CENPS-OP-DMMO

MEMORANDUM FOR RECORD 18 January 1994

SUBJECT: DETERMINATION ON THE SUITABILITY OF DREDGED MATERIAL TESTED FOR THE PORT OF SEATTLE'S TERMINAL-30 APRON REHABILITATION PROJECT, SEATTLE, WASHINGTON (93-2-00497) FOR DISPOSAL AT A PSDDA UNCONFINED OPEN-WATER DISPOSAL SITE.

1. The following summary reflects the consensus determination of the PSDDA Agencies' (U.S. Army Corps of Engineers, Department of Ecology, Department of Natural Resources, and the Environmental Protection Agency) with jurisdiction on dredging and disposal on the suitability of the estimated 33,400 cubic yards of dredged material proposed for dredging from the Port of Seattle's Terminal-30 Apron Rehabilitation Project, at Seattle, Washington for disposal at a PSDDA unconfined open-water disposal site (Elliott Bay nondispersive site). The determination of suitability is based on the acceptability of the sampling conducted on June 17-24, 1993 and all relevant test data contained in November 1993 Data Summary Report submitted by Parametrix Incorporated to the Dredged Material Management Office on December 20, 1993 for distribution to and review by the PSDDA agencies.

2. The Agencies' approved sampling and testing plan was generally followed, with one small deviation discussed below. Quality assurance/quality control guidelines specified by PSEP and the PSDDA program were generally complied with. This project was ranked "high" and sampling consisted of taking six core samples to the project maximum testing design depth of 22 feet, with two composited and one uncomposited surface dredged material management units (DMMU: C1, C2, S1), and two composited and one uncomposited subsurface DMMU (C3, C4, S2). The sampling and DMMU compositing scheme used were as presented in Table 1 and Figure 1. The PSDDA approved SAP called for two composited subsurface analyses, comprised of three samples each. During subsurface sampling at boring stations 1, 3, and 5, it was observed that structural fill predominated at stations 1 and 5, whereas station 3 consisted predominately of sand. A decision was made to analyze the structural fill separately from the sand as DMMU C3 and S2. This departure from the approved SAP was not deemed significant, and the data gathered from these analyses were sufficient and acceptable for decision making by the Agencies based on best professional judgement.

Table 1. Sampling and compositing scheme for T-30 DMMU.

Sampling Strata	DMMU ID[1]	Station # Composite ID[2]
Surface:	C1 C2 S1	1A + 5A 2B + 6B 3C
Subsurface:	C3 C4 S2 C5 (blind duplicate of C4)	1D + 5D 2E + 4E + 6E 3F 2E + 4E + 6E

1/ C = Composited DMMU; S = Uncomposited DMMU.
2/ Boring/Station # Composite subsample ID: (Surface: A, B, C) (Subsurface: D, E, F).

3. A summary of sediment conventional characteristics for all six DMMU is provided in Table 2 below.

Table 2. Summary of DMMU Sediment Conventional Parameters.

Conventional Parameters	C-1	C2	S1	C3	C4	S-2
DMMU Volume (cubic yards)	3584	3584	1792	8133	12200	4067
Grain Size (%):						
Gravel	38.2	0.1	8.1	24.2	0.2	0.3
Sand	58.4	55.6	31.5	73.3	59.3	53.0
Silt	2.2	36.1	52.4	1.3	34.5	38.5
Clay	1.1	8.3	7.9	1.2	6.1	8.4
Total Solids (%)	92.8	67.2	47.0	86.6	74.8	74.0
Total Volatile Solids (%)	0.39	5.0	11.0	0.91	3.0	2.35
Total Organic Carbon (%)	0.17	1.6	2.9	0.09	0.44	0.77
Bulk Ammonia (mg/Kg)	0.2	110	21	1.2	56	31
Total Sulfides (mg/Kg)	3.6	370	2800	3.7	82	16

4. The results of these chemical analyses showed that one surface DMMU (C1), and two subsurface DMMU (C3, C4) were all quantitated or detection limits were below the PSDDA screening levels (SL). Surface DMMU C2 and S1 had numerous exceedances of PSDDA SL, and C2 had 4 quantitated maximum level (ML) exceedances for total LPAH's, Acenaphthene, Fluorene, and Dibenzofuran. Bioaccumulation Triggers (BT) were exceeded for PCB's in surface DMMU's C2 and S1. Tributyltin analyses also indicated that both C2 and S1 exceeded the PSDDA SL (30 ng/g), whereas the rest of the samples were undetected below the SL. Subsurface DMMU C4 had a single quantitated SL exceedance for mercury, thereby necessitating bioassay testing in order to make a suitability determination. The four ML exceedances noted for C2 render this DMMU unsuitable for unconfined open-water disposal (UCOWD). The Port of Seattle elected not to perform necessary biological testing for DMMU S1, which would have required both bioassays and the 28-day bioaccumulation assessment for PCB's. Therefore, DMMU S1 is considered unsuitable for UCOWD in the absence of biological testing. A summary of all chemicals exceeding PSDDA guidelines is provided in Table 3 below.

Table 3. Chemicals quantitated above the PSDDA Chemical Guidelines.

Chemicals	SL	BT	ML	DMMU C2	DMMU S1	DMMU C4
Metals (mg/kg)						
Cadmium	0.96		9.6	5.0	6.7	
Copper	81		810		170	
Lead	66		660	79	230	
Mercury	0.21	1.5	2.1	0.312	0.539	0.424
Silver	1.2	4.6	5		1.9	
Zinc	160		1600	190	490	
Tributyltin (ng/g)	30	219	--	49.2	>30	
Organics (µg/kg)						
Total LPAH's	610		6100	6190.5	1126.5	
Acenapththene	63		630	1100		
Anthracene	130		1300	590	240	
Fluorene	64		640	930	78	
Naphthalene	210		2100	580		
Phenanthrene	320		3200	2800	640	
2-Methylnaphthalene	67		670	180		
Total HPAH's	1800		51000	4837	17010	
Benzo(a)anthracene	450		4500	460	1600	
Benzo(a)pyrene	680	4964	6800		1300	
Benzo(b,k)fluorenes	800		8000		3100	
Benzo(g,h,i)perylene	540		5400		680	
Chrysene	670		6700		1800	
Dibenzo(a,h)anthracene	120		5400		170	
Fluoranthene	630	4600	6300	1700	3900	
Indeno(1,2,3,c,d)pyrene	69		5200	110	760	
Pyrene	430		7300	1000	3700	
Dibenzofuran	54		540	650		
Aldrin	10	37		18	18	
Total DDT	6.9	50	69	9	28	
Dieldrin	10	37		18	47	
Heptachlor	10	37			36	
Total PCB's	130	(38[1]µg/g)	2500	1765 (110µg/g)	1761 (60.7µg/g)	

1/ TOC normalized value.

5. Biological testing was accomplished to evaluate the suitability of DMMU C4. The control sediment was collected at West Beach, Whidbey Island. The reference sediment was collected at Station 4 in Carr Inlet. Both control sediment and reference sediment met the PSDDA performance requirements for all four bioassays. The results of the bioassays are summarized below in Table 4, and showed that the amphipod, sediment larval, and *Neanthes* biomass bioassays passed the PSDDA dispersive and nondispersive disposal guidelines. The results from the saline microtox test showed light enhancement and were not interpretable. Therefore, the results of the bioassays demonstrated that the material was suitable for unconfined disposal at either a PSDDA dispersive site or nondispersive site.

Table 4. Bioassay Results for T-30 DMMU C4 dredged material.

STATION	Amphipod Mortality (%)	Sediment Larval (Echinoderm)		20-day *Neanthes* biomass (mg)	Saline Microtox (% light)
		Mort+Abnorm (%)	Abnormality (%)		
Control	10[1]	N/A	N/A	16.9	N/A
Reference. (CRR 4)	5	10.8	2.3	20.0	-29.7
DMMU C4	10	7.9	5.9	19.7 (98.5% of ref)	-21.6
Positive Control (LC50/EC50)	CdCl[2] 0.234 mg/L	CdCl[2] 4.3 mg/L	--	CdCl[2] 6.48 mg/L	phenol 24.3 mg/L

1/ One of five replicates exhibited 100 % mortality at test termination. The replicate was believed to be an outlier, because the results of the other four replicates exhibited relatively low mortalities (15%. 10%, 10%, 5%). Contaminated glassware may have caused the mortalities observed for the anomalous replicate. Based on this explanation, the anomalous replicate was dropped, and results depicted in Table 4 are based on the four remaining replicates.

6. The Agencies concluded based on the above discussion and summary of sediment chemical and biological testing results for the Port of Seattle's T-30 Apron Rehabilitation Project, in Elliott Bay, that two of the six DMMU tested (C2 and S1) representing a total of 5,376 cubic yards, were unsuitable for unconfined open-water disposal. The remaining four DMMU comprising 28,024 cubic yards of dredged material are suitable for unconfined disposal at a nondispersive open-water disposal site. The estimated 5,000 cubic yards of rip rap (as per SAP) located within the three surface DMMU are not suitable for unconfined open-water disposal. The riprap located in surface DMMU C1 will have to be separated from the suitable dredged material prior to disposal at the Elliott Bay disposal site. Rip rap will have to be disposed of at an Ecology approved upland site. The means of separating the rip rap from the dredged material will be articulated in the dredging plan, which will be reviewed and approved by the PSDDA agencies prior to dredging.

7. This memorandum documents the suitability of proposed dredged sediments for unconfined open-water disposal at a PSDDA site. It does not constitute final agency approval of the project. A public

notice will be issued for this project. During the public comment period, which follows a public notice, the resource agencies will provide input on the overall project. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under Section 404 (b)(1) of the Clean Water Act.

Concur:

19 Jan 1994
Date

David R. Kendall, Ph.D
Seattle District Corps of Engineers

24 January 1994
Date

Justine Barton/John Malek
Environmental Protection Agency
Region X

1/20/94
Date

Rick Vining
Washington Department of Ecology

20 Jan 1994
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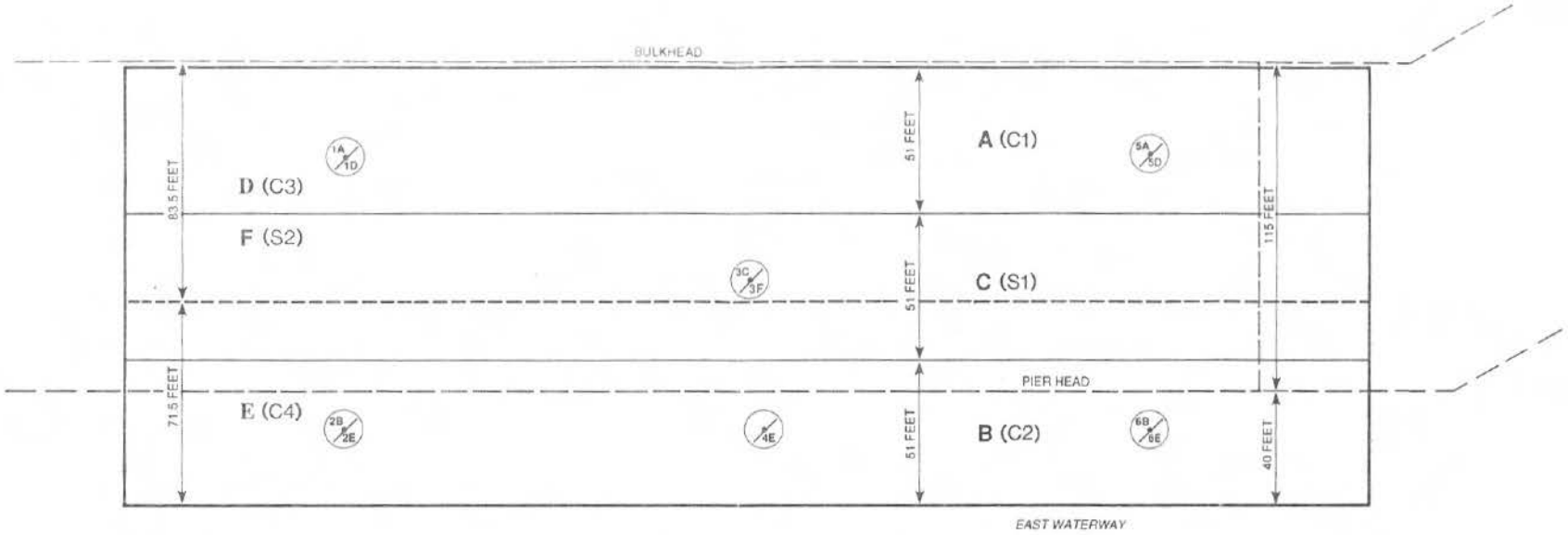
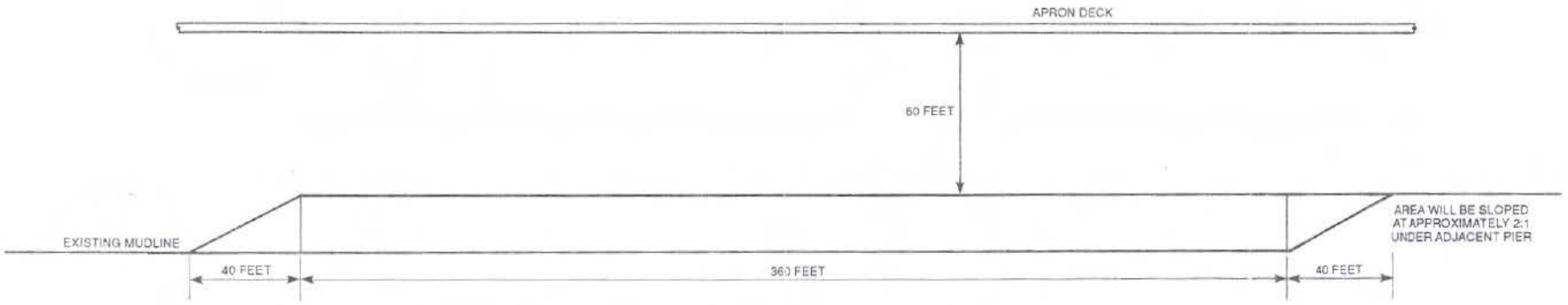
DMMO File



Plan View



Vertical Section - Pierhead Line

Note: Sediment will be accessed through 1 foot x 1 foot holes in the concrete apron for cores 1, 3, and 5

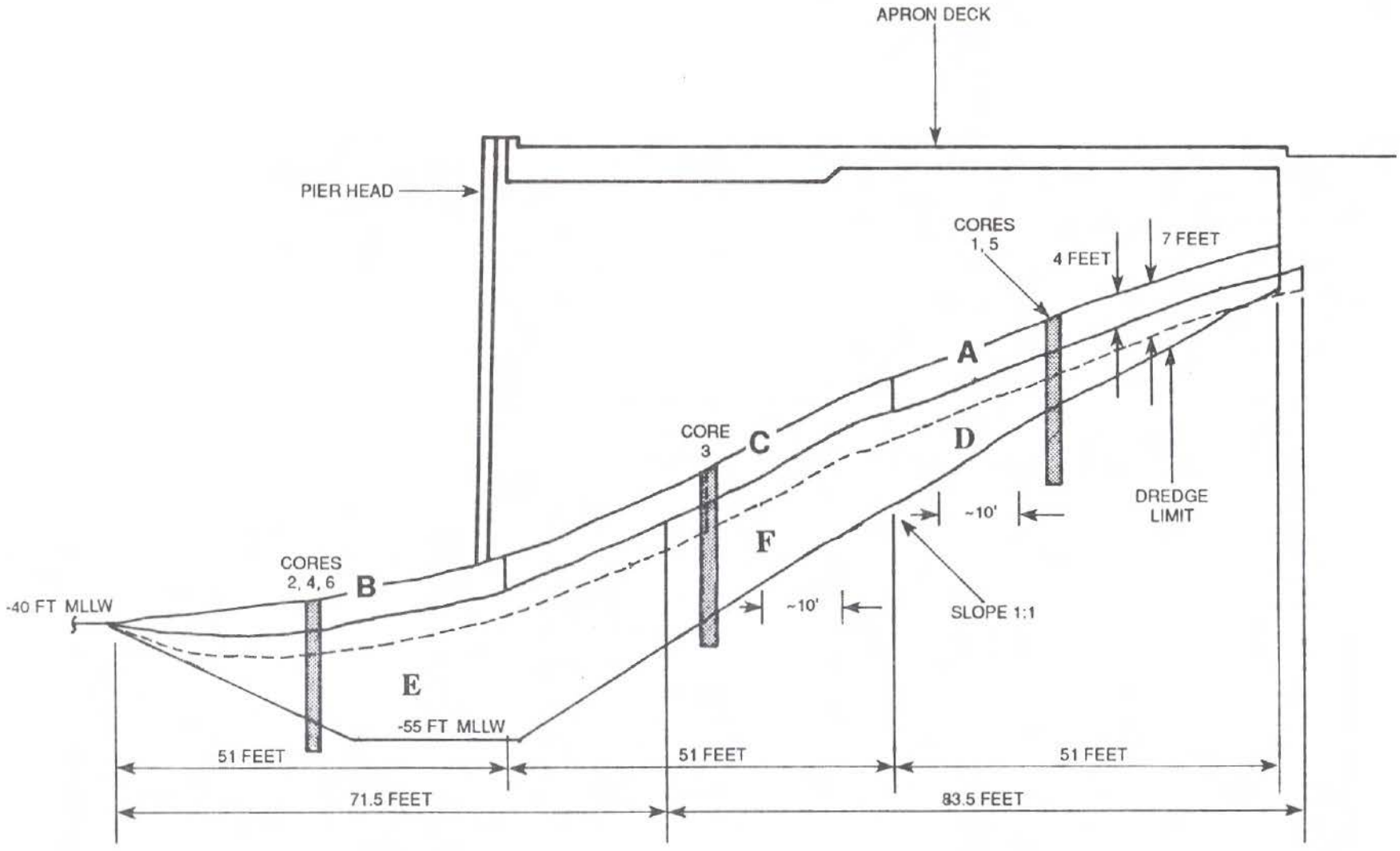
SCALE IN FEET
0 20 40

Outline of Existing Apron
Border of Surface DMMU's (<4')
Border of Subsurface DMMU's (>4

A, B, C Designation of Surface DMMU
D, E Designation of Subsurface DMMU
1A/1D Indicates Core Location, Core Location Designation and Composite Scheme for Surface/Subsurface DMMU's

Plan View and Sediment Grid Units

Figure 1(a)

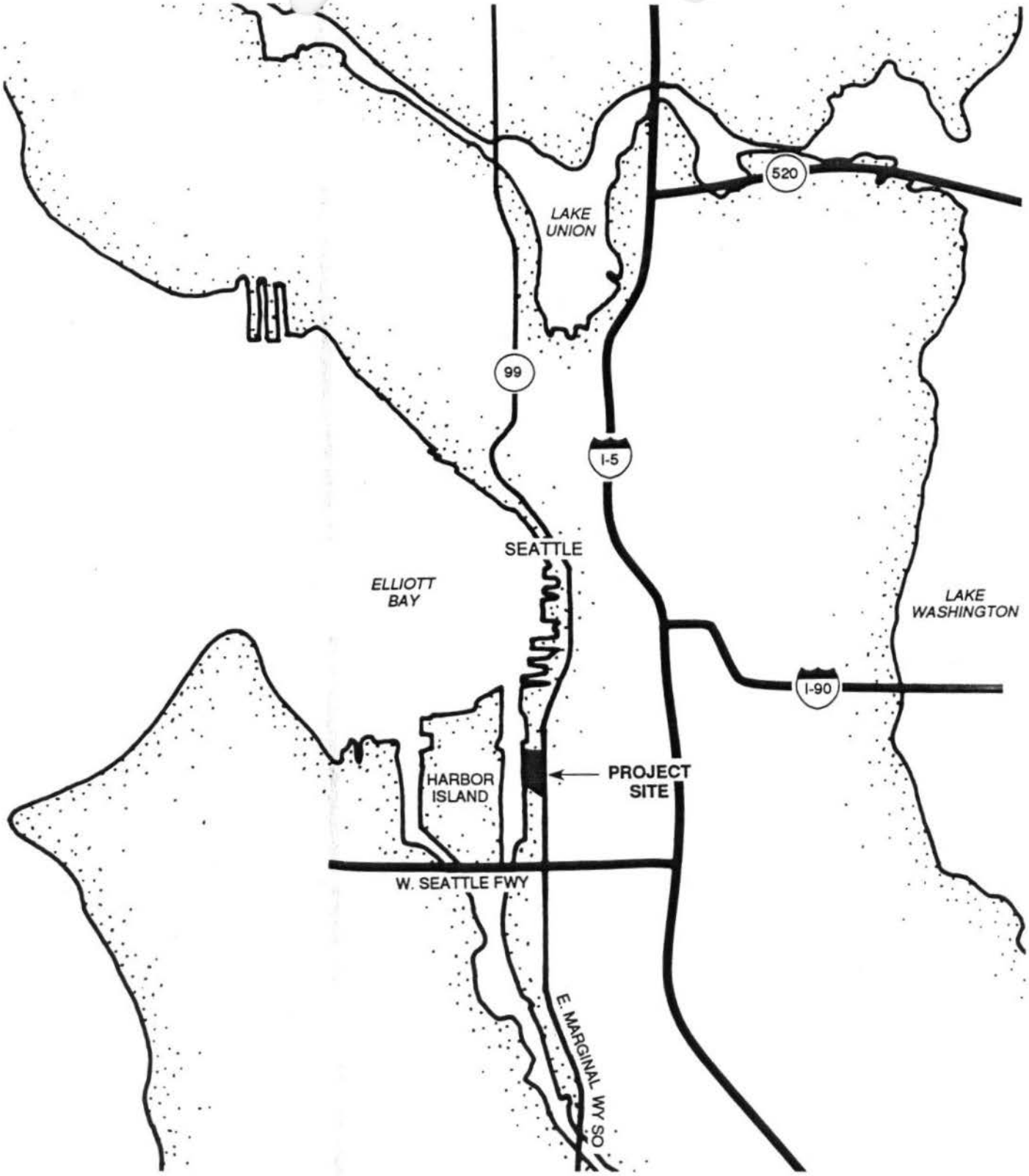


SCALE IN FEET

0 10 20

Cross Section Showing DMMUs and Typical Dredge Cut

Figure 1(b)



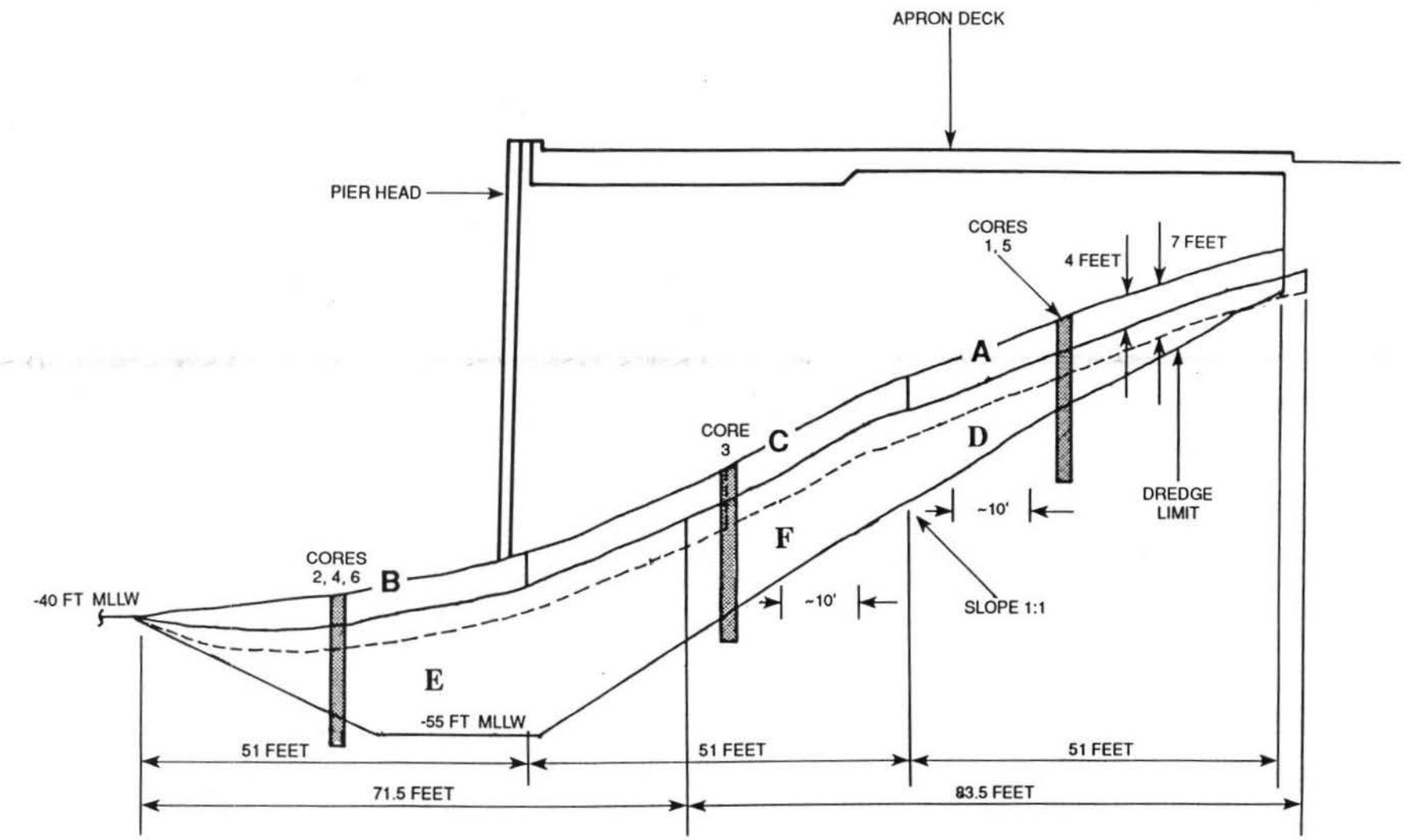
SCALE IN MILES

0 1/2 1

N

P05-T30

Figure 1.
Site Vicinity Map



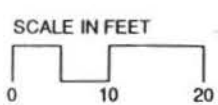
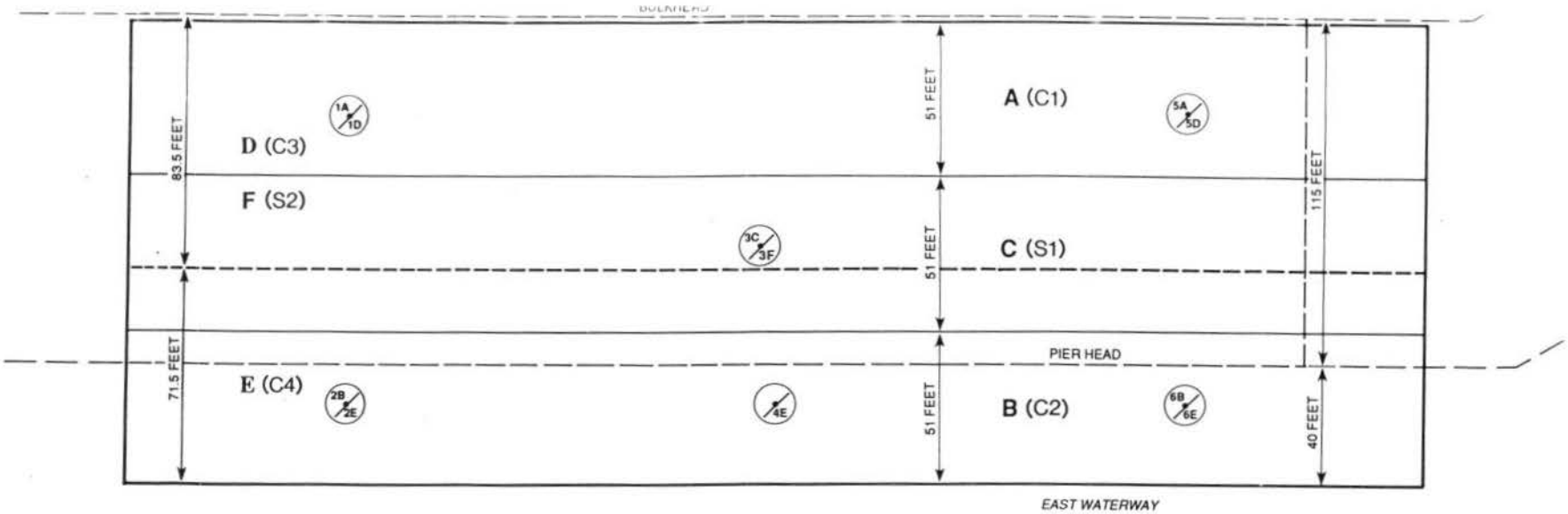
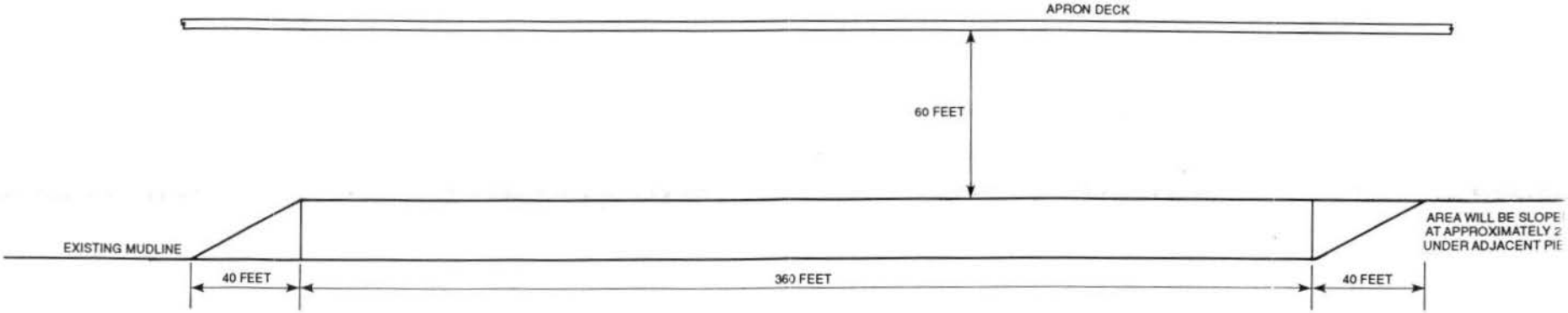


Figure 3.
Cross Section Showing DMMUs and Typical Dredge Cut



Plan View



Vertical Section - Pierhead Line

Sediment will be accessed through 1 foot x 1 foot holes in the concrete apron for cores 1, 3, and 5.

E IN FEET
20 40

Outline of Existing Apron
Border of Surface DMMU's (<4')
Border of Subsurface DMMU's (>4

A, B, C Designation of Surface DMMU
D, E Designation of Subsurface DMMU
1A/1D Indicates Core Location, Core Location Designation and Composite Scheme for Surface/Subsurface DMMU's

Fig
Pla
Se

2. METHODS AND MATERIALS

The approved SAP for characterizing the sediment at the T-30 apron is included with this report in Appendix A. Comments received from the Corps on the SAP are also included in Appendix A along with a response to those comments from the Port to the Corps.

Sampling was initiated on June 17, 1993. As discussed in the SAP, samples were collected with a hollow stem drill auger and shelby tube sampler. The site was accessed by two separate methods, cores at location numbers 2, 4, and 6 (see Figures 3 and 4) were collected from a barge positioned off the end of the dock. Core samples at location numbers 1, 3, and 5 were taken through holes drilled in the concrete deck of the apron, except as noted below.

2.1 SAMPLE COLLECTION

All field sampling was conducted in accordance with the attached SAP unless otherwise noted in this section. A plan view of the project site, sample locations, and sediment grid units is provided in Figure 4. The DMMO has an established and uniform field and laboratory sample and analysis identification scheme to provide consistency across projects for data entry into the Dredged Analysis Information System (DAIS). The Corps requested that the data report utilize this sample identification scheme. Table 1 shows the sampling scheme prepared by Parametrix and the corresponding data scheme required by the Corps. This document shows the Parametrix

Table 1. Sample compositing scheme.

Parametrix Sampling Scheme	PSDDA/DAIS Corps Sampling Scheme	
Surface Grid Unit		
A	C1	(core 1A + 5A)
B	C2	(core 2B + 4B + 6B
C	S1	(core 3C)
Subsurface Grid Unit		
D	C3	(1D, ~~3D~~, 5D)
E	C4	(2E, 4E, 6E)
F	S2	3F
G[1]	C5	

[1] Sample G is a blind duplicate of sample E.