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FINAL DREDGING INVESTIGATION OF SEAVEY ISLAND TIDAL FLAT AMENDMENT 1 NSY PORTSMOUTH ME

6/1/1977

"PARSONS, BRINCKERHOFF, QUADE & DOUGLAS NORMANDEAU ASSOCIATES"

LOCAL 77-3
Dredging, Portsmouth Naval Shipyard
Amendment I - Investigation of Seavey Island
Tidal Flat
Parsons, Brinckerhoff, Quade & Douglas, Inc.
FINAL

Dredging, Portsmouth Naval Shipyard Portsmouth, New Hampshire

Amendment 1

Investigation of Seavey Island Tidal Flat

Contract Number N62472-76-C-1069

Department of the Navy
Naval Facilities Engineering Command
Philadelphia, Pennsylvania

Prepared by Parsons, Brinckerhoff, Quade & Douglas, Inc., Boston, Massachusetts, in association with Normandeau Associates, Inc., Bedford, New Hampshire, for the Department of the Navy, Naval Facilities Engineering Command, Northern Division, Philadelphia, Pennsylvania, in accordance with OPNAVINST 6240.3D in compliance with Section 102 (2) (c) of the National Environmental Policy Act of 1969.

Parsons, Brinckerhoff, Quade & Douglas
Normandeau Associates
June 1977

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PART I

ADDENDUM TO PRELIMINARY ENGINEERING REPORT

INTRODUCTION

This Report investigates in further detail the feasibility of disposing of dredge spoils to be removed from Portsmouth Naval Shipyard Berths 6, 11, 12 and 13 at a tidal flat site on the east end of Seavey Island. Preliminary investigations of this site were conducted in preparation of the draft Candidate Environmental Impact Statement submitted to the Navy in October, 1976.

Disposal of dredge spoils at the Seavey Island Site is an alternative to ocean dumping at the designated Isles of Shoals disposal area or in deeper waters east of the Isles of Shoals. If feasible, with regard to engineering and ecological considerations, onshore disposal at Seavey Island could avoid potential adverse impacts identified in the draft CEIS as potentially being associated with ocean dumping. By confining the dredge and disposal operations to Seavey Island, the Navy could avoid possible infringements on fishing, shipping, recreation, and marine eco systems. In addition, disposal of dredge spoils at the solid waste disposal area at the east end of Seavey Island could eliminate the blighting influence of that existing area on the nearby hospital complex and possible sites for planned Navy housing.

However, as was pointed out in the CEIS, onshore disposal of the contaminated dredge spoils could, without proper precautions, be accompanied by endemic pollution of waterways resulting from leaching of contaminants from some of the dredge material. The purpose of this Report is to present the nature of the ecological impacts of placing dredged spoil on Seavey Island and the engineering and cost considerations of containing the dredge spoils at the disposal site, without escape of contaminants.

GENERAL DESCRIPTION OF THE SITE

The potential disposal site is located at the eastern end of Seavey Island on Navy property. It is just north of the causeway to Clark Island. Separating the site from the Piscataqua River is an existing stone dike structure through which tidal waters permeate to a small pond. The site has received dredged material in the past and has been receiving some solid waste, thereby partially filling the site. The entire area northeast of the site in the direction of Jamaica Island was at one time a tidal flat but successive filling with dredged material and solid waste has converted much of the area to usable land surface. It is principally used for storage of equipment and materials.

The potential disposal site has a sunken uneven topography with little vegetation and presents a poor and unnattractive appearance. To the west and southwest of the site is an embankment which identifies the former (natural) edge of Seavey Island. On top of this embankment formation are the Naval hospital to the west and the Navy Correctional facility complex. The latter is no longer in use. The site comprises about ten acres.

ENVIRONMENTAL INVESTIGATIONS

On site investigations of the natural environment were conducted at the proposed Seavey Island disposal area. Analysis of the natural environment was prepared by Normandeau Associates of Bedford, New Hampshire. The results of this analysis are presented below and in an addendum to the draft Candidate Environmental Impact Statement presented in Part B of this Report.

Surface Water Runoff Patterns

Surface water runoff at the proposed disposal site is limited to runoff from rain and snowmelt from surrounding areas. The runoff may percolate through the ground to the water table or run into the Piscataqua River. A portion of the runoff reaches the river after first collecting in a depression on the site. The rate of the exchange between the depression and river, where a free exchange of water occurs, is determined by the phase of the tide. The result of these various inflows is the presence of up to several feet of water within the depression. When inspected in March, 1977, considerable runoff from snowmelt was flowing into the depression.

Surface and Subsurface Geology

Information on subsurface geology was gathered from literature reviews

and telephone contacts with governmental agencies. No geology field studies were conducted.

The original tidal flat area at the proposed site has been covered with fill material. The surface now appears as a mixture of sand and cobble. The subsurface layers are characterized as glacial till which is a mixture of clay, silt, sand, gravel, cobbles and boulders (Prescott and Drake, 1962).

Groundwater

As the area being considered was formerly an intertidal area, the depth to groundwater is equal to the depth of the fill. This will vary from approximately 13.5 feet at mean low water to 5.5 feet at mean high water. Depth to groundwater in the depression is zero.

Flora and Fauna

Terrestrial

Field studies at the proposed Portsmouth disposal site were conducted in March 1977. One day was spent at the site, noting abundance, diversity and species composition of vegetation, observing wildlife and

wildlife signs and conducting a general habitat evaluation.

Flora

Vegetation at the proposed disposal area and immediate surroundings is exceedingly sparse. A very thin strip of grasses border the pit in scattered areas. There are no shrubs or plants at the proposed site.

Vegetation is more abundant at several areas in close proximity to the site. Clark's Island (approximately 500 yards distant) contains a vegetative cover of grasses, shrubs and small hardwood tree species. A small woody area is present approximately 150 yards northeast of the site and a small grove of conifers is situated near building H10.

Fauna

The present state of the proposed disposal site severely limits its value as wildlife habitat. The lack of appreciable amounts of vegetation, presence of large amounts of trash and scrap metal, and constant truck traffic and human activity in the area combine to make the area very unattractive to wildlife. The only species observed during the site visit were herring gulls (Larus argentatus) and great black-backed gulls (Larus marinus). It is likely other species of gulls,

the house mouse (Mus musculus) and Norway rat (Rattus norvegious) are present, but the lack of household garbage as a food supply would limit utilization of the area.

The more abundant and diverse vegetation on Clark's Island and lack of significant human activity provides an area of much higher value to wildlife. Small mammals and songbirds are undoubtedly present on the island, utilizing portions as breeding habitat during the spring and summer. The mud flats around the island are exposed at low tide and provide feeding habitat for gulls, shorebirds and waterfowl.

Marine

In addition to the land area described above, the Piscataqua River and Portsmouth Harbor area provide habitat for various species of birds and mammals. These animals could be expected to be found occasionally near the proposed site. In addition to various species of gulls, the Great Bay Area (including the study site) is heavily utilized by waterfowl. Approximately three-fourths of all waterfowl wintering within the state of New Hampshire do so in the Great Bay area (Lacaillade, 1975). The most numerous species are the Canada goose (Branta canadensis), black duck (Anas rubripes), greater scaup (Aytha marila) and lesser scaup (Aythya affinis). Other species present include common

goldeneye (Bucephala clangula), bufflehead (Bucephala albeola) and mallard (Anas platyrhynchos). In addition, the waters just offshore from the harbor mouth are utilized by white-winged scoter (Melanitta deglandi), surf scoter (Melanitta perspicillata), common scoter (Oidemia nigra), old squaw (Clangula hyemalis), common eiders (Somaterial molissima) and various seabird species such as great cormorants (Phalacrocorax carbo), razorbills (Alea torda), black guillemot (Cepphus grylle) and dovekies (Plautus alle). Although avian numbers are highest in the winter, the Great Bay and offshore areas are utilized during all seasons of the year.

The most common marine mammals in the area and those most likely to appear within Portsmouth Harbor are the harbor porpoise (Phocoena phocoena) and the harbor seal (Phoca vitulina)(Katona et al., 1975). Other species likely to be found outside the harbor but close to shore include the pilot whale (Globicephala melaena), finback whale (Balaenoptera physalus), humpback whale (Megaptera novaengliae) and white-sided dolphin (Lagenorhynchus acutus) (Burt and Grossenheider, 1952) (Katona et al., 1975).

Katona, S., D. Richardson and R. Hazard. 1975. A Field Guide to the Whales and Seals of the Gulf of Maine. Maine Coast Printers, Rockland, Maine. 97 pp.

Lacaillade, H. C. 1975. Waterfowl and Their Management in New Hampshire. N.H. Fish and Game Dept. Survey Report No.11. 126 pp.

Impact Upon Water Quality, Flora and Fauna

Placement of dredge spoils at the proposed Seavey Island site could produce a negative impact if adequate site preparation measures are not taken. Erosion and leaching of pollutants from the spoil could decrease water quality in the vicinity of the site. The action of heavy rains plus snowmelt runoff could cause erosion and carry spoil material into the Piscataqua River and a subsequent release of pollutants (heavy metals, chlorinated hydrocarbons, inorganic nutrients) into the water column. In addition to physical erosion, leaching action due to runoff and the free exchange of water between the river and low area of the site would be substantial. The rate and state in which the leachate would reach the ground water is unknown. However, as the site is former dredge spoil, construction rubble and scrap metal, its ability absorb and decompose or retard leachates is likely to be slight. This will result in the increased availability of heavy metals and PCB's free to enter the food chain and be accumulated by higher trophic level organisms (refer to Appendix 5.4.3.2-D of the Candidate Environmental Statement for a discussion of the effects of these pollutants on wildlife populations).

The present state of the proposed disposal site is such that it is of nominal value to wildlife. Impacts associated with the proposed

action would be limited to the surrounding areas.

The disposal of the material involves no direct removal of wildlife habitat. The very small amount of vegetation which would be destroyed is insignificant. Existing noise levels are high and the expected temporary increase in these levels would have no further detrimental effect on wildlife. The primary impact to be considered if this site is utilized is the release of PCB's and heavy metals into the marine environment. This must be prevented. Erosion, surface runoff and leaching actions could carry these contaminants into the waters of the Piscataqua River and Portsmouth Harbor. At that time, they would be subject to concentration by bottom dwelling organisms and increased concentration at each succeeding trophic level. Considering the presence of nearby tidal flats, the utilization of Great Bay, the Piscataqua River estuary and immediate offshore area by marine mammals and large numbers of birds, this impact may be significant.

Mitigating Measures

Negative environmental impacts associated with the disposal of dredge spoils at the Seavey Island intertidal site can be reduced by separating clean and contaminated material. Clean overburden and bedrock can be

placed at the Seavey Island site with no serious impacts. Contaminated spoils must be carefully handled to prevent leakage and spillage. They must be placed in such a manner that they are effectively sealed off from leaching and erosion.

ENGINEERING INVESTIGATIONS

A topographic and hydrographic survey was performed of the potential disposal site area to establish necessary control and determine current elevations of the existing dike, the natural embankment bordering the western side of the disposal site, the disposal area itself and the bottom profile of adjacent waters.

A program of subsurface investigations was also planned for the potential disposal site with particular attention to determining the characteristics of the existing dike, and the nature of the materials supporting the existing dike as well as identifying the type materials underlying the remaining portions of the potential disposed area. Con-Tec Incorporated of Concord, New Hampshire, was retained to extract cores and to conduct penetration tests at ten locations as shown at Sheet 3. These ten locations were selected after review of existing geological conditions at Seavey Island and inspection of the existing dike. An Acker AD2 drill rig was employed with 3.5 mile

inside diameter hollow stem augers to extract the cores. Standard penetration tests were made in each hole at five foot intervals and where changes in strata were encountered. Each hole was sunk to refusal. Data obtained is also shown at Sheet 3.

Probably the most significant discovery was that the existing dike is underlain by a 15-20 foot layer of medium to soft clay. The thickness of this clay layer appears to diminish to negligible amounts under the northern portion of the potential disposal site. The clay layer overlies a dense till 3-15 feet in thickness beneath which is bedrock.

STABILITY ANALYSIS OF EXISTING DIKE

In order to ascertain the performance of the existing dike under loadings to be expected if the disposed dredged material were to be placed behind it, a structural stability analysis was made.

The existing rock dike at the southeastern end of the potential disposal site, as previously mentioned, separates a tidal pool to the west from the Piscataqua River to the east. This dike is highly porous and allows the tidal waters to flow freely between the river and the pool. The bottom of the tidal pool is approximately 13 feet lower than the adjacent landfill area. The soil investigations determined that there is a medium to soft clay layer some 15-20 feet thick beneath the rock portions of the existing dike, then a layer of dense till 3-15 feet thick extending to bedrock. It was therefore decided that a calculation of stability of the existing dike was in order to find out if there was possibility of slippage. The Swedish slip circle method of slices was used to compute a factor of safety associated with the propensity of such a dike cross-section to slide on an unstable underlying clay material. The calculations were performed using an in-house computer program for the Swedish slip circle method for the existing dike. This and other runs performed are available.

This calculation determined the existing dike to be unstable with dredged material placed behind the dike. In addition, however, it was felt appropriate to perform another calculation based on a presumptive earthquake occurrence. For such analysis the horizontal component of earthquake force is calculated using the following relationship:

$$F_h = \frac{W}{g} \times a_h = \Psi \times W, \quad \text{where}$$

F_h = horizontal force acting at centroid of each soil wedge;

W = weight of soil wedge in Swedish slip circle method;

g = acceleration due to gravity;

a_h = horizontal acceleration due to earthquake;

Ψ = seismic coefficient obtained from "Engineering and Design Stability of Earth and Rock-Fill Dams", EM1110-2-1902, Army Corps of Engineers, 1970. For Zone III in which the site is assumed to be located $\Psi = .15$.

The earthquake analysis resulted in a determination that the existing dike would become unstable under an earthquake condition (factor of safety less than 1) with a slip plane possibly developing in the underlying clay layer and creating the possibility that any contaminated

dredge spoil material placed behind the dike could conceivably become exposed to the adjacent riverine environment.

A number of alternative designs were then developed and subjected to similar calculation to find a solution which would provide safety and be most economic under the circumstances. The alternatives were:

- Reinforce the existing dike with select material.
- Remove clay layer behind existing dike and replace with select material. Carry this material up to required height to contain dredged material.
- Build a new dike with clean dredged materials between the tidal pool and the existing dike and place potentially contaminated dredged material behind the new dike.

Reinforcing the existing dike involves reshaping the dike and placing additional select material on the existing dike. This adds weight but does not eliminate the clay layer problem beneath the dike. We found that removing the subsurface clay layer behind the existing dike, and replacing it with select dredged material piled to desired containment dike height provided reinforcing for the dike and resulted in a more stable arrangement at the rear of the dike under earthquake loading. However, the front area of the dike toward the river remained subject to possible slippage.

The third alternative seems more desirable and is recommended. Here a second dike will be constructed separately further behind and under the protection of the existing dike. The clay layer underlying the new dike area will be removed and stockpiled, and clean dredged rock and gravel will be placed upon the till layer and built up to the desired height. The new dike would be 250 feet long and 40-45 feet to its top and will have a volume of some 27,600 cubic yards. It will be capable of withstanding a Zone III seismic loading. Material will consist of select rock and gravel from Berths 6, 11, and 13.

Side slopes will be set at 1 (vertical) to 1½ (horizontal). On the inner slope of the new dike will be placed a filter layer of dredged gravel and a layer of stockpiled clay material to seal in any contaminated dredged material placed behind the dike. A typical section of such dike arrangement is shown at Sheet 2.

Special precautions must be taken in removing the clay stratum from the alignment of the new dike in order to prevent undermining of the existing dike. Longitudinal sections no more than 50 feet in length should be removed and replaced with clean select dredged material prior to proceeding to the next 50 foot section. Therefore, it is anticipated that five stages of clay removal and backfilling will be necessary in order to maintain stability of the existing dike.

PLACEMENT OF DREDGED MATERIAL

The amount of material to be dredged is 107,730 cubic yards consisting of 23,030 cubic yards of rock and 84,700 yards of overburden. All of the dredged material will be utilized at the potential disposal site either in constructing the new dike or filling the disposal area. Beyond the new 250 foot dike area previously discussed a gravel and sand dike approximately 6 feet above existing grade will be constructed to contain the dredged material. A trace of the dike extension is shown on Sheet 1. This dike extension will be 2,400 feet in length and 11,000 cubic yards in volume. Side slopes will be pitched at 1 (vertical) and 2 (horizontal). Approximately 6 feet of dredged spoils can thus be placed within upon the existing ground and the existing tidal pool area filled to similar elevation. On the basis of the soil profile in the area, the placement of the dredged material will not cause an unstable condition even under a Zone III seismic loading if the limits of the new fill are no closer than 125 feet from the existing shoreline.

In order to prevent the exchange of tidal waters through the bottom of the spoil disposal basin and to prevent seepage of rainwater and snow-melt into the Piscataqua River, an impermeable clay blanket 3 feet in thickness will be laid along the inside faces of the rock, gravel, and

sand dikes, and elsewhere where the existing clay stratum may have been breached.

POST PLACEMENT REQUIREMENTS

As the additional dredged material including potential contaminants is placed upon the disposal area, it will be spread, dried, graded and set with a series of swales to direct rainwater and snowmelt into a retention basin at the western edge of the site (toward the Base). Runoff thus collected will evaporate rather than drain into the Piscataqua River. The surface of the area will be dressed with 6 inches of loam from other areas and seeded with grasses to prevent erosion. It is expected that the dredged spoils will be sufficiently dry to allow this soil dressing at the completion of the dredging and dredged disposal placement programs. Covered with 6 inches of loam brought in from other areas, the dredged spoils should not produce unusual levels of undersirable odors. Fine seeding will be appropriate if a parklike setting is desired. Otherwise, hydroseeding will be sufficient. Landscaping with shrubs and trees will also be possible if contaminated dredged spoils are removed and relocated from the plantings root zones. The pits formed for setting trees and shrubs should be oversized and lined with an impermeable membrane then backfilled with sweet loam, sand and peat moss material.

Through this procedure new plantings of trees and shrubs will be protected from any toxic effects of dredged spoils, but should have a sufficiently large sweet soil zone from which to draw water and nourishment. Because the landfill area upon which the dredged spoil is to be placed has been formed with solid waste and not with domestic waste material, it is unlikely that methane, which is toxic to plant life, will be present in sufficient quantities to have adverse impacts on plantings.

With construction of the new impervious 250 foot dike as designed and the surface covered with loam, graded, and seeded as specified, any contaminated dredged spoil will be effectively sealed within the disposal area. All of the dredged material will also be utilized.

METHOD OF DREDGE SPOIL TRANSPORT

An analysis was made of the method to be used in transporting the dredged spoils from the dredge sites located at the west end of Seavey Island to the potential disposal site. Common methods are be means of barge, pipeline, and truck. Use of barge as means of transport would require construction of temporary docking facilities near the disposal site, employment of a crane and bucket device to remove the material from the barge, and employemnt of trucks to carry and distribute the dredged materials at the disposal site. Use of a pipeline would require transporting a slurry mixture that would be 90% water. Containment of such slurry to avoid release of contaminants and subsequent removal of water would be both time consuming and impractical and would render such operation unfeasible.

Transport of the dredged material across Seavey Island by truck is feasible if the transport containers are made water tight. A possible method is to fabricate 50-60 water tight "pans" especially for this transport task. The pans would be 5" x 5' x 4' deep and equipped with lifting handles to permit their being conveniently lifted by a crane. A number of pans could then be placed on a barge which can be moved adjacent to the dredging device and subsequently each pan filled. Particular dredged materials will remain fairly well segregated by pan.

The barge can then be moved to an existing dock and the pans lifted by crane onto a lowboy truckbed. Four or five pans could be transported at one time to the disposal site. There a mobile crane could lift each pan from the truck and empty each at a planned location depending on the nature of the material contained in the pan. The crane could then replace the empty pans on the lowboy truck for return trip to dock and dredge site.

This procedure would allow segregation of clean and contaminated spoils and would facilitate distribution of material at the disposal site.

CONSTRUCTION SEQUENCE

In order to segregate clean dredge material from contaminated material and to prevent escape of contaminants during the construction program, it will be necessary to specify a sequence for the dredging and impoundment basin construction program. The proposed sequence is presented in the following table.

PROPOSED CONSTRUCTION SEQUENCE

Time Interval (Months)	Location	Activity
1		Award Contract and mobilize equipment
1-3	Berth 11	Construct Berth protection
2-8	New Dikes	Remove and stockpile clay in dike area; backfill with select dredge material; extend to required height; line with clay
2-3	Berth 6	Remove overburden and rock; use in dike
3-4	Turning Basin	Remove only select material overburden; use in dike
3-6	Berth 13	Construct Berth protection
5-6	Berth 11	Remove overburden and rock; use in dike
5-6	Turning Basin	Remove remaining overburden and rock; use rock in dike; dispose of clay; silt in diked area
6-8	Berth 13	Remove overburden, rock; use rock in dike; dispose of clay, silt in diked area
8	Disposal Site	Grade; dress with loam; seed

In order to be certain that construction of the dike will keep pace with removal of contaminated spoil material, it may be necessary for the contractor to utilize some imported sand and gravel material. The contract should make provision for such a contingency, to be invoked at the discretion of the engineer in charge.

A construction schedule based on this sequence should be devised to avoid dredging of silt and clay during the periods April-mid-June and September-mid-November, when anadromous fish runs occur in the Piscataqua River, and during mid-June-August, when lobstering activity occurs close to Seavey Island. Removal of clean sand, gravel, and rock material during these months will have less significant adverse impacts. Construction of berth protection and new dikes can occur at any time without harmful effects to the environment.

COST ESTIMATES

Costs for removal of overburden and rock material and for protection of the berths adjacent to the dredge sites are estimated as follows:

• removal of overburden - 84,700 c.y. @ $5/c.y.	$ 424,000.
• blasting of rock - 23,030 c.y. @ $50/c.y.	1,150,000.
• removal of rock - 23,030 c.y. @ $5/c.y.	115,000.
• protect Berth 13 - 500 ft. @ $600/ft.	300,000.
• protect Berth 11 - 125 ft. @ $800/ft.	100,000.
• riprap Berth 11 - 400 ft. @ $16	6,000.
• contingencies	184,000.
• TOTAL COST OF DREDGING AND BERTH PROTECTION	$2,279,000.

These costs are based on those presented in the Preliminary Engineering Document dated November 1, 1976. Costs associated with disposal at the Seavey Island site are estimated as follows:

• fabrication of pans - 60 pans @ $1,000	$ 60,000.
• truck transport and rough grading - 107,730/ c.y. @ $2.50/c.y.	269,000.
• remove, dry, place, roll clay at dike 36,600 c.y. @ $3.80/c.y.	139,000.
• dressing, fine seeding, planting - 45,000 s.y. @ $3/s.y.	135,000.
• TOTAL COST OF DISPOSAL	$603,000.

These cost estimates are based on 1976 dollars and are consistent with the November 1, 1976, PED. Assuming that the project will be bid in March, 1978, bid prices are expected to be 14% higher than those listed above. That is, dredging costs will be approximately $2,598,000., and disposal costs using the Seavey Island site will be $687,000.

CONSIDERATION OF OTHER POSSIBLE ALTERNATIVE

As provided in Amendment 1, investigations and evaluations were made for disposal of 84,700 c.y. of overburden at the former tidal flats on Seavey

Island (pg. 5-35) and utilization of 23,030 c.y. of rock as rock breakwater or seawall elsewhere on the Naval Base (alternative locations for breakwater or seawall) construction to be developed by the A/E). This alternative was found to be infeasible because of the need to utilize all the sand, gravel, and rock dredge spoil material in construction of the dikes to contain the contaminated silt and clay spoils.

REVISIONS				
LTR	DESCRIPTION	PREP'D BY	DATE	APPROVED

PLAN

GRAPHIC SCALE 0' 40' 80'

NOTE
1. ALL ELEVATIONS REFER TO PNSY DATUM.

CHECK GRAPHIC SCALES BEFORE USING

PARSONS BRINCKERHOFF, QUADE & DOUGLAS, INC.
BOSTON, MASS.
ENGINEERS-ARCHITECTS-PLANNERS

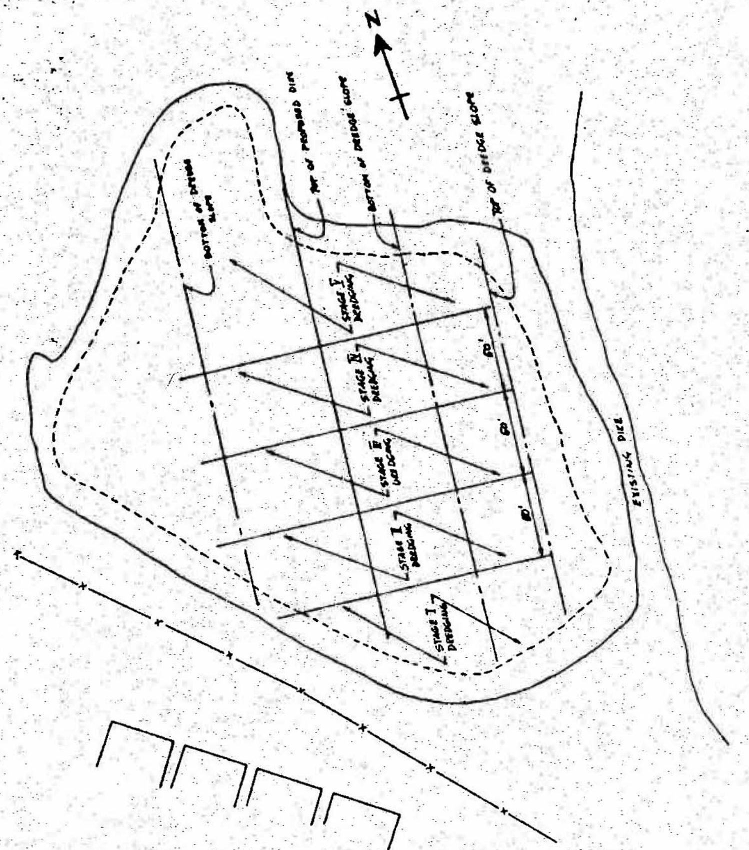
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NORTHERN DIVISION
NAVAL BASE PHILADELPHIA, PA.
PORTSMOUTH NAVAL SHIPYARD PORTSMOUTH, N.H.

P-152 DREDGING
BERTHS 6, 11 AND 13
SEAVEY ISLAND DISPOSAL AREA

DES. DR. CHK.
SUBMITTED BY DATE
DIRECTOR
SURVEY NO.
NO. ELC
NO. DIR
APPROVED DATE
OFFICER IN CHARGE
SATISFACTORY TO: DATE
APPROVED DATE
ROBERT FOR COMMANDER NAVFAC

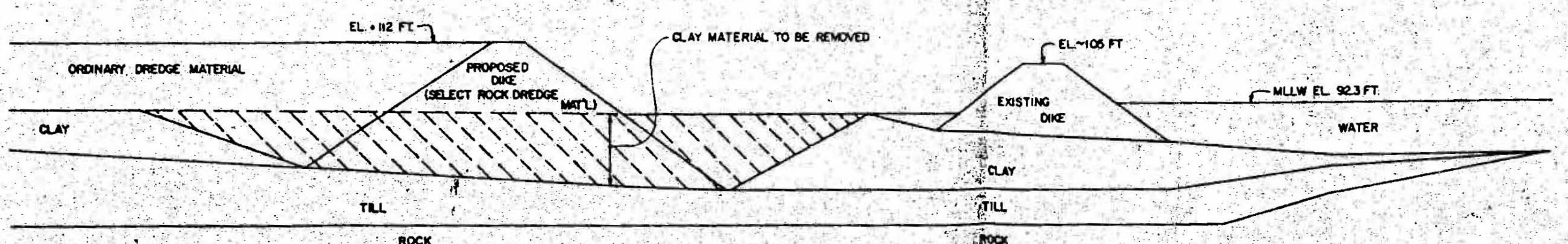
SIZE CODE IDENT NO. KAWFAC DRAWING NO.
CONST'L CONTR. NO.
SCALE: SPEC. SHEET 1 OF 3

LTR	REVISIONS DESCRIPTION	PREP'D BY	DATE	APPROVED



PLAN

GRAPHIC SCALE: 0' 40' 80'



TYPICAL SECTION

GRAPHIC SCALE: 0' 20' 40'

CHECK GRAPHIC SCALES BEFORE USING

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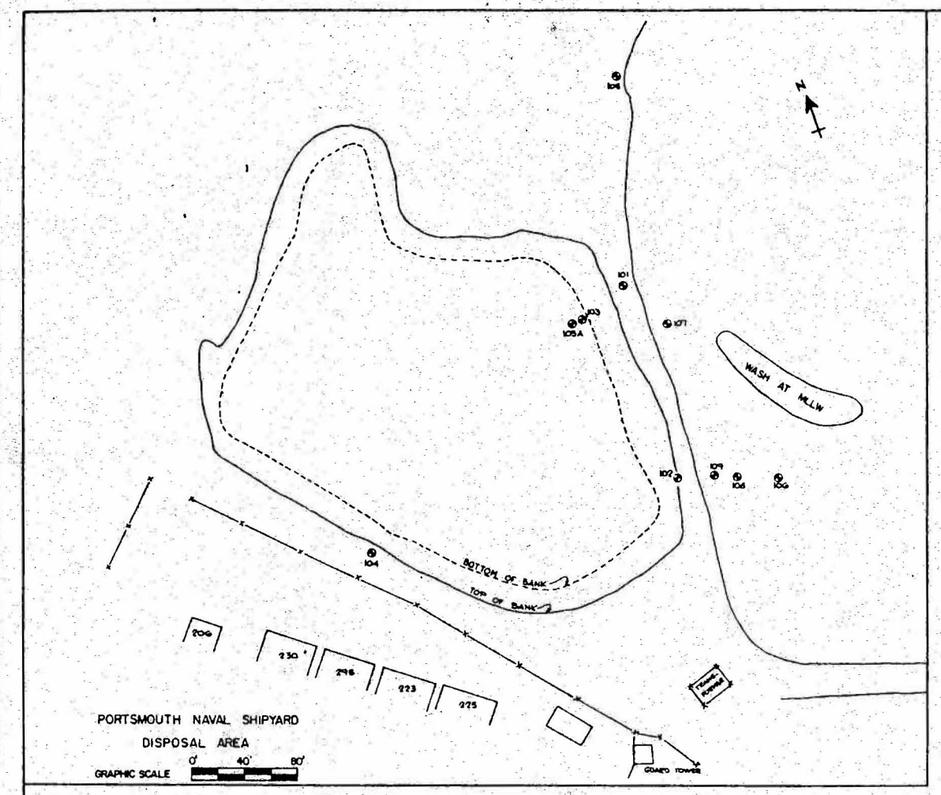
DES / DR / CHK	PORTSMOUTH NAVAL SHIPYARD PORTSMOUTH, N.H.
SUBMITTED BY DATE DIRECTOR	P-152 DREDGING BERTHS 6, 11 AND 13 SEAVEY ISLAND DISPOSAL AREA PART PLAN & SECTION
NORDIV HQ E.I.C. HD DIR	
APPROVED DATE OFFICER IN CHARGE	SIZE / CODE IDENT NO / NAVFAC DRAWING NO.
APPROVED DATE NORDIV FOR COMMANDER NAVFAC	CONSTR CONTR NO.
SATISFACTORY TO: DATE	SCALE / SPEC. / SHEET 2 OF 3



REVISIONS				
LTR	DESCRIPTION	PREP'D BY	DATE	APPROVED

104

Elev.	Description	Blows
+106.5	DIKE	
	MED DENSE BROWN & BLACK F/C GRAVEL & SAND (FILL)	22, 19
+95.5	LOOSE GREY FINE SAND & SILT, TRACE FINE GRAVEL	5
+92.5	DENSE BROWN F/C SAND & GRAVEL, LITTLE SILT, OCCASIONAL COBBLE	52
+85.7	REFUSAL	75/4"
	DARK GREY SLIGHTLY WEATHERED, MASSIVE METAMORPHO-SED SANDSTONE, TIGHT, OCCASIONAL SILICA VEIN	CORE
+76.5	E.O.B.	

105

Elev.	Description	Blows
+108.1	MED DENSE BROWN F/C SAND & GRAVEL, LITTLE WOOD FRAG. (FILL)	7
	MED DENSE BROWN F/C SAND & GRAVEL, OCCASIONAL COBBLE (FILL)	24
	LOOSE BROWN F/C SAND, SOME F C GRAVEL, TRACE SILT	6
+86.6	LOOSE BROWN F/C SAND	7
+84.1	STIFF YELLOW SILT & CLAY	
	DENSE BROWN F/C SAND, AND SILT, SOME MEDIUM/COARSE GRAVEL	40
+78.6	DARK GREY TIGHTLY JOINTED QUARTZITE, SLIGHTLY WEATHERED	CORE
+68.1	E.O.B.	

106

Elev.	Description	Blows
+82.7	BLACK ORGANIC SILT	5
+79.7	LOOSE BROWN F/C SAND & F/MED GRAVEL, TRACE SILT	
+72.7	ROCK	50/0.5'
	E.O.B.	

107

Elev.	Description	Blows
+87.7	SOFT BLACK SILT	
+85.7	MED DENSE BROWN SILT, TRACE CLAY & FINE SAND	17
+78.6	ROCK	50/0.1'
	E.O.B.	

108

Elev.	Description	Blows
+91.7	MED STIFF GREY-BLUE MOTTLED CLAY	6
	V SOFT LAYERED BLUE GREY-BROWN CLAY, LITTLE SILT	4, WOH
+68.7	MED DENSE GREY FINE SAND, SOME CLAY & MED COARSE GRAVEL	13, 24
	DENSE GREY F/C SAND & GRAVEL, TRACE SILT	30, 36
+58.7	ROCK	100/0.4'
	E.O.B.	

101 B

Elev.	Description	Blows
+107.2	DIKE FILL	
+89.7	MED DENSE BROWN BLACK F/C SAND & GRAVEL, LITTLE BRICK & CONCRETE (FILL)	29, 43
+83.2	MED STIFF BLUE YELLOW CLAY, TRACE SILT & FINE SAND	8
	GRADING V. SOFT	1
	V SOFT GREY CLAY, TRACE FINE SAND & SILT	1
+68.2	COARSE GRAVEL & SAND	25
	COARSE GRAVEL & SAND	26
	MED DENSE GREY F/C SAND & GRAVEL, TRACE SILT & COBBLES	20
+52.2	ROCK	100/0"
	E.O.B.	

102

Elev.	Description	Blows
+105.7	AUGER	
	MED DENSE BLACK COARSE SAND & GRAVEL, TRACE SILT, BRICK FRAG (FILL)	8
+87.7	MED DENSE BROWN F/C SAND, SOME FINE GRAVEL, BRICK FRAG. (FILL)	4, 19
+80.7	HARD GREY BLUE SILT, CLAY	6
+79.7	STIFF BLUE GREY CLAY, LITTLE SILT	12
	GRADES V. SOFT	
	V SOFT GREY CLAY, TRACE FINE SAND	WOR
+66.7	MED DENSE GREY F/C SAND & GRAVEL, LITTLE SILT, TRACE CLAY	5, 16
		63
	V. DENSE GREY F/C GRAVEL, LITTLE SILT, TRACE CLAY	100/0.4'
+50.7	E.O.B.	

103

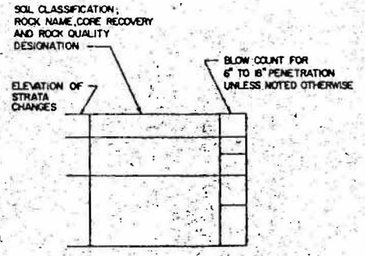
Elev.	Description	Blows
+90.1	MISC. FILL	14
+85.1	(REFUSAL - BORING MOVED)	
	E.O.B.	

103 A

Elev.	Description	Blows
+90.1	MED. DENSE TO DENSE GREY BLACK MISC. FILL	129
+85.3	STIFF YELLOW CLAY, LITTLE SILT	11
+80.1	VERY SOFT GREY CLAY OCCASIONAL FINE SAND LENSE	3
	SOFT GREY CLAY & FINE SAND LENSES	9
	V. SOFT GREY CLAY, TRACE SILT	WOR
	DENSE GREY F/C SAND & GRAVEL, TRACE SILT	29
	DENSE GREY F/C SAND & GRAVEL, TRACE SILT	89
+55.1	ROCK	100/0"
	E.O.B.	

109

Elev.	Description	Blows
+85.7	V LOOSE BLACK SILT	
+83.7	GREY YELLOW MOTTLED SILT & CLAY	9
+81.2	SOFT GREY CLAY, TRACE SILT	1
+69.7	MED. DENSE GREY F/C SAND & GRAVEL, TRACE SILT	10, 30
+60.7		100/0"
	E.O.B.	



NOTES

1. ALL ELEVATIONS REFER TO PNSY DATUM
2. ALL BLOW COUNTS REFER TO STANDARD PENETRATION TESTS, UNLESS OTHERWISE NOTED.
3. FOR MORE DETAILED INFORMATION SEE BORING & DRILL CORE LOGS.

WOH - WEIGHT OF HAMMER
WOR - WEIGHT OF RODS
EOB - END OF BORING

CHECK GRAPHIC SCALES BEFORE USING

SATISFACTORY TO: DATE

J.O.

PARSONS, BRINCKERHOFF, QUADE & DOUGLAS, INC
ENGINEERS - ARCHITECTS - PLANNERS
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DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND
NORTHERN DIVISION
NAVAL BASE PHILADELPHIA, PA.
PORTSMOUTH NAVAL SHIPYARD PORTSMOUTH, N.H.
P - 152 DREDGING
SEAVEY ISLAND DISPOSAL AREA
BORING PLAN AND LOGS

SIZE	CODE IDENT NO	NAVFAC DRAWING NO
		CONSTR CONTR NO
SCALE		SPEC. SHEET 3 OF 3

Former Tidal Flat on Seavey Island

Location and General Features

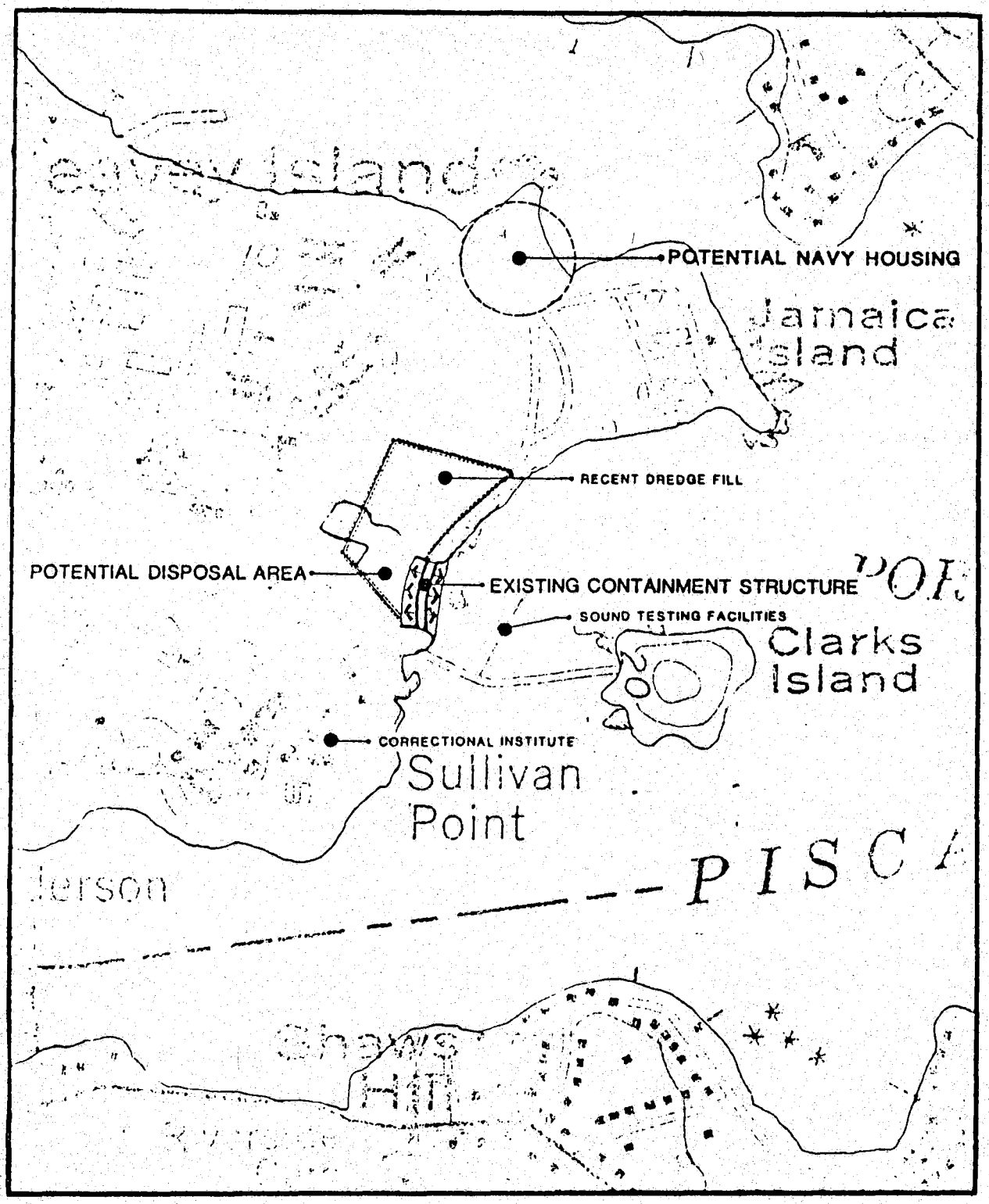
1 The proposed location for disposal of dredge spoils is on Navy property at the eastern end of Seavey Island (See Figure II-1). The site is a former tidal flat which has received dredge spoil in the past. It is located north of the causeway to Clark Island and the sound testing facilities. The entire area northeast of the potential site in the direction of Jamaica Island was at one time tidal flat. Successive filling with dredge spoils and solid waste has converted much of this area to usable land surface. A portion of the potential disposal site is a tidal pool which has not yet been reclaimed by fill operations. The remainder of the site is currently devoted to solid waste disposal and is visually unnattractive.

2 Disposal of the dredge spoils on this Seavey Island site could have the added benefit of covering the solid waste disposal area and improving the visual attractiveness of a site approximately 1,000 feet to the north recently proposed as a possible location for future Navy housing. Reclamation of the solid waste disposal area would be especially valuable if landscaping or recreation facilities could be established.

Engineering Aspects

3 Dredge spoils would be transported from the dredge sites to the disposal area by truck. The contractor would be required to provide waterproof, open top containers into which the spoil would be placed by clamshell or dragline bucket. The containers then could be lifted by crane onto a flatbed truck and driven across the island. A second crane at the disposal area could dump the containers wherever desired. By this procedure, spillage along shipyard roads would be minimized, and material of engineering value, e.g., gravel and rock, could by separated from mud and silt.

FIGURE II-1 SEAVEY ISLAND SITE, PORTSMOUTH NAVAL SHIPYARD DREDGING STUDY, 1977.



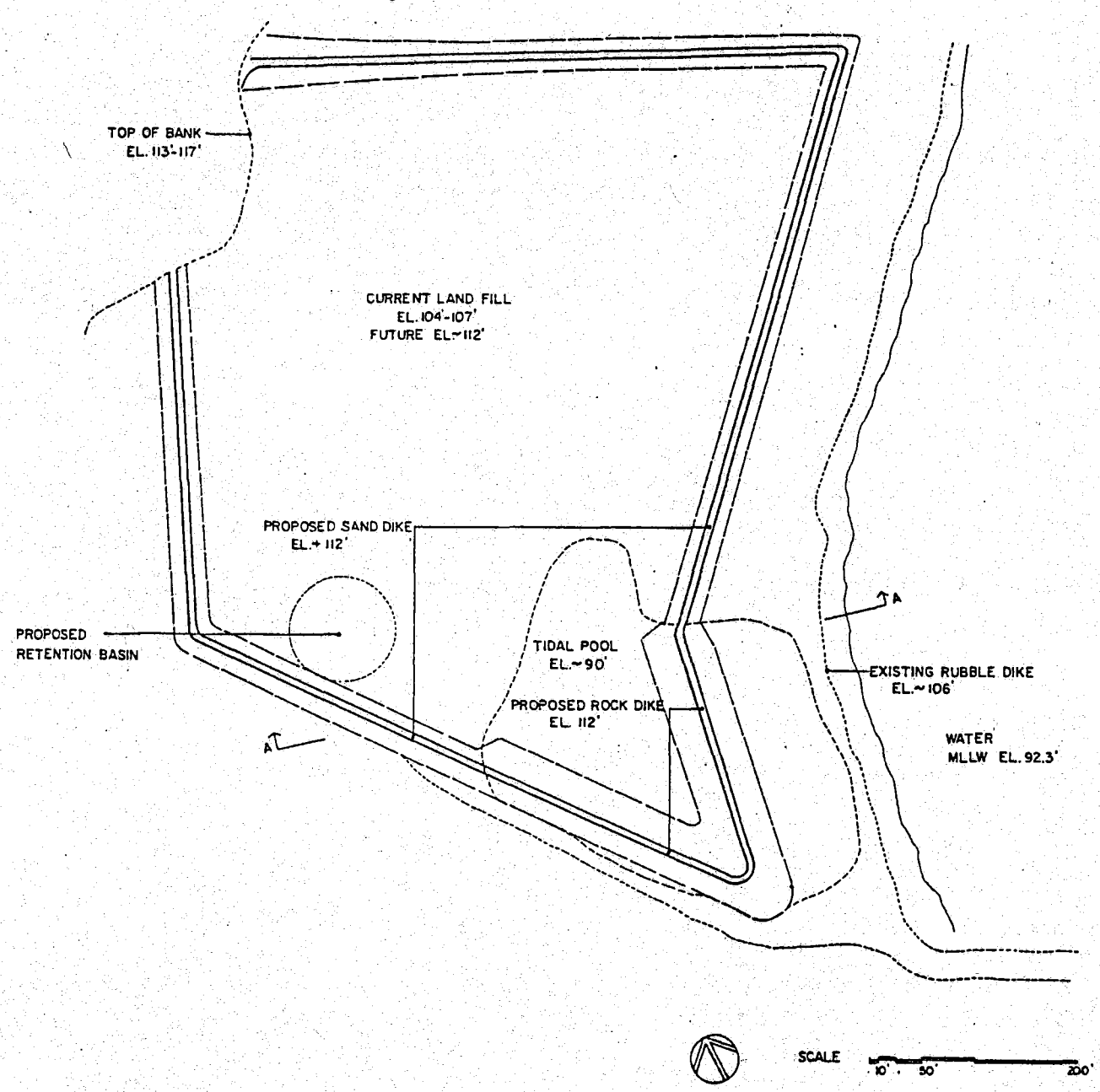
4 At the disposal site special engineering will be required to dike and contain the dredge spoils and to prevent seepage or runoff from the contaminated spoil into the adjacent Piscataqua River. Around most of the disposal site a sand dike should be constructed to contain dredge spoils approximately 6 feet in depth. In the vicinity of the existing tidal pool, the dike should be designed to withstand lateral pressures exerted by 20-25 feet of dredge spoil. Figure II-2 illustrates the retention works recommended for containing the dredge spoils.

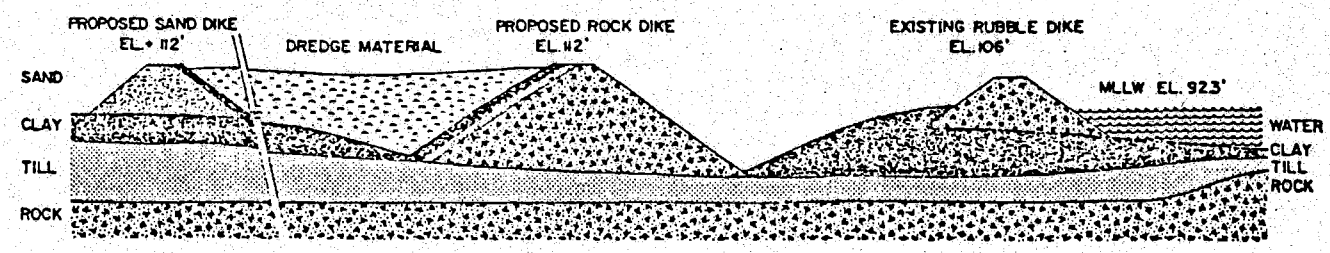
5 The existing dike which separates the tidal pool from the Piscataqua River is underlain by 15-20 feet of medium soft clay. The thickness of this clay layer appears to diminish to neglegible amounts under the northern section of the proposed fill area. The clay overlies a dense till 3 feet to 15 feet in thickness, beneath which is bedrock. Although the existing dike is statically stable under the present loading conditions, sections of this dike could be unstable under a presumed Zone 3 seismic loading. In order for a dike at this location to be stable under seismic loading, the clay layer would have to be removed and the foundations set directly on the surface of the till.

6 To assure stability of the spoil area under normal and seismic loading conditions, it is recommended that a second dike be constructed sufficiently inland of the existing dike to prevent any detrimental influence upon its structure. Existing material, including the clay layer, would be removed and deposited inland of the new dike in order to bare the surface of the till stratum. The new dike would be constructed of selected portions of the dredge spoils from Berths 6, 11 and 13, which consists of blasted rock, gravel and sand. The new dike would be about 6 feet higher than the existing dike.

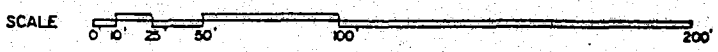
7 In order to preserve the integrity of the existing dike, special precautions must be taken during construction. Removal of the earth material to expose the till layer should take place in stages to prevent undermining of the existing dike. Re-

FIGURE I-2 PLAN AND PROFILE OF SEAVEY ISLAND DISPOSAL SITE CONTAINMENT WORKS. PORTSMOUTH NAVAL SHIPYARD DREDGING STUDY, 1977.





SECTION A - A



moval of the unwanted soil should proceed in sections no more than 50 feet in length, and the resulting trenches should be backfilled with select dredge spoil material before proceeding to the next dike section.

8 In order to prevent endemic leaching of dredge spoil contaminants, the bottom of the disposal area must be sealed to prevent incursion by tidal waters. The existing natural clay layer beneath that portion of the disposal site subjected to tidal action will be adequate to prevent seepage below ground. It will be necessary, however, to seal the inboard face of the dike with an impermeable material, such as clay, to prevent lateral flow through the dike. By this device, all water transported to the disposal site with the dredge spoil and all rainwater will be prevented from flowing into the ground water and the Piscataqua River.

9 Since drainage from the disposal area is to be prevented, it will be necessary to direct runoff from the site to a retention basin from which rainwater and snowmelt can evaporate. The disposal area should be graded with a series of swales which slope inland to a retention basin near the escarpment which identifies the former, natural shoreline of Seavey Island.

10 Considerable latitude will be possible for landscaping the spoil disposal area. The graded surface should be dressed with 6 inches of loam and planted immediately with grass to prevent possible undersirable odors and local erosion. The area could be seeded for lawn-like quality or hydroseeded simply for erosion control. As part of the spoil disposal operation, as part of the potential housing development, or at any other time, the Navy could install shrubbery or trees to further enhance the site's attractiveness. Thus reclaimed, this area would be ideal for active or passive recreation, such as athletic playing fields or park development.

11 If trees and shrubs are to be installed at the disposal area, it will be necessary to excavate toxic dredge spoils from planting pits, to seal the pits to prevent seepage of contaminants, and to backfill with "sweet" soil. Once established, the

plantings should survive without special irrigation or care.

12 The spoil disposal area will encompass an area of 6-7 acres. The combination of dredge spoils, soil removed from the site of the new dike, and imported surface loam will raise the grade approximately 7 feet. The costs associated with disposal at the Seavey Island site are as follows:*

• $5/c.y. to remove all material	$ 539,000.
• $50/c.y. to drill, blast rock	1,150,000.
• berth protection	406,000.
• fabrication of pans	60,000.
• $2.50/c.y. to transport, grade	269,000.
• $3.80/c.y. to remove, reuse clay at dike	139,000.
• $3/s.y. to dress, fine seed, plant	135,000.
• contingencies	184,000.
• TOTAL COST	$2,882,000.

13 Consideration has been given to disposing of only the contaminated overburden at the Seavey Island site and to transporting the clean rock and gravel material either to an ocean dumping site or to another Seavey Island site where it would be useful for breakwater or seawall construction. These alternatives are not viable because of the need to utilize the rock and gravel for dikes to contain the contaminated spoils. If the good quality material were to be dumped at sea or employed elsewhere for construction, a similar amount of material would have to be imported for the retention dike.

Surface and Subsurface Geology

14 The bedrock geology of this site is as has been described in Section 2.1.1.1. Overlying the metamorphised bedrock prominence which forms Seavey Island is a thin mantle of consolidated sediments of glacial fluvial origins. In this specific area, recent dredge spoil and solid waste disposal accounts for the surface topography and composition. Beneath the fill material is a natural stratum of medium to soft clay, 15-20 feet thick. The clay overlies a densed till, 3-15 feet in thickness, beneath which is bedrock.

*Note: Cost estimates are expressed in 1977 dollars consistent with other cost estimates presented in the Draft CEIS (October, 1977). Estimates do not include structural protection for berths.

Surface Water Runoff Patterns

15 The approximately 270 acres of Seavey Island, with the exception of this recently dredge-filled eastern section, is extensively developed and consequently has been provided with extensive storm water collection networks which overboard at specific outlets. No surface pattern is recognizable in the proposed disposal area.

16 Surface water runoff at the proposed disposal site is limited to runoff from rain and snowmelt from surrounding areas. The runoff may percolate through the ground to the water table or run into the Piscataqua River. A portion of the runoff reaches the river after first collecting in a depression on the site, and then percolating through the existing dike. The rate of flow through the dike between the depression and river, where a free exchange of water occurs, is determined by the phase of the tide. The result of these various inflows is the presence of up to several feet of water within the depression. When inspected in March 1977, considerable runoff from snowmelt was flowing into the depression.

Groundwater

17 The Shipyard is supplied potable water by the town of Kittery. Groundwater levels are shallow but are not significant to the Navy facility. There are no other potential groundwater users on the island.

18 As the area being considered was formerly an intertidal area, the depth to groundwater is equal to the depth of the fill. This varies from approximately 13.5 feet at mean low water to 5.5 feet at mean high water. Depth to groundwater in the depression is zero.

Fauna and Flora

19 Recent diking at the outlet has removed this area from the category of tidal flat. The site abuts an

area of institutional buildings--the former correctional institute to the west and the former hospital complex to the north. The land reclamation area to the northeast is relatively flat and has revegetated.

20 The intertidal biota found in the original site have already been removed as the result of historic landfill and the placement of an earthen dike across the mouth of the remaining tidal flat. Daily, the Navy landfill process is reclaiming the old tidal flat acreage. It is unlikely that additional disposal will significantly alter this habitat.

Terrestrial

21 Field studies at the proposed Seavey Island disposal site were conducted in March 1977. One day was spent at the site, noting abundance, diversity, and species composition of vegetation, observing wildlife and wildlife signs, and conducting a general habitat evaluation.

Flora

22 Vegetation at the proposed disposal area and immediate surroundings is exceedingly sparse. A very thin strip of grasses border the pit in scattered areas. There are no shrubs or plants at the proposed site.

23 Vegetation is more abundant at several areas in close proximity to the site. Clark's Island (approximately 500 yards distant) contains a vegetative cover of grasses, shrubs and small hardwood tree species. A small woody area is present approximately 150 yards northeast of the site and a small grove of conifers is situated near building H10 adjacent to the southeast corner of the disposal site.

Fauna

24 The present state of the proposed disposal site severely limits its value as wildlife habitat. The lack of appreciable amounts of vegetation, presence of large amounts of garbage and scrap metal, and constant truck traffic and human

activity in the area combine to make the area very unnattractive to wildlife. The only species observed during the site visit were herring gulls *(Larus argentatus)* and great black-backed gulls *(Larus marinus)*. It is likely other species of gulls, the house mouse *(Mus musculus)* and Norway rat *(Rattus norvegicus)* are present, but the lack of household garbage as a food supply would limit utilization of the area.

25 The more abundant and diverse vegetation on Clark's Island and lack of significant human activity provides an area of much higher value to wildlife. Small mammals and songbirds are undoubtedly present on the island, utilizing portions as breeding habitat during the spring and summer. The mud flats around the island are exposed at low tide and provide feeding habitat for gulls, shorebirds and waterfowl.

Marine

26 In addition to the land area described above, the Piscataqua River and Portsmouth Harbor area provide habitat for various species of birds and mammals. These animals could be expected to be found occasionally near the proposed site. In addition to various species of gulls, the Great Bay Area (including the study site) is heavily utilized by waterfowl. Approximately three-fourths of all waterfowl wintering within the State of New Hampshire do so in the Great Bay Area (Lacaillade, 1975). The most numerous species are the Canada goose *(Branta canadensis)*, black duck *(Anas rubripes)*, greater scaup *(Aytha marila)* and lesser scaup *(Aythya affinis)*. Other species present include common goldeneye *(Bucephala clangula)*, bufflehead *(Bucephala albeola)* and mallard *(Anas platyrhynchos)*. In addition, the waters just offshore from the harbor mouth are utilized by white-winged scoter *(Melanitta deglandi)*, surf scoter *(Melanitta perspicillata)*, common scoter *(Oidemia nigra)*, old squaw *(Clangula hyemalis)*, common eiders *(Somateria molissima)* and various seabird species, such as great cormorants *(Phalacrocorax carbo)*, razorbills *(Alea torda)*, black guillemot *(Cepphus grylle)* and dovekies *(Plautus alle)*. Although avian numbers are highest in the winter, the Great Bay and offshore areas are

31 The disposal of the material involves no direct removal of wildlife habitat. The very small amount of vegetation which would be destroyed is insignificant. Existing noise levels are high and the expected temporary increase in these levels would have no further detrimental effect on wildlife. A significant adverse impact to wildlife would occur if PCB's and heavy metals were released into the marine environment. If erosion, surface runoff and leaching actions were to carry these contaminants into the waters of the Piscataqua River and Portsmouth Harbor, they would be ingested by bottom dwelling organisms and their concentration increased at each succeeding trophic level. Considering the presence of nearby tidal flats, the utilization of Great Bay, the Piscataqua River estuary and immediate offshore area by marine mammals and large numbers of birds, this impact would be significant. It is for this reason that the special impervious containment facilities for the dredge spoil have been proposed.

32 Negative environmental impacts associated with the disposal of dredge spoils at the Seavey Island intertidal site can be reduced by separating clean and contaminated material. Clean overburden and bedrock can be placed in the proposed retention dike with no serious impacts. Contaminated spoils would then be contained by the impervious dike, bottom and sides of the disposal area.

Land Use

33 Seavey Island is a densely developed military installation. The only area not committed to heavy industry and military support facilities is near the potential disposal site area and the land reclaimed by dredge fill to the northeast of the disposal site. The Navy plans to develop military housing north of the disposal area near Jamaica Island. Covering of the solid waste disposal area would enhance the attractiveness of the proposed housing.

34 The filling would enhance the land use potential of the site by producing more useful land surface at an elevation more removed from the potential of

tidal flooding during unusual storm occurrences.

Sites of Historical or Archaeological Value

35 There are no known sites of historical or archaeological significance which will be affected by the use of this potential disposal site on the Navy property at Seavey Island.

Aesthetic Qualities of the Site

36 Surrounding industrial and institutional land uses dominate the visual setting at the site. The harbor island views to the east will not be affected by the continued use of this site as a dredge disposal site and its subsequent landscaping. Attractiveness of the planned Navy housing nearby would be greatly enhanced by covering the existing solid waste disposal area. Undersirable odors might emanate from the dredge spoils until they are covered with loam at the disposal site.

Corps of Engineers Permit for Discharge of Dredge Spoils

37 Section 404 of the Federal Water Pollution Control Acts assigns to the U. S. Army Corps of Engineers responsibility for regulating the discharge of dredge or fill material in coastal wetlands. The land fill program which created the proposed spoil disposal site was conducted by the Navy under a permit from the Corps' New England Division. Because that permit to fill tidal areas has expired, a new permit must be obtained prior to filling the tidal pool. Dike construction and disposal of dredge spoils on the existing solid waste disposal area will not require permits from the Corps of Engineers or other Federal, State or Local Agencies.