SUPPLEMENTAL INFORMATION SUMMARY

MIDDLE WATERWAY SHORE RESTORATION PROJECT

A summary of additional information on the Middle Waterway Shore Restoration Project that has been gathered since completion of the Project Analysis in September 1993.

To accompany local, state, and federal permit applications and other approvals pertaining to the Project.

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April 1994

Project Proposed By

Simpson Tacoma Kraft Company

Champion International Corporation

National Resource Trustees for Commencement Bay

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1. INTRODUCTION

This Supplemental Information Summary has been prepared to provide the U.S. Army Corps of Engineers (the Corps), the Natural Resource Trustees for Commencement Bay (Trustees), other federal, state and local agencies, and the public with a summary and discussion of additional information on the Middle Waterway Shore Restoration Project (the project) that has been gathered since completion of the Project Analysis (Parametrix, September 1993). This supplemental information includes site-specific sampling results, construction and planting plans, and a monitoring and adaptive management plan to ensure the long-term success of the project.

The supplemental information is intended to support various approvals and permit applications to several agencies, including the application for a Section 10/404 permit from the Corps, to allow implementation of an additional restoration project to provide habitat value in perpetuity in the Commencement Bay environment under the 1991 St. Paul Waterway Natural Resource Damage settlement agreement entered into by the Trustees, Simpson Tacoma Kraft Company (Simpson), Champion International Corporation (Champion) and the Washington Department of Natural Resource (WDNR).

1.1 PROJECT SETTING, GOALS AND OBJECTIVES

The Middle Waterway Shore Restoration Project is a proposal to construct substantial new riparian and wetland habitat and to improve and protect intertidal habitat for bird and marine life on a site located on the southeastern shore of the Middle Waterway in Commencement Bay. See Figure 1. The Middle Waterway Shore Restoration Project is solely an environmental improvement or "restoration" project; it is not being implemented as part of a development project or as "mitigation" for a development project. By its nature, the project is water-dependent. It also is designed to compliment possible new upland stormwater pollution and prevention and treatment facilities being considered for adjacent industrial property and water-dependent maritime and harbor uses.

The primary actions at the project site will be to excavate and contour the upland portion of the site to restore a natural shoreline, and to plant appropriate natural vegetation at the new elevations. Approximately 3.3 acres of the project site will be modified. These actions will produce new upper intertidal marsh areas and an adjoining riparian buffer to support and preserve the integrity of the existing intertidal habitat and enhance Commencement Bay aquatic resources.

The project has the twin goals of providing long term environmental restoration and study value for planning future restoration projects in Commencement Bay. Its main objective is to provide valuable estuarine habitat within Commencement Bay, in perpetuity, at a location adjacent to one of the largest remaining areas of original Commencement Bay intertidal mudflat (nearly 20 acres) and functionally related to the intertidal habitat constructed at the north shore of the Tacoma

Kraft Mill in 1988, the Puyallup delta, and other nearby intertidal and shallow subtidal habitat. Other environmental restoration objectives of the project include the following:

- Converting approximately 1.5 acres of upland from existing industrial use to estuarine intertidal wetland;
- Increasing the length of natural shoreline edge along the +9 to +13 foot contour from 840 to 960 feet;
- Establishing approximately 1.2 acres of habitat at known high and low saltmarsh elevations;
- Providing a riparian buffer and transition zone from tideflat to upland to screen, protect and support the integrity of the remaining original Middle Waterway mudflat and the diverse species that use this biologically productive area of the estuary; and
- Restoring a minimum of 0.23 acres of estuarine intertidal mud/sand habitat as mitigation for placing fill on a like acreage of intertidal mud/sand habitat at similar elevations.

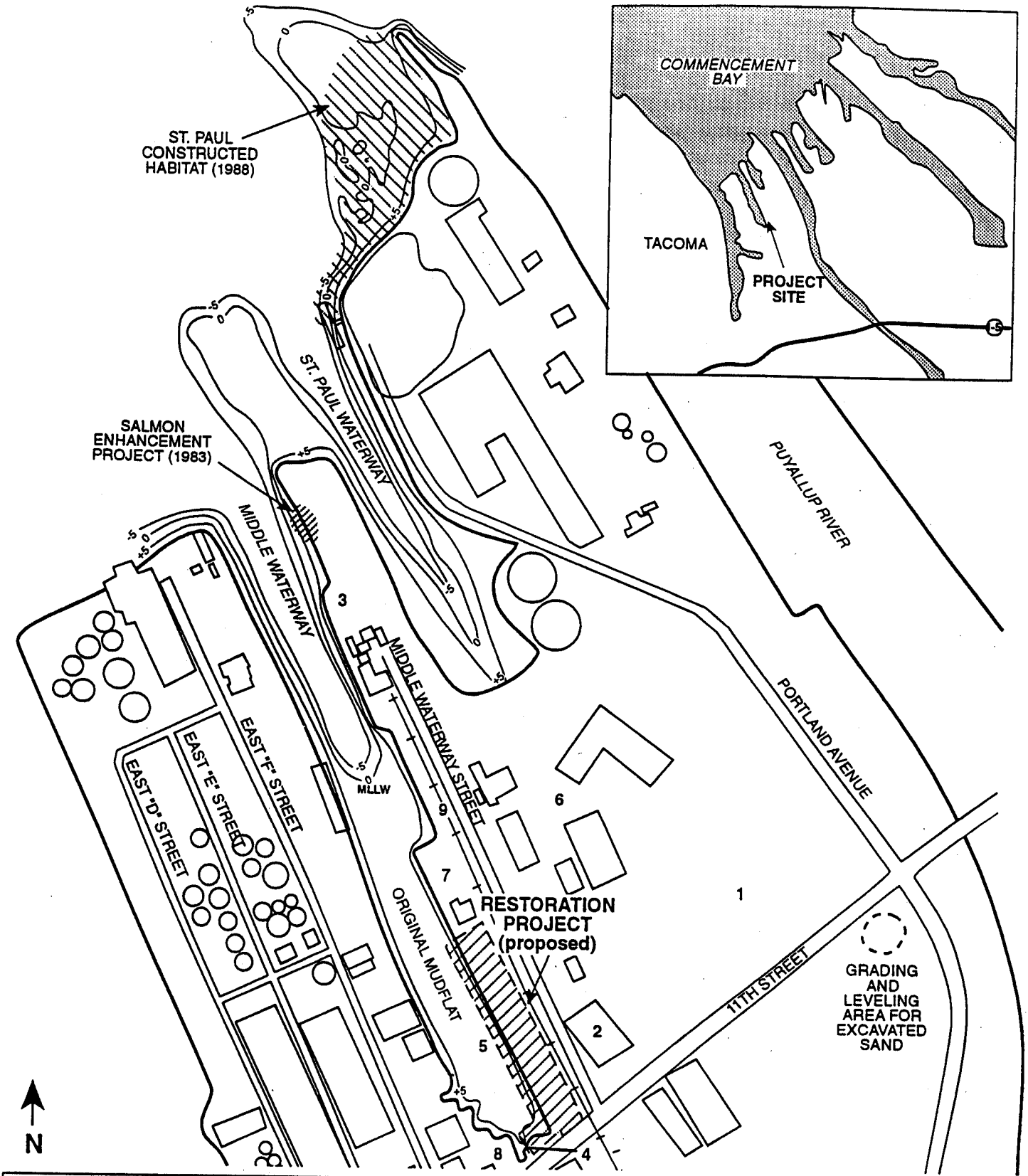
Pilot study objectives of the project include the following:

- Documenting and evaluating predictions regarding the general development of the new estuarine habitat in Commencement Bay;
- Determining if low to moderate levels of contamination within adjacent mudflats are transported to the new estuarine habitat; and
- Determining the relative success of different methods for establishing saltmarsh habitat in Commencement Bay.

Section 6.4 on "Monitoring and Adaptive Management" provides more detailed information regarding the descriptive and experimental studies on the restoration project site.

1.2 REGULATORY BACKGROUND

The Middle Waterway Shore Restoration Project includes excavation and re-contouring of the shoreline and limited dredging and filling in waters of the United States to establish the estuarine habitat and riparian buffer.



PURPOSE: Restoration of Riparian and Wetland Habitat
DATUM: MLLW
ADJACENT PROPERTY OWNERS:
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2 Morse Industrial
3 Foss Towing/Foss Maritime
4 City of Tacoma
5 State of Washington/DNR
6 Investco Financial Corp.
7 Paxport Mills, Inc.
8 Pacific Yacht Basin
9 Union Pacific Railroad

FIGURE 1

VICINITY MAP, MIDDLE WATERWAY SHORE RESTORATION, COMMENCEMENT BAY

0 600 1200
1" = 600'

PROPOSED CONSTRUCTION OF RIPARIAN AND WETLAND HABITAT

IN: Middle Waterway
AT: Tacoma
COUNTY OF: Pierce
STATE: Wa
APPLICATION BY: Simpson Tacoma Kraft Company

A combined Public Notice under the Shoreline Management Act and Tacoma Shoreline Management Program requirements, and the State Environmental Policy Act was published in October 1993. Local approval under the Shoreline Management Act for the project was received on January 4, 1994.

An application was submitted to the Corps in December 1993 to obtain the Section 10/404 permit to undertake the limited dredging and filling activity. The Corps made a determination that submission of site-specific sediment quality information was necessary to the Corps' 404(b)(1) evaluation of the project. This information is summarized, and the complete reports referenced, in this Supplemental Information Summary in a manner useful to the Corps' Section 404(b)(1) evaluation of the project.

The 404(b)(1) guidelines of the federal Clean Water Act require that "no discharge of dredge or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences." An alternative is practicable if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes." If the proposed dredging or filling is allowed, it also must include "all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem." 40 CFR § 230.10(a).

This examination of practicable alternatives under Section 404 has several considerations, which include:

- Is there another location where the proposal's goals and objectives can basically be met with less impact on the aquatic ecosystem?

  The project overview provided in the Project Analysis (Parametrix, September 1993) discusses the planning context for the project and the selection of the Middle Waterway site as the preferred location for the restoration project. The Trustees, Simpson and Champion identified no other location in Commencement Bay that would meet the project goals and objectives identified above and also result in less impact on the aquatic ecosystem.

- If not, are there alternative actions at the project site that will avoid or minimize potential harm to the aquatic ecosystem?

  Section 6 discusses alternative actions that have been developed during the project planning process to avoid or minimize impacts.

- Does the proposed project design include all appropriate and practicable measures to minimize potential environmental harm to the aquatic ecosystem?

Section 6 identifies the "appropriate and practicable measures to minimize potential harm to the aquatic ecosystem" that have been incorporated into the proposed project design.

1.3 DOCUMENTS INCORPORATED BY REFERENCE INTO THIS SUPPLEMENTAL INFORMATION SUMMARY

This Supplemental Information Summary summarizes information from the following reports on the Middle Waterway Shore Restoration Project that have been completed since the Project Analysis (Parametrix, September 1993):

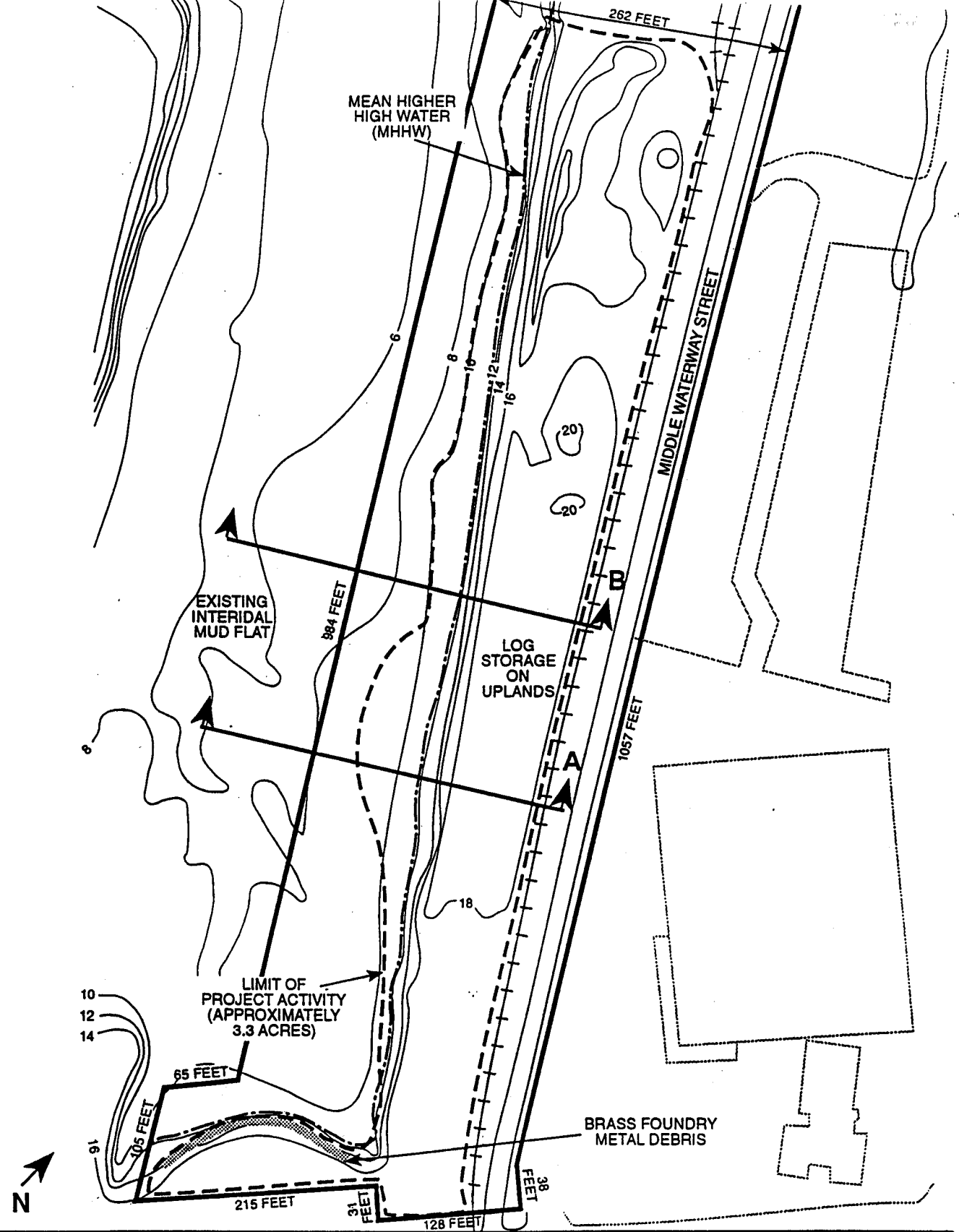
- Sampling and Analysis Plan, Puget Sound Dredged Disposal Analysis for Sediment Characterization at the Middle Waterway Shore Restoration Project (Parametrix, March 1994b);
- Sampling and Analysis Report, Puget Sound Dredged Disposal Analysis for Sediment Characterization at the Middle Waterway Shore Restoration Project (Parametrix, April 1994a);
- Preconstruction Sampling Report (Parametrix, April 1994b);
- Excavation and Grading Plan (Parametrix, April 1994c);
- Planting Plan (Parametrix, April 1994d); and
- Monitoring and Adaptive Management Plan (Parametrix, April 1994e).

These documents, and the Project Analysis (Parametrix, September 1993), are incorporated by reference into this Supplemental Information Summary. Copies of the referenced documents may be obtained by calling Dave McEntee, Environmental Manager, Simpson Tacoma Kraft Mill (at 206-596-0257).

2. ENVIRONMENTAL BACKGROUND

The proposed restoration project site is located along the southeastern shore of the Middle Waterway in Commencement Bay, adjacent to a relict mudflat owned predominantly by the State of Washington. The project site contains existing (apparently natural) tideflat and uplands that were historically, and are currently, used for lumber and log storage. Simpson owns the project site and leases the upland portions of the site to Paxport Mills. See Figure 2.

The following is a brief summary of the general environmental conditions of the project site. A more detailed description of the project site, its historical and present use, its soil and sediment quality, and its biological conditions may be found in the Project Analysis (Parametrix, September 1993), the Sampling and Analysis Plan (Parametrix, March 1994b), the Sampling and Analysis Report (Parametrix, April 1994a), and the Preconstruction Sampling Report (Parametrix, April 1994b).



PURPOSE: Restoration of Riparian and Wetland Habitat
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7 Paxport Mills, Inc.
8 Pacific Yacht Basin
9 Union Pacific Railroad

FIGURE 2

PLAN VIEW (PRE-PROJECT), MIDDLE WATERWAY SHORE RESTORATION, COMMENCEMENT BAY

0 100 200
1" = 100'

PROPOSED CONSTRUCTION C
RIPARIAN AND WETLAND HABI

IN: Middle Waterway
AT: Tacoma
COUNTY OF: Pierce
STATE: Wa
APPLICATION BY: Simpson Taco
Kraft Compan

2.1 GENERAL SOIL AND GROUNDWATER QUALITY

Soils on the project site consist of sand and gravel fill with occasional wood chips, overlain by a foot to foot and a half of sawdust and rotted bark and underlain by fluvial marine deposit (silt and sand) (McEntee, July 1993; Parametrix, 1988b). Based on color, grain size and proximity, it is likely that the site was originally filled with sand from dredging of the Puyallup River delta. The thickness of the fill is estimated to not exceed five to six feet. Groundwater is encountered at approximately eight to ten feet below ground surface. Groundwater levels are likely to respond to tidal fluctuations and seasonal variations (rainfall and surface drainage) (Parametrix, 1988b).

Existing and available environmental investigations of the project site reveal no current soil or groundwater contamination problems, with the apparent exception of limited surface contamination along the east bank of the head of the waterway (where brass foundry metal debris may be found containing metals above Commencement Bay Nearshore/Tideflats sediment cleanup objectives (SCOs)) (Parametrix, 1988b; HartCrowser, 1992b; Martinez, August 1993; Ecology UBAT, 1994). Testing of the brass foundry metal debris under the Toxicity Characteristic Leaching Procedure (TCLP) has shown the metals in the debris to be considerably below state dangerous waste (DW) and extremely hazardous waste (EHW) levels (Borque, April 1994), and therefore suitable for onsite containment. See Appendix A for more detailed information concerning the onsite containment of the brass foundry metal debris.

2.2 GENERAL SEDIMENT AND WATER QUALITY

Tideflats on and in the vicinity of the project site are sandy with typically 54% fine-grained material, and include a clay content of approximately 12% (David Evans and Associates, 1993). Three plus-feet of soft, recent (historical) sediment containing man-made debris overlay dense sand and silt layers which presumably represent the original deposit of the Puyallup delta and tideflats.

Past sampling has shown some of the tideflat surface sediments in the vicinity of the project site to be contaminated by metals and organic chemicals (principally mercury and PAHs) (Johnstone, 1985; Parametrix, 1988a: U.S. EPA, 1989; HartCrowser, 1991; HartCrowser, 1992a; HartCrowser, 1992b). The EPA Commencement Bay Record of Decision (Commencement Bay ROD) identified the City of Tacoma's stormwater drain #200 at the head of the waterway as the historical source of PAH contamination to the waterway (U.S. EPA, 1989). Existing information suggests that the situation is improving at stormwater drain #200 and that an enforcement action for source control is not necessary at this time (Ecology UBAT, 1994). Ecology UBAT investigations identified several properties on the other side of Middle Waterway (the southwestern side) as confirmed sources of metal contamination to the waterway (Ecology UBAT, 1994).

It is unlikely that the original mudflats at the head of the Middle Waterway lying adjacent to the project site will be identified by EPA or Ecology for active sediment remediation. This area lies outside of the Middle Waterway Problem Area, and is not identified for active remediation under the EPA Commencement Bay ROD (U.S. EPA, 1989). Although Ecology could list it in the

future as a contaminated sediment site under the state Sediment Management Standards (SMS), Ch. 173-204 WAC, because of the presence of moderate levels of mercury and PAHs, active remediation would destroy one of the largest remaining remnants of original mudflat habitat in Commencement Bay. Active remediation of the mouth of the Middle Waterway, as contemplated by EPA, will also likely remove the main source of mercury contamination and other metals to the head of the Middle Waterway, as the presence of mercury in the mudflat sediments at the head of the waterway appears to occur through tidal agitation and mixing, dispersion and settling of the mercury on the tideflats (HartCrowser, 1992b).

In any event, the Middle Waterway Shore Restoration Project will not foreclose any future cleanup options that might be undertaken by EPA or Ecology with respect to contaminated mudflat sediments in the vicinity of the project site. The project site lies at upper intertidal elevations, above the general elevation of the mudflats at the head of the Middle Waterway. Active remediation of any contaminated mudflat sediments could occur without disturbing the project site, especially if a silt curtain or other protective device was used to minimize the dispersion of dredged sediment material onto the project site.

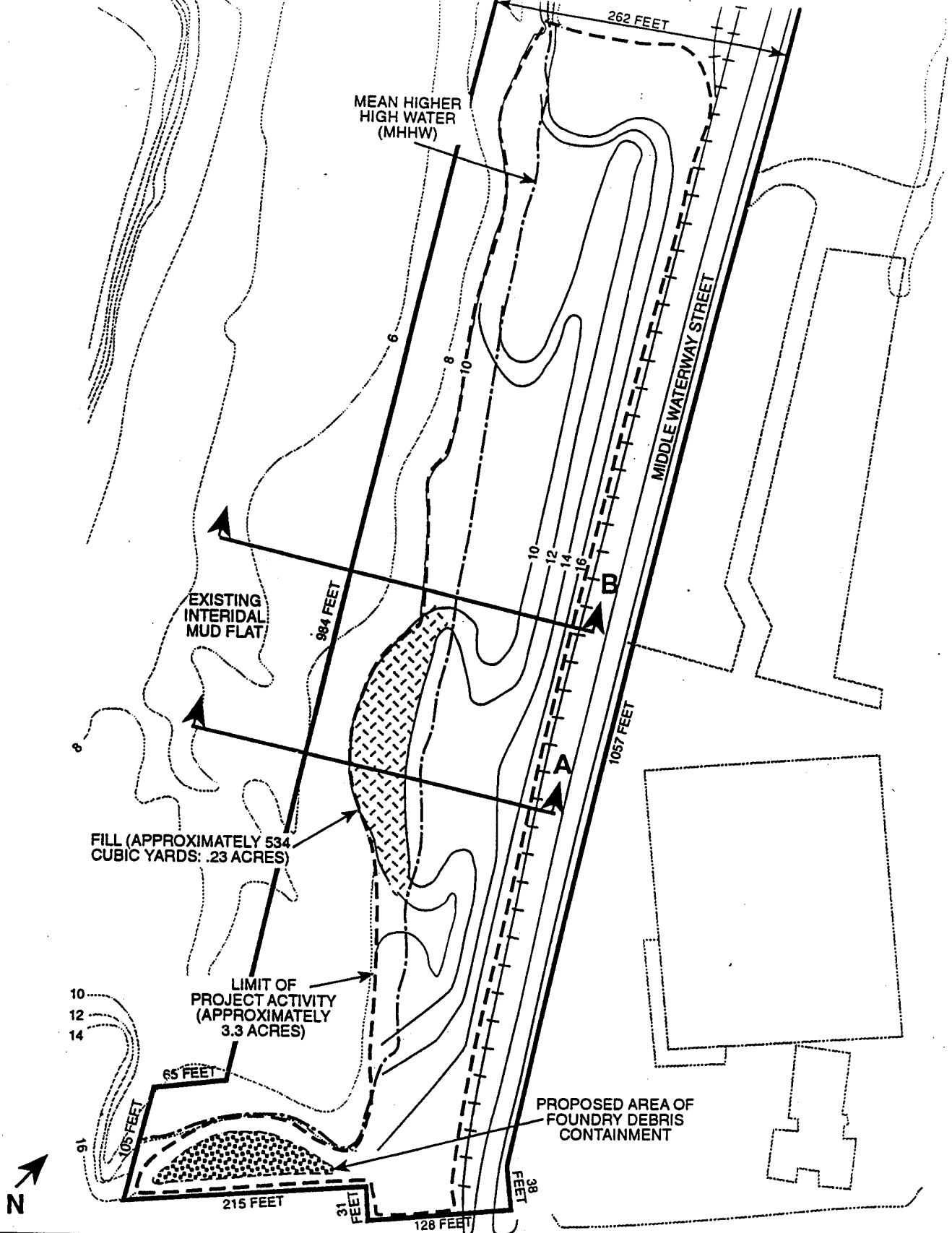
3. DESCRIPTION OF PROJECT ELEMENTS DIRECTLY AFFECTING THE AQUATIC ECOSYSTEM

Approximately 3.3 acres of the project site will be modified to support, compliment and enhance the integrity of the existing mudflats. Primary actions at the project site directly affecting the aquatic ecosystem include:

- The excavation of tidal channels similar to those existing in a natural estuary;
- The construction of a vegetative bench similar to those commonly occurring in the marsh areas of Puget Sound estuaries; and
- The resloping of the head of the waterway.

These actions will increase the length of natural shoreline along the +9 to +13 contour of the Middle Waterway. They will also increase the acreage of estuarine intertidal and wetland habitat and associated functional attributes in Middle Waterway and Commencement Bay.

The following is a brief summary of the need for, method and timing of construction of, and general characteristics and quantity of material involved in each of these project elements. See Figure 3 for their location on the project site. A more detailed description of the project elements may be found in the Project Analysis (Parametrix, September 1993), the Excavation and Grading Plan (Parametrix, April 1994c), and the Planting Plan (Parametrix, April 1994d).



PURPOSE: Restoration of Riparian and Wetland Habitat
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FIGURE 3

PLAN VIEW
PROPOSED FINAL GRADES FOR THE MIDDLE WATERWAY SHORE RESTORATION

0 100 200
1" = 100'

PROPOSED CONSTRUCTION OF RIPARIAN AND WETLAND HABITAT

IN: Middle Waterway
AT: Tacoma
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APPLICATION BY: Simpson Tacoma Kraft Company

3.1 EXCAVATION OF TIDAL CHANNELS

Approximately 456 cubic yards of material on the project site will be dredged to about +8 to +9 MLLW to form two tidal channels on the project site similar to those existing in a natural estuary. The configuration and depths of these tidal channels will be strongly influenced by the existing tideflat elevations and the linear shape of the existing uplands. Approximately 156 cubic yards of the material being dredged will come from true mudflat sediments on the waterway side of the existing dike; the remaining 300 cubic yards of material being dredged will come from subsurface saturated fill material occupying the area shoreward of the existing dike.

Project construction will be initiated in late June 1994 and completed in August 1994. A dozer will be employed to excavate, dredge and grade the project site. The dredged mudflat sediments will be reused on the site to topdress and provide a seed source for the vegetative bench described below. See Figures 3 and 4 for a plan and cross-sectional view of the final grades for the tidal channels and the Excavation and Grading Plan (Parametrix, April 1994c) for more information.

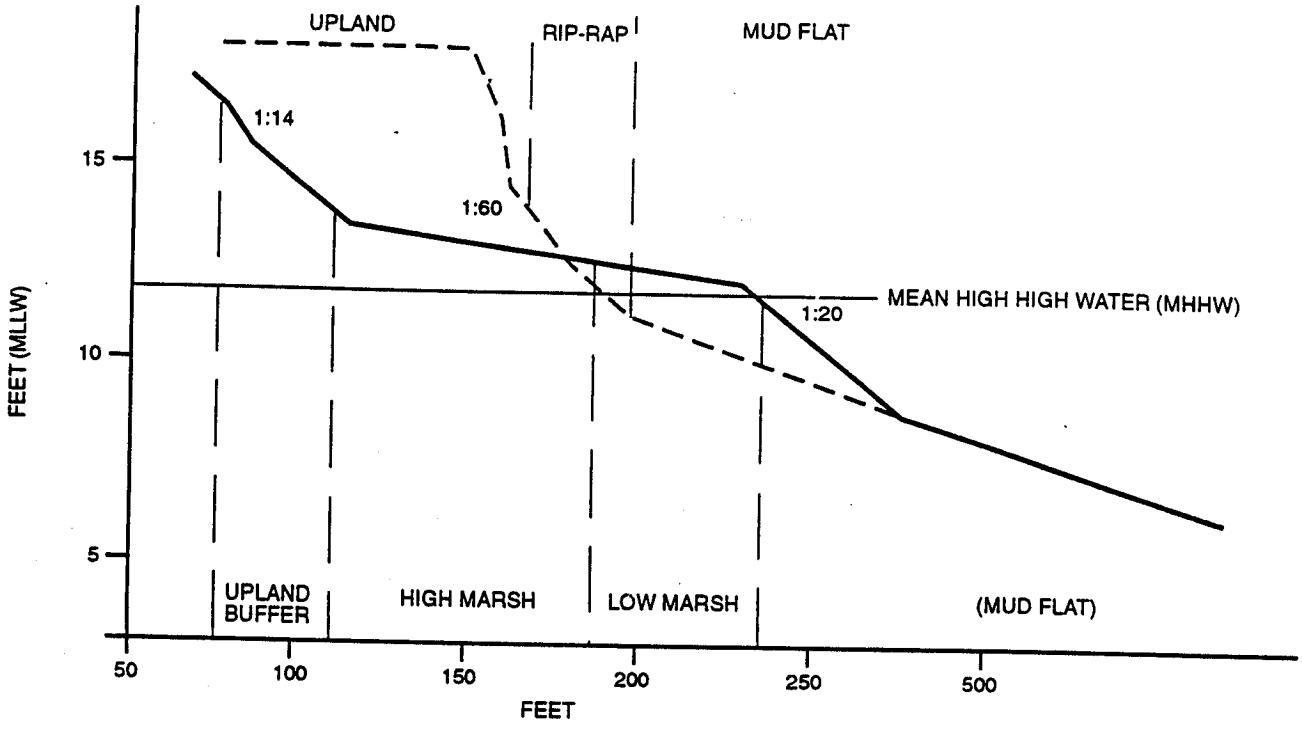
The saltmarsh areas to the northwest of the larger tidal channel will be planted in April of 1995. Planting during the Spring will allow the new plants to become established during the late Spring/early Summer period of maximum growth. The saltmarsh areas to the southeast of the larger tidal channel and surrounding the smaller tidal channel will not be planted, so that the relative merits of planting and non-planting restoration methods can be compared. See Figure 5 for a plan view of the new intertidal and marsh habitats and the Planting Plan (Parametrix, April 1994d) for more detailed information.

3.2 CONSTRUCTION OF VEGETATIVE BENCH

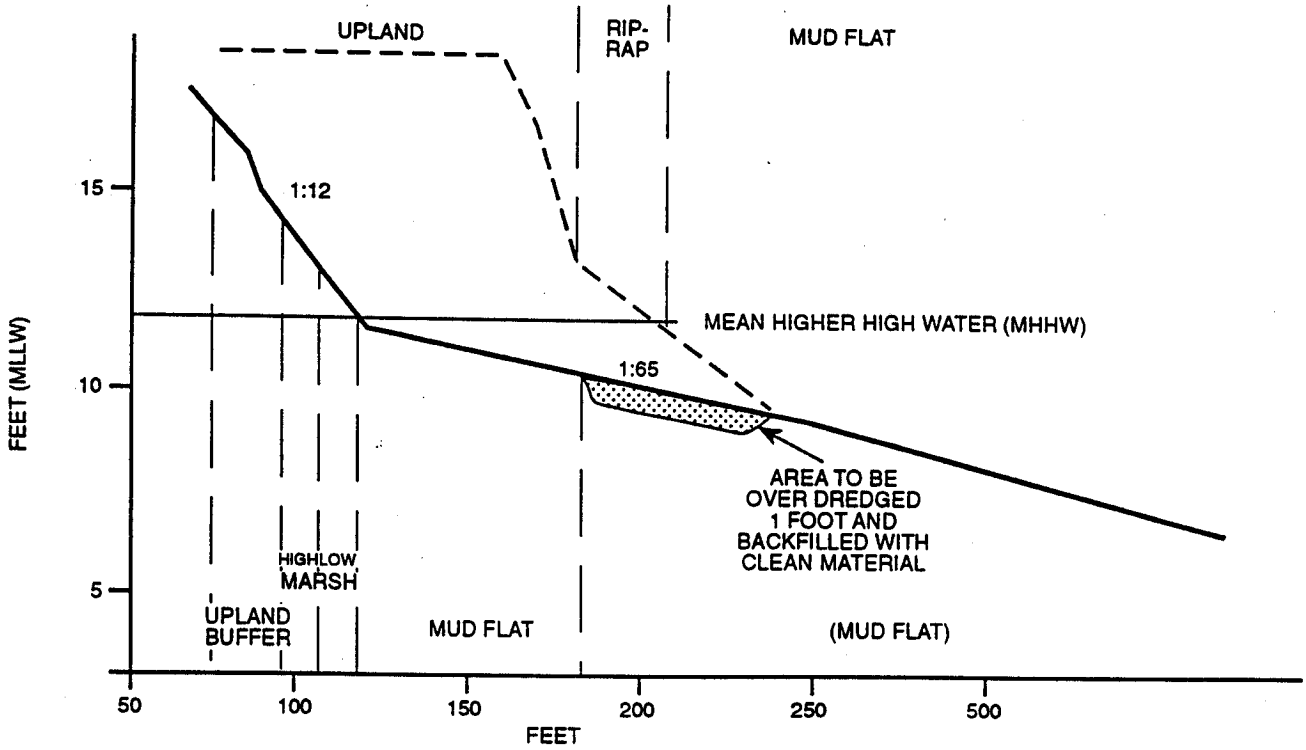
The 456 cubic yards of material dredged during creation of the tidal channels will be placed in a small portion (about .23 acres) of the existing mudflat on the project site to construct a vegetative bench similar to those commonly occurring in the marsh areas of Puget Sound estuaries. This vegetative bench will be constructed at the mean lower low water (MLLW) contour to support growth of Lyngby's sedge (*Carex lyngbyei*) and/or pickleweed (*Salicornia virginica*).

Filling of the small portion of the exiting mudflat on the project site will occur in July or August of 1994. A dozer will place and compact the fill material. The dredged mudflat sediments will be used to topdress and provide a seed source for a portion of the vegetative bench. The vegetative bench will not otherwise be planted, so that the relative merits of planting and non-planting restoration methods can be compared. See Figures 3 and 4 for a plan and cross-sectional view of the final grades for the vegetative bench and the Excavation and Grading Plan (Parametrix, April 1994c) for more information. See Figure 5 for a plan view of the new marsh habitats and the Planting Plan (Parametrix, April 1994d) for more detailed information.

CROSS SECTION A



CROSS SECTION B



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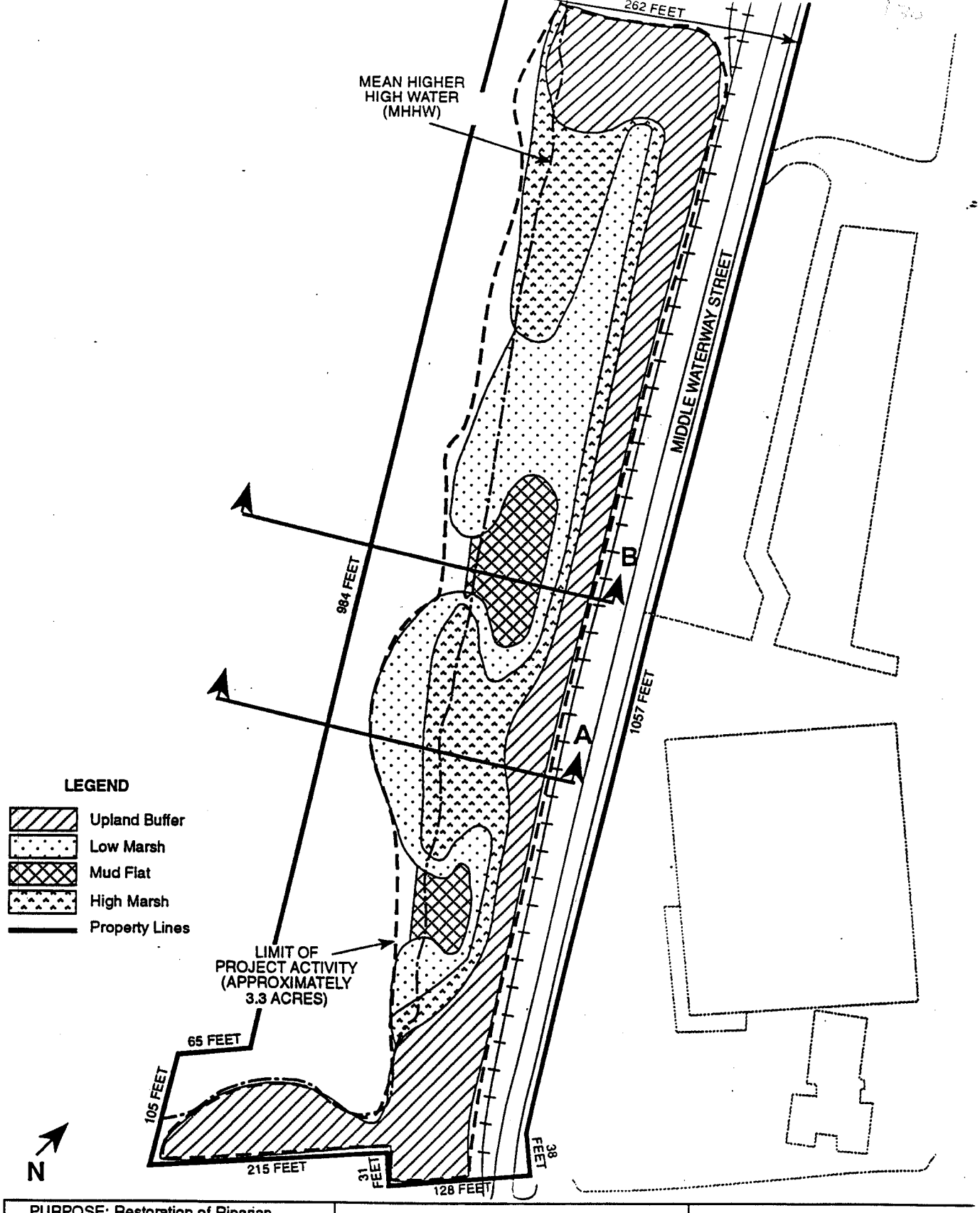

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FIGURE 5

PLAN VIEW
MIDDLE WATERWAY SHORE
RESTORATION VEGETATION PLANTING PLAN

0 100 200
1" = 100'

PROPOSED CONSTRUCTION OF
RIPARIAN AND WETLAND HABITA

IN: Middle Waterway
AT: Tacoma
COUNTY OF: Pierce
STATE: Wa
APPLICATION BY: Simpson Tacoma
Kraft Company

3.3 RESLOPING OF THE HEAD OF THE WATERWAY

About 44 cubic yards of material will dredged during the resloping of the head of the waterway to natural contours. Resloping of the head of the waterway will occur during July and August of 1994. The dredged material will be removed from the aquatic environment and confined together with the brass foundry metal debris in the berm at the head of the waterway (see Appendix A for more information). See Figure 3 for a plan view of the final grades for the head of the waterway and the Excavation and Grading Plan (Parametrix, April 1994c) for more information.

The bank of the head of the waterway will be secured and planted immediately following project construction. Planting of the riparian upland buffer vegetation will occur in fall of 1994. See Figure 5 for a plan view of the new upland buffer riparian habitat and the Planting Plan (Parametrix, April 1994d) for more information.

4. POTENTIAL IMPACTS ON THE AQUATIC ECOSYSTEM

The following is a brief discussion of the potential impacts (both positive and negative) of the project on the physical, chemical, biological and human use characteristics of the Middle Waterway. A further discussion of these impacts may be found in the Project Analysis (Parametrix, September 1993).

4.1 PHYSICAL AND CHEMICAL CHARACTERISTICS

The project will alter the physical and chemical characteristics of the substrate along portions of the project site. The excavation of tidal channels will lower the elevation of two areas of the project site to below the mean higher high water (MHHW) mark and expose new surface sediments in those areas. The construction of the vegetative bench will raise the elevation of a portion of the project to above the MHHW. The resloping of the head of the waterway will also expose new surface sediments.

Minor erosion and turbidity could occur during excavation of the tidal channels, construction of the vegetative bench, and resloping of the head of the waterway. General methods to control erosion and turbidity during project construction will include the placement of: (a) 750 feet of silt fence in the waterway to contain the excavation sediments; and (b) straw mulch on exposed slopes. In addition, geogrid or other geosynthetic reinforcement will be placed on the new face of the slope at the head of the waterway to prevent erosion of the outer slope. If necessary, work conducted below the MHHW mark will also be limited to the six hours of low tide to minimize sediment discharge into the waterway.

The project will generally have a net positive or neutral effect on water quality. Containing the brass foundry metal debris found in the east bank of the head of the waterway, which contains materials that presently exceed SCOs (sediment cleanup objectives) for arsenic, copper, lead, nickel and zinc, will improve water quality in this area by eliminating a potential source of

contamination. Excavating the existing surface sediments in the area of the tidal channels, on the other hand, could have a minor adverse effect on water quality because of the exposure of surface sediments containing copper at levels slightly above the State Sediment Quality Standards (SQS) (see Section 5 below). Therefore, this area will be overdredged by one foot and backfilled with clean Puyallup sand material excavated elsewhere from the project site (see Section 6 below).

The project is not expected to have an impact on current patterns and water circulation and fluctuation in the overall project area. The project also will not impact salinity gradients in the overall project area.

4.2 BIOLOGICAL CHARACTERISTICS

The project is designed to enhance aquatic habitat through the restoration of estuarine intertidal and saltmarsh habitats. The project will provide a more complex component of the mudflat/ wetland ecosystem than currently exists in Middle Waterway or Commencement Bay. Only an estimated 57 acres (or 1%) of emergent marsh habitat remains in Commencement Bay of the estimated 3,814 acres of emergent marsh habitat that once occurred in a wide band between the MHHW level and the present location of Interstate 5 (David Evans and Associates, 1991; Shapiro and Associates, 1992). Much of this remaining emergent marsh habitat is probably not original habitat.

The project is expected to greatly enhance the aquatic food web over existing conditions at the site. New wetland habitat at the site will contribute to food chain production, fish and wildlife habitat, hydrologic support, shoreline protection, storm and floodwater storage, groundwater recharge, and water purification (Boule and Dybdahl, 1981). New riparian habitat at the site will provide nesting, roosting, feeding, and cover for mammals, reptiles, waterfowl and songbirds. It will also stabilize the bank of the waterway with roots, and filter out nutrient runoff from uplands.

The tideflat's habitat value will also increase because of the food source provided by the newly established riparian vegetation combined with the protection provided by this buffer strip. Thus, the habitat will become more valuable to both aquatic organisms such as young marine fish and salmonids, as well as to the shorebirds and otter that presently use the Middle Waterway tideflat. Intertidal flats contribute nesting, nursery, and feeding habitat for invertebrates and fish; feeding and resting habitat for birds and mammals; nutrient cycling; shoreline protection from erosion; and dissipation of storm surge runoff (40 CFR § 230.42).

Animals expected to use the new habitat include primarily young fish and shorebirds. Young marine and anadromous fish would use the new habitat during high tide periods. Shorebirds would most likely use the new habitat during moderate and low tide periods. No Federally listed threatened or endangered species will be impacted by the project.

4.3 SPECIAL AQUATIC SITES

The project will increase the acreage of wetland and mudflat habitats on the project site. Currently, the project site only contains a very narrow fringing saltmarsh waterward of the

ordinary high water mark (there are no freshwater wetlands on the project site). Although a small portion of the existing mudflat habitat on the project site (.23 acres) will be filled to create wetland habitat, additional mudflat habitat will also be restored resulting in a slight net increase of mudflat habitat on the site (expected to be approximately .30 acres).

4.4 HUMAN USE CHARACTERISTICS

The project is expected to have a net positive impact on recreational and commercial fisheries in the Puyallup River/Commencement Bay areas by provision of habitat that may be used by young marine fish and salmonids. Other than positive impacts on fisheries, no other water-related recreation will be impacted by the project.

Views in the immediate vicinity of the project site will be improved by the project. The project will restore the natural shoreline and create a natural transition from the original mudflat to upland industrial uses. The project will also remove debris from the surface of the site, restore riparian and wetland habitat on-site, and establish a vegetative buffer to screen the estuarine habitat from adjacent human activity.

The project will enhance the Commencement Bay fishery resource by restoring intertidal habitat, which provides valuable rearing habitat for juvenile salmon and other fish. There are no known landmarks or evidence of historic, archaeological, scientific or cultural importance on or next to the site.

5. EVALUATION AND TESTING OF DISCHARGE MATERIAL

A sediment characterization study of the project site was undertaken in February 1994. The purposes of this study were to:

- Characterize the sediment (approximately 156 cubic yards) and subsurface saturated fill material (approximately 300 cubic yards) to be dredged and placed within the intertidal area to create the vegetative bench;
- Characterize the sediment (approximately 44 cubic yards) to be dredged from the intertidal area to reslope the head of the waterway to natural contours; and
- Confirm that the newly exposed surface sediment quality in the intertidal and excavated upland areas approximates the existing surface sediment quality in these areas.

The sampling and analysis plan for the sediment characterization study is provided in the Sampling and Analysis Plan (Parametrix, March 1994b). The results of the sediment characterization study are provided in the Sampling and Analysis Report (Parametrix, April 1994a).

The following is a brief summary of the results of this sediment characterization study. See Figures 6 through 8 for the on-site locations of the sediment station positions, and Tables 1 and 2 for a comparison of the chemistry results to State Sediment Quality Standards (SQS) and PSDDA screening levels for PSDDA chemicals of concern not covered under the State SQS.

Only two parameters in the five stations were detected above the SQS. Sample B (surface sediments that will be removed from the aquatic environment during resloping of the head of the waterway) contained mercury at a concentration slightly above the SQS (0.650 mg/kg versus SQS of 0.410 mg/kg). During resloping of the head of the waterway, these surface sediments will be removed from the aquatic environment and contained together with the brass foundry metal debris in the berm at the head of the waterway. Sample D (subsurface material which will form the surface of the newly graded restoration area) contained copper at a concentration slightly above the SQS (430 mg/kg versus SQS of 390 mg/kg). During excavation of the tidal channels, this area will be overdredged by one foot and backfilled with clean Puyallup sand material excavated from elsewhere on the project site. The dredged subsurface sediments containing the elevated copper (approximately 160 cubic yards) will be removed from the aquatic environment and blended with the regraded upland soils elswhere on the project site.

Several other parameters (including hexachlorobenzene in samples A and C, and butylbenzyl phthalate and total PCBs in sample C) were non-detected at a detection limit slightly above the SQS. These non-detects are not considered significant. Hexachlorobenzene has never been identified as a chemical of concern in any of the studies previously conducted in Middle Waterway, and none of the chemically related compounds such as di- and tri-chlorobenzenes were detected in samples A and C. Sample C has extremely low organic carbon content (0.24 % dry weight), making lower detection limits very difficult to obtain. Finally, these non-detects are considerably below the State Minimum Cleanup Level (MCUL) for each chemical of concern.

6. ACTIONS TO AVOID AND MINIMIZE ADVERSE IMPACTS ON THE AQUATIC ECOSYSTEM

The following is a brief discussion, for each of the proposed project elements directly affecting the aquatic ecosystem, of the actions developed during project planning and public review to reduce any identified adverse effects of the proposed project elements (primary and secondary effects).

6.1 EXCAVATION OF TIDAL CHANNELS

The excavation of tidal channels is expected to result predominantly in positive impacts on the aquatic environment on the project site, including an increase in estuarine habitat valuable to bird and aquatic life. The only likely adverse impacts on the aquatic ecosystem associated with this project element are minor erosion and turbidity impacts occurring during project construction and minor adverse effects on water quality that could result from exposure of subsurface sediments containing copper at concentrations slightly above the State SQS.

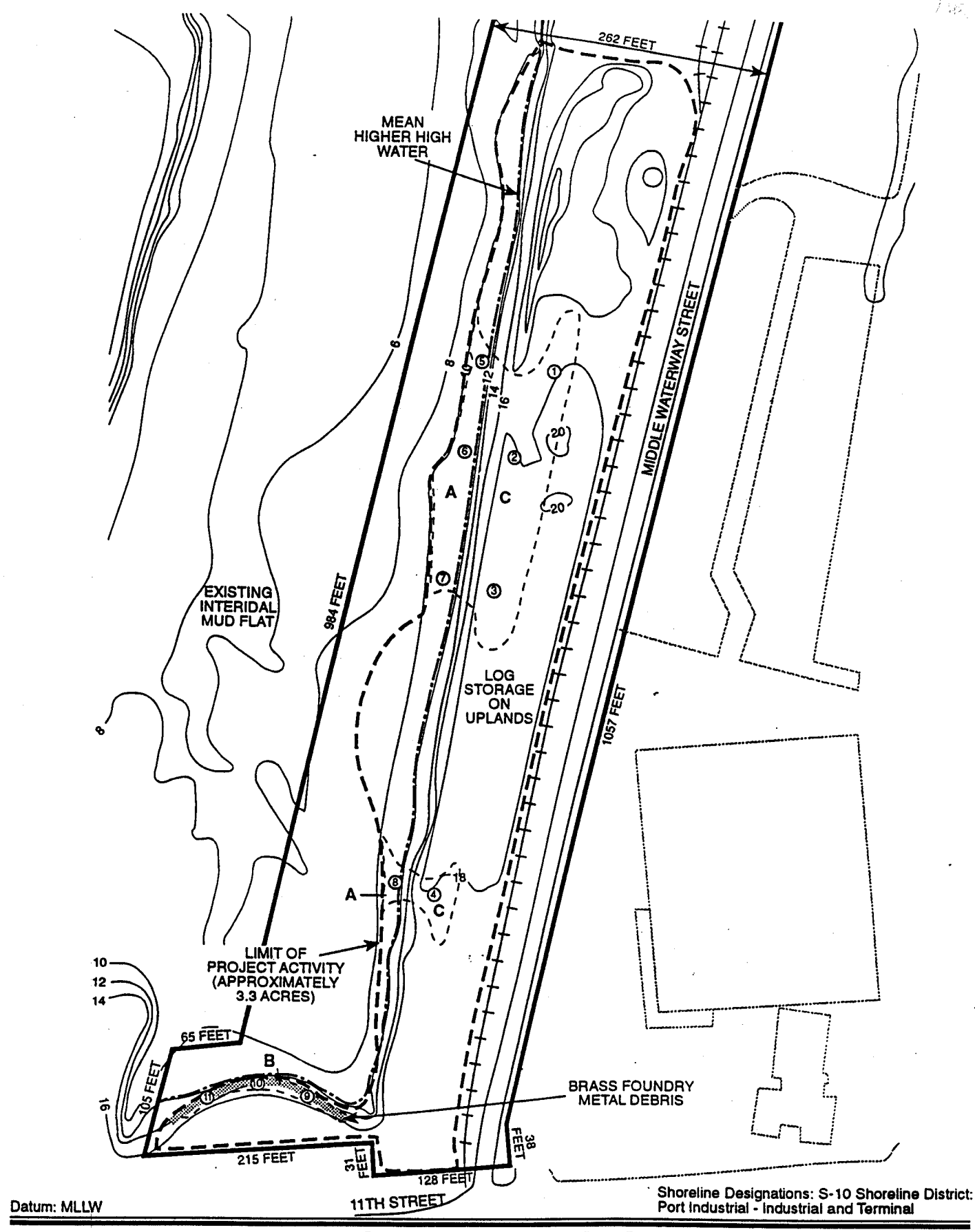


Figure 6.
Plan View (Pre-Project)
Middle Waterway Shore Restoration Project
(Location of Dredge Units)

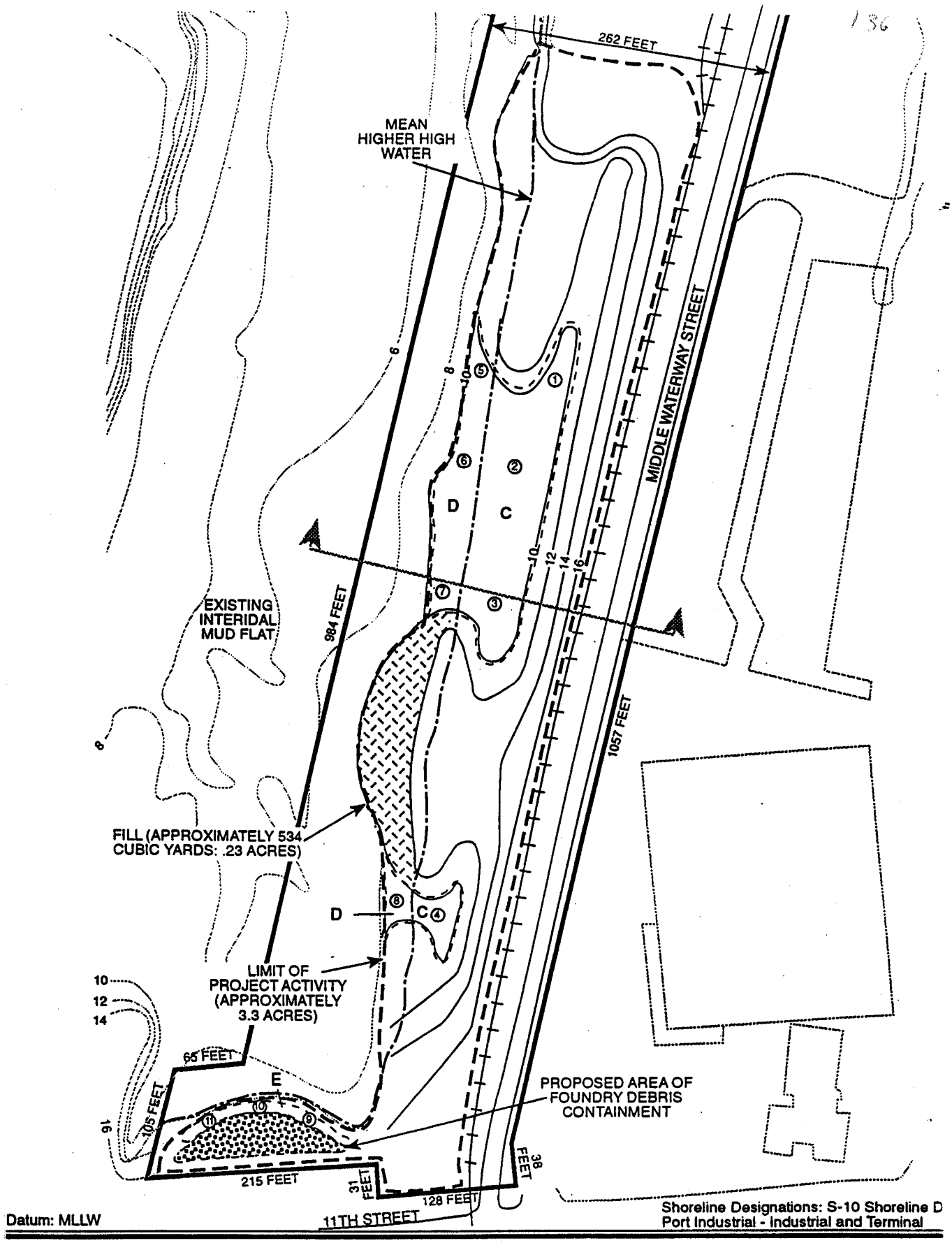
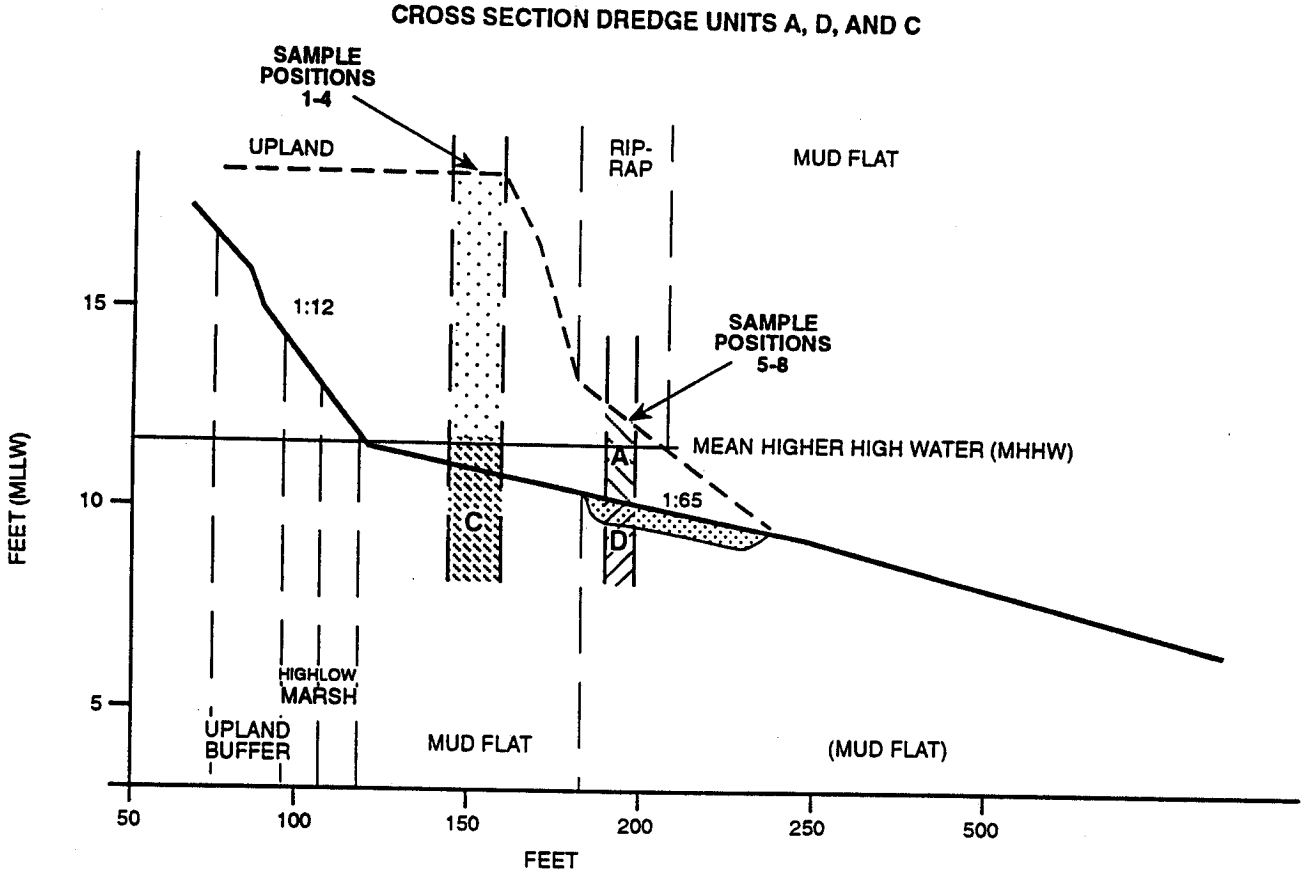


Figure 7.
Plan View Propo:
Final Grade for t
Middle Waterway
Restoration Proj
(Location of Dre
Units to be Expo



A Dredge Unit Designation

Area to be Over Dredged 1 Foot and Backfilled with Clean Material

Soil to be Removed with Backhoe

Existing Surface

Proposed Surface

VERTICAL:HORIZONTAL
1:10

Figure 8.
Cross Sections of Proposed Habitat Restoration (Showing Dredge Units A, C and D)

Table 1. Middle Waterway chemical results, appropriate organics normalized for carbon, 1994.

CHEMICAL	State MCUL	State SQS	A	B	C	D	E	A dup.
METALS								
* Antimony	--	--	3.1	8.2	2.1	2.2	2.2	4.3
* Arsenic	93	57 mg/kg	11	13	3.9	5.1	4.2	8.9
* Cadmium	6.7	5.1 mg/kg	0.94	1.2	0.36	0.46	1.5	0.98
* Copper	390	390 mg/kg	100	280	35	430	82	120
* Lead	530	450 mg/kg	200	170	96	210	290	220
* Mercury	0.59	0.41 mg/kg	0.393	0.650	0.037	0.150	0.103	0.371
* Nickel	--	--	36	52	40	33	40	40
* Silver	6.1	6.1 mg/kg	0.36	0.24	0.13	0.22	0.21	0.18
* Zinc	960	410 mg/kg	330	260	320	190	380	320
* Chromium	270	260 mg/kg	110	65	48	40	50	38
ORGANICS								
LPAH								
Acenaphthylene	66	66 mg/kg	3	1	8 U	8	5	3
Acenaphthene	57	16 mg/kg	3	1	8 U	3	1	3
Anthracene	1,200	220 mg/kg	5	2	8 U	18	10	6
Fluorene	79	23 mg/kg	4	1	8 U	6	3	4
Naphthalene	170	99 mg/kg	8	3	8 U	6	4	10
Phenanthrene	480	100 mg/kg	23	10	9	20	12	20
2-Methylnaphthalene	64	38 mg/kg	3	1	8 U	2	1	4
Total LPAH's	780	370 mg/kg	49	20	54	62	36	50
HPAH								
Benzo(a)anthracene	270	110 mg/kg	26	9	8 U	60	36	20
Benzo(a) pyrene	210	99 mg/kg	34	15	17	76	49	29
Benzo(b)fluoranthenes	--	--	43	23	23	74	51	39
Benzo(k)fluoranthenes	--	--	14 J	6 J	8 U	19 J	14 J	11 J
Total benzofluoranthenes	450	230 mg/kg	57	29	30	93	65	50
Benzo(g,h,i)perylene	78	31 mg/kg	22	7	27	24	16	14
Chrysene	460	110 mg/kg	26	12	11	52	17	23
Dibenzo(a,h)anthracene	33	12 mg/kg	5	2	8 U	8	4	3
Fluoranthene	1,200	160 mg/kg	26	14	13	26	34	22
Indeno(1,2,3,-c,d)pyrene	88	34 mg/kg	23	8	21	26	19	15
Pyrene	1,400	1000 mg/kg	34	21	17	67	44	48
Total HPAH's	5,300	960 mg/kg	311	146	182	524	348	275
CHLORINATED HYRDROCARBONS								
Hexachlorobenzene	2.3	0.38 mg/kg	0.43 U[1]	0.30 U	0.41 U[1]	0.33 U	0.22 U	0.42 U
1,2-Dichlorobenzene	2.3	2.3 mg/kg	0.09 U	0.07 U	1.25 U	0.07 U	0.05 U	0.09 U
1,3-Dichlorobenzene	--	--	0.09 U	0.07 U	1.25 U	0.07 U	0.05 U	0.09 U
1,4-Dichlorobenzene	9	3.1 mg/kg	0.09 U	0.07 U	1.25 U	0.07 U	0.05 U	0.09 U
1,2,4-Trichlorobenzene	1.8	0.81 mg/kg	0.22 U	0.15 U	0.375 U	0.16 U	0.11 U	0.21 U
PHTHALATES								
bis(2-Ethylhexyl) phthalate	78	47 mg/kg	5.7	8.2	9.2	0.9	1.9	4.5
Butylbenzyl phthalate	64	4.9 mg/kg	1.1	0.8	7.5 U[1]	0.5 U	0.4 U	1.2
Diethyl phthalate	110	61 mg/kg	0.74 U	0.51 U	7.50 U	0.55 U	0.36 U	0.70 U
Dimethyl phthalate	53	53 mg/kg	0.74 U	0.51 U	7.50 U	0.55 U	0.36 U	0.70 U
Di-n-Butyl phthalate	1,700	220 mg/kg	0.74 U	0.51 U	7.50 U	0.55 U	0.36 U	0.70 U
Di-n-octyl phthalate	4,500	58 mg/kg	0.74 U	0.51 U	7.50 U	0.55 U	0.36 U	0.70 U
PHENOLS								
* Pentachlorophenol	690	360 µg/kg	64 U	71 U	45 U	58 U	53 U	57 U
* Phenol	1,200	420 µg/kg	26 U	31	18 U	23 U	21 U	23 U
* 2-Methylphenol	63	63 µg/kg	13 U	14 U	9.1 U	12 U	11 U	11 U
* 4-Methylphenol	670	670 µg/kg	27	43	18 U	23 U	28	46
* 2,4-Dimethylphenol	29	29 µg/kg	13 U	14 U	9.1 U	12 U	11 U	11 U

Table 1. Middle Waterway chemical results, appropriate organics normalized for carbon, 1994.

CHEMICAL	State MCUL	State SQS	A	B	C	D	E	A dup.
MISCELLANEOUS COMPOUNDS								
* Benzoic Acid	650	650 µg/kg	130 U	140 U	91 U	120 U	110 U	110 U
* Benzyl alcohol	73	57 µg/kg	15 U	17 U	11 U	14 U	13 U	14 U
Dibenzofuran	58	15 mg/kg	1.86	0.84	7.50 U	2.02	1.02	2.24
Hexachlorobutadiene	6.2	3.9 mg/kg	0.57 U	0.40 U	1.25 U	0.45 U	0.29 U	0.55 U
Hexachloroethane	--	--	0.74 U	0.51 U	7.50 U	0.55 U	0.36 U	0.70 U
N-Nitrosodiphenylamine	11	11 mg/kg	0.43 U	0.30 U	4.58 U	0.33 U	0.22 U	0.42 U
VOLATILE ORGANICS								
Ethylbenzene	--	--	0.09 U	0.07 U	1.25 U	0.07 U	0.05 U	0.09 U
Tetrachloroethene	--	--	0.09 U	0.07 U	1.25 U	0.07 U	0.05 U	0.09 U
Trichloroethene	--	--	0.09 U	0.07 U	1.25 U	0.07 U	0.05 U	0.09 U
Xylenes	--	--	0.09 U	0.07 U	1.25 U	0.07 U	0.05 U	0.09 U
PESTICIDES & PCB's								
Aldrin	--	--	0.16	0.05 U	0.46 U	0.07 U	0.05 U	0.10 U
Chlordane	--	--	0.09 U	0.05 U	0.46 U	0.07 U	0.05 U	0.10 U
DDD	--	--	0.15 U	0.07 U	0.75 U	0.11 U	0.09 U	0.17 U
DDE	--	--	0.15	0.06 U	0.58 U	0.09 U	0.07 U	0.18
DDT	--	--	0.29 U	0.15 U	1.50 U	0.22 U	0.17 U	0.33 U
Dieldrin	--	--	0.12 U	0.06 U	0.58 U	0.09 U	0.07 U	0.14 U
Heptachlor	--	--	0.09 U	0.05 U	0.46 U	0.07 U	0.05 U	0.10 U
Lindane	--	--	0.09 U	0.05 U	0.46 U	0.07 U	0.05 U	0.10 U
A-1016	--	--	0.37 U	0.75 U	1.88 U	0.29 U	0.17 U	0.33 U
A-1221	--	--	1.49 U	2.98 U	7.5 U	1.10 U	0.71 U	1.39 U
A-1232	--	--	0.37 U	0.75 U	1.88 U	0.29 U	0.17 U	0.33 U
A-1242	--	--	0.37 U	0.75 U	1.88 U	0.29 U	0.17 U	0.33 U
A-1248	--	--	0.37 U	0.75 U	1.88 U	0.29 U	0.17 U	0.33 U
A-1254	--	--	0.37 U	0.75 U	1.88 U	0.29 U	0.17 U	0.33 U
A-1260	--	--	0.60	1.65	1.88 U	0.29 U	0.17 U	0.73
Total PCB's	65	12 mg/kg	3.94	8.40	18.78 [2]	2.81	1.73	3.79
CONVENTIONALS								
Total solids (%)			69.9	46.1	79.4	73.5	71.3	69.8
Total volatile solids (%)			4.47	15.2	2.26	4.20	1.46	3.37
Total organic carbon (% dry weight)			3.5	5.7	0.24	4.2	5.9	3.3
Ammonia (mg/kg)			8.2	9.3	8.9	9.7	6.6	8.0
Total sulfides (mg/kg)			700	190	5.9	1,500	420	120
Percent fines			17.8	73.2	27.8	33.8	98.6	23.7

U = Value below stated detection limit.

* = Not normalized for total organic carbon.

1 Detection limit above SQS.

2 This value is not based directly on analysis. This value is the sum of all non-detected Aroclor isomers, and is above the SQS. Boxed values are above SQS.

J = Estimated value

Table 2. Middle Waterway analysis results for PSDDA chemicals of concern not covered under State SQS.

CHEMICAL	PSDDA* SL	PSDDA* ML	A	B	C	D	E	A dup.
METALS (ppm; dry weight)								
Antimony	20	200	3.1	8.2	2.1	2.2	2.2	4.3
Nickel	140	--	36	52	40	33	40	40
ORGANICS (ppb; dry weight)								
CHLORINATED HYRDROCARBONS								
1,3-Dichlorobenzene	170	--	3 U	4 U	3 U	3 U	3 U	3 U
MISCELLANEOUS COMPOUNDS								
Hexachloroethane	1,400	14,000	26 U	29 U	18 U	23 U	21 U	23 U
VOLATILE ORGANICS								
Ethylbenzene	10	50	3 U	4 U	3 U	3 U	3 U	3 U
Tetrachloroethene	14	210	3 U	4 U	3 U	3 U	3 U	3 U
Trichloroethene	160	1,600	3 U	4 U	3 U	3 U	3 U	3 U
Xylenes	12	160	3 U	4 U	3 U	3 U	3 U	3 U
PESTICIDES (ppb; dry weight)								
Aldrin	10	--	5.6	2.6 U	1.1 U	2.8 U	3.2 U	3.4 U
Chlordane	10	--	3.1 U	2.6 U	1.1 U	2.8 U	3.2 U	3.4 U
DDD	6.9	69	5.2 U	4.2 U	1.1 U	4.6 U	5.2 U	5.7 U
DDE	--	--	5.3	3.4 U	1.8 U	3.7 U	4.2 U	6.0
DDT	--	--	10 U	8.5 U	1.4 U	9.3 U	10 U	11 U
Dieldrin	10	--	4.1 U	3.4 U	3.6 U	3.7 U	4.2 U	4.6 U
Heptachlor	10	--	3.1 U	2.6 U	1.4 U	2.8 U	3.2 U	3.4 U
Lindane	10	--	3.1 U	2.6 U	1.1 U	2.8 U	3.2 U	3.4 U

U = Value below stated detection limit

The following actions have been included in project design and implementation to avoid and minimize adverse impacts on the aquatic ecosystem during project construction:

- Providing broad openings and gentle contours to prevent erosion;
- Placing 750 feet of silt fence in the waterway to contain the excavation sediments and straw mulch on exposed slopes to minimize erosion;
- Salvaging pickleweed (*Salicornia virginica*), fleshy jaumea (*Jaumea carnosa*), and salt grass (*Distichilis spicata*) from the upper intertidal areas where construction disturbance will occur for use in project landscaping; and
- Removing surface debris from the existing mudflats on the project site.

If necessary, work conducted below the MHHW mark will also be limited to the six hours of low tide to minimize sediment discharge into the waterway.

The following actions have been included in project design and implementation to avoid and minimize adverse impacts on water quality that could otherwise result from the project:

- Dredging and removing the subsurface sediments containing elevated copper levels from the aquatic environment (approximately 160 cubic yards).

The area to be dredged for creation of the tidal channels will be overdredged by one foot and backfilled with clean Puyallup sand material excavated from elsewhere on the project site. The dredged subsurface sediments containing the elevated copper will be removed from the aquatic environment and blended with the regraded upland soils elswhere on the project site.

The following actions have been included in project design and implementation to assure the long-term success of the restoration project and similar restoration projects in Commencement Bay:

- Landscaping saltmarsh areas with native species documented to inhabit similar elevations on the project site or elsewhere in Commencement Bay;
- Experimenting with planted and unplanted areas to determine the relative success of different methods for establishing saltmarsh habitat in Commencement Bay; and
- Post-construction monitoring and adaptive management to maintain the restored habitat or change the habitat as necessary to meet habitat objectives.

6.2 CONSTRUCTION OF A VEGETATIVE BENCH

The construction of the vegetative bench is expected to result predominantly in positive impacts on the aquatic environment on the project site, including an increase in estuarine habitat valuable

to bird and aquatic life and cleaner substrate conditions than presently exist. At the same time, this project element will result in the filling of about .23 acres of existing intertidal habitat on-site and minor erosion and turbidity impacts.

The following actions have been included in project design and implementation to avoid and minimize adverse impacts on the aquatic ecosystem during project construction:

- Providing intertidal habitat elsewhere on the project site, resulting in an overall slight net increase of intertidal habitat on the project site;
- Placing 750 feet of silt fence in the waterway to contain the excavation sediments and straw mulch on exposed slopes to minimize erosion; and
- Salvaging pickleweed (*Salicornia virginica*), fleshy jaumea (*Jaumea carnosa*), and salt grass (*Distichilis spicata*) from the upper intertidal areas where construction disturbance will occur for use in project landscaping.

If necessary, work conducted below the MHHW mark will also be limited to the six hours of low tide to minimize sediment discharge into the waterway.

The following actions have been included in project design and implementation to assure the long-term success of the restoration project and similar restoration projects in Commencement Bay:

- Experimenting with different substrates to determine the relative success of different methods for establishing saltmarsh habitat in Commencement Bay; and
- Post-construction monitoring and adaptive management to maintain the restored habitat or change the habitat as necessary to meet habitat objectives.

6.3 RESLOPING OF THE HEAD OF THE WATERWAY

The resloping of the head of the waterway is expected to result almost exclusively in positive impacts on the aquatic environment on the project site, including an increase in riparian buffer habitat valuable to screening and protecting the remnant mudflat, cleaner substrate conditions than currently exist, and isolation from the environment of possible contaminants in the metal debris that provided a source of potential contamination to the waterway. The only likely adverse impacts on the aquatic ecosystem associated with this project element are minor erosion and turbidity impacts occurring during project construction.

The following actions have been included in project design and implementation to avoid and minimize adverse impacts on the aquatic ecosystem during project construction:

- Placing 750 feet of silt fence in the waterway to contain the excavation sediments and straw mulch on exposed slopes to minimize erosion;

- Placing geogrid or other geosynthetic reinforcement on the new face of the slope at the head of the waterway to prevent erosion of the outer slope; and

- Salvaging pickleweed (*Salicornia virginica*), fleshy jaumea (*Jaumea carnosa*), and salt grass (*Distichilis spicata*)from the upper intertidal areas where construction disturbance will occur for use in project landscaping.

If necessary, work conducted below the MHHW mark will also be limited to the six hours of low tide to minimize sediment discharge into the waterway.

The following actions have been included in project design and implementation to assure the long-term success of the restoration project and similar restoration projects in Commencement Bay:

- Post-construction monitoring and adaptive management to maintain the restored habitat or change the habitat as necessary to meet habitat objectives.

6.4 MONITORING AND ADAPTIVE MANAGEMENT

The Middle Waterway Shore Restoration Project is solely an environmental improvement or "restoration" project undertaken voluntarily in cooperation with the Natural Resource Trustees for Commencement Bay. It is not being implemented as part of a development project or as "mitigation" for a development project.

Expressed another way, the project is intended to result in a net increase of estuarine intertidal and saltmarsh habitats in Commencement Bay. It is not intended to compensate, under Section 404 of the Clean Water Act, for the loss of habitat resulting from a development project.

Simpson and the Trustees have worked together, and with other non-Trustee resource agencies, for almost a year to develop plans and a process for increasing the chances that the restoration project will succeed over the long-term. First, they have worked with restoration professionals to prepare restoration design standards suitable to the project site. For more information, see the Project Analysis (Parametrix, September 1993), the Excavation and Grading Plan (Parametrix, April 1994c) and the Planting Plan (Parametrix, April 1994d). Second, Simpson will record a deed restriction on the project site exclusive of the railroad right-of-way imposing use restrictions and other obligations on Simpson, its successors and assigns that are intended to ensure that the property provides habitat value in perpetuity in the Commencement Bay environment. Third, Simpson and the Trustees will enter into a cooperative agreement to address the long-term protection and maintenance of the project site. This cooperative agreement will include a monitoring and adaptive management plan (Parametrix, April 1994e) for the project site (see below). Finally, the Trustees will set aside a portion of the St. Paul settlement in a fund to cover the costs of any adaptive management actions that may be necessary on the project site.

Simpson successfully completed another shoreline habitat restoration project in 1988 on the St. Paul Waterway, in close proximity to the Middle Waterway Shore Restoration Project site (described in Weiner, January 1991). See Figure 1 for the location of the St. Paul habitat. Five

years of monitoring results for the St. Paul Waterway Area Remedial Action and Habitat Restoration Project indicate that the project provides habitat to diverse biological communities of benthic, epibenthic and macrophytic organisms (Parametrix, 1990; Parametrix, 1991a; Parametrix, 1991b; Parametrix, 1992; Parametrix, March 1994a). Shorebirds use the site for feeding and rearing, and tide pools observed at low tide are abundant with invertebrates. Productive shoreline habitat now exists at the St. Paul project site where there was essentially no productive habitat prior to project construction.

6.4.1 Project Monitoring

Monitoring for the Middle Waterway Shore Restoration Project is intended to provide information necessary for maintaining the newly-established estuarine habitat over time and valuable for planning future restoration projects in Commencement Bay. Monitoring of the restoration project site will include the following descriptive studies:

- Documenting the general development of estuarine habitat on the project site (through photopoints and aerial photographs);
- Documenting the general development of new intertidal and saltmarsh habitat substrates (through grain size analyses);
- Documenting trends in sediment chemistry, including whether or not contaminants from adjacent mudflat are transported to the new intertidal habitat resulting in contamination (through sediment chemistry analyses);
- Documenting trends in benthic fauna that may or may not correspond to changes in sediment grain size and chemistry (through biological analyses);
- Evaluating predictions regarding elevations and emergent saltmarsh establishment with actual high saltmarsh/low saltmarsh vegetation established onsite (through vegetative analyses and periodic measurement of elevations); and
- Documenting the general use of intertidal, saltmarsh and riparian habitats by wildlife (through qualitative wildlife surveys).

Monitoring of the restoration project site will also include the following experimental studies:

- Evaluating the effectiveness of hand-planting to establish estuarine intertidal low saltmarsh and high saltmarsh vegetation (through vegetative analyses);
- Evaluating the effectiveness of natural revegetation to establish estuarine intertidal emergent low saltmarsh and high saltmarsh vegetation (through vegetative analyses);

- Evaluating the natural revegetation of estuarine intertidal emergent vegetation on pumped Puyallup sands (through vegetative analyses); and

- Evaluating the natural revegetation of estuarine intertidal emergent vegetation on pumped Puyallup sands top-dressed with salvaged mudflat soils (through vegetative analyses).

Monitoring for the various physical, sediment, vegetation and wildlife usage parameters will vary according to the anticipated rate of change in the characteristics and will occur over a five-year period. Trustees will try to do more than is required under the plan, using funds gathered from other sources. Future monitoring will also be coordinated with EPA/Ecology cleanup plans for the Middle Waterway.

6.4.2 Adaptive Management

Because of the protected nature of the restoration project site and the absence of major sources of potential contamination, it is not anticipated that any adverse changes will rapidly occur on the site. Therefore, information necessary for adaptive management will be derived from the post-construction monitoring through routine reporting.

Anticipated changes or developments that may require adaptive management include:

- Failure of vegetation to establish or spread;

- Possible contamination of sediments above State SQS levels;

- Substantial erosion or sedimentation that adversely alters habitat characteristics; and

- Inclusion of treated stormwater flows into the constructed habitat.

Representatives from the Trustees and Simpson will meet at least annually to review monitoring results and to determine the need for adaptive management based upon their best professional judgment.

7. IDENTIFICATION AND EVALUATION OF PRACTICABLE ALTERNATIVES

All practicable actions developed during project planning and public review to reduce any identified adverse effects of the proposed dredging or filling activities have been incorporated into the proposed project (the preferred alternative). As proposed, the project will result almost exclusively in positive impacts on the aquatic environment on the project site, including removal of a potential source of contaminants to the aquatic environment, generally cleaner substrate conditions than presently exist, and an increase in estuarine habitat valuable to bird and aquatic life and screened from adjacent industrial uses. The only likely adverse impacts on the aquatic

ecosystem associated with the project are minor erosion and turbidity impacts occurring during project construction.

There are no other practicable alternatives to the proposed project. The project overview provided in the Project Analysis (Parametrix, September 1993) discusses the planning context for the project and the selection of the Middle Waterway site as the preferred location for the restoration project. The Trustees, Simpson and Champion identified no other location in Commencement Bay that would meet the main project objective of increasing valuable estuarine habitat within Commencement Bay in perpetuity at a location functionally related to the previously constructed Kraft Mill habitat, the Puyallup delta, and other nearby intertidal and shallow subtidal habitat, and also result in less impact on the aquatic ecosystem. The Trustees, Simpson and Champion also identified no other alternative project design at the project location that would meet this project objective as well as the preferred alternative.

The project helps to implement and is consistent with the restoration goal and principles of the Trustees and the Commencement Bay NRD Restoration Panel (1992-1993) and the U.S. Army Corps of Engineers Cumulative Impact Studies for Commencement Bay (David Evans and Associates, 1991; Shapiro and Associates, 1992). The project also helps to implement and is consistent with the vision and restoration and land use goals and principles of the Commencement Bay Cleanup Action Committee (CBCAC, November 1993), the CBCAC Commencement Bay Watershed Restoration Landscape Concept Plan (CBCAC, November 1993), and other efforts in Commencement Bay and the Lower Puyallup Watershed.

8. SOURCES OF INFORMATION

Borque, T., April 1994. Middle Waterway Shore Restoration Project --Planning Level Grading Construction; prepared by Parametrix, Inc. for the Restoration Project Planning Group.

Boule, M. and M. Dybdahl, 1981. Wetlands Technical Report in *Commencement Bay Study*, Dames & More, 1981; prepared for U.S. Army Corps of Engineers, Seattle District.

Commencement Bay Cleanup Action Committee (CBCAC), November 1993 (adopted). A Vision for Commencement Bay.

Commencement Bay Cleanup Action Committee (CBCAC), November 1993 (adopted). Commencement Bay Watershed Restoration Landscape Concept Plan: A Local Initiative to Catalyze Bay-Wide Restoration Actions.

Commencement Bay-Wide NRDA Restoration Panel, 1992-1993. Restoration Planning Documents (including working drafts of the Commencement Bay Restoration Framework, the Commencement Bay-Wide Restoration Goals and Principles, the Screening and Selection Criteria for Potential Restoration Sites in Commencement Bay, the Potential Restoration Habitat Types, and the Preliminary Inventory of Potential Restoration Sites).

David Evans and Associates, 1991. Commencement Bay Cumulative Impact Study: Historic Review of Special Aquatic Sites; prepared for U.S. Army Corps of Engineers, Seattle District.

David Evans and Associates, 1993. Analysis of Changes in Benthic and Epibenthic Invertebrate Communities in Commencement Bay, Washington, prepared for U.S. Army Corps of Engineers, Seattle District.

Ecology Urban Bay Action Team (UBAT), 1994. Milestone 1 and 2 Source Control Status Reports for the Middle Waterway Problem Area: Commencement Bay Nearshore/Tideflats Superfund Site.

Hart Crowser, 1991. Historical Characterization of Potential Contamination Sources to the Middle Waterway, Tacoma, Washington; prepared for Foss Maritime and Simpson Tacoma Kraft Company.

Hart Crowser, 1992a. Historical Characterization and Sediment Quality Compilation, Middle Waterway, Tacoma, Washington; prepared for Foss Maritime.

Hart Crowser, 1992b. Environmental Assessment of Outfalls, Seeps, and Tideflat Sediments, Middle Waterway, Tacoma, Washington; prepared for Foss Maritime and Simpson Tacoma Kraft Company.

Johnstone, Annamarie K., Ph.D., 1985. Paxport Mills Sediment Metals Study and Benthic Infauna of Salmon Enhancement Area.

Martinez, V., August 1993. Test Pits at Middle Waterway Restoration Project to Characterize Extent and Nature of On-Site Debris; prepared by Parametrix, Inc. for the Restoration Project Planning Group.

McEntee, Dave, July 1993. Field Soil Sampling Report: Middle Waterway Shore Restoration Project, prepared for the Restoration Project Planning Group.

Parametrix, Inc., 1988a. Middle Waterway Sediment Sampling; prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., 1988b. Paxport Site Environmental Audit Data, prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., 1990. St. Paul Waterway Area Remedial Action and Habitat Restoration Project, Monitoring Report 1988-1989; prepared for Simpson Tacoma Kraft Company and Champion International Corporation.

Parametrix, Inc., 1991a. St. Paul Waterway Area Remedial Action and Habitat Restoration Project, Monitoring Report 1990; prepared for Simpson Tacoma Kraft Company and Champion International Corporation.

Parametrix, Inc., 1991b. St. Paul Waterway Area Remedial Action and Habitat Restoration Project, Monitoring Report; prepared for Simpson Tacoma Kraft Company and Champion International Corporation.

Parametrix, Inc., 1992. St. Paul Waterway Area Remedial Action and Habitat Restoration Project, Monitoring Report 1992; prepared for Simpson Tacma Kraft Company and Champion International Corporation.

Parametrix, Inc., September 1993. Project Analysis: Middle Waterway Shore Restoration Project; prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., March 1994a. St. Paul Waterway Area Remedial Action and Habitat Restoration Project, Monitoring Report 1993 (including a five year overview of the monitoring effort); prepared for Simpson Tacoma Kraft Company and Champion International Corporation.

Parametrix, Inc., March 1994b. Sampling and Analysis Plan, Puget Sound Dredged Disposal Analysis for Sediment Characterization at the Middle Waterway Shore Restoration Project; prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., April 1994a. Sampling and Analysis Report, Puget Sound Dredged Disposal Analysis for Sediment Characterization at the Middle Waterway Shore Restoration Project; prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., April 1994b. Preconstruction Sampling Report: Middle Waterway Shore Restoration Project; prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., April 1994c. Excavation and Grading Plan: Middle Waterway Shore Restoration Project; prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., April 1994d. Planting Plan: Middle Waterway Shore Restoration Project; prepared for Simpson Tacoma Kraft Company.

Parametrix, Inc., April 1994e. Monitoring and Adaptive Management Plan: Middle Waterway Shore Restoration Project; prepared for Simpson Tacoma Kraft Company.

Shapiro and Associates, Inc., 1992. Commencement Bay Cumulative Impact Study: Assessment of Habitat Loss; prepared for U.S. Army Corps of Engineers, Seattle District.

U.S. Environmental Protection Agency (EPA), 1989. Commencement Bay Nearshore/Tideflats Record of Decision, Region 10.

Weiner, Kenneth S., January 1991. Commencement Bay Nearshore Tideflats Superfund Completion Report for the St. Paul Waterway Sediment Remedial Action. Submitted to the U.S. Environmental Protection Agency for Simpson Tacoma Kraft Company and Champion International Corporation.

Appendix A

MEMORANDUM

to: Don Weitkamp, Ph.D. April 27, 1994

from: Tom Bourque, P.E. 55-1650-30

re: Middle Waterway Shore Restoration Project - Planning Level Grading Construction

Grading Construction

A planning level cost estimate analysis for the Middle Waterway Wetland Restoration grading construction has been completed. This analysis considers site preparation, excavation, dredging, off-site hauling, final grading, erosion control, and off-site stockpile regrading and stabilization. Cost estimates are based on *Means Heavy Construction Cost Data - 1993* and Parametrix' experience in construction services. Excavation, dredging, and disturbed area estimates are based on preliminary estimates presented in the *Project Analysis - Middle Waterway Shore Restoration Project (September 1993).* Presented below is a summary table of the grading construction cost estimate. Totals have been rounded to the nearest one-hundred dollars.

Simpson Tacoma Kraft Company - Middle Waterway Share Restoration Project
Planning Level Cost Estimate for Site Grading

Item	UnitPrice	Quantity	Total
Mobilization	$10,000	1	$10,000
Site Preparation	$725/AC	3.5	$2,500
Excavation (above water line)	$5/CY	7,900	$39,500
Dredge (below water line)	$10/CY	600	$6,000
Embankment	$4/CY	550	$2,200
Final Site Grading	$750/AC	3.5	$2,600
Access Road with Rock Pad	$9,000	1	$9,000
Erosion Control	$4,500	1	$4,500
Off-Site Stockpile Regrade	$4/CY	7,900	$31,600
Hydroseed	$2000/AC	1.5	$3,000
		Subtotal	$110,900
		Contingency(25%)	$27,700
		Total	**$138,600**

* This planning estimate is considered accurate between -20% and +30% of the actual costs.

Note: Costs associated with excavating and containing the metal debris at the head of Middle Waterway are discussed in Attachment A.

The overall project consists of excavating and contouring the site's upland portion to restore the natural shoreline and to plant appropriate natural vegetation to establish wetlands and a riparian upland buffer. Restoration will occur on 3.3 acres. The grading configuration will create a small protected inlet and shoreline similar to local tideflat areas and linear shaped uplands.

Approximately 7900 cubic yards will be excavated and 600 cubic yards dredged during restoration. Approximately 550 cubic yards of the excavated material will be placed in the existing site mudflat to construct a vegetation bench. The remaining excavated and dredged material will be hauled off-site to a stockpile area for regrading and stabilization.

Presented below are each cost item's description and assumptions.

Mobilization

Mobilization is assumed at about ten percent of the total project cost.

Site Preparation

Site preparation includes 3.3 acres of light clearing and grubbing of the project area and 0.2 acres of access road.

Excavation

Excavation assumes standard excavation of 7900 cubic yards of moist silt and sand above the high water mark. After excavation the soil would be hauled one-half mile to a stockpile area. It is assumed trucks would haul the material at a rate of three trips per hour and 600 cubic yards per day.

Dredge

Dredging assumes removing 600 cubic yards of saturated silt and sand below the high water line. Material is assumed to be hauled off-site at a rate of 280 cubic yards per day. In addition, 160 yd^3 of copper-containing subsurface sedients will be dredged.

Embankment

Embankment construction will produce a vegetation bench that extend into the existing site mudflat. This filling and compaction will be limited to about 550 cubic yards. A dozer will place and compact the embankment material.

Final Site Grading

Final site grading will be performed by a dozer. One acre is assumed because only the shore slope will require finish grading. The remaining area will be graded during the site preparation. The construction sequence is described in Attachment B.

Access Road

The site access road will be 15 feet wide and 300 feet long. The road will run the length of the construction area and intersect the site entrance rock pad (see Erosion Control). The road would be constructed of twelve-inch thick quarry spall base. This road is assumed to be included; however, it may not be required depending on the site conditions.

Erosion Control

Two elements of erosion control will be utilized on the site. First, 750 feet of silt fence will be placed in the waterway to contain excavation sediments. Once the project is complete the fence will be removed. Second, straw mulch will be placed on exposed slopes until vegetated.

A 100-foot long, 15-foot wide, and 1-foot thick quarry spall pad will be placed at the site exit to shake mud and debris off the trucks before they leave the site. This pad will intersect Middle Waterway Road at the north end of the site. Construction of the pad is required by the county.

Off-site Stockpile Regrade and Hydroseeding

Once excavated material has been hauled to an off-site location it will be regraded and hydroseeded for erosion stability. Grading and hydroseeding may be delayed if the material requires additional dewatering. A dozer will grade the material in a three-foot lift.

Contingency

The contingency attempts to account for unknown site conditions and changes between the planning documents and the final grading plan.

cc: Rick Hermes
Jim Kelly

ATTACHMENT A

M E M O R A N D U M

to: Don Weitkamp, Ph.D. April 27, 1994

from: Tom Bourque, P.E. 55-1650-30

re: Middle Waterway Debris Excavation and Containment

UBAT sampling in 1993 identified brass foundry debris and soil along the east bank of the head of the Middle Waterway within the Middle Waterway habitat restoration project site. Testing of the brass foundry metal debris under the Toxicity Characteristic Leaching Procedure (TCLP) has shown the metals in the debris to be considerably below state dangerous waste (DW) and extremely hazardous waste (EHW) levels, and therefore not requiring removal to an appropriate landfill offsite. See Figure 1 (for approximate TCLP sampling locations) and Table 1 (for TCLP sampling results). Because these materials exceeded SCOs for a number of constituents, though, excavation with on-site containment was determined to be the preferred option in handling this material. Assumptions, remediation alternatives, and costs addressing this preferred option are presented below.

Assumptions

The brass foundry debris is assumed to be primarily the consistency of soil (approximately 1% to 5% debris with the remainder soil). The debris is assumed to be up to two feet in diameter. Neither material would require dewatering before placement within the containment system.

Testing of these materials and the waterway suggest that leaching of metals from the debris has not been a problem relative to those contaminants found in the local area. As a result, treatment or stabilization before confinement is assumed to be unnecessary.

On-site confinement of the debris would be allowable on the upland portions of the project site. No bottom liner, leachate collection system, or monitoring system would be required.

Groundwater is assumed to be at approximately +12 MLLW.

Excavation and confinement of the debris is assumed to be covered under the SEPA review and restoration construction permits for this project.

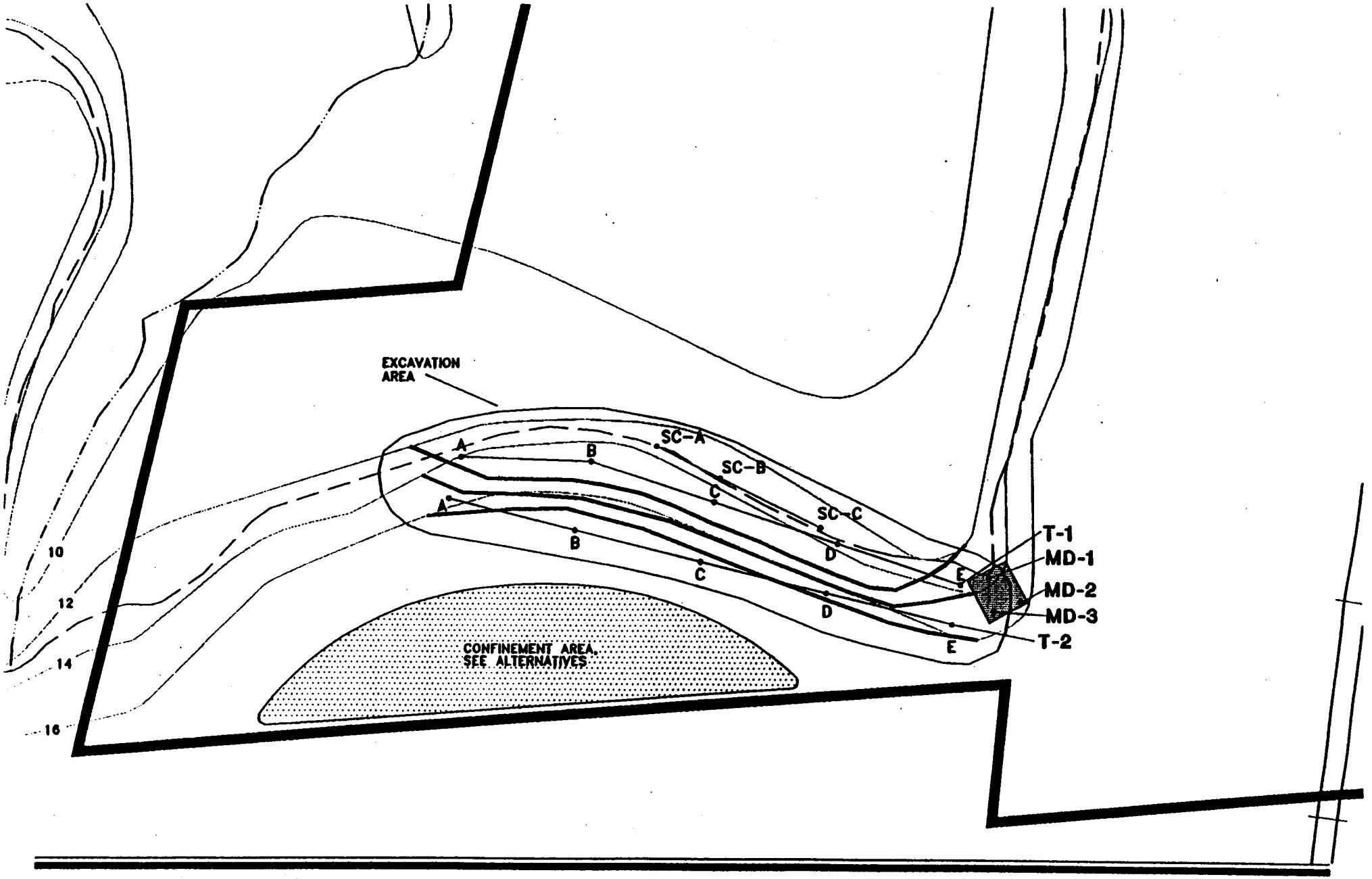

EXCAVATION AREA
SC-A
SC-B
SC-C
A
B
C
D
E
T-1
MD-1
MD-2
MD-3
T-2
10
12
14
16
CONFINEMENT AREA, SEE ALTERNATIVES
0
15
30
High Water Line
Excavation Contour Lines
Existing Contour Lines

Figure 1

Table 1. Middle Waterway Upland Soil Samples - TCLP Metals Results

Composite Number / Date Sampled				T-1 3/18/94	T-2 3/18/94	SC 3/18/94	MD 3/18/94
Analyte	Units	EHW Limit	DW Limit				
Arsenic	mg/L	500	5	<0.05	<0.05	<0.05	<0.05
Barium	mg/L	10,000	100	0.715	0.600	0.178	0.365
Cadmium	mg/L	100	1	0.004	0.002	<0.002	0.006
Chromium	mg/L	500	5	<0.005	<0.005	<0.005	<0.005
Lead	mg/L	500	5	0.03	0.05	0.05	0.02
Mercury	mg/L	20	0.2	<0.0001	<0.0001	<0.0001	<0.0001
Selenium	mg/L	100	1	<0.05	<0.05	<0.05	<0.05
Silver	mg/L	500	5	<0.003	<0.003	<0.003	<0.003

Note: All samples are composite samples.

Excavation

The amount of excavated soil and brass foundry debris would be approximately 150 cubic yards of material. The excavation along the east bank would be above the flat shoreline as it approaches the embankment (approximately +12 MLLW) and would remove a five foot deep, ten foot wide, and 80 foot long cut along the shore. The excavation would be performed by a tracked excavator. Material would be piled behind the excavator and then moved to and placed at the containment area by a front-end loader.

The excavation would have near-vertical cut-slopes and may be adjusted as the work proceeds and the debris materials exposed. Once the debris and soil have been removed, clean on-site material would fill the excavation back to pre-existing grades or more gradual slopes. The fill's outer slope would not exceed 2:1 (H:V). Two measures which may be considered for protecting the fill's outer slope would be:

- Place one to two foot diameter rip-rap at the slope toe and horizontal logs up the slope to its crest. The logs would be side-by-side and connected by cable or other means. The rip-rap may be replaced by logs if the concern for slope stability and erosion by wave-action is minor.

- Place geogrid or other geosynthetic reinforcement on the face and revegetate. This method provides less wave-action protection, but may be more compatible with the site's restoration.

Excavation would need to employ the project's erosion control plan. In addition, consideration should be given as to the timing of excavation. That is, limiting work below the MHHW mark to the six hours of low tide to minimize sediment discharge into the waterway. If restoration permits allow for construction during high tide than this precaution may not be necessary.

Confinement

Three alternatives are evaluated for confining the excavated debris and soil. These alternatives include: (1) confinement within a berm; (2) confinement within a trench; and (3) confinement on-grade. The three confinement alternatives utilize a simple liner, either plastic (30 mil PolyVinyl Chloride) or one-foot of clay. The reason for the liner is to avoid monitoring the confinement and to ensure permanent confinement. All confinement areas would be located within the immediate area of the debris excavation. Attached are figures which show the excavation grades and confinement location and cross-sections (Figures 2 through 4).

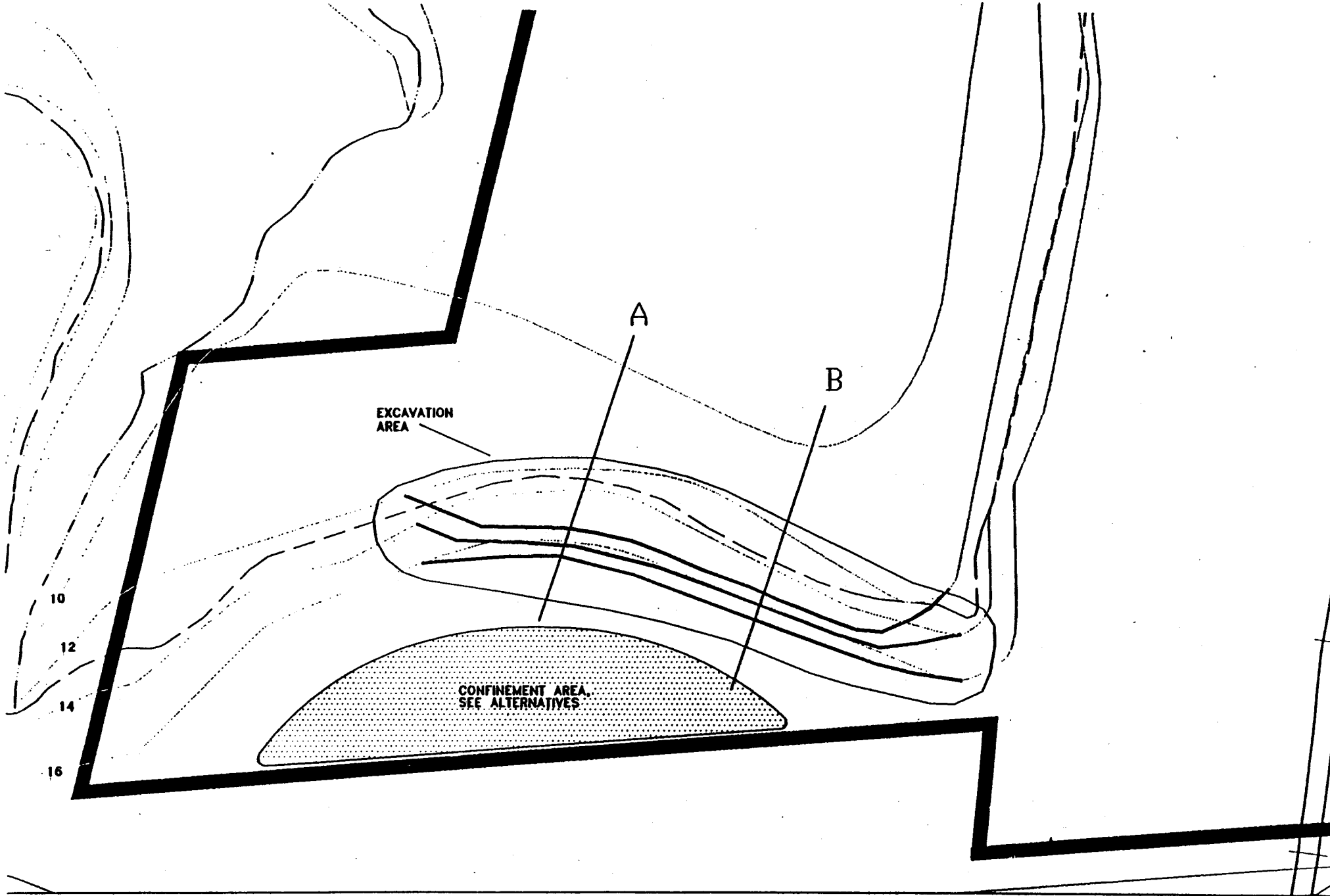
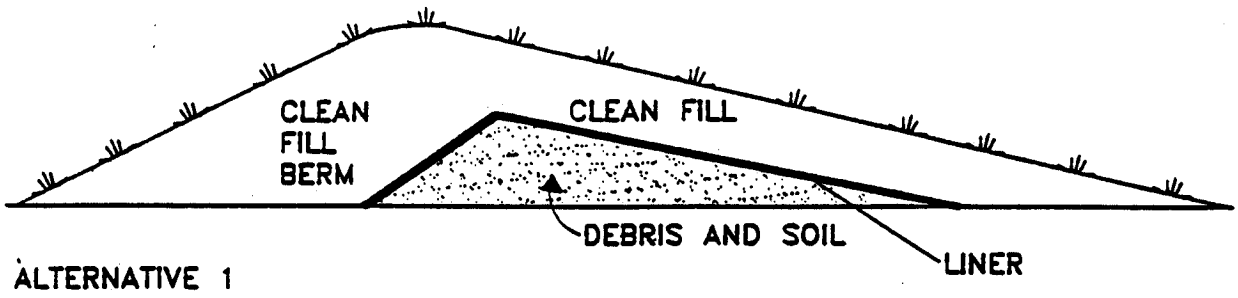
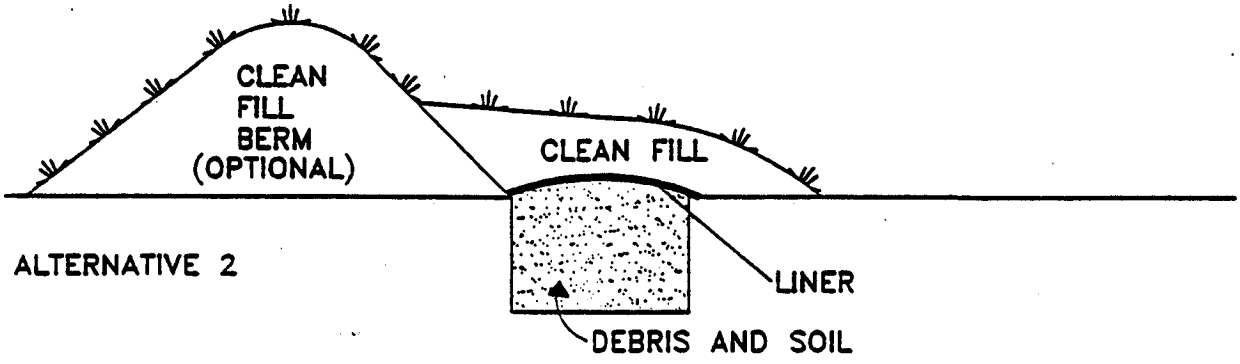


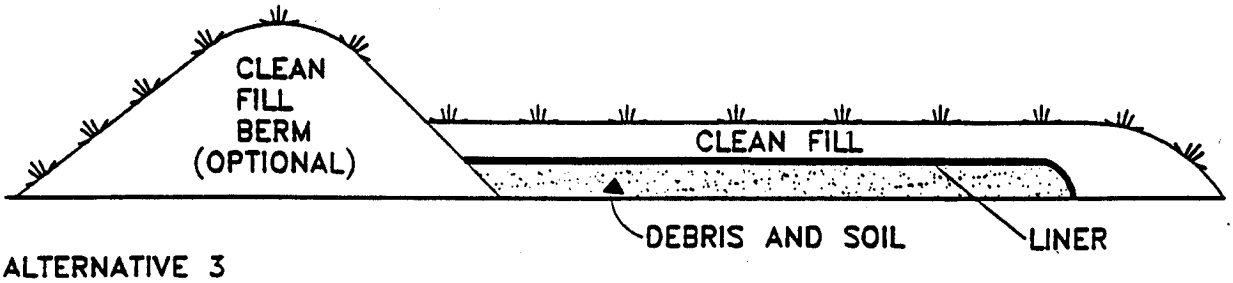
Figure 2.
Debris Material Excavation



ALTERNATIVE 1

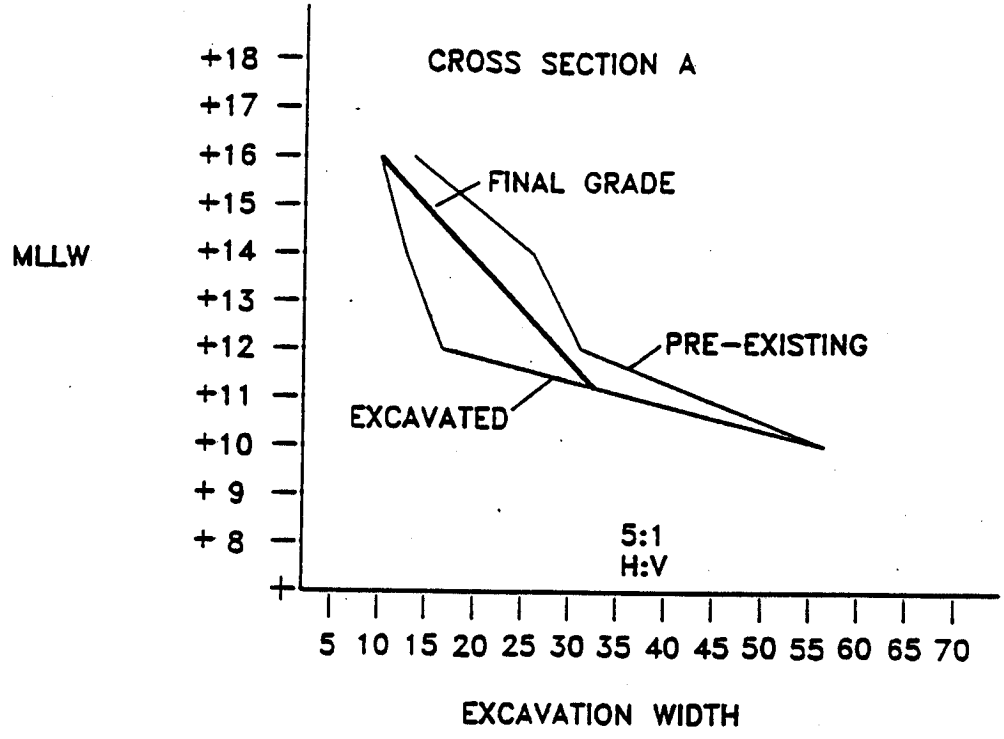


ALTERNATIVE 2



ALTERNATIVE 3

Figure 3.
Confinement Alterna



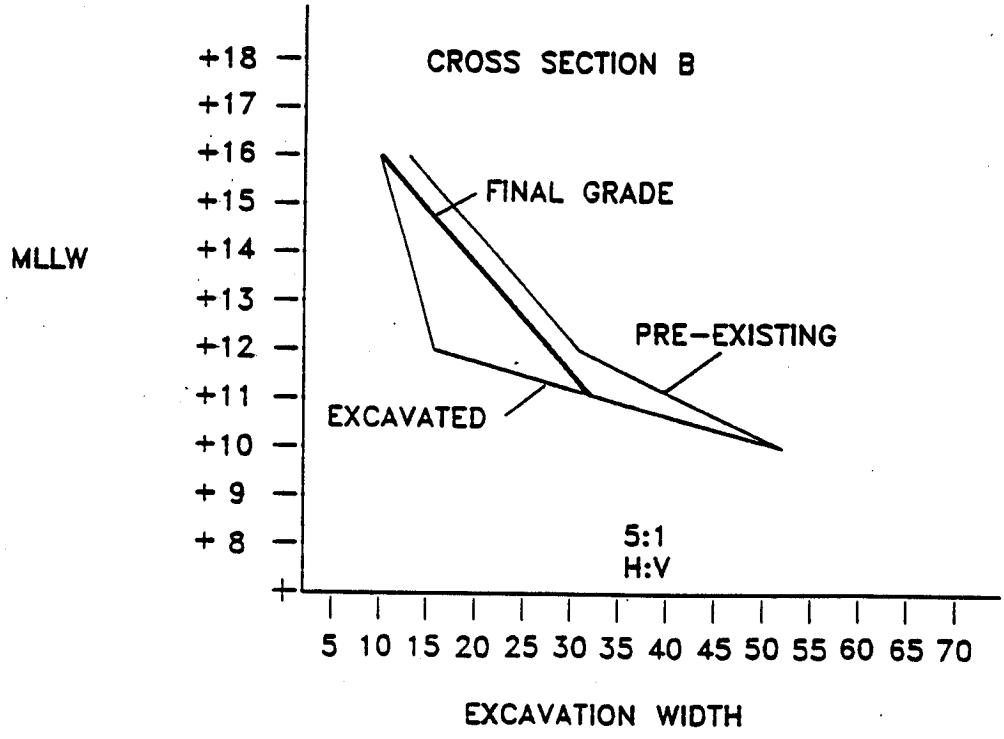


Figure 4.
Excavation Cross Sections

Alternative 1 - Berm Construction

Excavated debris and soil materials would be placed along the property line adjacent to 11th Street as part of a berm construction. The berm would be approximately 15 feet wide, 5 feet high, and 125 feet long with 2:1 sideslopes. The debris material would be placed first at 5-15 feet wide and 3 feet high. A plastic liner or one foot clay layer would be placed over the debris and soil material. Clean on-site fill at least two feet thick would be placed over the liner. Finally, the berm would be vegetated.

This alternative is preferred. It provides the easiest construction because only an excavator and front-end loader would be required and the berm construction would be simple and fast. The loader would place and compact both fill materials with its bucket.

Alternative 2 - Trench

Along the berm alignment (alternative 1) a trench would be excavated approximately 100 feet long, 5-15 feet wide, and 5 feet deep. The debris and soil material would be placed in the trench and capped with a plastic or clay liner, two feet of soil, and vegetated. Excess clean soil would be utilized for the berm adjacent to the trench and vegetated.

This alternative provides the best confinement for the soil and debris material. However, the excavator would need to excavate a large trench and the loader would have to still shape a berm.

Alternative 3 - On-Grade Confinement

Debris and soil material would be utilized as part of the site grading, but still remain isolated by a plastic or clay liner. At two feet deep, the debris and soil material would require an area of approximately 2,000 square feet.

This alternative avoids berm construction and may assist in reaching the proposed project grades. However, a larger area requires lining. An excavator and dozer would be required and, perhaps, a loader depending on where the debris and soil material would be placed.

Confinement Cost Estimates

The confinement cost estimates (Table 2) are for planning purposes only. The costs are based on typically construction unit prices and estimated quantities. Actual costs and quantities may vary. It is assumed that the equipment would be available from the other activities occurring on-site.

Table 2. Confinement Alternative Preliminary Cost Estimates.

ITEMS	QUANTITY	UNIT PRICE	TOTAL
ALTERNATIVE 1			
Excavator	2 DAYS	$800/DAY	$1,600
Loader	1.5 DAYS	$750/DAY	$1,125
Liner (PVC)	175 SY	$3.5/SY	$610
Liner (Clay)	75 CY	$12/CY	$900
Contingency (25%)			$850
TOTAL			$4,185
ALTERNATIVE 2			
Excavator	3 DAYS	$800/DAY	$2,400
Loader	1.5 DAYS	$750/DAY	$1,250
Loader (PVC)	100 SY	$3.5/SY	$350
Liner (Clay)	35 CY	$12/CY	$420
Contingency (25%)			$950
TOTAL			$4,825
ALTERNATIVE 3			
Excavator	2 DAYS	$800/DAY	$1,600
Loader	1 DAY	$750/DAY	$750
Dozer	1 DAY	$750/DAY	$750
Liner (PVC)	225 SY	$3.5/SY	$790
Liner (Clay)	110 CY	$12/CY	$1,320
Contingency (25%)			$925
TOTAL			$4,815

Note:

(1) The clay liner is not considered because it is assumed more costly.
(2) Vegetating the confinement area is considered incidental to the project.

Table 3. Bank Reconstruction Preliminary Cost Estimates.

ITEMS	QUANTITY	UNIT PRICE	TOTAL
Excavator	3 DAYS	$800/DAY	$2,400
Dozer	2 DAYS	$750/DAY	$1,500
Dump Truck	1 DAY	$500/DAY	$500
Laborers (2)	8 DAYS	$300/DAY	$2,400
Subtotal			$6,800
Logs	15	$20/EA	$300
Rip-Rap	20 CY	$25/CY	$500
Geogrid	60 SY	$5/SY	$300
Contingency (25%) Logs/Rip-Rap			$1,900
Contingency (25%) Geogrid			$1,800
TOTAL (Logs/Rip-Rap)			$9,500
TOTAL (Geogrid)			$8,900

Note:

(1) Revegetation is considered incidental to the project.

(2) On-site fill would be placed near the reconstruction area, loader and dozer will place the material in the excavated area, and then the loader and laborers would construct the log/rip-rap or geogrid reinforced outer slope. If geogrid is used, the loader's time will probably be less than shown.

Summary

Each confinement alternative would allow confined debris on-site. Liner would provide protection from precipitation. Alternative 1 is selected because it provides adequate containment for the metal debris and soil at the lowest cost. The total cost for excavation and reconstruction under Alternative 1 using the less expensive materials would be in the neighborhood of $13,085. This estimate is considered to be +30 and -20 percent of the actual cost. This alternative would require the restoration project to provide the clean berm material, which may add to the total cost (1 Dump truck and 1 excavator for one day - $1,500). This cost also assumes the use of geogrid instead of logs/rip-rap. Geogrid was selected because of cost and the intent of the restoration project to provide vegetated slopes down to the water.

ATTACHMENT B

CONSTRUCTION SEQUENCE

1. Access to project site will be established near the center of the site, and the site will be graded in three phases.

2. Grading will start on the northern third of the site (Phase I) and proceed south towards the center. Following completion of grading on Phase I, Phase II (the south third) will be graded from south to north. Finally, the center portion (Phase III) of the site will be graded.

   Each phase will include appropriate erosion control procedures, as identified in the grading plans.

4. Immediately following grading of the northernmost 50 feet of the project, a storage area will be established for intertidal plants. Plants will be dug from intertidal areas and stored in plastic pools, partially filled with seawater.

5. Within each phase, plants will first be salvaged from intertidal zones. Excavation in new intertidal areas to about 13 feet MLLW will then occur.

6. Next, final grades will be established in intertidal areas (including overexcavation and backfilling with intertidal sediments, where specified).

7. Finally, final grades in upland buffer areas will be established.

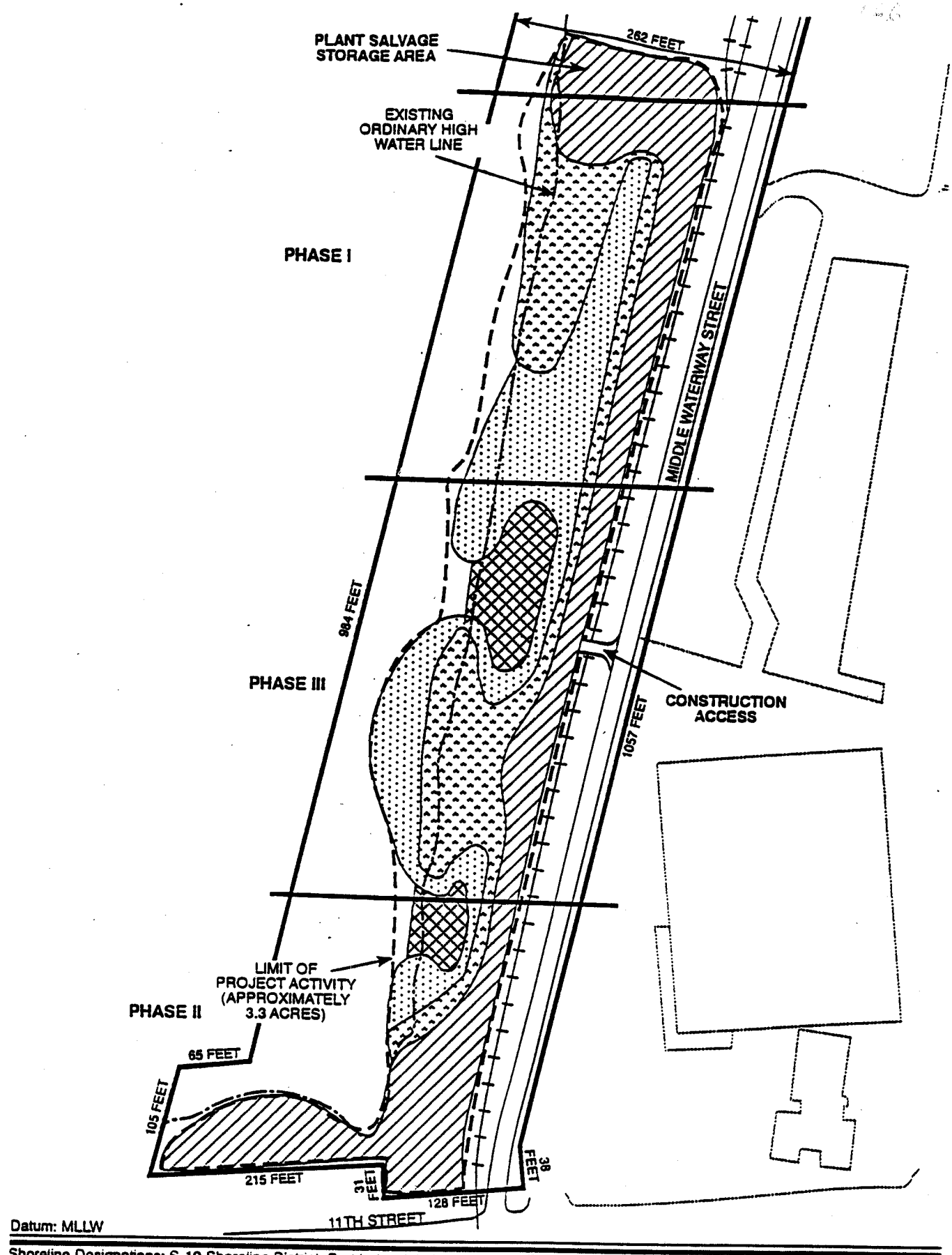


Figure 1.
Construction Pha
Middle Waterway
Shoreline Restor

EXHIBIT E

RESTORATION PROJECT DELIVERABLES

1. Project Analysis (September 1993, April 1994)
2. City of Tacoma Shoreline Substantial Development Permit Application (September 1993)
3. U.S. Corps of Engineers Section 10/404 Permit Application (December 1993)
4. City of Tacoma Excavating and Grading Permit Application (August 1994)
5. Pre-Construction Sampling Plan (March 1994)
6. Report on Pre-Construction Sampling Results (April 1994)
7. Final Design Plan for Excavation and Grading (May-June 1994)
8. Final Design Plan for Planting (May-June 1994)
9. Final Design Plan for Removal or Containment of Brass Foundry Metal Debris (May-June 1994)
10. Monitoring and Adaptive Management Plan (April 1994)
11. As-Built Construction Drawings
12. Monitoring Reports

SCHEDULE 1

TERMS AND CONDITIONS REGARDING COMPENSATION FOR THE VALUE OF THE RESTORATION PROPERTY AND REIMBURSEMENT OF RESTORATION PROJECT EXPENSES

1. The Trustees will pay $625,000.00 to Simpson as compensation for the diminution in value of the Restoration Property as a result of Simpson's obligations under the Cooperative Agreement, including Simpson's incurring of otherwise unreimbursable expenses in association with the design, selection and implementation of the Restoration Project, the placement of the Deed Restriction on the Restoration Property, and Simpson's agreement to continue to pay the property tax liability allocable to the Restoration Property.

2. The Trustees will pay $165,843.16 to Simpson as reimbursement for Simpson's out-of-pocket costs in completing the first four phases of the Restoration Project (planning design, permitting, sampling and final project design), as documented in invoices attached to a letter from Simpson to the Trustees, dated February 1, 1995.

3. The Trustees will pay Simpson's reasonable out-of-pocket costs, as described in invoices provided by Simpson to the Trustees at least thirty (30) days in advance of the requested date of payment, in completing the final two phases of the Restoration Project (construction and planting and post-construction monitoring). The estimated costs for construction and planting are approximately $250,000.00. The estimated costs for post-construction monitoring are approximately $125,000.00.

4. The Trustees will take all necessary steps to request disbursement from the Court Registry Account of the funds identified in paragraphs 1-3 of this Schedule 1 as follows:

   a. $125,000.00 within thirty (30) days of the initiation of construction of the Restoration Project;

   b. $150,000.00 on or before December 31, 1995;

   c. The balance of any amount due and owing under this Schedule 1 on or before June 30, 1996; and

d. Any further amounts due and owing within thirty (30) days of the Trustees' receipt of invoices from Simpson describing such costs as a consequence of work under this Schedule 1 undertaken after June 30, 1996.

Except for subparagraph 4.a, the Trustees will not be required to make any payment described above by the date described above if Simpson and the Trustees mutually agree to defer such payment because a Commencement Bay-wide Natural Resource Damage settlement agreement involving Simpson and the Trustees is still pending with the court. Any payment made to Simpson under this paragraph will be credited to the Trustees in the event that a Commencement Bay-wide Natural Resource Damage settlement agreement involving Simpson and the Trustees is entered by the court.