Cleanup Action Report
Upland, Bank & Intertidal Cleanup
Tacoma Boat Property
1840 Marine View Drive
Tacoma, Washington

Volume 1 of 2

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Prepared for

Ace Tank & Equipment Company

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CLEANUP ACTION REPORT
TACOMA BOATBUILDING SITE

1 INTRODUCTION

This report describes the cleanup that occurred at the Tacoma Boatbuilding Company site located at the head of Hylebos Waterway at 1840 Marine View Drive, Tacoma, Washington (property) during the summer and fall of 1998. The report has been prepared to satisfy the requirements of the Cleanup Action Plan associated with the Washington State Department of Ecology Prospective Purchaser Consent Decree (No. 98-2-0716173) for Ace Tank and Equipment Company (Ace Tank). The purpose of this report is to provide :

- Description of the cleanup actions.
- Description of the conditions encountered during upland bank area excavation.
- Site map showing bank and intertidal area excavations, depth of excavations, and results of confirmation sampling.
- Estimates of the quantities of soil and sediment excavated and of imported backfill.
- Documentation of shipment and proper disposal of all excavated soil/sediment.
- Summary of confirmation monitoring data.
- Demonstrations of attainment of cleanup levels.

Ace Tank assumed ownership of the property in June 1998 per bankruptcy proceedings. The Department of Ecology (Ecology) and the state Attorney General's Office prepared a prospective purchaser consent decree for property cleanup. The United States Environmental Protection Agency (EPA) is also arrived at a settlement with Ace Tank for intertidal and subtidal cleanup. The remedial actions were completed under Ecology oversight, with EPA review and comment.

2 PROPERTY DESCRIPTION

The 19-acre property, roughly 800 feet wide and 1,000 feet deep, is bordered by the Hylebos Waterway to the southwest, Manke Lumber to the southeast, General Metals of Tacoma to the northwest, and Marine View Drive to the northeast. The property location is shown on the vicinity map, Figure 1.

Aerial photographs and related historical records indicate that the site was undeveloped pasture through the late 1960s. Tacoma Boatbuilding Company (Tacoma Boat) operated at the site, 1840 Marine View Drive, since 1970. By the early 1970s, site buildings reached their current configuration and the site was paved. At that time, the timber pier located immediately southwest of the launching way was also constructed. The main concrete portion of the outfitting pier was constructed in the early 1980s.

Tacoma Boat designed, built, and repaired high performance ships for commercial and government customers. Property activities included welding, metal cutting and cleaning, machining sandblasting, painting, carpentry, and pipefitting. Tacoma Boat sold the property to Ace Tank and Equipment Company in June 1998 through bankruptcy proceedings.

The site is generally flat, graded for drainage to catch basins, which discharge to the Hylebos Waterway. The evaluation definitions for this report are as follows:

- MLLW: Definition of zero foot tidal elevation, based on mean lower low water level.
- Upland: The generally flat portion of the property behind the shoreline. Upland elevations are typically at and above elevation. +17 feet MLLW.
- Bank: The shoreline portion of the property which is above the ordinary high water level (+12 feet MLLW) and adjacent to the upland.
- Intertidal: The shoreline portion of the property between elevation 0 feet MLLW and +12 feet MLLW.
- Subtidal: The offshore portion of the property, which is below elevation 0 feet MLLW.

For the purpose of the cleanup, the property is subdivided into several areas of similar elevation and use characteristics. Each is described below and shown on the Site Plan, Figure 2 or the Shoreline Remediation Areas, Figure 3.

Paved Upland Area: With the exception of the bank area described below, the upland at the site is fully paved or under building cover. The paved upland area is surfaced with asphalt concrete or Portland cement concrete. Areas under building cover are not counted as part of the paved upland area of the property.

Unpaved Bank Area: The unpaved bank area is located adjacent to the shoreline and open intertidal slope of the Hylebos Waterway. As shown on Figure 3, the area is approximately 25 feet wide and 335 feet long.

Piers and Docks: The outfitting pier, approximately 680 feet long, extends along most of the Tacoma Boat property along the Hylebos shoreline, with the exception of the launching ways at the south-end. The southern 285 feet and northern 60 feet of the outfitting pier are continuous to the upland and cover the intertidal area. The outfitting pier is separated from the upland by a 50-foot wide-open intertidal area adjacent to the 335-foot long upland bank area.

Intertidal Open Area: Roughly half of the intertidal shoreline of the property is covered by piers and docks. The two open intertidal areas are the launching ways (discussed below) and an intertidal open area located adjacent to the unpaved bank area of the shoreline. This intertidal

open area is approximately 35 to 50 feet wide and 335 feet long. It is bounded to the east by the unpaved bank area described above, and to the west by the outfitting pier which parallels the shoreline. The elevation of the intertidal slope at the face of the outfitting pier is approximately 0 feet MLLW. The intertidal open area is sloped at approximately 2-1/2:1 horizontal to vertical.

Launching Way: The launching way is located at the southern boundary of the property and consists of a 50-foot wide marine railway constructed on timber ties, which are supported on piles. The top of the timber ties are located at about the existing mudline. A timber beam, approximately 15 inches thick, spans from tie to tie to support each rail. The marine railway is bounded on each side by a 25-foot wide strip of intertidal sediment. These side areas are then bounded by timber piers that parallel the marine railway. The launching way is sloped at approximately 20:1 horizontal to vertical.

Subtidal Area: The subtidal areas are below elevation 0 feet MLLW. This elevation was selected because it also represents the boundary between the intertidal open area and the outfitting pier. Along the Hylebos shoreline, approximately half of the subtidal area is covered by the outfitting pier. The subtidal area is open outboard of the outfitting pier and also in the launching ways.

3 SUMMARY OF REMEDIAL ACTON AND CLEANUP STANDARDS

3.1 Selected Remedial Action

The Ecology Cleanup Action Plan (CAP) was selected to protect human health and the environment, comply with cleanup standards, comply with applicable state and federal laws, and provide for compliance monitoring. Three potential remediation alternatives were screened and evaluated by Ecology to select the most effective, implementable, and cost-effective alternative. A brief description of the selected alternative is provided below:

- Removal and disposal of sandblast grit from the paved upland area.
- Excavation and disposal of sandblast grit from the unpaved bank area, and backfill the area with clean fill.
- Excavation and disposal of sediment containing sandblast grit from intertidal open areas and the launching way (i.e., not under docks) and dress the slope with clean fill.

The preferred alternative was selected by Ecology because it results in removal of the most highly contaminated sediments in the shortest and most controlled timeframe. Although the preferred alternative does not include excavation of sediments underneath the docks area, these

areas will be evaluated for further remediation by EPA in the forthcoming Hylebos Waterway cleanup.

The cleanup action was designed to accomplish the following Ecology requirements:

- Protect human health and the environment.
- Comply with cleanup standards per WAC 173-340-700 through 760.
- Comply with applicable state and federal laws per WAC 173-340-710.
- Provide compliance monitoring per WAC 173-340-410.
- Use permanent solutions to the maximum extent practicable per WAC 173-340-360(4), (5), (7), (8).
- Consider public concerns raised during public comment on the draft cleanup action plan per 173-340-360(10) through (13).

3.2 Cleanup Standards

3.2.1 Cleanup Action Objectives

The cleanup action for the property was designed to achieve the following three objectives:

- **Upland source control of sandblast grit:** Prevent erosion of existing sandblast grit from the upland portions of the property to the marine environment;

- **Remediation and restoration of intertidal sediment:** Restore surficial intertidal sediments adjacent to the property to a condition which ensures no adverse effect to the marine environment; and

- **Sediments underneath docks and in subtidal areas:** No remedial action for these areas were included in the Ecology CAP. EPA will consider these areas for possible remediation as part of the overall Hylebos Waterway Superfund Cleanup.

3.3 Cleanup Levels for Intertidal and Upland Areas

Upland Paved Areas: The objective of upland cleanup was to remove sandblast grit that could migrate or erode to the marine environment from paved areas. The confirmation that sandblast grit removal is complete was based on a visual absence of accumulated sandblast grit to the standard of normal parking lot maintenance.

Upland Bank and Intertidal Areas: The objective in the upland bank area was to remove sandblast grit from an unpaved area that could erode to the marine environment. Because the upland bank is located immediately adjacent to the marine environment, the chemical cleanup levels are set by the chemical Sediment Quality Objectives (SQOs) in the Commencement Bay Record of Decision (USEPA 1989) (ROD). The Hylebos SQOs are legally applicable requirements per WAC 173-340-710. The SOQs are lower (more stringent) than MTCA Method A Industrial Soil Cleanup Standards listed in WAC 173-340-745, thus they are applicable for soils adjacent to, and sloping toward, salt water bodies such as the Hylebos Waterway. The cleanup level for the intertidal cleanup areas is also set by the chemical SQOs in the Commencement Bay ROD. The cleanup levels based on the CBN/T ROD SQO chemical concentrations for arsenic, zinc, copper, antimony, and lead are summarized in Table 1 below.

Table 1: Soil/Sediment Cleanup Levels

Parameter	Cleanup Level mg/kg
Arsenic	57
Antimony	150
Copper	390
Lead	450
Zinc	410

4 DESCRIPTION OF THE CLEANUP ACTION

4.1 Sequencing and Schedule of Cleanup

The cleanup was initiated in early June of 1998, with the transfer of ownership of the property to Ace Tank. Because deposits of sandblast grit in the upland bank were acting as a source to the intertidal areas, the upland bank cleanup was completed prior to initiating the intertidal excavation. The upland bank cleanup was completed by the end of the third week in June.

Excavation at the intertidal open area and launching way occurred during daylight periods of low tide so the work could be completed and observed prior to inundation by the tide. Daylight low tides reaching 0 feet MLLW or lower typically occur during late March to September. Since intertidal work is prohibited from March 15 through June 14 for protection of migrating juvenile salmonids, the intertidal work was initiated after June 14. The intertidal open area cleanup was completed in late June. The launching area cleanup occurred between July and August.

Sweeping of the upland paved areas was completed in August and September, following the public auction and removal of most of the solid materials and debris from the property.

The final Ecology inspection and acceptance of the cleanup occurred on October 13, 1998.

4.2 Upland Removal of Sandblast Grit and Other Actions

4.2.1 Solid Materials and Debris

A large quantity of wood, metal, hoses, equipment and machinery, and other solid materials and debris from previous yard operations were generally sold at pubic auction in August 1998. Once the materials were removed from the property in September 1998, the pavement sweeping was initiated and completed.

4.2.2 Upland Paved Areas

Sandblast grit that had accumulated on upland paved areas of the site, including the concrete apron of the marine railway, was collected by sweeping. Sweeping was completed with conventional pavement sweeping equipment and hand brooms. Yard debris and other inventory stored on site was moved to allow sweeping of the entire upland paved area.

4.2.3 Storm Drains

Storm drains were cleaned in areas where sandblast grit has been stored since the last time the system was cleaned in the early 1990s. Storm drains in the southwestern 500 feet of the site (see Figure 4) were cleaned with equipment that washes the lines upgradient to the watch basin, where the water and sediment was removed with a vacuum truck. The catch basins, but not the drain lines, in the northeastern side of the site were also cleaned with a vacuum truck.

4.2.4 Upland Bank Area

Sandblast grit and soil containing sandblast grit from the upland bank area, shown on Figure 3, was excavated and disposed or recycled. Excavation was considered complete when soil was reached that satisfied the cleanup level (Table 1). Excavation depths were on the order of two feet, and up to 3 feet in some places. The excavation was completed with a track excavator, and the material stockpiled with a front end loader. Photographs on Figures P-1, P-2, and P-3 show the conditions before and during cleanup.

A buried pile of paint cans was discovered during the removal of sandblast grit from the upland bank area (photographs on Figure P-4. The debris was segregated from the sandblast material for

testing. The Toxicity Characteristic Leaching Procedure (TCLP) testing results of the material (Gravel/Paint Debris, Sand/Paint Debris) are shown on Table 3a. The material was disposed of at the Olympic View Sanitary Landfill.

After the paint/debris materials were removed, two subgrade samples (UA-1, UA-2) were collected and tested for chlorinated compounds (USEPA Method 5030/8260B) and extended diesel range compounds (WTPH-D Modified). Diesel and motor oil were not detected above 40 mg/kg. Chlorinated compounds were not detected above 10 ug/kg. The results are summarized on Table 3a.

After excavations were completed, confirmation samples were obtained as outlined in Section 5. As excavation areas were verified as having complied with site cleanup level requirements, a sand and gravel backfill was placed in the excavated areas and compacted to generally match original site grades. A total of 250 tons of sand and gravel were imported for backfilling the area.

4.2.5 Storage and Disposal

Collected materials which contain sandblast grit were placed in a covered stockpile(s), or stored under building cover, so as not to be eroded by rainfall or stormwater. Ace Tank received approval from Ecology for disposal of the material at Holnam Cement (Seattle, Washington) for recycling, and at Olympic View Sanitary Landfill (Bremerton, Washington) prior to off-site transportation of excavated materials. The Toxicity Characteristic Leaching Procedure (TCLP) testing results of the material (Upland Bank) are shown on Table 3a. An estimated 65 tons of upland sweeping materials were delivered to Holnam Cement, and 550 tons of unpaved bank materials to Olympic View Sanitary Landfill (Table 2). Documentation of delivery and disposal is provided in Appendix A.

4.3 Excavation of Intertidal Open Areas

Sandblast grit, sediment containing sandblast grit, and other debris were excavated from the intertidal open area, which is adjacent to the upland bank area (Figure 3). The area is bounded to the side by the outfitting pier, toward the upland by the upland bank area, and toward the water by the 0 foot MLLW contour and the face of the outfitting pier.

The sediment containing sandblast grit was generally sandy, while the underlying native clean sediment was generally fine-grained silt. The visual difference between the sandblast sediment and the native sediment was the preliminary basis for establishing the depth of excavation. The depth of excavation was verified with sampling and chemical analysis of the bottom of the excavation. Excavation was considered to be complete when sediment was reached that meets the cleanup levels (Table 1). The depth to clean sediment ranged from ½ of a foot to 2 feet, with a maximum of about 3 feet.

The excavation was completed with track excavators and the material stockpiled with a front end loader. Photographs on Figures P-1, P-2, P-5, P-6, and P-7 show the conditions before and during cleanup. In order to minimize erosion, excavation did not occur from areas inundated by tidal waters, and the teeth of the excavator bucket were covered with a continuous steel plate to effect a relatively smooth excavation face, reducing the disturbance to the native subgrade. After excavations were completed, confirmation samples were obtained as outlined in Section 5.

The final slope configurations are similar to the slope configurations existing prior to excavation, and do not contain depressions that would result in entrapment of juvenile salmonids or other fish. Backfilling to achieve the desired slope configuration, was completed with imported sand and gravel material (Figure P-7). Existing bed material in the intertidal area was not be utilized for project construction or fill.

No fish kill or distressed fish were observed during the cleanup of the intertidal open area.

Excavated sediment was not stockpiled on the beach, but was placed in a covered stockpile(s), or stored under building cover, so as not to be eroded by rainfall or stormwater. Ace Tank received approval from Ecology for disposal of the material at Holnam Cement (Seattle, Washington) for recycling, and at Olympic View Sanitary Landfill (Bremerton, Washington) prior to off-site transportation of excavated materials. An estimated 955 tons of Intertidal Open Area cleanup materials were delivered to Holnam Cement, and 860 tons to Olympic View Sanitary Landfill (Table 2).

The metal slag pile located at the southern end of the intertidal open area was removed from the slope. The Toxicity Characteristic Leaching Procedure (TCLP) testing results of the material (Welding Debris) are shown on Table 3a. The slag material was disposed of at the Olympic View Sanitary Landfill.

4.4 Excavation of Launching Area and Optional Launching Area

Sandblast grit, sediment containing sandblast grit, and other manmade debris was excavated in the Launching Area down to the 0 MLLW shown on Figure 3. The area is bounded to the side by the crane way piers, toward the upland by the concrete apron of the launching way, and toward the water by the +0 feet MLLW contour and the end of the crane way.

The sediment containing sandblast grit was generally fine grained, much like the native clean sediment. However, the sandblast containing sediment was softer than the underlying native sediment because of the relatively recent deposition (last 20 years) of the sandblast containing sediment, and was also generally darker than the native sediment. The difference in density and color between the sandblast sediment and the native sediment was utilized in initially estimating the depth of excavation, confirmed sediment sampling and analysis. Excavation was considered

complete when sediment was reached that meets the cleanup levels (see Table 1). Test pits completed in the launching area indicated the impacted sediment varied from a ½ of a foot thick to 3.5 feet thick (Figures 5a and 5b).

The excavation was advanced with track excavators and dump trucks. Photographs on Figures P-8, P-9 and P-10 show the conditions before and during cleanup. In order to minimize erosion, excavation did not occur from areas inundated by tidal waters, and the teeth of the excavator bucket was covered with a continuous steel plate to effect a relatively smooth excavation face, reducing the disturbance to the native subgrade. After excavations were completed, confirmation samples were obtained as outlined in the Section 5.

The final slope configurations are similar to the slope configurations existing prior to excavation, and do not contain depressions that would result in entrapment of juvenile salmonids or other fish. Backfilling to achieve the desired slope configuration was completed with imported sand and gravel material. Existing bed material in the intertidal area was not be utilized for project construction or fill.

No fish kill or distressed fish were observed during the cleanup of the intertidal open area.

Excavated sediment was not stockpiled on the beach, but was placed in a covered stockpile(s), or stored under building cover, so as not to be eroded by rainfall or stormwater. The Toxicity Characteristic Leaching Procedure (TCLP) testing results of the material (Launch Way) are shown on Table 3a. Ace Tank received approval from Ecology for disposal of the material at Holnam Cement (Seattle, Washington) for recycling, and at Olympic View Sanitary Landfill (Bremerton, Washington) prior to off-site transportation of excavated materials. An estimated 1,140 tons of cleanup materials were delivered to Holnam Cement, and 1,030 tons to Olympic View Sanitary Landfill from the launching area and optional launching area (Table 2).

4.5 Repair of Outfall

A 12-inch diameter concrete stormwater outfall was located within the intertidal open area excavation. It was removed prior to excavation and then replaced with a new catch basin at the top of the slope and a 12-inch diameter ductile iron pipe extending down to 0 foot MLLW on the slope (Figure 6).

5 PERFORMANCE MONITORING SAMPLING AND ANALYSIS

The objective of performance monitoring was to provide data to assess the effectiveness of the shoreline remediation within the limits of the bank and intertidal cleanup areas of the Tacoma Boatbuilding site. The performance monitoring data is summarized on Table 3b. All performance monitoring samples passed the cleanup levels set by the CAP.

5.1 COLLECTION OF PERFORMANCE MONITORING DATA

The remediation process focused on removal of black sandblast grit, and sediment containing black sandblast grit. Once such material was removed from an area, based on visual confirmation, then performance monitoring data was collected, as detailed below.

The performance monitoring plan was designed to be consistent with the approach and methods used for EPA by the Hylebos Cleanup Committee for the Event 1B Intertidal Sampling for the Hylebos Pre-Remedial Design program. The Tacoma Boat program used a similar scheme of random sample locations, used the same sampling equipment (hand-held cores), sampled the same depth (10 cm) of sediment, and used the same analytical methods (ICP) as the Event 1B Intertidal program.

5.1.1 Random Sample Locations

The intertidal sampling completed for EPA by the Hylebos Cleanup Committee for the Hylebos Pre-Remedial Design (Event 1B) involved collecting multiple, randomly selected, samples from equal segments within a specific intertidal area of the waterway and compositing them into a single sample for chemical analysis. The same approach is applied in this performance monitoring plan.

5.1.1.1 Standard Sampling

The bank, intertidal open area, and launching way remediation areas are divided into monitoring zones for the purpose of performance monitoring. After remediation in a monitoring zone, Ecology was invited to visit the area to look for evidence of visually anomalous material that might contain sandblast grit. In one instance sandblast grit was observed in the corner of a cleaned area, in quadrant D of area S1 of the intertidal open area. In that situation, the contractor was directed to remove the sandblast grit and then a separate discrete sample (S1-D-4-4) was collected to confirm removal of the material.

A typical monitoring zone divided into quadrants is shown on Figure 7. The quadrants are identified in a clockwise sequence, A-B-C-D, starting in the upper left hand corner. A randomly defined sample point was located in each of the four quadrants of each monitoring zone as follows:

- First, the width (x) and height (y) of the quadrant are calculated (half the width and height of the monitoring zone).
- Then, the coordinate (x,y) of the sample point in the quadrant is calculated by multiplying a randomly generated fraction (between 0-1) times the width (x), and another times the height (y) of the quadrant. (table of random numbers, Statistical Tables, Rohlf and Sokal, W.H.

Freeman and Company, 1960).

- The sample is positioned in the quadrant based on an x-y coordinate system with origin located at the lower left hand corner of the quadrant.

The coordinates for randomly selected quadrant sampling points for each of the designated monitoring zones are presented on Table 4.

For the purpose of performance monitoring, each of the intertidal and launching way monitoring zones was divided in half, each half consisting of two of the four quadrants of the monitoring zone (Figure 7). A three-point composite sample was collected from each half monitoring zone. Two of the sample locations for the composite were the defined random sample locations for the two quadrants as presented on Table 4, and the third sample point was located at the approximate center of the half monitoring zone. The composite areas for the upland bank and intertidal open area are shown on Figure 8a, and on Figure 8b for the launching area.

5.1.2 Sample Collection and Compositing

The samples were collected consistent with the methods described in the Hylebos Cleanup Committee shoreline sampling plan: *Sampling Plan for Event 1B*, Striplin Environmental Associates, Inc., July 7, 1994.

The top 10 cm of sediment were collected using an hand held calibrated stainless steel coring device that is four inches in diameter by eight inches in length, with an attached "T" handle for advancing the tube.

The collected sediment was placed into a decontaminated stainless steel bowl and covered with aluminum foil. A field log was prepared for each sample point that describes the sample location, core penetration depth, sediment characteristics, and significant anthropogenic materials.

Each sample point was of approximately equal volume. The sample points were combined in the field into one sample representing conditions of the designated area.

The composited sample was placed in a 8-ounce wide-mouth glass container with Teflon lined lids provided by the laboratory, which in turn will be placed into a chilled cooler for transport to the laboratory, Sound Analytical in Tacoma.

5.1.3 Decontamination of Sampling Equipment

The sampling equipment was washed with a laboratory grade detergent and tap water followed by a tap water rinse, between composite areas. The sampling equipment was not decontaminated

between sampling points within the same composite area.

5.1.4 Field Locating Sampling Sites

The boundaries of the monitoring zones shown on Figures 8a and 8b were located by measuring from the permanent site features, such as the face and end of the docks. The boundaries of the zones were marked on site with either wood stakes or paint markings on the dock. The location of individual sampling points were measured from the edge of the sampling zones with a tape measure.

5.1.5 Labeling and Chain-of-Custody (for sample transport to the laboratory):

Each sample container was labeled as to project site, monitoring zone, date, and initials of sampler. Each sample for laboratory analysis was also be logged on a chain-of-custody form that included a site identifier, sample number, signature of collector, date and time of collection, sample matrix type, signature of persons involved in the chain of possession, inclusive dates of possession, and analyses to be performed. Samples were delivered to the laboratory the same day or the following day of collection.

5.1.6 Analysis Parameters and Methods

Soil/sediment samples were analyzed for the following parameters

ANALYTE	METHOD	PRQL (mg/kg) dry weight	Method Capability
Arsenic	6020 (ICP-MS)	57	1
Antimony	6020 (ICP-MS)	150	1
Copper	6010 (ICP)	390	2
Lead	6010 (ICP)	450	15
Zinc	6010 (ICP)	410	2

PRQL: Project Required Quantitation Limit

The required preservation of the samples is storage at 4°C. The holding time is 180 days.

5.1.7 Laboratory Quality Assurance

Sound Analytical followed protocols outlined in EPA Manual SW-846 and their in-house QA program that has been reviewed and approved by Ecology as part of their laboratory accreditation program. Laboratory calibrations were performed as presented in the Ecology approved QA program for the analytical laboratory. This program includes initial calibrations, calibration confirmation from a second source standard, detection limit verification studies plus

daily and continuing calibrations as the samples are analyzed. The results of the QC analyses are reported on QC data reports provided to the laboratory (Appendix B).

Two batches of samples included a duplicate sample, once from the intertidal open area, and once from the launching area (Table 3b).

5.1.8 Laboratory Reporting

The laboratory reports, presented in Appendix B, include the QC data reports, copies of the chain-of-custody documents, and notation of any unusual analytical events or method non-conformance.

5.2 INTERPRETATION OF PERFORMANCE MONITORING DATA

A monitoring zone or half monitoring zone was in compliance if the sample results for the composite sample were below the cleanup criteria for the site, set by the Ecology Cleanup Action Plan. All of the performance monitoring samples met the criteria. No additional removal was required after performance monitoring.

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Shoreline Cleanup Monitoring
Tacoma Boatbuilding Property

Table 2: Quantities of Excavated and Imported Materials, tons

Location	Off-Site Disposal			Imported Sand & Gravel
	Olympic View Landfill	Holnam Cement	TOTAL	
Upland Sweeping	0	65	65	0
Unpaved Bank	550	0	550	250
Intertidal Open Area	860	955	1815	995
Launching Area	610	675	1285	675
Optional Launching Area	420	465	885	530
TOTAL	2440	2160	4600	2450

Quantities rounded to nearest 5 tons.

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2/2/99

Shoreline Cleanup Monitoring
Tacoma Boatbuilding Property

Table 3a: Characterization Results (see Appendix C)

Location		Date	TCLP Testing Results by Analyte, mg/l							
Area	Sample	Sampled	Arsenic	Barium	Cadmium	Chromium	Lead	Selenium	Silver	Mercury
Upland Bank	Upland Bank	7/8/98	<0.4	0.16	<0.08	<0.01	0.2	<0.5	<0.02	<0.002
Launch Way	Launch Way	7/8/98	0.69	0.24	<0.08	<0.01	<0.15	0.87	<0.02	<0.002
Intertidal Open	Welding Debris	8/21/98	<0.4	5.3	<0.08	0.13	0.48	<0.5	<0.02	<0.002
Upland Bank	Gravel/Paint Debris	8/21/98	<0.4	0.61	<0.08	0.049	2	<0.5	<0.02	<0.002
Upland Bank	Sand/Paint Debris	8/21/98	<0.4	0.54	<0.08	0.068	2	0.51	<0.02	<0.002

			Soil Testing Results				
			TPH-D, mg/kg		Volatile Organics, ug/kg		
			Diesel	Motor Oil	Trichloroethene	m,p-Xylene	Other Compounds
Upland Bank	UA-1	6/16/98	<20	<39	5.8	7.3	<10
Upland Bank	UA-2	6/16/98	<21	<41	5.7	<19	<10

Table 3b: Performance Monitoring Results (see Appendix B)

Location Area	Location Composite	Date Sampled	Results by Analyte, mg/kg Arsenic	Antimony	Copper	Lead	Zinc
	Cleanup Level		57	150	390	450	410
Upland Bank							
	U1	6/24/98	12	<2	49	<32	130
	U2	6/24/98	34	<2	230	58	310
	U3	6/25/98	32	<2	160	48	330
Intertidal Open Area							
	S1-AD	6/23/98	8.9	<3	88	<39	92
	S1-D-4-4	6/25/98	8.4	3.6	320	55	140
	S1-BC	6/23/98	24	<4	40	<52	130
	S1-BC (Dup.)	6/23/98	16	<3	36	<47	110
	S2-AD	6/25/98	8.2	<3	71	43	140
	S2-BC	6/23/98	29	<3	140	<44	210
	S3-AD	6/25/98	21	<3	47	<49	130
	S3-BC	6/25/98	9.5	<3	200	40	77
Launching Area							
	L1-AD	7/9/98	<38	<140	28	<14	51
	L1-BC	7/10/98	<3	<3	24	<34	26
	L2-AD	7/10/98	<3	<3	25	<40	32
	L2-BC	7/9/98	<29	<110	22	<11	34
	L3-AD	7/20/98	7	<3	69	<34	98
Optional Launching Area							
	OL1-AD	7/22/98	13	<3	120	<35	150
	OL1-BC	7/21/98	7	<3	34	<39	42
	OL2-AD	7/21/98	10	<3	35	48	54
	OL2-BC	7/21/98	3	<3	24	<38	20
	OL3AD	7/20/98	9	<3	18	<34	31
	OL4-AB_n	7/22/98	25	<3	120	63	200
	OL4-Abn (Dup.)	7/22/98	14	<3	130	<40	140
	OL4-B_s	7/10/98	31	<2	190	63	210

Table 4: Random Sample Locations by Quadrant

Zone	Dimension (X,Y)		Quad A		Quad B		Quad C		Quad D	
	Zone	Quad	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)	X (ft)	Y (ft)
Monitoring Zones										
U1	110' X 20'	55' x 10'	26	2	40	7	29	4	33	9
U2	110' X 20'	55' x 10'	42	4	27	3	29	1	11	3
U3	110' X 20'	55' x 10'	38	3	21	1	13	6	37	8
S1	110' X 50'	55' x 25'	32	1	24	3	39	23	5	2
S2	110' X 50'	55' x 25'	2	14	9	13	15	18	18	8
S3	110' X 50'	55' x 25'	42	3	38	21	16	11	46	1
L1	38' X 125'	19' X 62'	11	38	17	50	5	60	13	1
L2	38' X 125'	19' X 62'	17	2	7	2	16	17	11	60
L3	22 X 125	22 X 62	11	56					11	35
OL1	38 X 70	19 X 35	2	8.75	15	16.6	13	19.3	10	4.38
OL2	38 X 60	19 X 30	13	27	9.93	7	12.5	27	16	8
OL3	22 X 64	22 X 32	12	10					7	31
OL4	40 X 40	20 X 40	3	32	1	39				

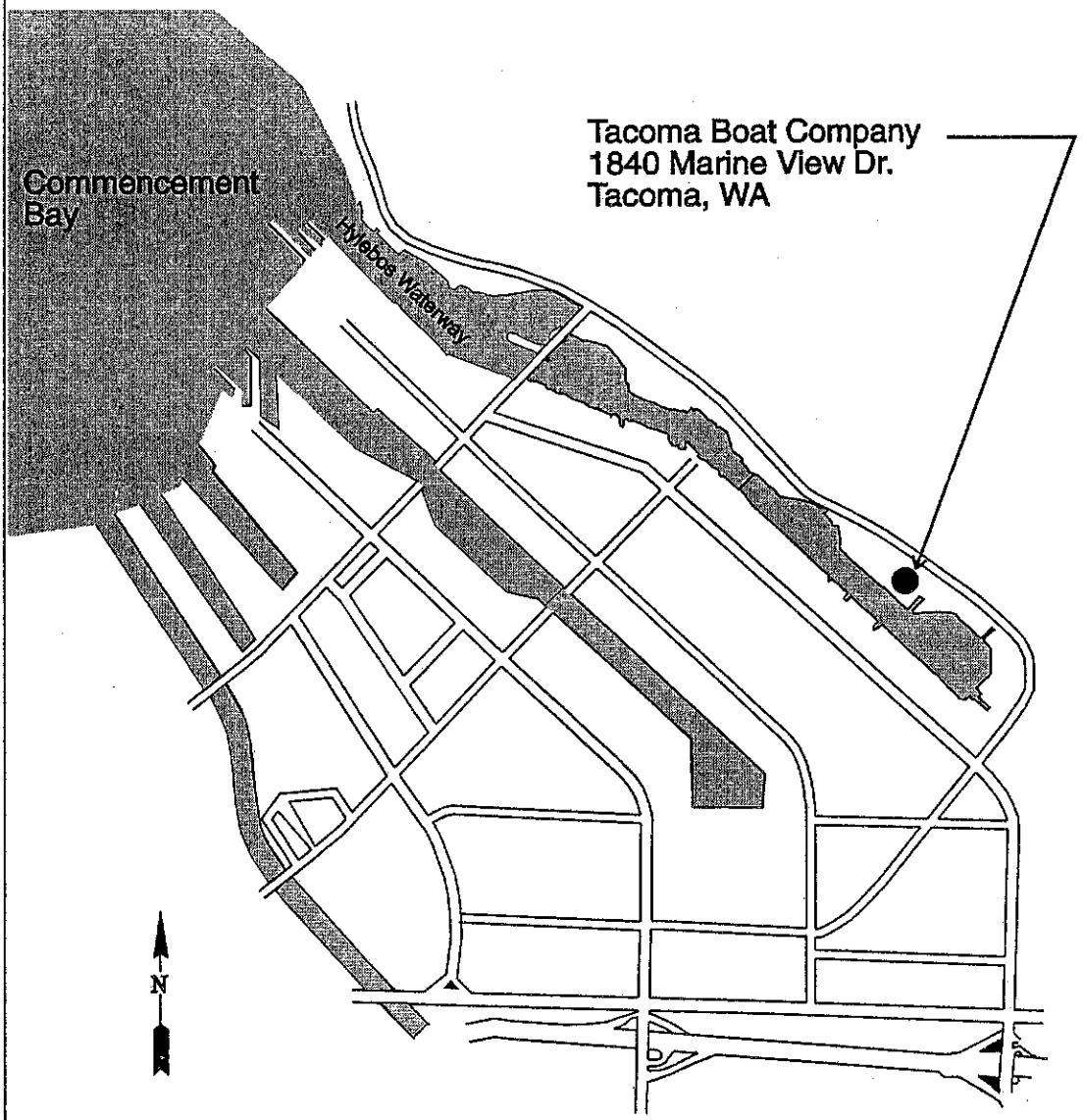

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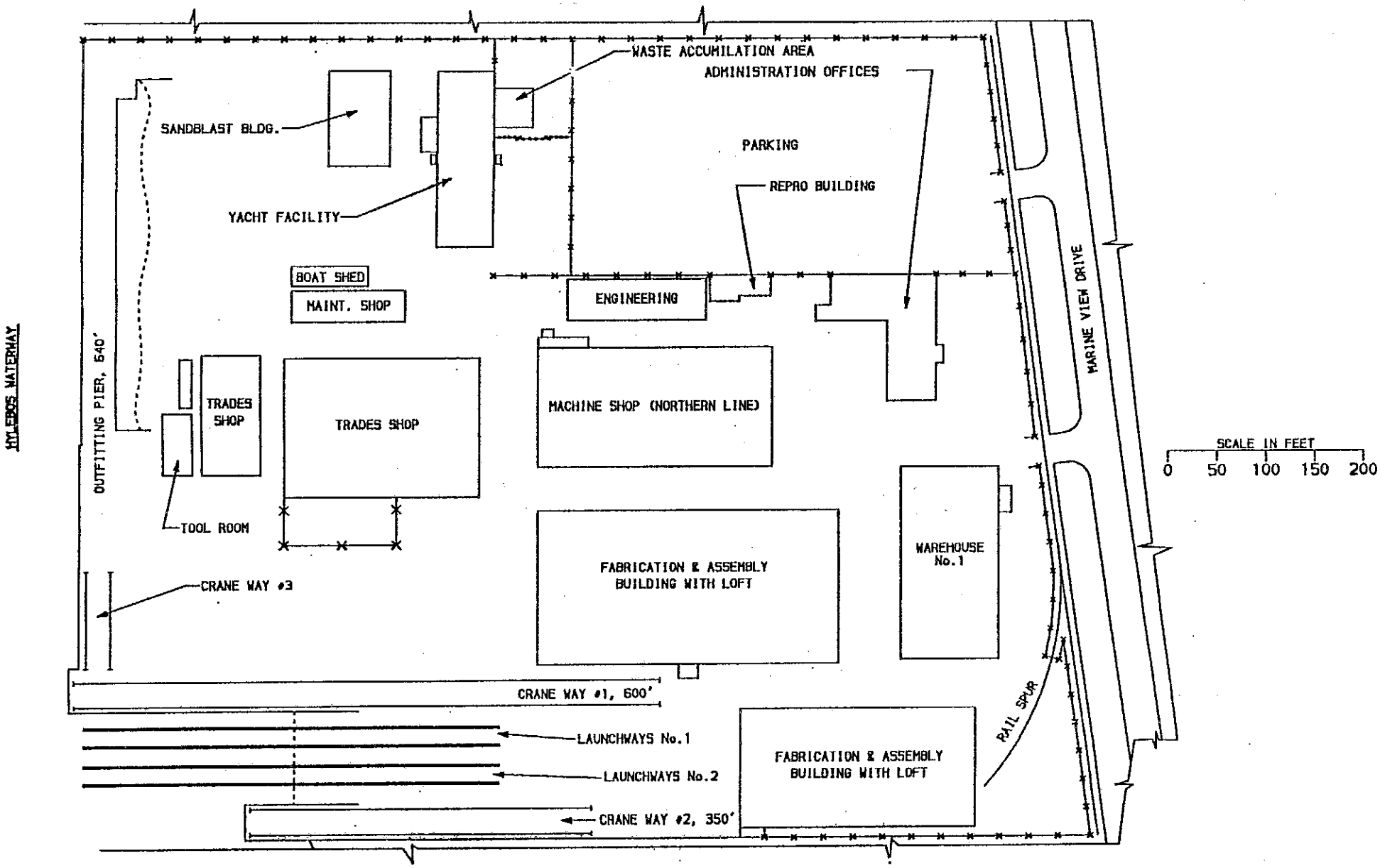
Figure 1
Vicinity Map
Dalton, Olmsted & Fuglevand, Inc.



Source: Tacoma Boatbuilding Co., Yard #1 Site Plan, 10/12/90

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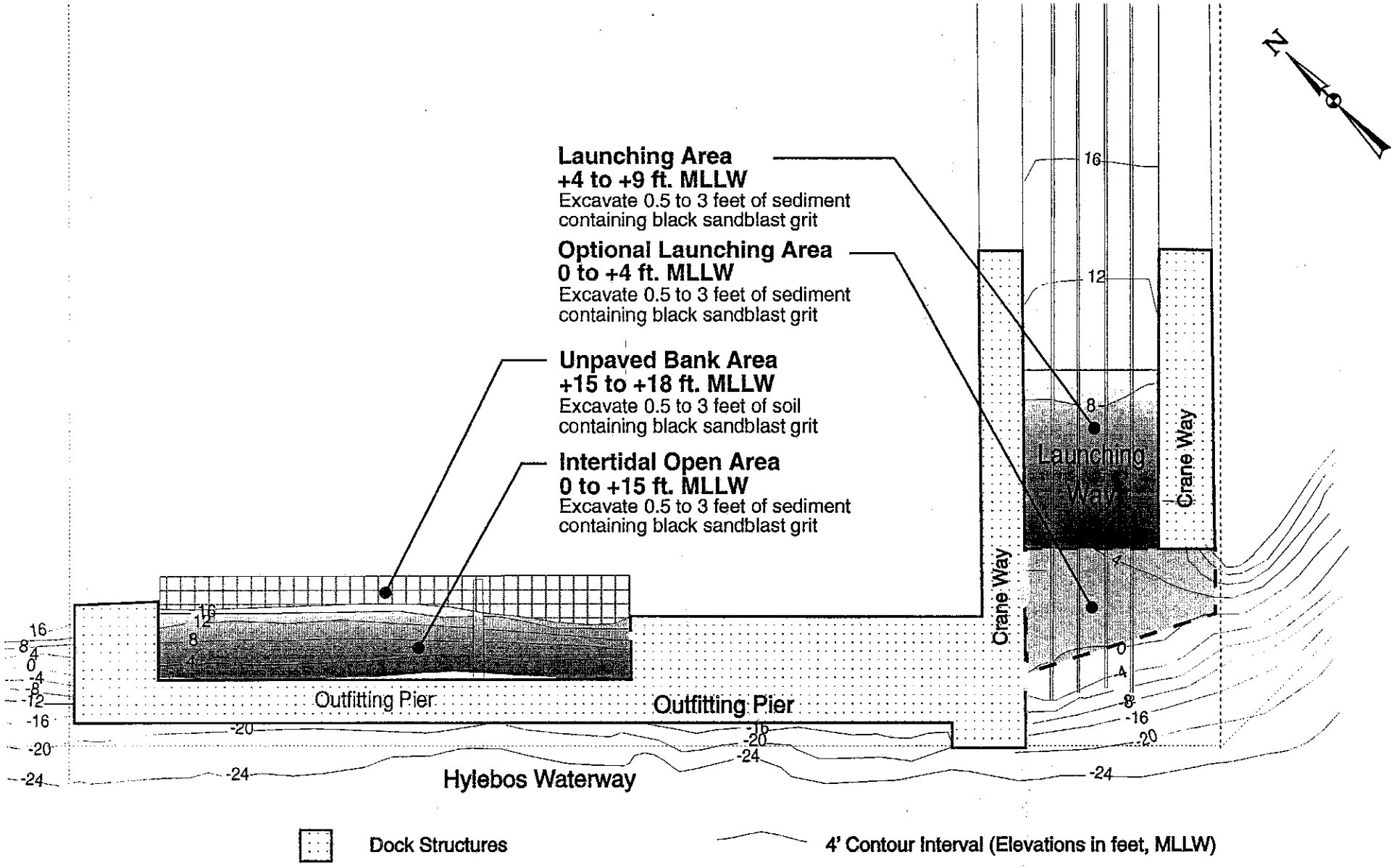
Figure 2
Site Plan



Base Map from Figure 3-2c of Event 1A and 1B Data Report, Hylebos Waterway Pre-Remedial Design Program, Striplin Environmental, June 1996

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0 100 200
Scale in Feet

Figure 3
Tacoma Boatbuilding Shoreline Remediation Areas
Dalton, Olmsted & Fuglevand, Inc.

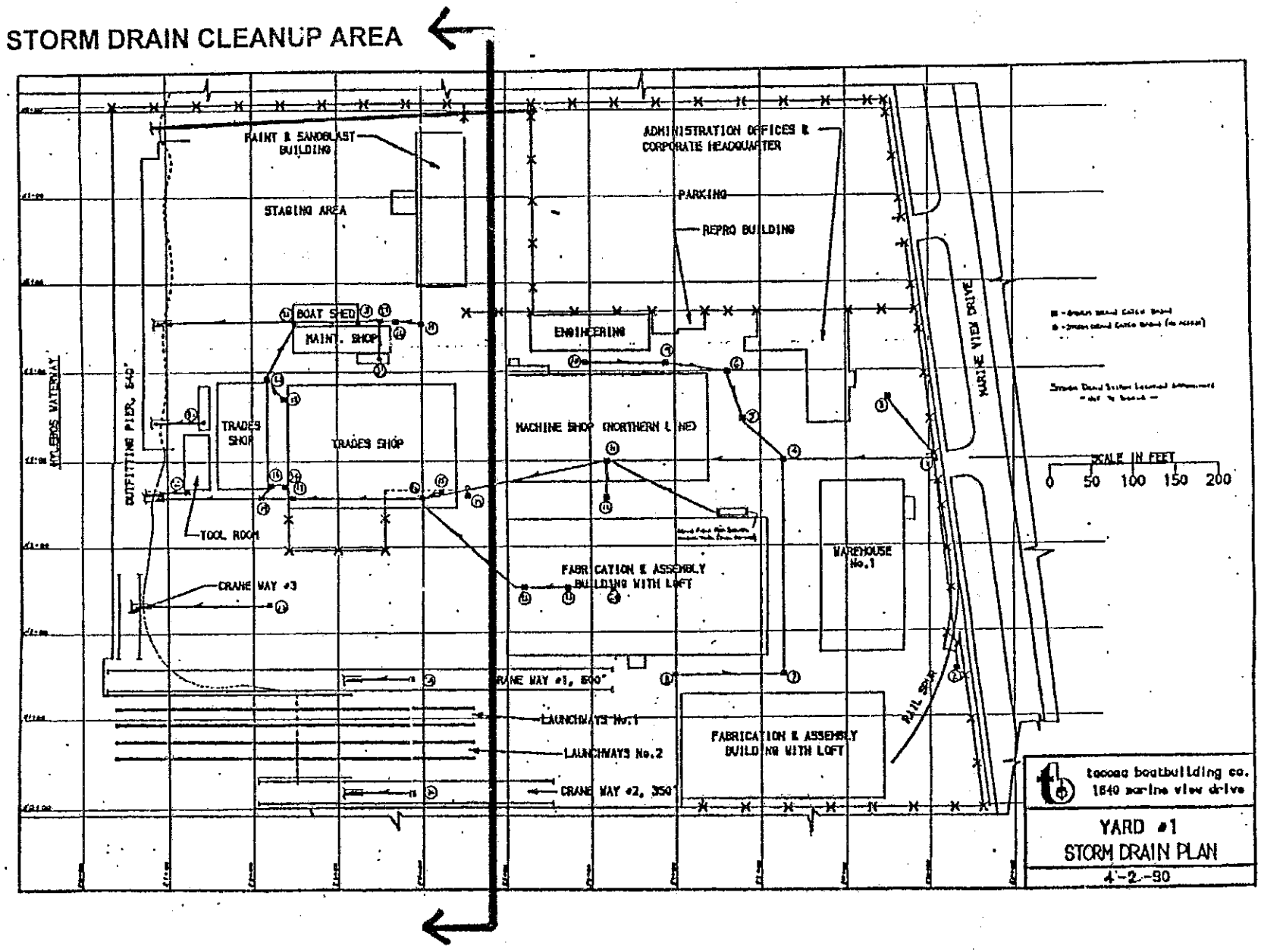

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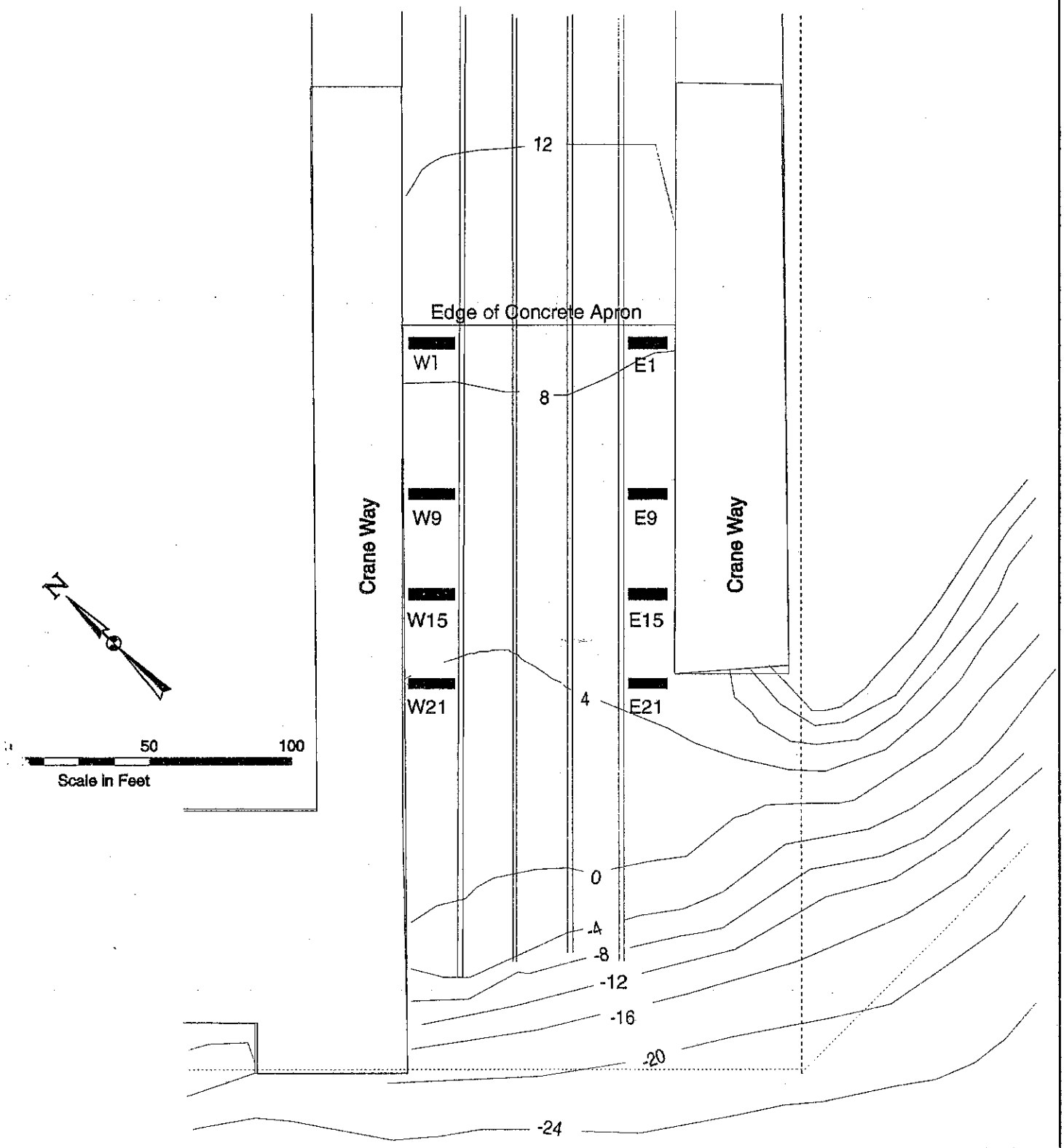
Figure 4
Storm Drain Cleanup Area
Dalton, Olmsted & Fuglevand, Inc.



4' Contour Interval (Elevations in feet, MLLW)

W15 Test Pit Location and Name, July 7, 1998

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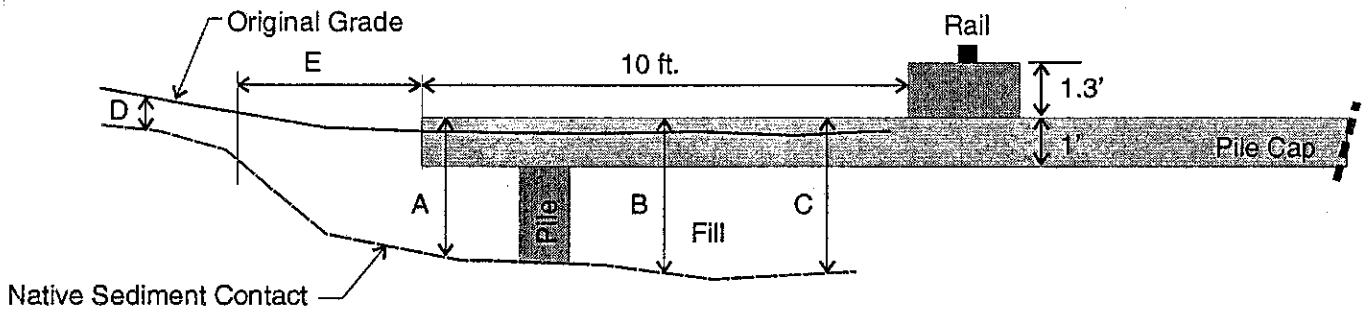
Figure 5a

Test Pit Location Map, July 7, 1998

Dalton, Olmsted & Fuglevand, Inc.



Typical Test Pit Cross Section

Test Pit Observations, 7/7/98

Test Pit Location	Depth Measurements (ft.)				Outset (ft.)	Soil Type	
	A	B	C	D	E	Fill	Native
E1	2.5	3.5	3.3	1	4	G	F/C
E9	2	2.5	2.75	N.M.	N.M.	G	F
E15	2	2.5	3	1	4	G	F/C
E21	2	2.5	3	2	6	G	F
W1	3	N.M.	N.M.	0.5	3	G	F/C
W9	N.M.	3	2.5	1	3	G	F/C
W15	3.5	3.3	3	1.5	3	G	F
W21	3.5	3.3	3	1	4	G	C

Soil Types

G Sandblast Grit, black, with sand and gravel and minor debirs
F Fine grained sediment, olive gray, stiff
C Coase grained sediment (sand and gravel), gray to brown

N.M. Not Measured

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Figure 5b
Test Pit Data, July 7, 1998
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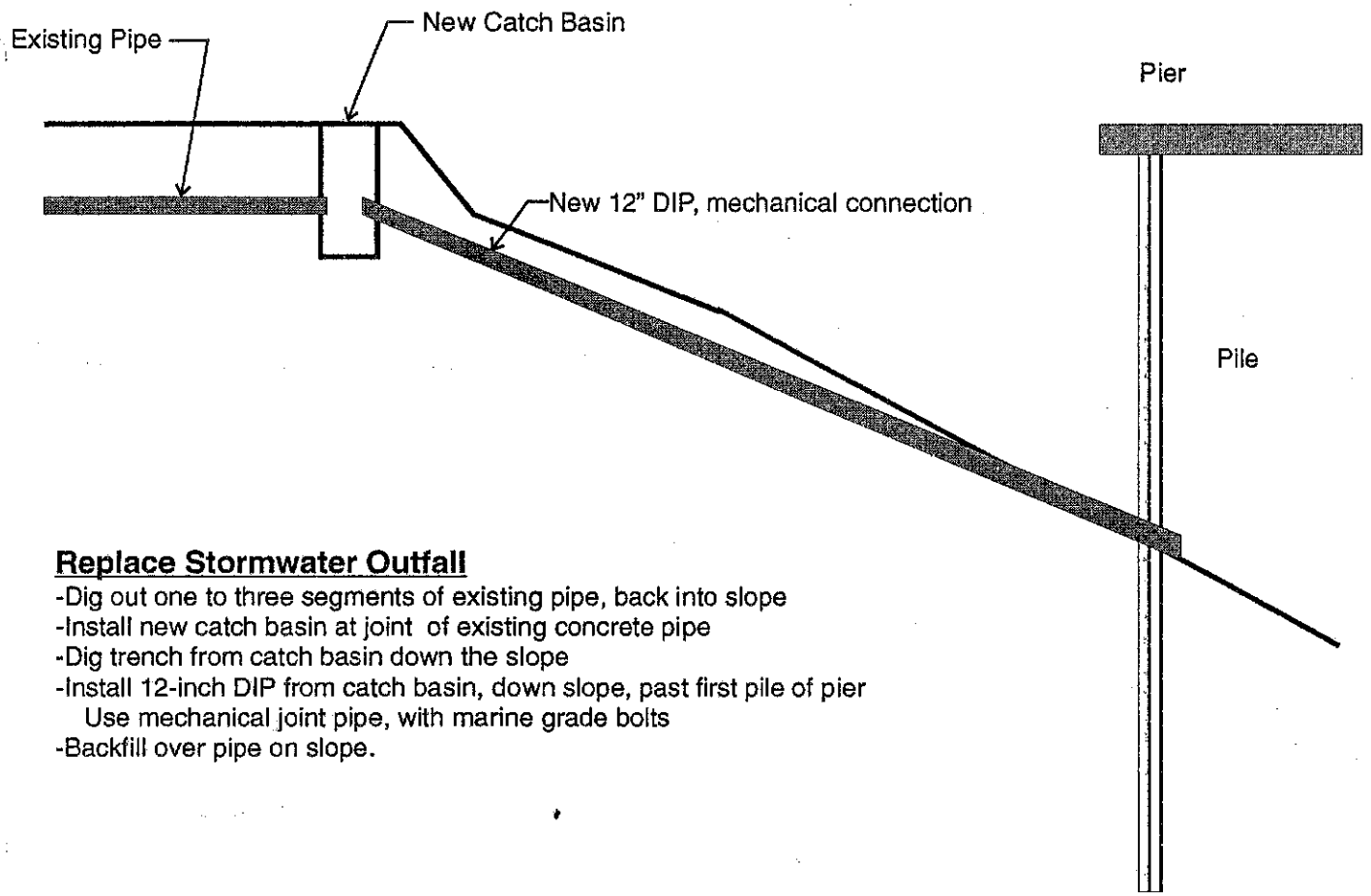

Replace Stormwater Outfall

-Dig out one to three segments of existing pipe, back into slope
-Install new catch basin at joint of existing concrete pipe
-Dig trench from catch basin down the slope
-Install 12-inch DIP from catch basin, down slope, past first pile of pier
Use mechanical joint pipe, with marine grade bolts
-Backfill over pipe on slope.

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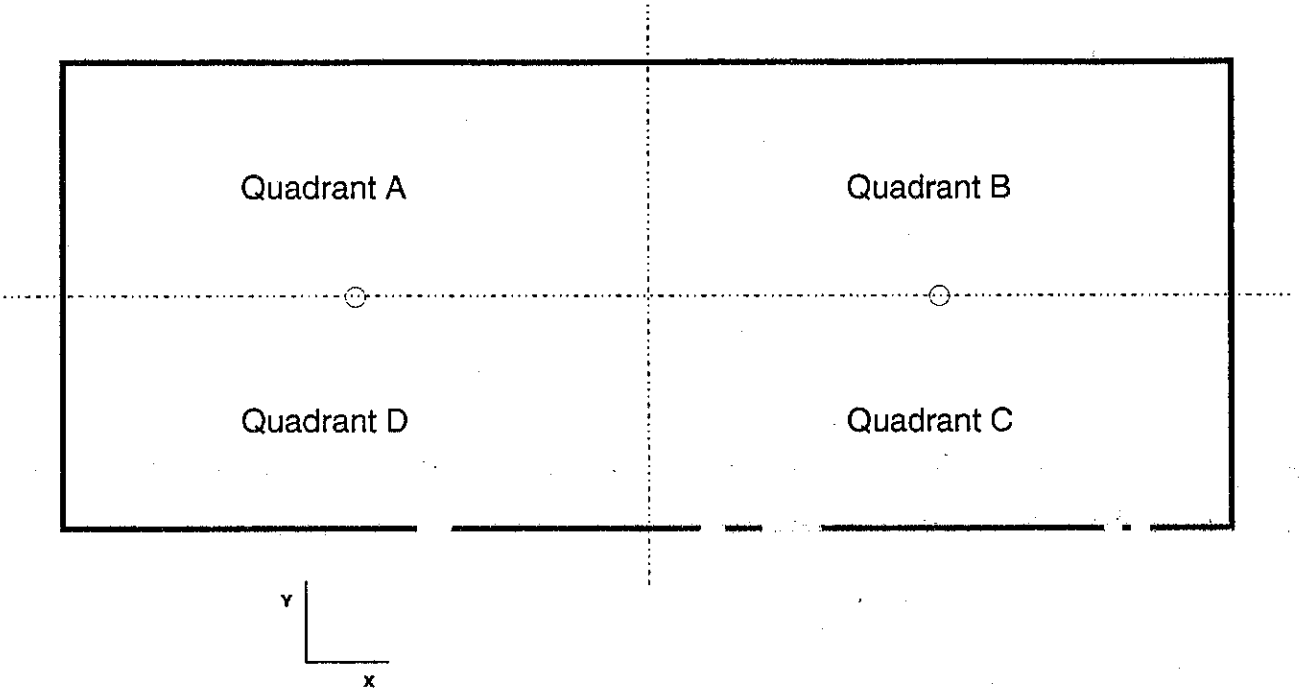
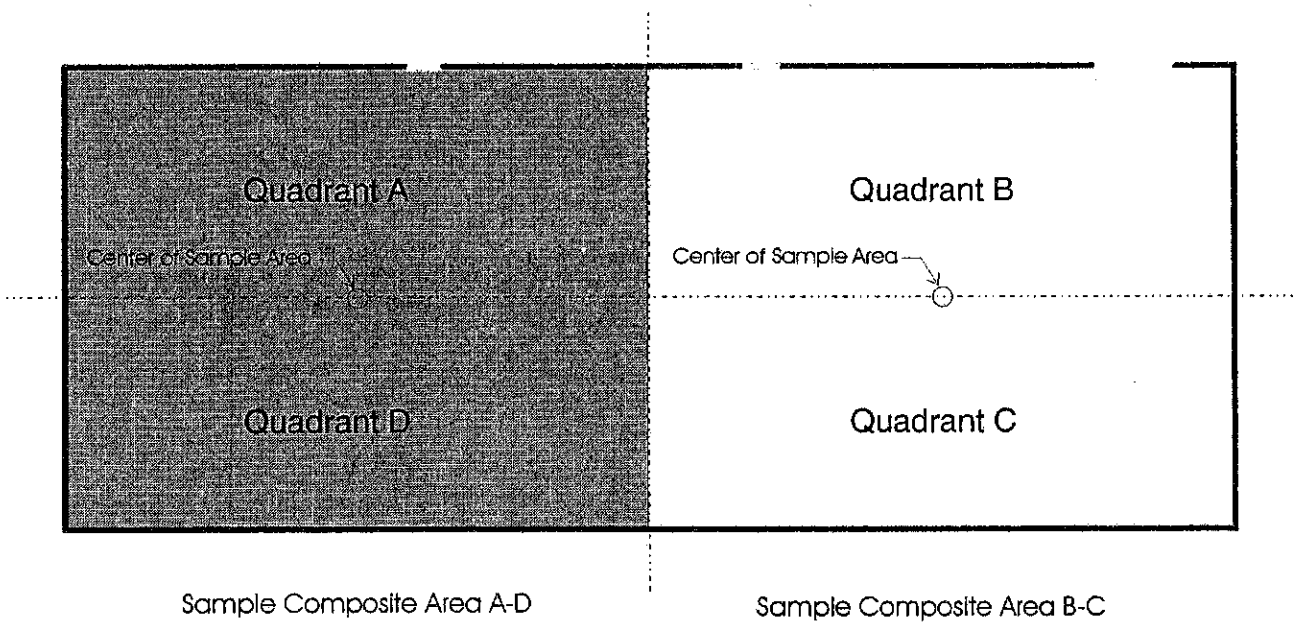
Figure 6
Replacement of Outfall at Intertidal Open Area
Dalton, Olmsted & Fuglevand, Inc.

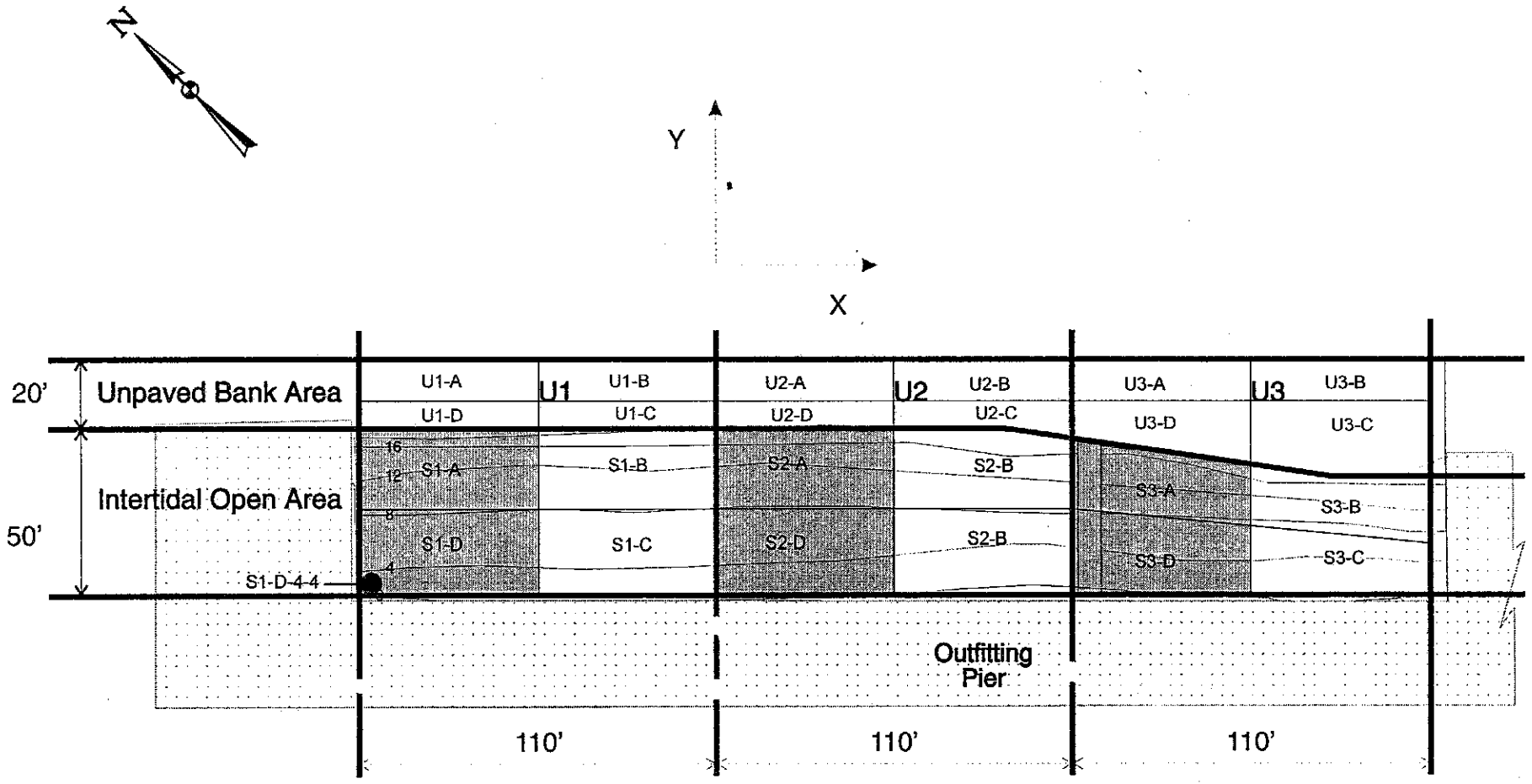


Typical subdivision of Monitoring Zone into Quadrants



Typical combining of two quadrants into a sample composite area

Tacoma Boat ACET-001 2/1/99	Figure 7 **Typical Monitoring Zone and Sample Composite Area** Dalton, Olmsted & Fuglevand, Inc.



Hylebos Waterway

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0 50 100
Scale in Feet

Figure 8a
Unpaved Bank and Intertidal Sample Composite Areas
Dalton, Olmsted & Fuglevand, Inc.

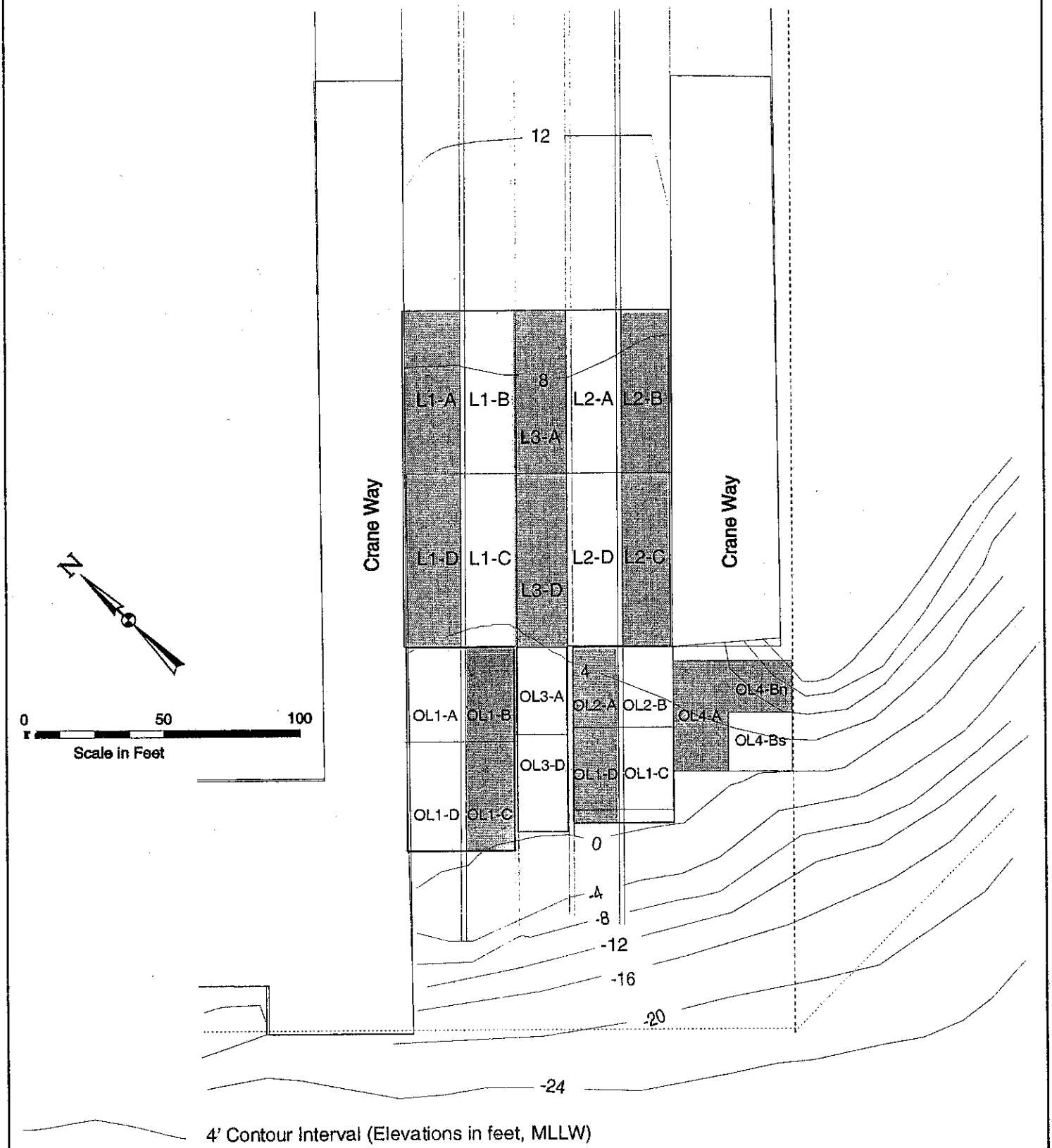

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Figure 8b
Launching Area Sample Composite Areas
Dalton, Olmsted & Fuglevand, Inc.