

01.01-07/29/97-0011

George Allen
Director

Norton Dunlop
Secretary of Natural Resources



Kathleen W. Lawrence
Director

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July 29, 1997

Mr. George A. Janek
GEO-MARINE, INC.
610 Thimble Shoals Boulevard
Newport News, Virginia 23606

*This info incorporated into
IR Site #1 shoreline erosion
assessment*

RE: - SPS #97210

Dear George:

On June 30, I met with you at Cheatham Annex on the York River in York County. Robin Bedenbaugh and Steve Hubner were also present. The site visit was in response to your request for advisory assistance with the development of a shoreline management plan for the installation.

The publication entitled Shoreline Erosion in Tidewater Virginia reports the historical erosion rate for the area averages 1.9 feet per year. During the site visit, we divided the shoreline into different sections for planning purposes. The sections were the housing area, the eroding points and the recreational field. The following recommendations are for the fill site in the housing area:

1. The fill material dumped over the bank should be graded to a 2:1 (horizontal/vertical) slope or flatter. Broken concrete free of projecting rebar, bricks or other material suitable for use as core material in a riprap revetment should be stockpiled for later use.
2. After grading the fill material, a vegetative cover should be established on the slope. I recommend honeysuckle, a mixture of grasses or other low-growing vegetation. For further details about the establishment of vegetation or soil tests, contact the Virginia Cooperative Extension Agent for York County at 890-3730.
3. To prevent erosion at the toe of the fill, I recommend a properly designed and constructed riprap (large rock) structure. The structure should be installed to minimize encroachment beyond the mean low water elevation. The riprap should be constructed on a 2:1 slope or flatter. A minimum of two layers of armor rock should be used. Each armor rock should weigh a minimum of 150 pounds. The toe of the riprap should be buried a minimum of 3 feet

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below the mean low water elevation. A layer of woven filter cloth should be used under and behind the riprap. The riprap should be extended inland or properly connected to neighboring structures to prevent erosional flanking.

The eroding points provide an opportunity to develop and implement two different management strategies to address the erosion problem. The first strategy involves tree removal, vegetative cover planting and marsh grass enhancement. The second approach involves bank grading, construction of gapped breakwaters and all elements of the first approach. The following recommendations expand the information for the first strategy concerning the eroding points:

4. All trees and shrubs growing on the bank and within 30 feet of the bank edge should be cut or trimmed. Trees undermined by erosion displace large amounts of soil when they fall. Tree removal should decrease the weight on the bank and reduce the chance of sloughing. The additional sunlight exposure should stimulate growth of the upland ground cover and the marsh fringe. Before cutting any trees, please contact York County for information concerning tree removal under the Chesapeake Bay Preservation Act.
5. After tree removal, a vegetative cover should be established on all bare areas. I recommend honeysuckle, a mixture of grasses or other low-growing vegetation.
6. The marsh grasses growing on the shoreline dissipate wave energy and bind the soil with their roots. A semiannual fertilization and maintenance program is recommended for the grasses. The program should increase plant vigor and promote growth.

To fertilize the marsh grasses, broadcast a commercial fertilizer (10-10-10) at low tide. The fertilizer should be applied at the rate of 2.5 pounds per 1000 square feet at the beginning of May and middle of August. Tidal debris should be periodically removed to prevent smothering of the grasses. The encroachment of trees or shrubs into the grasses should be prohibited.

The following recommendations expand the information for the second strategy concerning the eroding points:

7. To protect the bank from erosion, a series of properly designed and constructed gapped breakwaters should be installed along the shoreline. The breakwaters should be constructed of riprap with a minimum weight of 150 pounds. The breakwater should have a trapezoidal cross-section with 2:1 side slopes. The top of the breakwater should have a minimum width of 4 feet. A layer of woven filter cloth should be used under the riprap. The breakwater should have a minimum height of 2 feet above the mean high tide elevation. The length of each breakwater and the distance channelward of mean low water is site specific. If you desire additional information concerning a breakwater system, please call me.

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8. To provide fill for the breakwater system, the bank should be graded to a 2:1 slope. Irregularities in slope between the graded bank and adjoining shoreline should be minimized. The soil placed behind the breakwaters should create a planting area for the marsh grasses.
9. The establishment of a marsh fringe behind the breakwaters may involve planting smooth cordgrass, saltmeadow hay and several types of beachgrass. The grasses may be purchased or transplanted from neighboring areas on the base.

Smooth cordgrass grows between the mean low and mean high tide elevations. Saltmeadow hay grows above the mean high tide elevation. Smooth cordgrass and saltmeadow hay should be planted from late April through June. Beachgrasses grow above the spring high tide elevation and should be planted from late October through April. Care should be taken to plant the grasses within the proper tidal zone.

To transplant the grasses, dig healthy plants and be sure to obtain an adequate root mass. Plant the grasses on an 18-inch by 18-inch grid. I recommend fertilization at the time of planting. A slow release fertilizer such as Osmocote can be placed in the hole with the plant. Approximately one ounce per plant should be used. An alternative to Osmocote is any available fertilizer such as 10-10-10. Approximately two ounces of the alternate fertilizer should be side-dressed about six inches from the plant. To prevent damage to the source area, do not remove large numbers of plants from one section. The source area should be fertilized after plugging.

10. Recommendations 4 through 6 should also be implemented for the site.

The following recommendations apply to the recreational field:

11. All trees and shrubs growing on the bank and within 30 feet of the bank edge should be cut or trimmed. Tree removal should decrease the weight on the bank and reduce the chance of sloughing. The additional sunlight should stimulate growth of the upland ground cover and marsh fringe.
12. After tree removal, a vegetative cover should be established on all bare areas. Honeysuckle, a mixture of grasses or other low-growing vegetation is recommended.
13. The marsh grasses growing on the shore dissipate wave energy and bind the soil with their roots. A semiannual fertilization and maintenance program is recommended for the grasses. The grasses should be fertilized following the guidelines in recommendation 6.

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14. To protect the bank from erosion, I recommend a properly designed and constructed riprap structure. The structure should be installed to minimize encroachment beyond the mean high water elevation. Where marsh grasses are growing, the structure should be designed not to encroach into the grasses. The structure should be constructed following the guidelines provided in recommendation 7.

The above recommendations are made in my capacity as an advisory agent in shoreline erosion control matters. If you have any questions, please call me at 804/786-3998.

Sincerely,



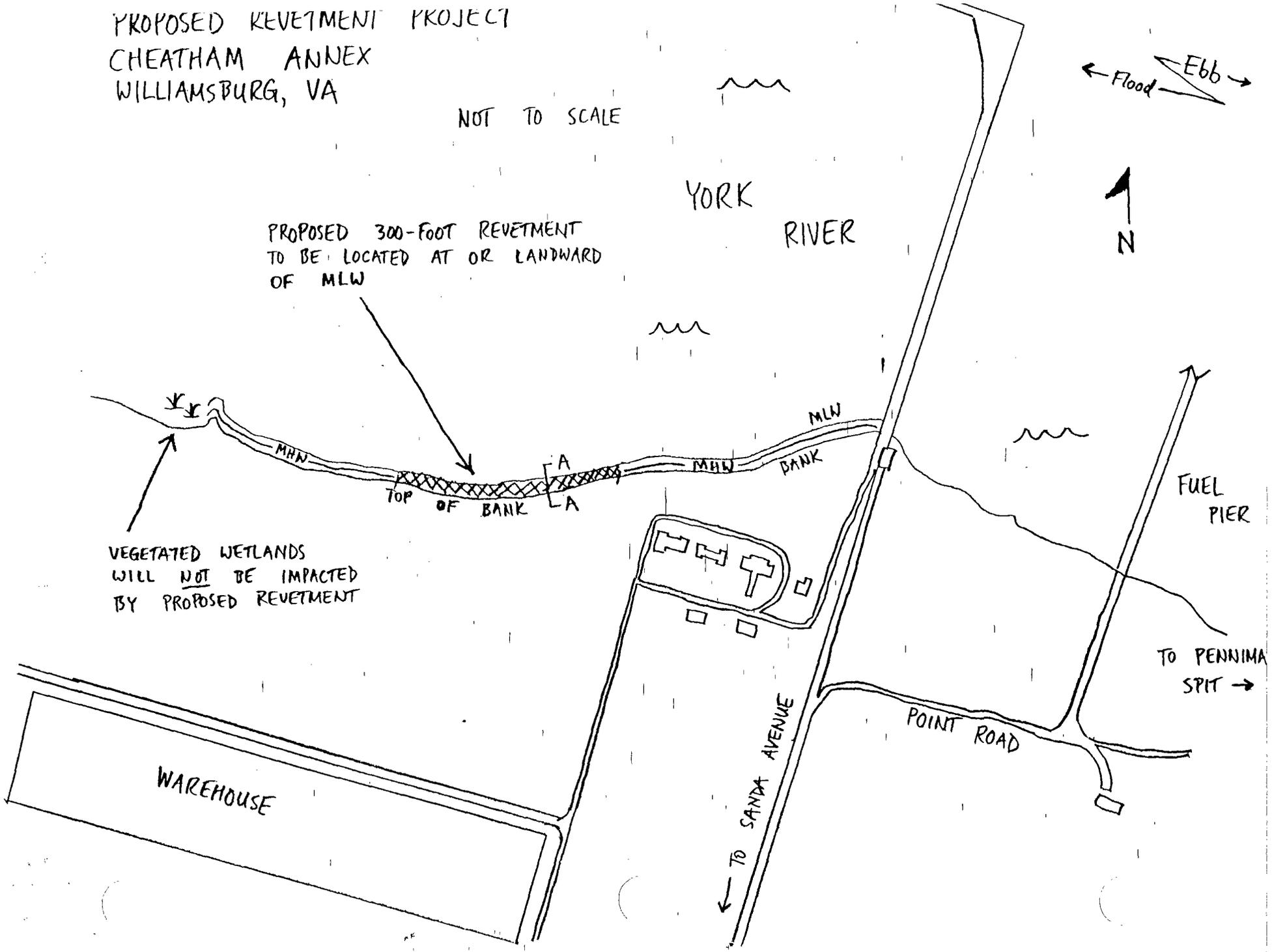
Carlton Lee Hill
Chief Shoreline Engineer

CLH/hem

cc: Steve Hubner

PROPOSED REVEGETMENT PROJECT
CHEATHAM ANNEX
WILLIAMSBURG, VA

NOT TO SCALE



PROPOSED 300-FOOT REVEGETMENT
TO BE LOCATED AT OR LANDWARD
OF MLW

VEGETATED WETLANDS
WILL NOT BE IMPACTED
BY PROPOSED REVEGETMENT

YORK RIVER

N

Flood Ebb

FUEL PIER

TO PENNIMA SPIT

POINT ROAD

TO SANDA AVENUE

WAREHOUSE

MLW

BANK

CHEATHAM ANNEX

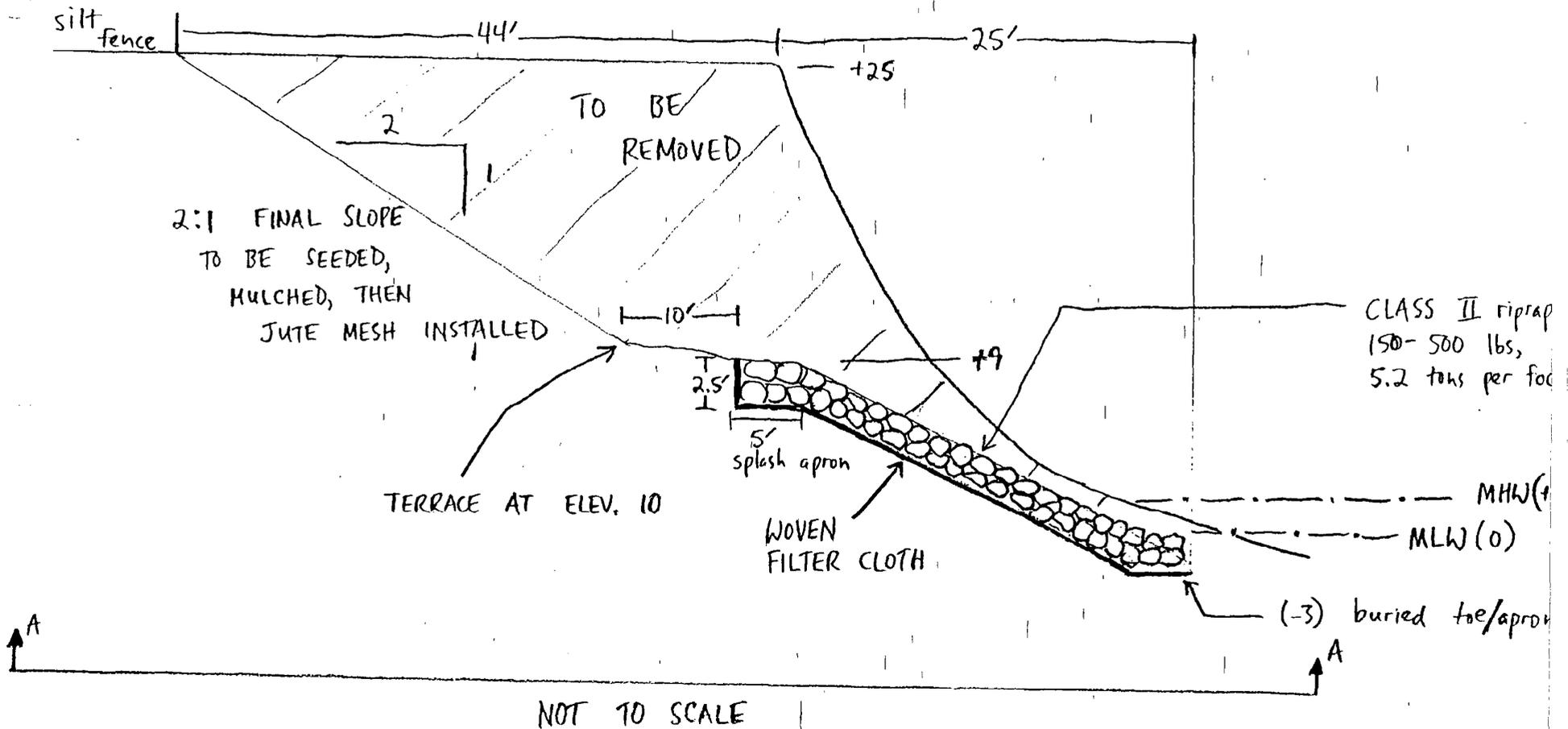
TOP OF BANK LA

MLW

MLW

MLW

PROPOSED RIPRAP REVETMENT,
CHEATHAM ANNEX
WILLIAMSBURG, VA



Cheatham Annex Riprap Project

DEC/DSWC
 (804) 786-3998
 8/6/97

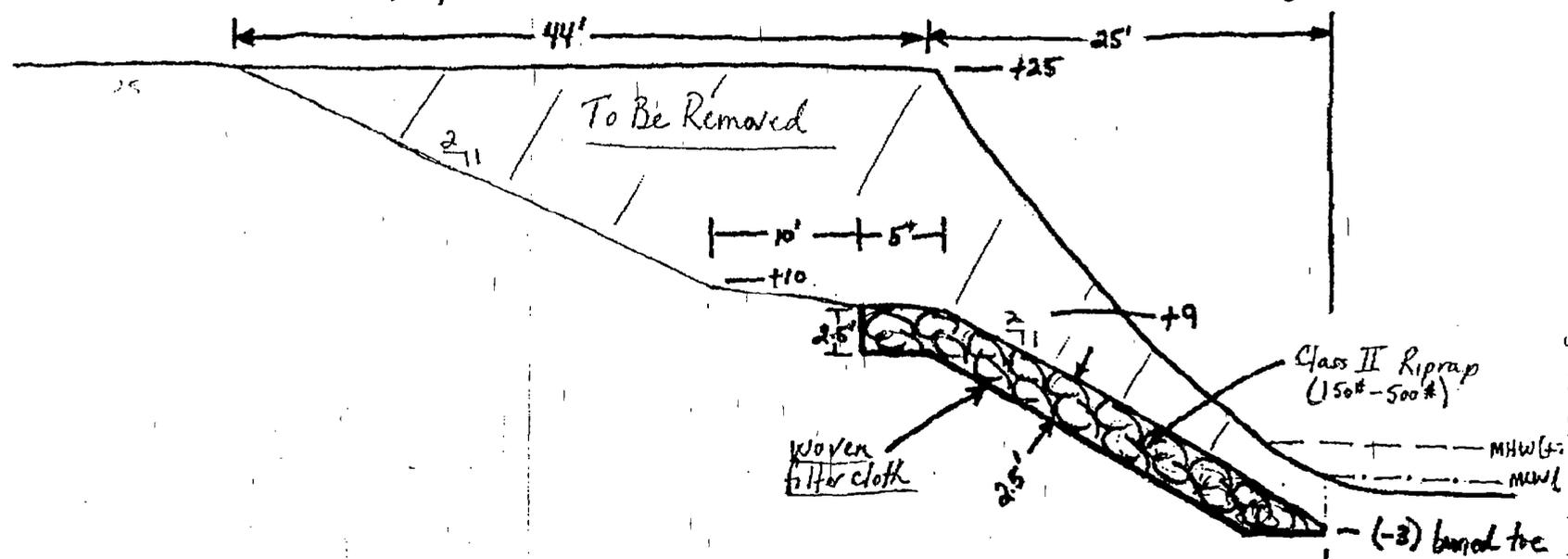
Amount of Riprap per ft. of structure : 5.2 tons/ft $\left[(2.5)(5)\left(\frac{135}{2000}\right) + \left(\frac{28+23}{2}\right)(2.5)\left(\frac{135}{2000}\right) \right]$

Amount of Fill to move per ft. of structure (200 feet of shoreline) : 22.6 yd³/ft

Estimate for cost of Riprap : (300 feet)(5.2 tons/ft)($\$45$ /ton)(1.25 Navy factor) = \$87,750

Estimate for moving fill : (200 feet)(22.6 yd³/ft)($\$5$ /yd³) = \$22,600 } \$27,700
 (100 feet)(17 yd³/ft)($\$3$ /yd³) = \$5,100

Estimate { Seeding, mulch, fertilizer : ($\$1500$ /acre)($(33 \times 300) + (10 \times 300)$) = ($\1500 /acre)($\frac{12,900}{43,560}$) = \$444.21 } \$3,350
 { Jute mesh : ($\$2$ /yd²)($\frac{12,900}{9}$) = \$2867 } Total : \$2867 + \$444 = \$3311 → \$3350



Total Cost : \$87,750 + \$27,700 + \$3,350 = \$118,800 + contingencies (25%)

Total Cost = \$148,500 (\$150,000 with contingencies)
 (\$120,000 without contingencies)