96260.03

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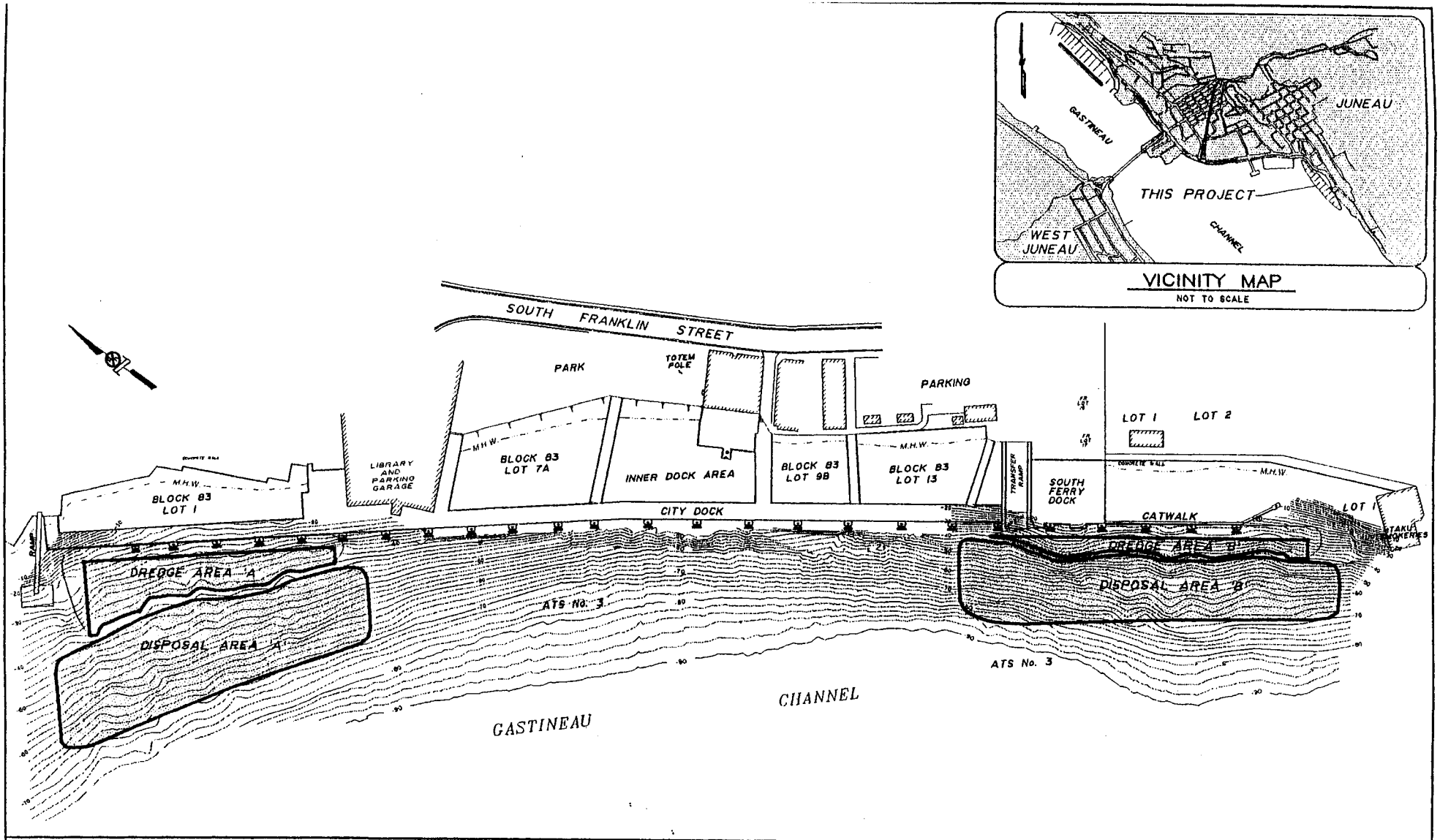
Juneau Cruise Ship Dock Dredging Sediment Characterization and Analysis

August 20, 1997

Prepared for
City and Borough of Juneau, Alaska

Prepared by
Easton Environmental and
Peratrovich, Nottingham & Drage



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PN&D DWG. NO.: 96260\ENV.\FIG1-1.DWG

PLAN VIEW

SCALE IN FEET

0 200 400

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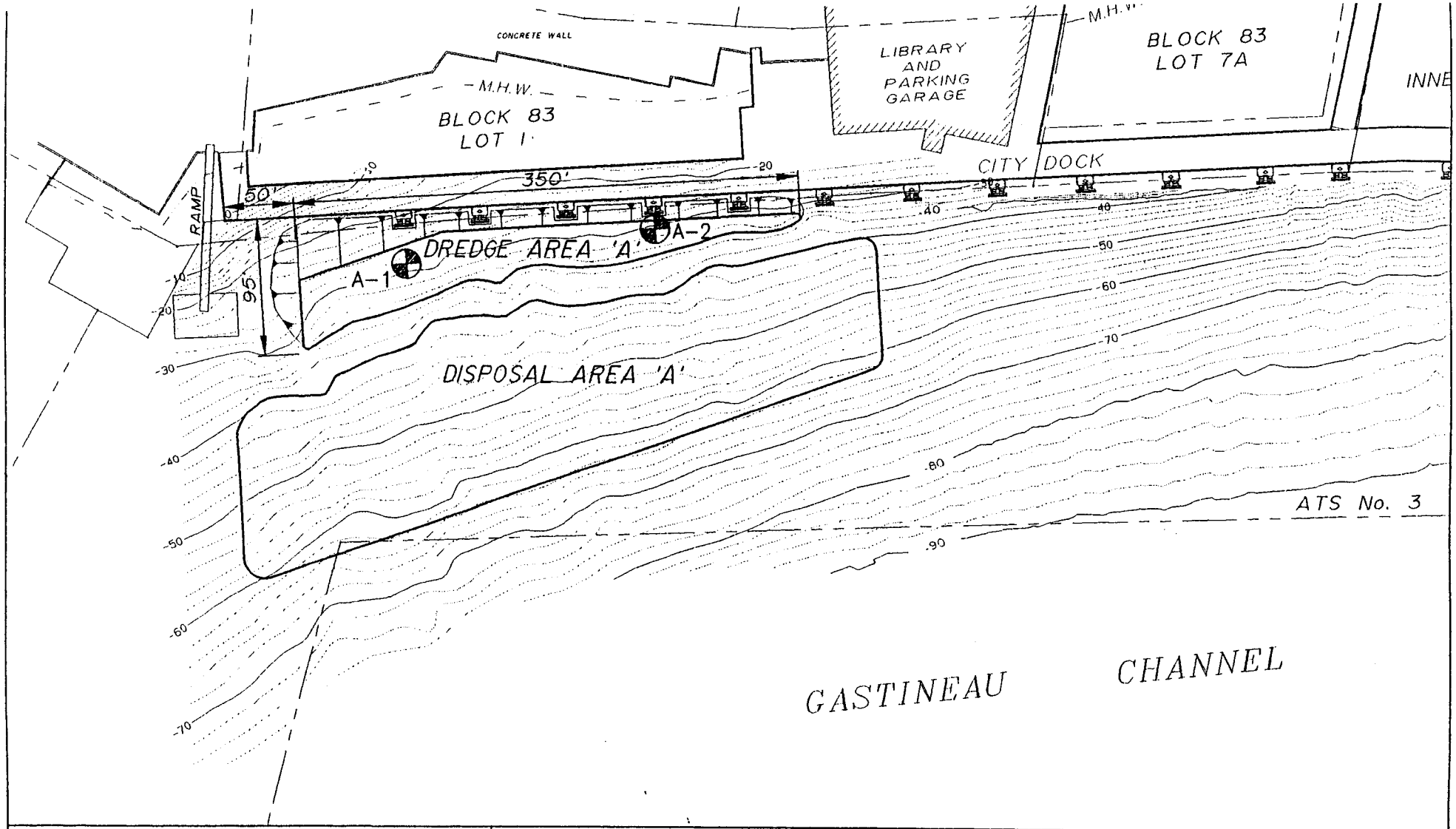
FIGURE 1-1

VICINITY MAP



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DREDGE AREA 'A'

SCALE IN FEET

0 100 200

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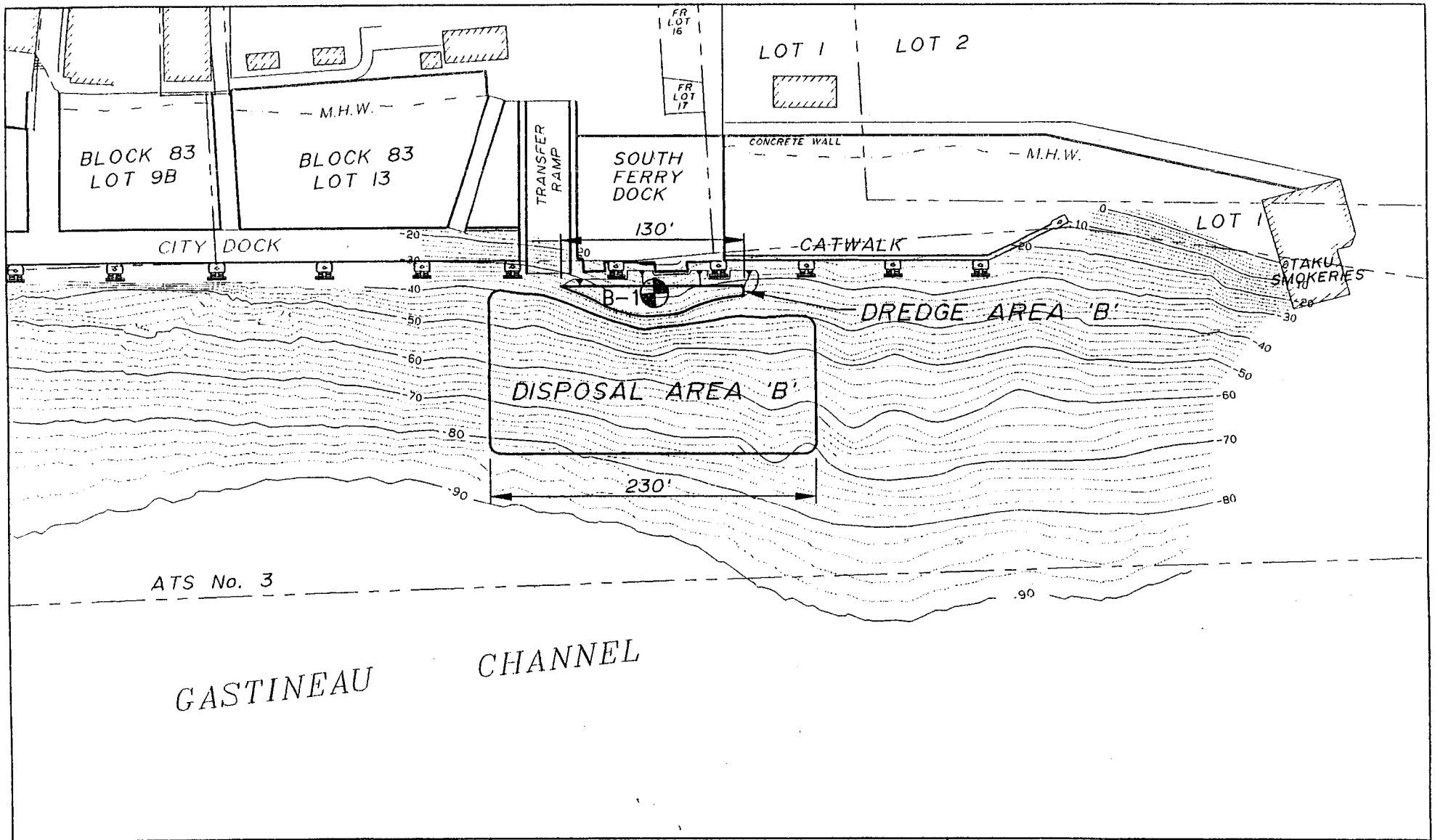
FIGURE 2-1
AREA "A"
SAMPLING
LOCATIONS



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DREDGE AREA 'B'

SCALE IN FEET

0 100 200

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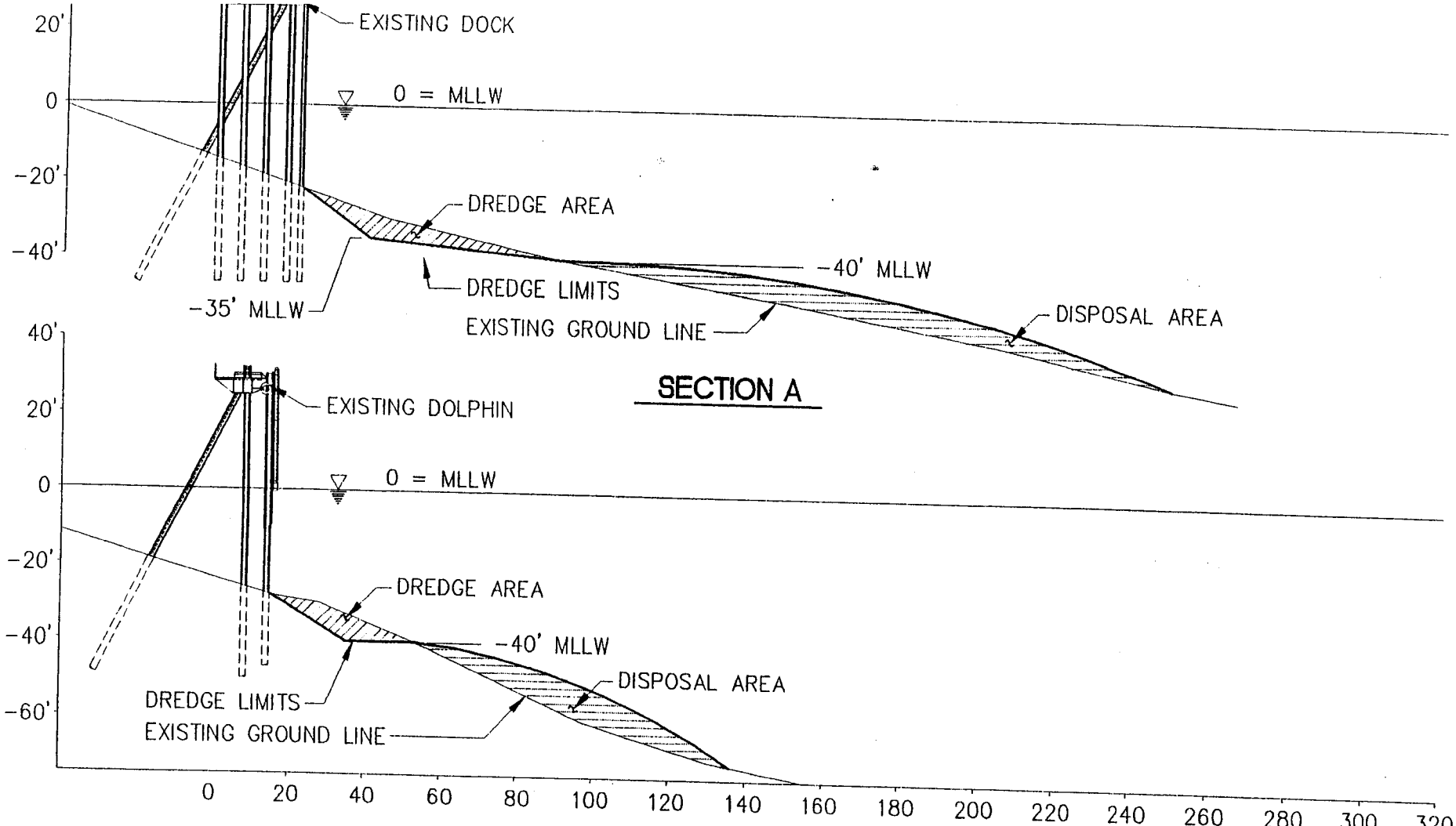
FIGURE 2-2
AREA "B" SAMPLING LOCATIONS



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SECTIONS

SCALE IN FEET

0 40 80

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FIGURE 1-4
PROPOSED DREDGE AND DISPOSAL AREAS

3.4 Physical Parameters

Results of laboratory analyses to characterize sediment grain size and classification are presented in the following table. Analyses were conducted using ASTM Methods D2487 and D422. Actual grain size accumulation graphs are included in **Appendix E**.

Table 3-4
Apparent Grain Size Distribution Summary

Size (microns)	Phi Size	Seive Size	Percent passing by weight A-1	A-1	A-1	A-2	B-1
4,750	-	#4	89	91	88	90	64
2,000	-	#10	81	84	82	79	31
1000	-	#18	76	78	76	71	18
500	-	#35	70	72	71	67	7
250	-	#60	63	63	64	64	4
125	-	#120	52	52	54	60	3
62	4	#230	44	43	46	56	2
31	5	-	36	37	35	51	2
16	6	-	28	25	28	32	1
8	7	-	19	18	18	20	1
4	8	-	14	14	15	14	1
2	9	-	10	11	12	11	1
1	10	-	8	8	8	7	1

3.5 Discussion

Surface sediments located in the vicinity of the transfer ramp in dredge area B-1 consist primarily of pea gravel likely deposited during snow dumping. No chemical constituents of concern were noted. The detection level for hexachlorobenzene (HCB) is above the State of Washington standards, but concentrations are below PSSDA maximum levels.

Sediments located in the vicinity of the northern end of the cruise ship dock in dredge area A include a substantial amount of fine material and exceed PSSDA maximum levels and State of Washington standards for polynuclear aromatic hydrocarbons. These are semivolatile hydrocarbon compounds containing multiple benzene rings and are present in some concentrations in most common petroleum products.

None of the sediments contain chlorinated hydrocarbons, phthalates, phenols, miscellaneous extractables, volatile organics or metals in concentrations that exceed standards. Concentrations of mercury at both station A-1 and A-2 exceed the State of Washington standard, but are within the PSDDA maximum levels.

Comparative Sediment Chemical Quality
Semi-Volatile Organic Compounds

The following table compares the results of semi-volatile organic compound analysis of sediments collected from the proposed north cruise ship dock dredge area to those dredged from Douglas Harbor and discharged to Gastineau Channel. Shading indicates where analytical results or detection limits were the higher of the two sample sets.

ANALYTE (µg/kg-dry)	CSD A-1	CSD A-2	DBH Sta 1	DBH Sta 2
Organics				
Naphthalene	100	74U	1300 U	1400 U
Acenaphthylene	54	75	1300 U	1400 U
Acenaphthene	110	150	1300 U	1400 U
Fluorene	740	480	1300 U	1400 U
Phenanthrene	10000	6400	1300 U	1400 U
Anthracene	11000	1300	1300 U	1400 U
2-Methylnaphthalene	91	74 U	1300 U	1400 U
Fluoranthene	76000	31000	3500	2900
Pyrene	54000	33000	1800	1600
Benzo (a) anthracene	12000	4400	1300 U	1400 U
Chrysene	13000	8600	1900	1400 U
Benzo (b) fluoranthene	5100	3300	1300 U	1400 U
Benzo (k) fluoranthene	4500	4000	1300 U	1400 U
Total Benzo fluoranthenes	9600	7300	2600 U	2800 U
Benzo (a) pyrene	3900	2600	1300 U	1400 U
Ideno (1,2,3-cd) pyrene	980	800	1300 U	1400 U
Dibenz (a,h) anthracene	560	350	1300 U	1400 U
Benzo (g,h,i) perylene	800	740	1300 U	1400 U
Chlorinated Hydrocarbons				
1,3-Dichlorobenzene	1.6 U	1.4 U	1300 U	1400 U
1,4-Dichlorobenzene	65	1.4 U	1300 U	1400 U
1,2-Dichlorobenzene	1.6 U	1.4 U	1300 U	1400 U
1,2,4-Trichlorobenzene	7.8 U	7.2 U	1300 U	1400 U
Hexachlorobenzene	19 U	74 U	1300 U	1400 U
Phthalates				
Dimethylphthalate	19 U	74 U	1300 U	1400 U
Diethylphthalate	19 U	74 U	1300 U	1400 U
Di-n-Butylphthalate	140	74 U	1300 U	1400 U
Butylbenzylphthalate	19 U	74 U	1300 U	1400 U
bis (2-Ethylhexyl) phthalate	570	240	1300 U	1400 U
Di-n-Octyl phthalate	19 U	74 U	1300 U	1400 U
Phenols				
Phenol	25	74 U	1300 U	1400 U
2-Methylphenol	19 U	74 U	1300 U	1400 U
4-Methylphenol	31	74 U	N/A	N/A
2,4-Dimethylphenol	19 U	74 U	1300 U	1400 U
Pentachlorophenol	97 U	370 U	800 U	800 U
Misc Extractables				
Benzyl Alcohol	19 U	74 U	1300 U	1400 U
Benzoic Acid	190 U	740 U	800 U	800 U
Dibenzofuran	190	220	1300 U	1400 U
Hexachloroethane	19 U	74 U	1300 U	1400 U
Hexachlorobutadiene	19 U	74 U	1300 U	1400 U
N-Nitrosodiphenylamine	19 U	74 U	1300 U	1400 U

All results in micrograms per kilogram (dry weight basis).
U = Undetected at indicated minimum detection level.
CSD = Cruise ship dock.
DBH = Douglas boat harbor.

REC'D 2/5/98
FROM EASTON

The Corps of Engineers has characterized the north cruise ship dock sediments as containing "high levels of Mercury" (letter from Terry Stone to Dick Somerville dated November 7, 1997). Comparing Mercury concentrations in sediments collected from the cruise ship dock and Douglas Harbor sites:

ANALYTE (results in mg/kg-dry)	**CSD A-1**	**CSD A-2**	**DBH Sta 1**	**DBH Sta 2**	**Gastineau Channel**
Mercury	0.77	0.71	1.67	1.55	1.54

One of the Corps' duplicate samples yielded an even higher mercury concentration of 2 mg/kg. The Corps recently discharged sediments to Gastineau Channel containing roughly twice the mercury concentration of the cruise ship dock sediments. The Corps report notes that the PSDDA maximum level is 2.1 mg/kg. Background Mercury concentrations are roughly twice the cruise ship dock concentrations.