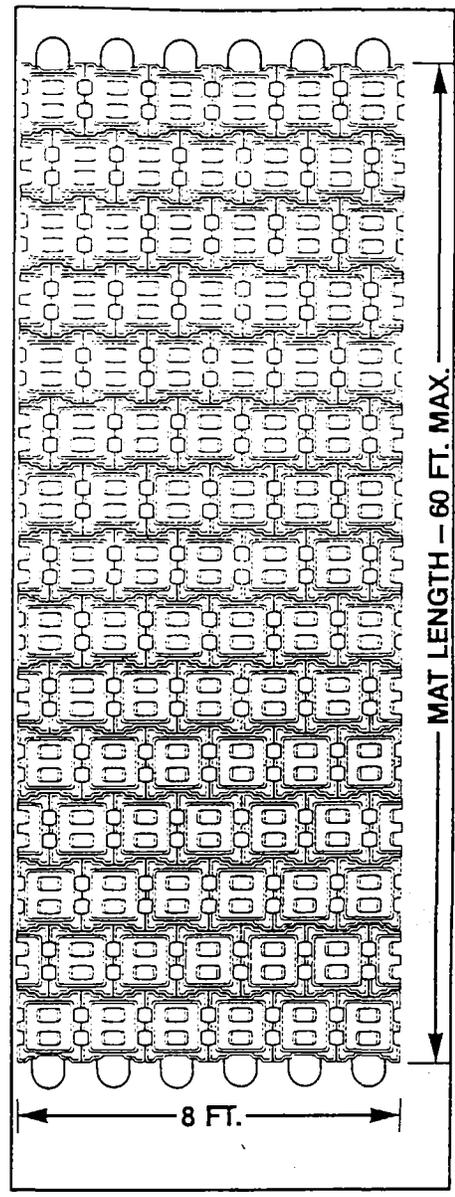


ARMORFLEX MATS CAN BE EASILY INSTALLED UNDERWATER. The spreader bar can be fitted with special, remote release clamps, which allow the mat to be released from the surface. There is no need to de-water the work area. The positioning of the mats can be done from the surface in shallow water or by divers in deep water. In addition, a structure can be easily built on an environmentally restricted site because there is no need for expensive cofferdams that disturb the natural environment surrounding the project site.





ARMORFLEX GRID SPECIFICATIONS											
CLASS	TECHNICAL DATA				DIMENSIONS & WEIGHTS						
	SPECIFIC WEIGHT LBS./CU.FT.	COMPRESSIVE STRENGTH LBS./SQ.IN.	% MAXIMUM ABSORPTION	NOMINAL DIMENSIONS IN.			GROSS AREA/ GRID SQ.FT.	WEIGHT/ GRID LBS.	WEIGHT/ AREA LBS./SQ.FT.	OPEN AREA %	
				A	B	C					
OPEN CELL	30	130-150	4000-5000	5	13.0	11.6	4.75	0.98	31-36	32-37	25
	50	130-150	4000-5000	5	13.0	11.6	6.0	0.98	45-52	46-53	20
	70	130-150	4000-5000	5	17.4	15.5	9.0	1.77	120-138	68-78	20
CLOSED CELL	45	130-150	4000-5000	5	13.0	11.6	4.75	0.98	39-45	40-46	10
	55	130-150	4000-5000	5	13.0	11.6	6.0	0.98	53-61	54-62	10
	85	130-150	4000-5000	5	17.4	15.5	9.0	1.77	145-167	82-95	10



Components.

GRIDS. The grids are precast concrete blocks, available in a range of classes to accommodate various applications. The range of classes allows the selection of the proper combination of unit weight, surface roughness and open area for stability and hydraulic relief.

CABLE & FITTINGS. Cables are galvanized steel aircraft cable or polyester; stainless steel has been used for special applications.

The compression fittings used to make cable splices and to confine the grids are selected to match the cable strength and are composed of materials suitable for the cable employed.

FILTER FABRIC. The filter fabric is a pervious sheet of woven and/or nonwoven fabric selected in accordance to the gradation and permeability analysis of the soil and/or fill material on which the mats are to be placed. If a graded filter material is selected for use, it must be carefully designed and installed to prevent movement of the gradation through the filter fabric over layer.

MAT ANCHORS. For structures with steep side slopes, helix type corrosion resistant anchors are installed at the top of the slope to provide additional stability.

Technical Assistance.

ARMORTEC is staffed by qualified civil engineers to aid in the preparation of designs and cost estimates for potential projects. If approved, ARMORTEC's engineering department will prepare shop drawings for the engineer's review and approval. Pre-bid and pre-construction conferences with contractors and on-site construction assistance are also provided by ARMORTEC's construction services group.

Manufacturer and Supply.

ARMORFLEX erosion control mats are available in six classes to accommodate the conditions prevailing in a given application. ARMORFLEX grids are manufactured on standard concrete block machines located around the world. ARMORFLEX mat cabling machines are portable and can pre-assemble mats at the concrete block plants or on the construction site. Mat dimensions are selected to meet the area required for the ARMORFLEX installation.

ARMORTEC Erosion Control Systems are currently in service around the world. Their uses range from channel linings to riverbanks and from subaqueous pipeline protection to major shoreline revetments. The positive results achieved by ARMORTEC in providing revetment and bank protection systems for civil engineering projects supply convincing proof of the benefits you may reap from ARMORTEC's broad spectrum of erosion control systems.

For further information on our erosion control systems and their varied applications, contact:

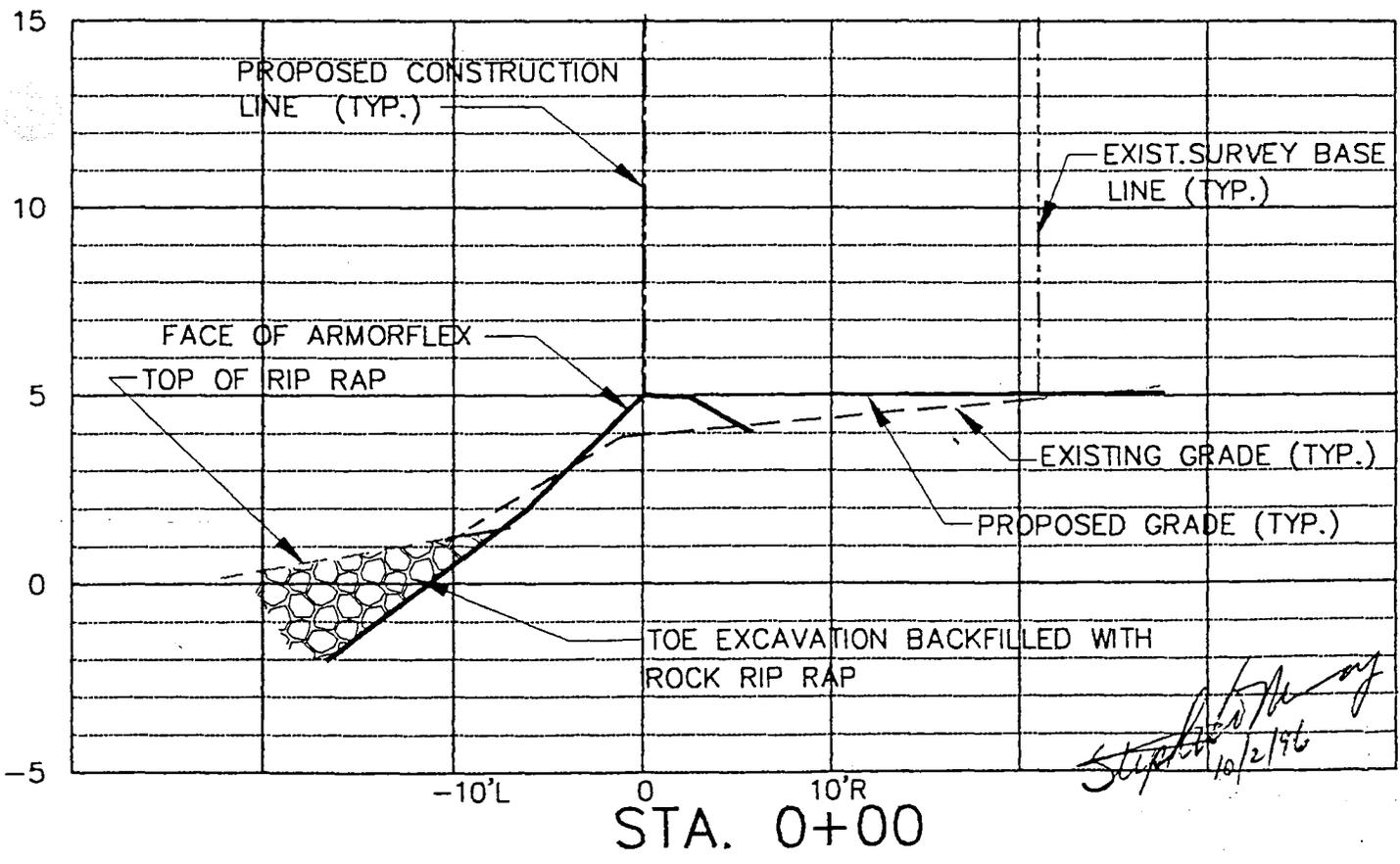
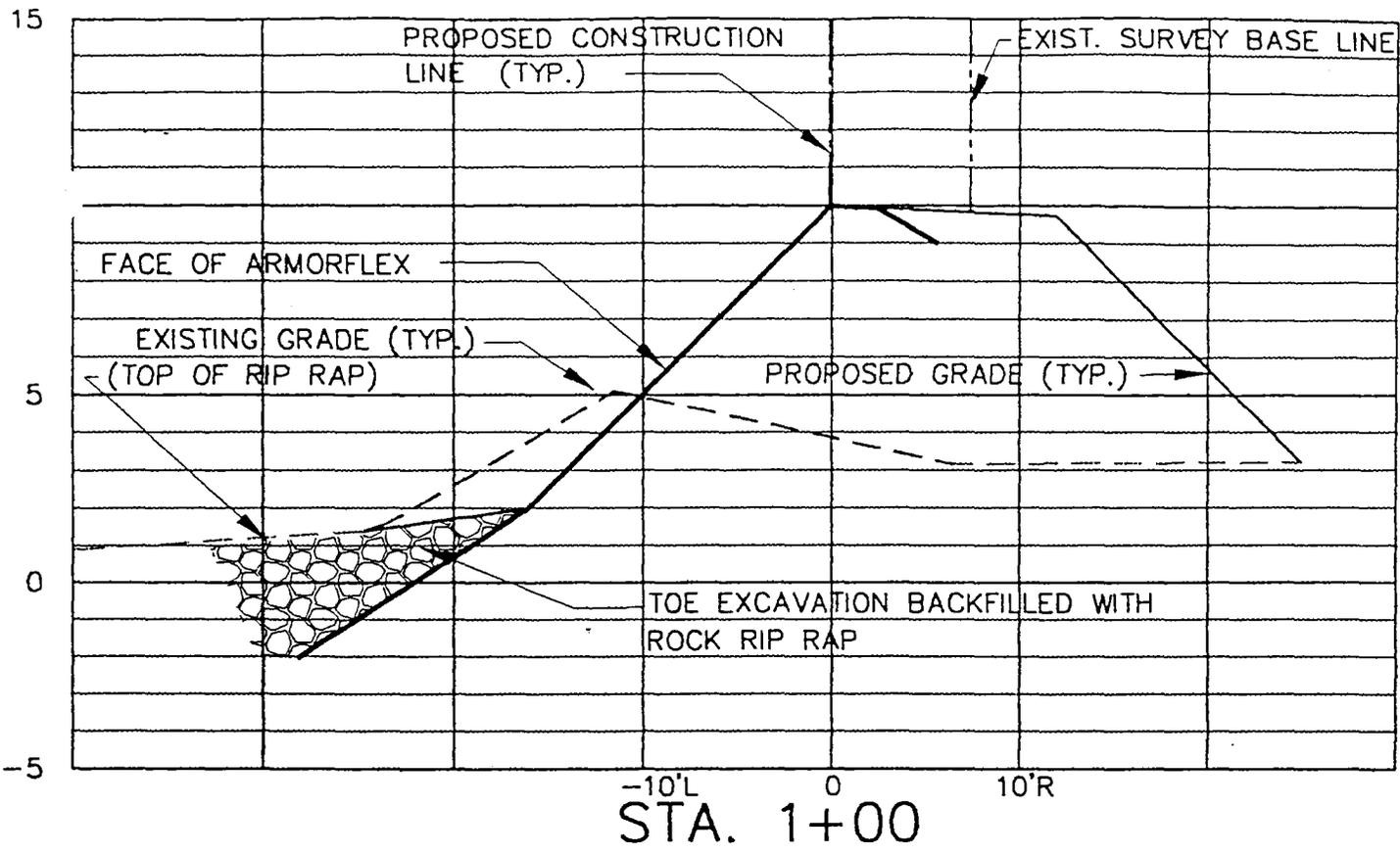


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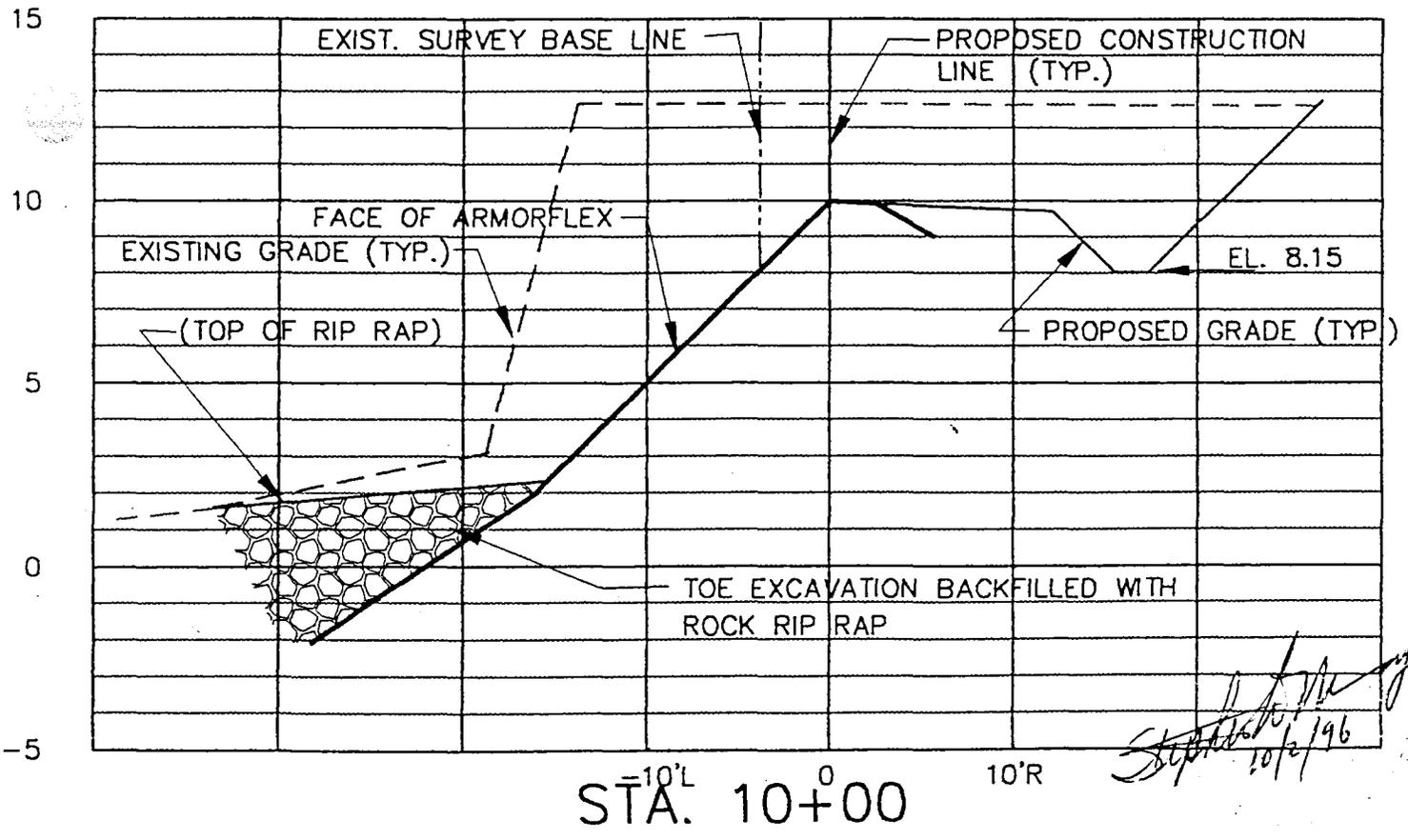
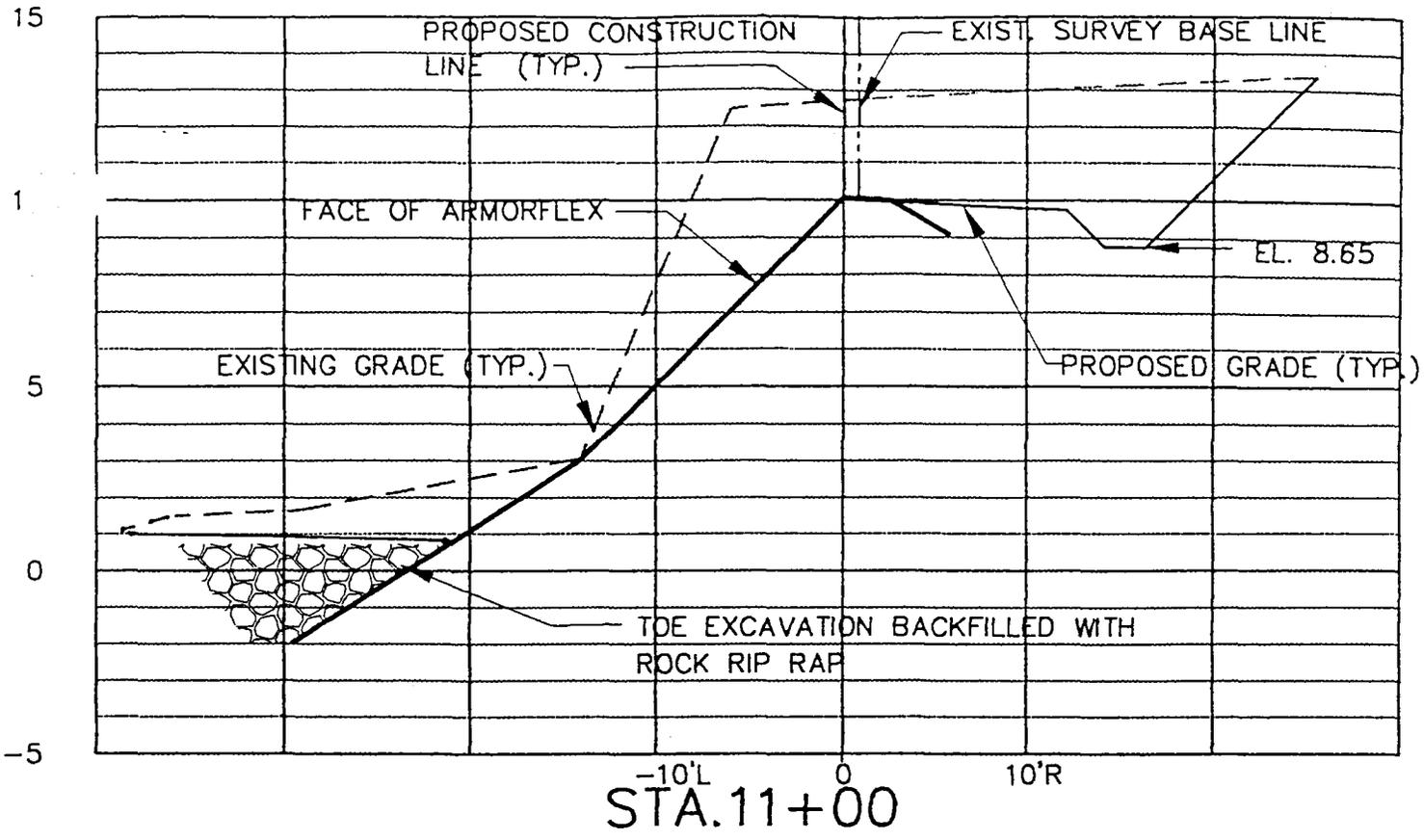


To the best of our knowledge, the information contained herein is accurate. However, Armortec, Incorporated, cannot accept liability of any kind for the accuracy or completeness thereof. Final determination of the suitability of any information or material for the use contemplated, of its manner of use, and whether the suggested use infringes any patents, is the sole responsibility of the user.

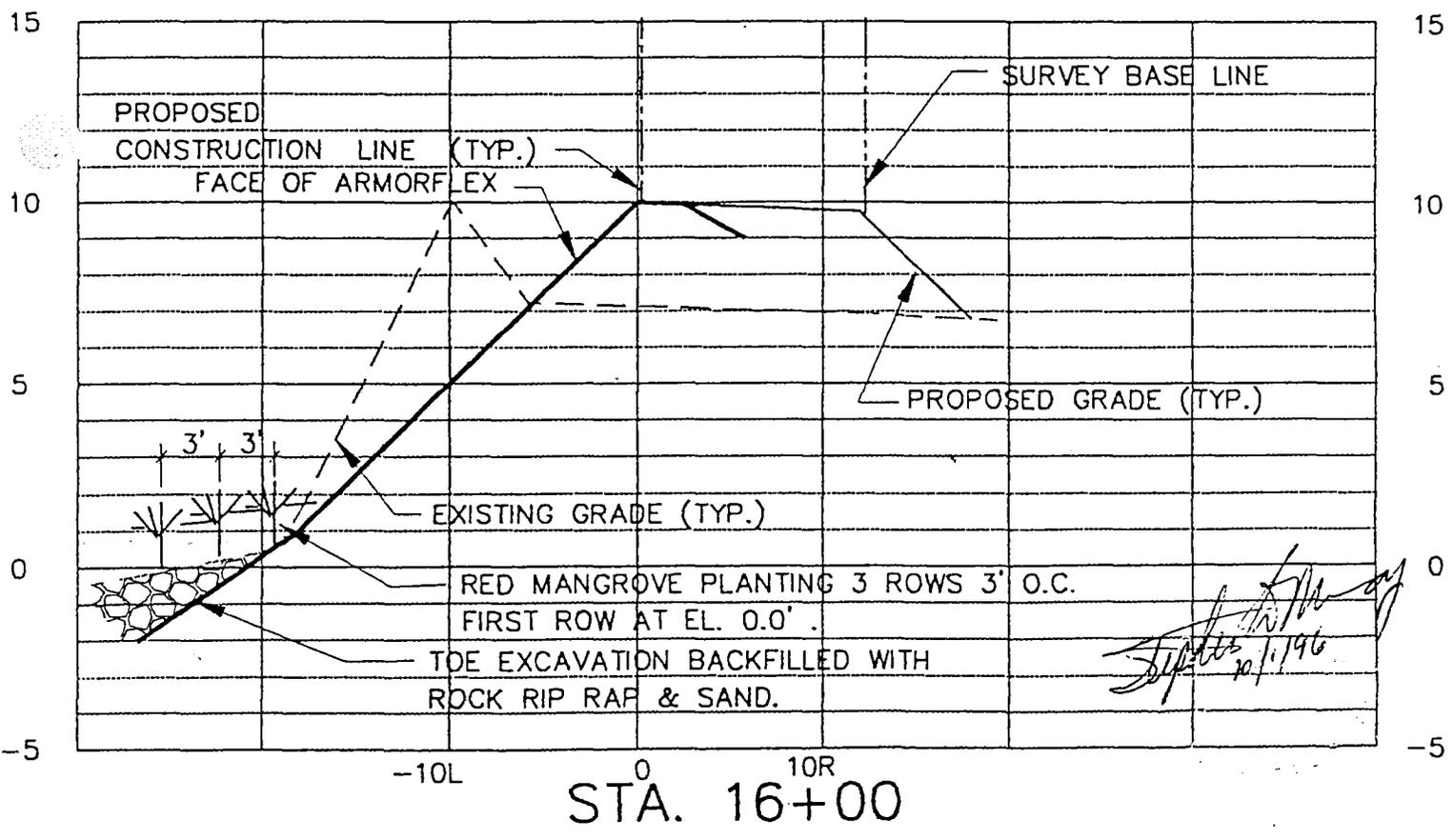
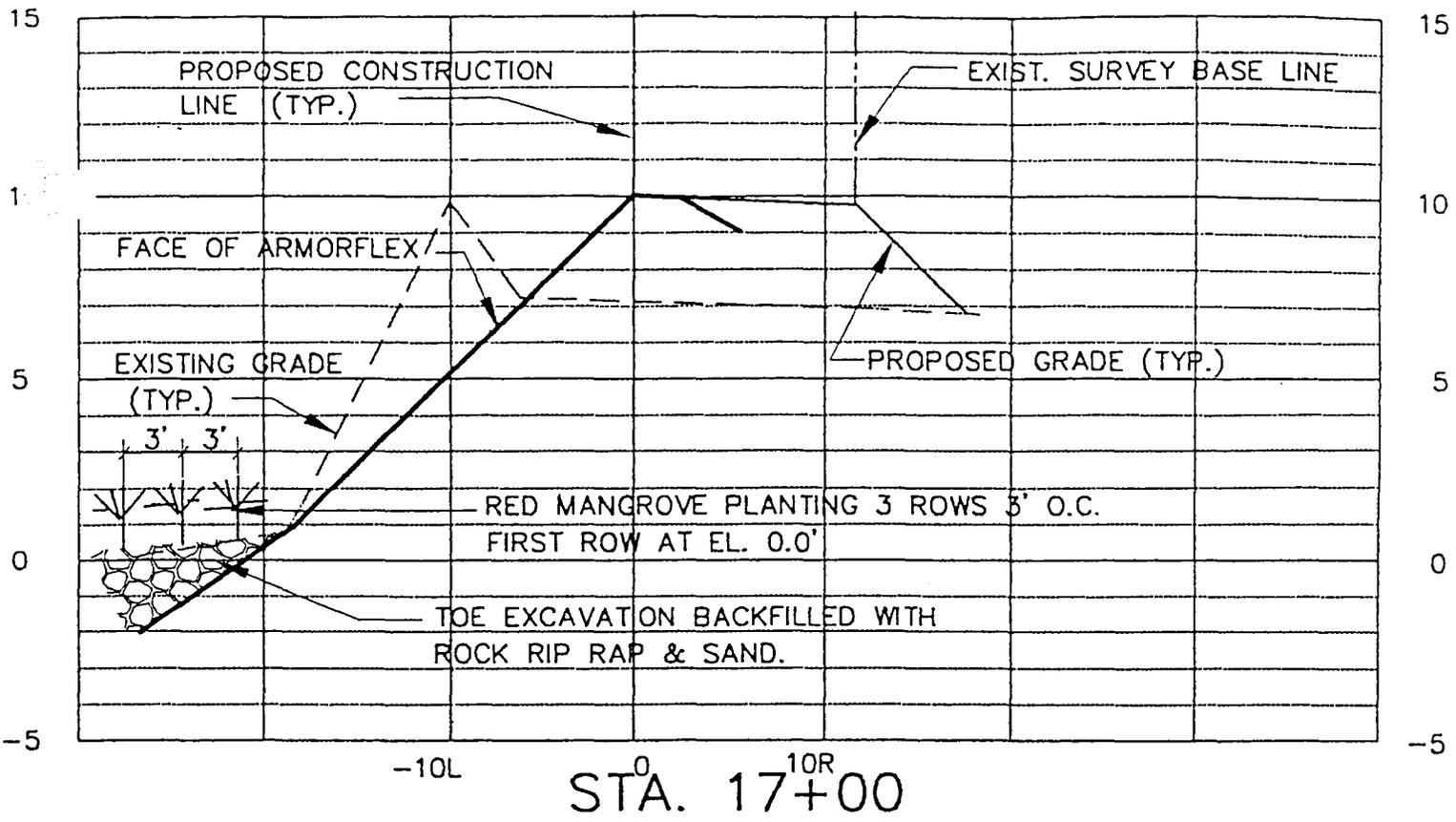
Canadian Patent No. 1,141,554 Other U.S. and foreign patents issued and pending
 U.S. Patent No. 4,370,075



IGNER'S PROJECT NO.: J53 DRAWN BY: M.S. ISSUE DATE: 08/13/96	<p align="center">DHA</p> <p align="center">DELON HAMPTON & ASSOCIATES</p> <p align="center">600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL: (404) 872-5514 FAX: (404) 872-5883</p>	DRAWING TITLE: ATTACHMENT 8.1 SCALE: 1"=10' H , 1"=5' V KEY WEST NAVAL STATION	SKETCH NO.:
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OWNER'S PROJECT NO.: 5533 DRAWN BY: M.S. ISSUE DATE: 09/13/96	DHA DELON HAMPTON & ASSOCIATES 600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL.: (404) 872-5514 FAX: (404) 872-5883	DRAWING TITLE: ATTACHMENT 8.2	SKETCH NO.:
		SCALE: 1"=10' H , 1"=5' V	
		KEY WEST NAVAL STATION	

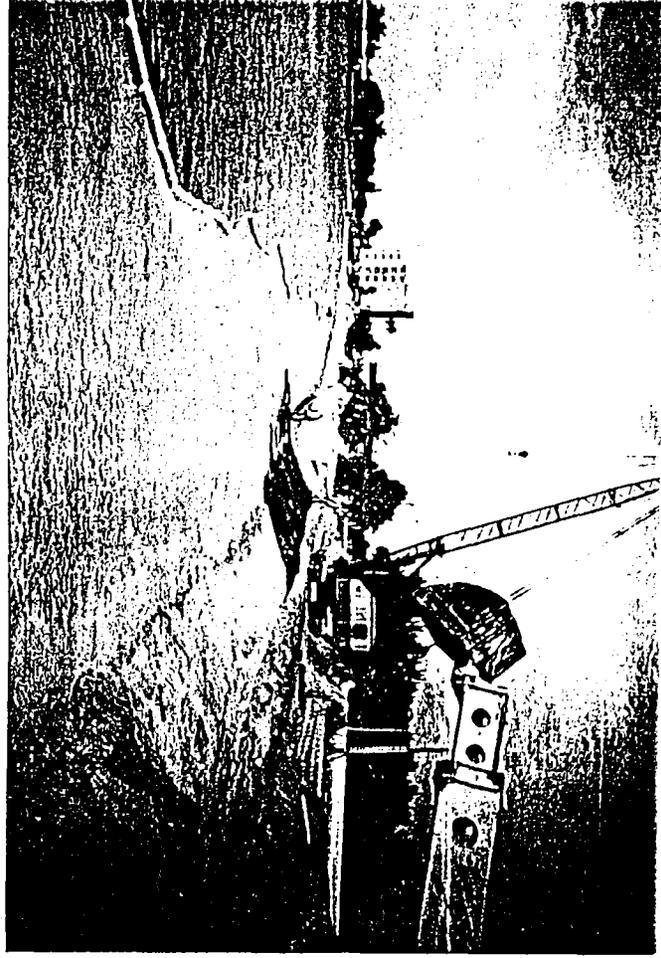
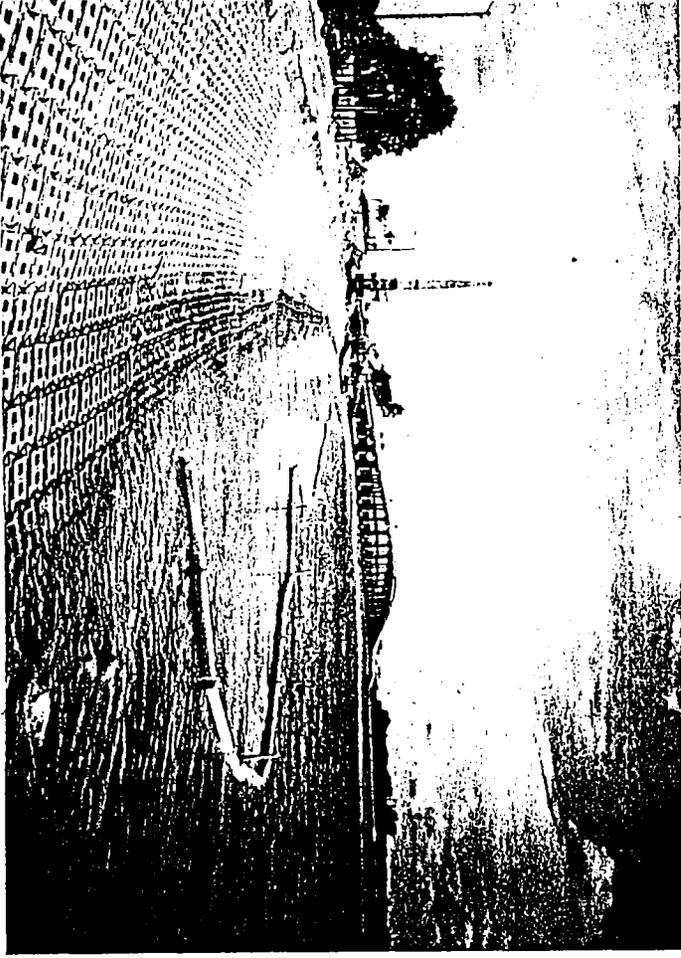


OWNER'S PROJECT NO.: 63 DRAWN BY: M.S. ISSUE DATE: 09/13/96	DHA DELON HAMPTON & ASSOCIATES 600 WEST PEACHTREE ST. N.W. SUITE 1470 ATLANTA, GA 30308 TEL: (404) 872-5514 FAX: (404) 872-5883	DRAWING TITLE: ATTACHMENT 8.3	SKETCH NO.:
		SCALE: 1"=10' H , 1"=5' V	
		KEY WEST NAVAL STATION	



Attachment 12a





CAPE CORAL PARKWAY
CHARLOTTE HARBOR
ARMORFLEX CLASS 50



ARMORFLEX CLASS 30 WITH RED MANGROVES



ARMORLOC CLASS 3510 REVEGITATED WITH
SEED AND MULCH

