



DRAFT

Sediment Management Standards Cleanup Action Decision Amendment

Duwamish/Diagonal CSO/SD

December 14, 2004

Introduction

The Department of Ecology has reviewed the pre- and post-action sediment sample results for the Duwamish/Diagonal Way CSO/SD sediment remedial action that was completed in February of 2004. It is clear from this review that concentrations of polychlorinated biphenyls (PCBs) have increased significantly in one area of the interim action site. This area is immediately to the west and south of Area B of the original dredge plan. These increases are more than would be expected from dredging operations using best management practices for environmental dredging of contaminated sediments, as required under the US Army Corps of Engineers Nationwide 38 permit issued for this project.

Under authority of the 1991 Natural Resource Damage Assessment Consent Decree between King County, the City of Seattle, the Department of Ecology and the National Oceanic and Atmospheric Administration, and under authority of the Model Toxics Control Act, Chapter 70.105D RCW and Chapter 173-340 WAC, the Department of Ecology requires a continuation of the interim remedial action in this area, as specified below:

- Due to the ongoing Superfund investigation of the Lower Duwamish Waterway by the US Environmental Protection Agency, the Department of Ecology and the Lower Duwamish Waterway Group (City of Seattle, Port of Seattle, King County, The Boeing Company), this will be considered a continuation of the interim action, and is not the final remedy for this area. Ecology expects that the Lower Duwamish Waterway Group will investigate a full range of long-term cleanup options for this area in the upcoming site Feasibility Study.
- In addition, King County will contact the US Army Corps of Engineers, the US Fish and Wildlife Services, and other relevant permitting agencies to pursue any required permits, or conditions under existing permits, for this action.

- Water quality and sediment monitoring will be implemented as proposed in the attached plan. Ecology and EPA will continue to work with King County on the development of the sediment monitoring plan.
- King County will work closely with Ecology to monitor and inspect contractor practices and the implementation of the water quality monitoring plan during the action.
- This interim action will be completed this season (2004-05), in order to reduce risks from the PCBs as quickly as possible.

This action is proceeding under the same legal authority (Model Toxics Control Act, Chapter 70.105D RCW and Chapter 173-340 WAC, and Chapter 173-204 WAC the State Sediment Management Standards) as the action that was completed in February of 2004.

King County has submitted an interim action plan to Ecology for its approval to address the issue described above. The plan and supporting material are provided with this amendment. This draft Cleanup Action Decision Amendment and the interim action plan will be finalized after stakeholder review, and may be modified to incorporate comments received on the draft document.

Finally, this draft Cleanup Action Decision Amendment has been prepared by Ecology to document that the proposed cleanup method is consistent with the Sediment Management Standards, in accordance with WAC 173-204. Currently, the cleanup action is scheduled for completion by March 1, 2005.

For further information, contact:

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Memorandum

To Department of Ecology

From: King County

Date: December 10, 2004

Re: Duwamish Diagonal Interim Action Residual Remedy Proposal

Background

The Duwamish/Diagonal Sediment Remediation Project occurred during the 2003-2004 dredging season (November to March). The contractor selected by King County was Miller Contracting. Their initial efforts, which began in the more highly contaminated "Area B" portion of the site, resulted in a higher proportion and of water quality exceedances for total suspended solids (TSS) proximal to the dredging operations than during the remainder of the project. Those exceedances also had much higher exceedance ratios than other TSS exceedances throughout the remainder of the project, and appeared to be the result of relatively high production rates, overfilling of the dredge bucket, and other operations (EBDRP 2004). King County and permit oversight staff notified the contractor that it would enforce the provisions of the contract to require that the contractor follow Best Management Practices (BMPs) to control sediment releases associated with dredging operations. Dredging operations for the remainder of the project, including all dredging in the primary "Area A" region of the site, occurred under much lower production rates and strict time penalties for overfilling among other methods to control operations and lower releases of sediment into the water column during dredging (EBDRP 2004).

Sediment residuals are defined as contaminated sediments that either remain at the dredge site after dredging, or have been spread to adjacent areas as a result of dredging. Residuals have been documented to occur at sediment cleanup sites, though the magnitude of release have rarely been quantified and likely varies widely between projects based on a range of site-specific and operational factors. Immediately prior to initiation of dredging activities (baseline sampling in October 2003), and also shortly following completion of the project in late March 2004, King County collected surface (0 to 10 cm) sediment residuals performance monitoring samples from 12 stations located immediately outside the project area, as described in the agency-approved Sediment Monitoring Plan (King County 2003). The data revealed that dredging activities had increased surface sediment PCB concentrations around the southwest margin of "Area B" significantly higher than other site margins (Figure 1).



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The occurrence of a greater amount of sediment residuals in the southwest margin of “Area B” was consistent with the contractor’s initial operations in this area that did not appear to have fully utilized practicable BMPs as required by the Corps Nationwide Permit 38 issued for the project. As a result, the Washington Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and stakeholders requested that King County examine prospective further remedial actions to address the excess sediment residuals released during this portion of the project, which King County evaluated in summer 2004.

Potential Remedies

Six potential remedies were considered. These included the following supplemental response actions (listed in order of increasing permanence, as this term is generally defined under the Washington State Model Toxics Control Act [MTCA]):

- Remedy 1.* **Monitored Natural Recovery.** This remedy would rely on natural processes such as sedimentation to reduce risks associated with the sediment residuals, and would require monitoring the sediments over time to verify risk reductions and attainment of cleanup levels. Based on modeling performed during remedial design (EBDRP 2001), updated to reflect the post-construction monitoring data, monitored natural recovery would likely attain State Sediment Quality Standards (SQS) in the region surrounding “Area B” within a period of several years.¹ Monitoring would be performed to document the effectiveness of the natural recovery.
- Remedy 2.* **Enhanced Natural Recovery.** This remedy includes the placement of a thin layer of clean material (approximately 6 inches) over the sediment residuals to accelerate the natural recovery time frame (e.g., potentially to be accomplished by early 2005). This remedy has been employed for sediment residual management at other similar cleanup sites in Puget Sound, such as in areas immediately adjacent to the Puget Sound Naval Shipyard confined aquatic disposal facility. Enhanced natural recovery actions would provide a layer of clean cover material that would then be bioturbated through natural processes into the existing sediment bed. Monitoring would be performed to document the effectiveness of the thin-layer placement and bioturbation process.
- Remedy 3.* **Thick Cap.** This remedy would include the placement of a relatively thick layer of clean materials that would isolate the sediment residuals to depths well below the biologically active surface sediment zone. Typically, a cap thickness of 3 feet is placed to ensure long-term isolation under worst-case sediment erosion conditions, although site-specific conditions may allow for a thinner cap section in some areas.
- Remedy 4.* **Thin Removal.** This remedy includes the “precision” removal of the sediment residuals (as defined by the practicable limit of current dredging technologies),

¹Note: the sediment concentrations measured around “Area A” following the interim action are predicted to fall to pre-remediation levels within one to three years.

potentially with a clean thin backfill layer to address remaining sediment residuals.

- Remedy 5. **Dredge and Thick Cap.** This remedy includes removal of existing sediments to make room for the thick (3 foot) cap described above, so that there is no net change to the sediment surface elevation.
- Remedy 6. **Deep Removal.** This remedy includes the removal and disposal of all sediment contaminants to the clean native contact, potentially including a clean backfill to address sediment residuals that may result from this action.

Evaluation of Potential Remedies

Remedy 1 – Monitored Natural Recovery would provide the least cost remedy but potentially take the longest to achieve cleanup standards. Monitoring would likely occur over a 2 to 5 year period depending on the results of the preceding rounds of sampling. This remedy could act like a pilot study with the results of the monitoring providing valuable information about the effectiveness of natural recovery as a long-term risk management option within the Lower Duwamish Waterway Superfund site. The total present worth cost of the Monitored Natural Recovery alternative is estimated at about \$100,000. This remedy was carried forward for further consideration.

Remedy 2 – Enhanced Natural Recovery could be easily implemented and may be able to be performed in the 2004-2005 dredging window, depending in part on resolution of contracting issues. Clean sand material could be placed at the site using mechanical or hydraulic methods. Based on recent bathymetric surveys of the site area, there is a small portion of the prospective remedial action area within the navigation channel that has currently shoaled to an elevation at or above (shallower than) -30 feet mean lower low water (MLLW), the federally-authorized channel depth. Thus, in order to implement the thin layer placement remedy within this shoaled portion of the waterway, the Corps would likely need to provide authorization under its Section 10 authorities. However, since the site area currently receives approximately 1.5 inches of new sediment deposition each year (EBDRP 2001), a 6 inch layer placed in this area would only “use” approximately 4 years of channel capacity. Since this portion of the Lower Duwamish Waterway has not been dredged since 1968, potential further shoaling concerns associated with implementation of this remedy are likely to be minor. The cost to construct and monitor the effectiveness of this remedy is estimated to range from approximately \$200,000 to \$300,000, depending on the final size of the area to be covered, and construction methods employed. This remedy was carried forward for further consideration.

Remedy 3 – Thick Cap could likely not be implemented at the site, as most of the area of concern is located within the federal navigation channel. A 3-foot thick cap would raise the elevation of the bottom well above the authorized depth and would likely not be approved by the Corps under its Section 10 authorities. Thus, this remedy was eliminated from further consideration.

Remedy 4 – Thin Removal of only the dredge residuals is not practicable and potentially not technically feasible, as current dredging technologies are not capable of limiting removal to the anticipated depth of the residual layer (nominally 1 inch-thick in the zone surrounding “Area B”).

Implementation of this remedy would require the removal of a thin layer of residuals (likely at least 12 inches) by either mechanical or hydraulic means. Mechanically this would be very difficult because dredging contractors would typically employ a bucket that dredges a larger thickness of material. This option would also result in the collection of relatively large amounts of water (requiring treatment and/or disposal), and would likely also remove subsurface materials that currently underlie the sediment residuals. Since existing sediment core data collected in this area reveal that contaminant concentrations increase with depth, implementation of this remedy could potentially expose subsurface contaminated sediments that contain chemical concentrations even higher than the current residual concentrations, also with attendant residuals release concerns (i.e., potentially leading to further spreading of residuals). If hydraulic methods were used, larger amounts of water would be generated. This water would need to be collected, sediments separated from the water, and the water tested prior to disposal in an appropriate location. The ability to remove a layer thin enough to avoid exposing subsurface contamination is also unlikely, leaving a similar problem as with mechanical removal. The unit (and total) cost of this remedy would be relatively high and disproportionate to the degree of protection provided. Leaving higher surface concentrations than pre-remedy levels is likely. Thus, this remedy was eliminated from further consideration.

Remedy 5 – Dredge and Thick Cap is not implementable prior to late 2005 at the earliest but more likely a year later. In order to implement this option a subsurface investigation would need to be performed to characterize the vertical extent of contamination and the concentrations that would be exposed prior to placing the thick cap. As discussed above, the vertical distribution of contamination observed in nearby cores is generally characterized by an increase in chemical concentrations with depth, particularly over the top 3 feet of the sediment column. Peak chemical concentrations are generally reported in cores within the site area at depth between roughly 3 and 6 feet below existing mudline. Thus, it would be important to characterize the location of this peak in order to design the remedy properly. Given the relatively high cost of implementing this action – on the order of \$1,000,000 for 10,000 cy of removal – King County would only be interested in implementing such an action as a final cleanup remedy for this part of the site. Since both Ecology and EPA have indicated that final cleanup actions can only be determined following completion of the ongoing remedial investigation/feasibility study (RI/FS) of the Lower Duwamish Waterway Site, this remedy was eliminated from further consideration.

Remedy 6 – Deep Removal has the same general difficulties as Remedy 5. The volume of removal required to achieve the clean native interface is currently not well characterized, and would require a major sampling effort to determine. Similar to the discussion provided above for Remedy 5, such an action will be considered as part of the Lower Duwamish Waterway RI/FS. Preliminary cost estimates for this remedy applied to the prospective sediment residuals cleanup acre are on the order of \$1,400,000 for 20,000 cy of removal. This remedy was eliminated from further consideration.

Proposed Remedy

Two different remedies (Remedy 1 – Monitored Natural Recovery and Remedy 2 – Enhanced Natural Recovery) were carried forward as potential supplemental remedies to address “Area B” sediment residuals resulting from the 2003/2004 Duwamish/Diagonal interim cleanup action. King County approached both Ecology and EPA to determine whether they had a preference for one over the other. A key factor for the agencies was to try to implement the supplemental remedy prior to March 2005. The agencies indicated that both Remedy 1 or 2 would: 1) be consistent with the timing concerns and 2) possibly provide benefits that could be applicable to the Lower Duwamish Waterway RI/FS and relevant to the eventual final cleanup decision.

King County is proposing to pursue implementation of Remedy 2 – Enhanced Natural Recovery, subject to confirmation on the extent of the placement area required, placement methods, and resolution of contracting issues. This remedy will provide faster return to pre-dredging sediment levels in the southwest margin of the site. In addition, King County proposes to monitor natural recovery of the other margin areas as a way to gain information about this second remediation technique that could also be applicable to the Lower Duwamish Waterway RI/FS.

Figure 2 (Sheet C-1) defines the proposed project boundaries for the Enhanced Natural Recovery. The intent is to cover the bottom of the navigation channel to the west of “Area B” and 25 feet up the side slope in order to cover the residuals that spread cross-current and to cover the area upstream to the extent that the residual levels are found at concentrations above those around Area A. It is anticipated that those areas further upstream of the cap boundaries should naturally recover at the same time scale as the margins around “Area A”. This upstream area will be monitored together with the margins of “Area A” to determine if natural recovery is occurring at an acceptable pace or additional action would be warranted.

The placement of 5500 tons of clean sand will be evenly distributed across the project boundaries resulting in an average 7-inch placement. A placement plan will be developed to ensure even distribution of each bucket of material throughout the boundary by defining each bucket placement box in a grid tied to a WinOps type software system. The placement will be verified by documentation of the software records which will show that each grid cell was covered and placement across each grid was uniform. Coverage on the sediment surface will be verified by measuring stakes placed on bottom at known locations within the placement grid. The stakes will be inspected by a diver survey following placement to determine if additional material needs to be added to areas within the site that have inadequate coverage. Specifications for the sand layer, placement procedures and best management practices (BMPs) are included in the Specification Sections attached.

Contractor Oversight

King County inspection and construction management will be undertaken to ensure that the work is performed and completed per the approved plans and specifications. Not later 7 days after the effective date of Notice to Proceed, the Contractor shall submit to King County a detailed, written project Placement Plan. It is anticipated that the project will be consistent with the technical

specifications for thin layer placement attached. Field oversight will ensure operations will comply with all BMPs, placement is uniform and consistent with the placement plan and verify the WinOps-type system software documentation matches the placement grid. Post placement survey will determine placement thickness and require additional placement as necessary.

Monitoring Plan

Monitoring proposed for this remedy is organized into three components. The first represents water quality monitoring to be conducted during the action. The second represents the sampling that will be completed prior to the action to complete the understanding of pre-remedy conditions used as the baseline from which to compare post-remedy results. The third represents post-remedy monitoring to evaluate the effectiveness of the remedy. All three sampling components will be discussed in relation to the monitoring plans for water quality and surface sediment chemistry developed for the original interim action approved by the permitting agencies (King County 2004a, b). That plan provided specifics of the monitoring conducted before, during and after the dredging and capping, so this document will refer to those specifics instead of repeating them here and define what differences are proposed. Addenda will be included for each of those sampling plans to cover the changes.

Water quality monitoring for turbidity consistent with the original capping monitoring plan will be performed throughout the placement operation. Details are presented in the attached addendum.

Monitoring of surface sediment chemistry will be conducted across the area of residuals including the thin-layer placement area. The twelve stations where pre- and post-dredging surface sediment chemistry was collected will continue to be monitored (Figure 3; 1C through 12C). Two additional pre-remedy surface sediment chemistry samples will be added at the edge and 150 feet upstream of the proposed thin layer placement boundary in line with the two existing surface sediment stations upstream of "Area B" (new stations 13C and 14C). The initial round of samples collected pre-remedy samples will be collected as composites consistent with the original sediment monitoring plan. These fourteen stations will provide a baseline for the enhanced natural recovery monitoring and provide (approximately) year 1 data for natural recovery of the rest of the area. Note that there are an additional eight sample locations (15C through 20C) on Figure 3 that will be collected at the same time as the other samples. These sample locations are not part of the long-term monitoring plan but will improve the understanding of the distribution of chemical concentrations in the area.

Shortly after completion of the remedy, the five surface sediment stations located within the remedy boundaries will be resampled to provide a year 0 baseline for that area. Methods will be consistent with the original surface sediment sampling plan. The fourteen surface sediment stations will be sampled yearly post remedy to evaluate the effectiveness of the remedy and the natural recovery of the other areas. Monitoring will continue yearly for a period totaling five years or until 1) the sediment concentrations reach pre-action levels or 2) a final remedial action

for the area is initiated, whichever comes first. Note that all post-remedy sampling will not be 10-grab composite sampling used up to this point as this method would, over time, significantly remove a portion of the thin layer that we are trying to monitor. All subsequent rounds of sampling will be single grab samples.

To gain additional understanding about the distribution of residuals pre-remedy, a number of locations will be sampled by sediment profile imaging (SPI) methods (Figure 4). Fourteen of these stations will be co-located with the long-term monitoring sediment chemistry stations and an additional nine samples will be distributed farther from the original site boundaries to attempt to gain additional information about residual depths farther from the site. Note that only the additional station locations beyond the long-term monitoring stations 1C through 14C are marked on Figure 4. These data will help to provide the baseline to assess and interpret the post-remedy monitoring.

References

EBDRP. 2001. Duwamish/Diagonal CSO/SD Cleanup Study Report. Draft. Prepared by King County, Anchor Environmental and EcoChem for the Elliott Bay/Duwamish Restoration Program (EBDRP), Seattle WA. EBDRP Panel Publication 30.

EBDRP. 2004. Duwamish/Diagonal CSO/SD Sediment Remediation Project Closure Report. Draft. Prepared for the Elliott Bay/Duwamish Restoration Program (EBDRP) and King County Department of Natural Resources, Seattle, WA.

King County . 2004a. Water Quality Sampling and Analysis Plan for the Duwamish/Diagonal CSO/SD Sediment Remediation Project. King County Department of Natural Resources and Parks, Seattle, Wa.

King County . 2004b. Surface Sediment Chemistry Sampling and Analysis Plan for the Duwamish/Diagonal CSO/SD Sediment Remediation Project. King County Department of Natural Resources and Parks, Seattle, Wa.

**ADDENDUM TO WATER QUALITY MONITORING
FOR DUWAMISH/DIAGONAL SEDIMENT REMEDIATION PROJECT**

Introduction

The primary work for the Du/Di dredge and cap project was completed in March 2004. However, in November 2004, Ecology notified King County that additional work was needed. King County is proceeding with plans to have the thin layer cap installed before the end of the current dredge window that ends in February 2005. Ecology has requested that water quality monitoring be conducted during this capping. King County is proposing to use the same methods as used during the original capping in 2004 as documented in the .

Monitoring Activities

The "Study Objectives" presented on page 6 indicate that TSS will be monitored during capping, but that chemicals of concern do not need to be measured because the cap material consists of clean sand. Sampling schedule will be the same with one ebb tide per day and one flood tide per day. The sampling stations and depths will be the same at 150 feet and 300 feet down stream and at 90 cm from the bottom and 60 cm from the surface (section 5 on page 12 and section 6.4.2 on page 14). The estimated duration of capping is about one week so monitoring will continue during all day time capping work. Sample collection, handling, analysis and reporting will be the same as described in sections 7 through 10. Ecology and other regulatory agencies will be notified prior to starting the capping work.

**ADDENDUM TO SURFACE SEDIMENT CHEMISTRY MONITORING
FOR DUWAMISH/DIAGONAL SEDIMENT REMEDIATION PROJECT**

To be supplied

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. This Section contains a summary of the work in this contract and other known work in the vicinity of the Contract work.
- B. The work to be performed under this Contract consists of furnishing all tools, equipment, materials, supplies, and manufactured articles; furnishing all labor, transportation, and services, including fuel, power, water, and essential communications; and performing all work or other operations required for the fulfillment of the Contract, in strict accordance with the Contract Documents. Provide work complete. Provide all work, materials, and services not expressly indicated in the Contract Documents which may be necessary for the complete and proper construction of the work.

1.02 WORK OF THIS PROJECT

- A. The work on this project is follow-up work from the Duwamish/Diagonal project performed during the 2003-2004 work window located adjacent to this project site.
- B. The work of this Contract consists of:
 - 1. The Contractor will place a Thin Layer in the cleanup area defined on the Drawings with clean material. Clean sediment will be obtained from an approved material source. The quantity of material required to be placed is equivalent to 7 inches and is to be placed evenly throughout the site.
- C. Accomplishment of work in the Contract Documents shall meet all requirements and dates specified by Section 01014.
- D. The above description is not intended to be complete. The work to be complete is provided for in the Contract Documents. The listing in Paragraph 01010-1.02A is not intended to relieve the Contractor of the responsibility for reading and understanding the Contract Documents.

1.03 GEOTECHNICAL CONDITIONS

Geotechnical conditions are addressed in Section 01036 and APPENDIX A of these specifications.

1.04 SPECIFICATION LANGUAGE

- A. Specifications are written mostly in imperative and streamlined form. Unless indicated otherwise, this imperative language is directed to the Contractor. Additionally, the words "shall be" shall be included by inference where a colon (:) is used within sentences or phrases.
 - 1. Examples:
 - a. Aggregate: ASTM C33
 - b. Adhesive: Spread with notched trowel.
- B. Related Section: Individual Specification sections may include a paragraph entitled "Related Sections". Specification sections are listed within the paragraph to assist the Contractor in

locating related work. This list is not necessarily all-inclusive. Use all specifications required to complete the work.

- C. Meet the following state of Washington legal requirements whenever there is reference to certification of documents by an architect, engineer, land surveyor, or landscape architect:
 - 1. Architect: RCW 18.08.420(7), RCW 18.08.440(5), WAC 308-12-081
 - 2. Engineers and land surveyors: RCW 18.43.070. RCW 18.43.130(8)(h), WAC 196-24-095.
 - 3. Landscape architects: RCW 18.96.150
- D. Whenever there is wording stating that an item is “as specified” or “as shown”, the reference is to all Technical Specifications and all Drawings in the Contract Documents. Stating “as specified” or “as shown” does not refer necessarily to a Drawing or Specification, but it refers to either.
- E. Unless otherwise indicated, all materials and equipment incorporated into the Work shall be as specified and shall be new and of good quality.

PART 2 MATERIALS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01014
WORK SEQUENCE

PART 1 GENERAL

1.01 CONTRACT TIME

- A. The Contractor shall have in-water activities complete by March 1, 2005. The Contractor shall have all cleanup activities complete by March 30, 2005. Failure of the Contractor to meet any of the above milestones or finish within the Contract Time will result in assessment of damages in accordance with Section 00700.

1.02 MILESTONES AND SEQUENCE OF WORK

- A. The purpose of the milestones, sequence, and limitations of construction are to insure that the Contractor understands the limitations placed on its work by the specific characteristics of the project and the facility. The Contractor shall schedule and conduct its work in a manner consistent with achieving these purposes, and the construction schedule shall comply with and include the specific sequence milestones and limitations of work specified in this Section. Refer to Section 02221. Failure of the Contractor to complete specified work by the milestones and Contractor remobilization during the following capping season shall be at no cost to the County.
- B. Milestones:
 - 1. Upon completion of placement of 7 inches of clean material evenly throughout the site, KC will perform a diver-survey, which will be used to verify the thickness of material placed throughout the site by the Contractor. The Contractor will provide 24-hour notice to KC prior to the completion of placement.
 - 2. Upon completion of required placement of clean material and satisfaction of the KCDNRP Project Representative, the Contractor will perform a post-placement bathymetric survey.
 - 3. The fish closure window for the Duwamish Waterway established for this project is from March 2 to October 31, 2005. No in-water construction activities are permitted during the fish closure window, including placement and pile installation and/or removal, if required.
- C. All work shall be sequenced in a logical planned manner. This specifically may include, but is not limited to:
 - 1. Commence and complete placing clean sediment as shown on plans to the satisfaction of the KCDNRP Project Representative.
 - 2. Coordinate with KCDNRP for KCDNRP to perform diver-survey.
 - 3. Coordinate with KCDNRP to perform post-Thin Layer placement survey.
- D. After award of the Contract, submit a draft construction schedule bar chart that includes all bid items, milestones, construction window, and work sequence described in Sections 00300 and 01014. The draft schedule will be discussed in the preconstruction conference as discussed in Section 01200 and 01310.

1.03 TIME RESTRICTIONS

- A. Thin Layer placement may occur 24 hours each day. However, state noise regulations Chapter 173-60 WAC and the City of Seattle Noise Ordinance must be adhered to.
- B. Submit a schedule of working hours in accordance with Section 00700. The Contractor shall be liable for the premium costs of King County's overtime inspection, in accordance with Section 00700.

1.04 APPROVAL OF SCHEDULE

- A. Scheduling of the work shall be in accordance with the provisions of Section 01310.

1.05 PROJECT CONSTRUCTION COORDINATION

- A. In accordance with the provisions of Section 00700, designate a representative to be on the site at all times during the construction. This representative shall be capable of giving direct field orders as the need arises. Official project communication shall be conducted between the Contractor's representative and the KCDNRP Project Representative.

1.06 SPECIAL PRECAUTIONS

- A. Take special precautions to protect operating mechanical equipment, power supply and distribution equipment, and instrumentation equipment from exposure to weather, concrete dust, debris, dirt, and water during the construction period.

1.07 CONSTRAINTS

- A. During installation of the Duwamish siphon sewer lines in 1965 to 1967, sediment was dredged and backfilled near the outfalls and across the waterway. The siphon pipes (42-inch and 21-inch diameter pipes) were buried in a trench that was dredged across the river bottom.
- B. A portion of the area to be placed with clean material is within the Navigation Channel as shown in the Drawings.
- C. Results of water quality monitoring during construction to comply with State water quality standards may affect construction activities. The County shall not incur additional expenses due to delays to changes resulting from water quality monitoring.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies earthwork, which consists of excavation, material, backfilling, compacting, and grading.
- B. Related Sections: The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to the proper performance of this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.
1. Section 01560: Environmental Controls.
 2. Section 02221: Thin Layer Placement.

1.02 QUALITY ASSURANCE

- A. Referenced Standards. This provision incorporates by reference the latest version of the following standards. In case of conflict between the referenced standard and the requirements of this Section, this Section shall control.

<u>Reference</u>	<u>Title</u>
AASHTO T176	Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D422	Grain Size Distribution
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM E329	Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
SW846-6000/7000 Series	Priority Pollutant Metals (EPA Methods)
SW846-Method 8260	Volatile Organic Compounds (EPA Method as modified by Puget Sound Estuary Program [PSEP])
SW846-Method 8270	Semi-Volatile Organic Compounds (EPA Method as modified by PSEP)
SW846-Method 8281	Pesticide (EPA Method as modified by PSEP)
SW846-Method 8282	Polychlorinated Biphenyls (PCBs) (EPA Method as modified by PSEP)
Standard Methods [SM] 5310B	Total Organic Carbon

B. Tests:

1. A characterization of any and all imported material shall be performed by the Contractor prior to any on-site placement. The characterization will include analysis of a borrow source sample, site inspection, and site characterization.
2. Remove surface material at locations designated by the King County Department of Natural Resources and Parks (KCDNRP) Project Representative and provide such assistance as necessary for sampling and testing.
3. Testing by the KCDNRP Project Representative does not relieve the Contractor of its responsibility to determine to its own satisfaction when and if its work meets the Specifications.
4. Tests will be made in accordance with ASTM E329 in accordance with the following:

<u>Test</u>	<u>Standard Procedure</u>
Moisture content	ASTM D2216
Gradation	ASTM C136; ASTM D422
Priority Pollutant Metals	EPA SW846 6000/7000 Series
Volatile Organic Compounds	EPA SW846-Method 8240

Semi-Volatile Organic Compounds	EPA SW846-Method 8270
Pesticides	EPA SW846-Method 8281
PCBs	EPA SW846-Method 8282
Total Organic Carbon	SM 5310B

C. Inspection of Materials at the Site:

1. Truckloads or barges of import material shall be visually inspected by the Contractor upon delivery. Materials shall be inspected for the presence of foreign, recycled, or reprocessed material. The KCDNRP Project Representative may at any and all times perform an independent inspection. Material may be rejected if identified as substandard or test results show it to be substandard. Materials may be segregated for testing based on appearance or odor. Segregated materials may be tested according to designated procedures at the KCDNRP Project Representative's discretion.

1.03 SUBMITTALS

- A. Procedures: Section 01300.
- B. Source Identification: Prior to borrow source sampling, the Contractor shall provide documentation of the origin of borrow source materials and maps identifying specific location(s) of borrow sources.
- C. Samples of all fill materials to be used 5 days in advance of use. Samples shall consist of 0.5 cubic feet of each type of material. Each sample should be composited from no less than five subsamples taken throughout any one source. The Contractor shall assure that the samples(s) are representative of all materials to be imported.
- D. Inspection of Source: The borrow source shall be inspected by the Contractor. During such inspection, the Contractor shall assure that the materials to be delivered to the site are likely to meet the appropriate specifications. The Contractor shall provide the KCDNRP Project Representative with five-day notice of such inspections. At the KCDNRP Project Representative's discretion, the KCDNRP Project Representative or a representative may accompany the Contractor to witness such inspections. This witnessing shall in no way release the Contractor from complying with the specifications and shall in no way be construed as approval of any particular source of material.
- E. Laboratory test reports and samples of fill materials to be used: The Contractor shall provide the results of such tests at least five days before delivery of the materials to the site. Contractor's certification that the samples tested and the results provided are representative of materials that shall be delivered to the site. The results shall be provided in report form, with the reports clearly identifying the following:
 1. Source of samples.
 2. Sampling dates.
 3. Chain of custody.
 4. Sampling locations.
 5. Moisture density relationships and gradation test reports and curves.
 5. Gradation tests for non-cohesive materials.
 6. Dredged Material Management Program chemical test results as identified in subparagraph 1.02.B.4, of this Section.

PART 2 MATERIALS

2.01 FILL MATERIALS

- A. Base Cap Material
 1. Base cap material shall be clean, free-draining sand from a recognized and established borrow site or from a dredge site. The material shall be free of all objectionable coating and shall be suitable for open-water disposal when tested against the Dredged Material Management Program chemical guidelines.

2. Material shall be graded between the limits specified below:

<u>U.S. Standard Sieve Size</u>	<u>Percent by Weight Passing</u>
3/4 inch	100
U.S. No. 4	90 to 100
U.S. No. 10	60 to 85
U.S. No. 40	10 to 40
U.S. No. 200	0 to 2

PART 3 EXECUTION

3.01 CLASSIFICATION OF FILL

- A. Placement of Clean Material: Section 02221.
- B. Material type is specified in the contract drawings.
- C. Clean material average layer depth is specified in Section 01010.

END OF SECTION

SECTION 02221

THIN LAYER PLACEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies requirements for capping of the dredged area.
- B. Related Sections: The work of the following Sections is related to the work of this Section. Other Sections, not referenced below, may also be related to the proper performance of this work. It is the Contractor's responsibility to perform all the work required by the Contract Documents.
 - 1. Document 00420 – Qualifications Information
 - 2. Document 00700 – General Conditions
 - 3. Document 00800 – Supplemental Conditions
 - 4. Section 01012 – Reference Material
 - 5. Section 01014 – Work Sequence
 - 6. Section 01025 – Measurement and Payment
 - 7. Section 01063 – Health and Safety
 - 8. Section 01090 – Reference Standards
 - 9. Section 01195 – Protection and Maintenance of Property and Work
 - 10. Section 01200 – Contract Meetings
 - 11. Section 01300 – Submittals Procedure
 - 12. Section 01310 – Progress Schedules and Reports
 - 13. Section 01560 – Environmental Controls
 - 14. Section 02200 – Earthwork

1.02 QUALITY ASSURANCE

- A. Referenced Statutes and Regulations: This provision incorporates by reference the latest revision of the following document. These references are a part of this Section as specified and modified. In case of conflict between these statutes and regulations, the more stringent shall control.

<u>Reference</u>	<u>Title</u>
33 U.S.C. 410	Rivers and Harbor Act
Chapter 296-62 WAC	WISHA General Occupational Health Standards
Chapter 296-67 WAC	WISHA Process Safety Management Standards
Chapter 296-155 WAC	WISHA Safety Standards for Construction
RCW 49.17	Washington Industrial Safety and Health Act (WISHA)

1.03 SUBMITTALS

- A. Procedures: Section 01300.

1.04 CONSTRUCTION PERIOD

- A. The work described in the following sections shall be performed during the period November 1, 2004 through March 1, 2005. Due to fisheries restrictions, no in-water work can be performed during the periods March 2 through October 31, 2005.

1.05 PLACEMENT

- A. The project area is located on the east bank and in the Navigation Channel of the Duwamish River and is approximately four acres in size. The required Thin Layer involves placing the amount of material within the area shown on the Drawings.

1.06 JOB CONDITIONS

- A. See APPENDIX B for geotechnical information on the site. The explorations are representative of the subsurface conditions at their respective locations. The Contractor shall determine the soil classification to his own satisfaction prior to bidding. Variations in the type of materials encountered may occur which do not materially differ from those indicated in this contract, and if encountered, will not be considered as basis for claims due to differing site conditions. The Contractor shall verify the quantity of sediments to be placed with a Thin Layer of clean material from the information on the drawings before submitting a bid.
- B. E-Shaped Pier: An E-shaped pier is located east of the northern portion of the site. This pier shall not be damaged during cleanup operations, as defined in Section 01195 Protection and Maintenance of Property and Work.
- C. Control of pollutants other than sediment: All pollutants other than sediment that occur on site during construction shall be handled and disposed of in a manner that does not contaminate stormwater. Fueling of Contractor's equipment shall be performed away from storm drain outlets. Extreme care shall be taken to prevent fuel spills. A Contractor's representative shall be present at all times when equipment is being fueled. In the event of a spill the Fire Department or Coast Guard (if the spill occurs in the River) shall be called. Absorbent oil pads and drip pans shall be placed beneath the vehicle being fueled and under parked vehicles (overnight and otherwise). Absorbent materials, shovels, and five gallon buckets shall be provided and maintained for spill cleanup. No vehicle maintenance other than emergency repair shall be performed on the project site, nor are engine fluids to be stored on the project site.
- D. Interference with navigation: A portion of the project site is located within the Duwamish Waterway Navigational Project, with the remaining portion of the site adjacent to the navigational channel. The Contractor shall conduct its operations in a manner that will minimize interference with shipping and navigational activities, and comply with Coast Guard regulations.
- E. Protection of existing structures: Section 01095.

1.07 MISPLACED MATERIAL

- A. Should the Contractor, during the execution of the work, lose, dump, throw overboard, sink or misplace any material, cap, barge, machinery, or appliance, the Contractor shall promptly recover and remove the same. The Contractor shall give immediate verbal notice, followed by written confirmation, of the description and location of such obstructions to the King County Department of Natural Resources and Parks (KCDNRP) Project Representative and shall mark and buoy such obstructions until they are removed. Should the Contractor refuse, neglect, or delay compliance with this requirement, such obstructions may be removed by KCDNRP or its agents, and the cost of such operations may be deducted from any money due to the Contractor, or may be recovered from his bond. The liability of the Contractor for the removal of a vessel wrecked or sunk without his fault or negligence shall be limited to that provided in Sections 15, 19, and 20 of the River and Harbor Act of 3 March 1899 (33 U.S.C. 410 et seq.).

1.08 DEFINITIONS

- A. Ton: Short Ton equals 2,000 pounds (avoirdupois).

1.09 PLACEMENT PLAN

- A. Not later than 3 days after the effective date of Notice to Proceed, the Contractor shall submit to KCDNRP a detailed, written project Placement Plan. Refer to Section 01300 for submittal requirements. As a minimum, the plan shall contain the following:

1. Order in which the work is to be performed indicating the work sequence; number, types and capacity of equipment to be used; hours of operation; methods of operation and the time required to complete each activity. A list of key personnel and supervisory chain will be included.
2. Source of Thin Layer placement materials and the methods, procedures and equipment to be used for transporting Thin Layer placement materials to the site.
3. Methods, procedures and equipment to be used for placement of Thin Layer materials. Procedures and equipment to be used for layout of the work and positioning of placement equipment; and environmental monitoring, including procedures for emergency spill containment and removal operations. It is anticipated that placement will be based on dividing the site into a grid of small boxes that will be tied to the WinOps software system to spread a given amount of clean material within each box to arrive at the required average 7-inch thickness for the entire site. The Contractor will provide WinOps records that document each box received the required amount of material that was defined in the plan that will be accepted by KC. Additionally, KC will have a series of measuring stakes installed at the bottom of the placement area. The Contractor will be required to identify the stake locations relative to the WinOps grid used for material placement. The measuring stakes will be inspected during the diver-survey to determine if additional material placement is required.

PART 2 MATERIALS

2.01 BASE CAP MATERIAL

- A. Material used as the base cap layer for the site as indicated on the Drawings, shall comply with specifications provided in Section 02200 Earthwork.

PART 3 EXECUTION

3.01 QUALITY CONTROL

- A. The Contractor shall furnish for review by KCDNR, after the Contract is awarded, its Contractor Quality Control (CQC) plan. This plan will be used to document the inspections, monitoring, surveys and other actions to be taken by the Contractor to ensure that the work complies with all contract requirements. The Contractor shall clearly discuss how he will control and monitor Thin Layer placement to ensure proper coverage and thickness are obtained. The Contractor shall assure that all required gauges, targets, ranges and other survey markers are in place and properly maintained. The Contractor shall install a tide gauge or staff at the capping location so that the operator and hydrographic surveyors can observe the water level at all times.
- B. The Contractor shall prepare and maintain a daily CQC report of operations and furnish a copy to the KCDNRP Project Representative on the day after the date of the report. (See Section 01999 for sample form). Information to be included in the report will be the date, period covered by the report, equipment used, description of activity as identified by stationing and offset, quantity of Base Cap material placed that day and to date, downtime and delays to the operation, safety, and other relevant comments concerning the conduct of the operation. The report shall include the results of all inspections, surveys and monitoring activities and shall be signed by the Contractor's superintendent.

3.02 SURVEYS

- A. Diver-survey: Upon completion of placement of clean material evenly throughout the site as demonstrated by quality control actions taken by the Contractor, KC will perform a diver-survey of the measuring stakes placed on the bottom of the placement area. The diver-survey will be used to verify the thickness of material placed throughout the site by the Contractor. If the diver-survey determines that portions of the site have material thickness of 3 inches or less, the Project

Representative may direct the contractor to adjust its placement procedure to place additional material, not greater than 7 inches total, in the areas of the site having material thickness of 3 inches or less, to assure compliance with the Drawings and permit requirements, at no additional expense to KC.

- B. Post-Placement Bathymetric Survey: A post-placement bathymetric survey will be performed by the Contractor. The soundings will be in NOS MLLW. The Drawings show a detailed bathymetric survey from March 2003.
- C. Survey Conference: At the Pre-construction Conference specified in Section 01200 Part 1.02, the Contractor's chief surveyor shall meet with the KCDNRP Project Representative to discuss survey procedures, datums, methods, and equipment to be used for the Contractor's surveys. Any additional horizontal or vertical control references, not shown on the drawings, will be provided to the Contractor at this time.
- D. Ranges and Tide Gauges: The Contractor shall furnish, set and maintain in good order, all ranges, buoys, and other markers necessary to define the Work and to facilitate inspection. The Contractor shall establish and maintain a tide gauge or board in a location where it may be clearly seen during Thin Layer placement operations and inspections. The Contractor shall also install an automatic recording tide gauge with water level sensor. The tide gauge shall provide a continuous recording of tidal change for every 15-minute interval or each 0.1 foot change, whichever occurs first. Tidal changes shall be recorded in MLLW datum, with these changes visually provided to the equipment operator at all times during the capping process to allow proper adjustment of cap depth. All costs for providing the tide gauges and other survey control shall be included in the bid price for placement.
- E. Positioning Equipment and Methods: The Contractor shall employ a suitable method to locate and control horizontal placement position that may include: Differential Global Positioning System (DGPS), sextant angle triangulation, theodolite/transit angle triangulation, theodolite/transit angle EDM distance intersection triangulation, range-range electronic positioning system, or range-azimuth electronic positioning system. Observation data will be recorded in standard surveying field book format. Automated position determinations will be accomplished by standard trilateration procedures whereby lengths to two or more shore-based control points are electronically measured by either time delay or phase comparison techniques. Observed ranges are corrected for scale, calibration, and/or automatic variations when present. Accuracy of cap horizontal position shall be within +/- 3 feet. Accuracy of vertical positioning shall be within +/- 0.5 feet.

3.03 CONDUCT OF PLACEMENT

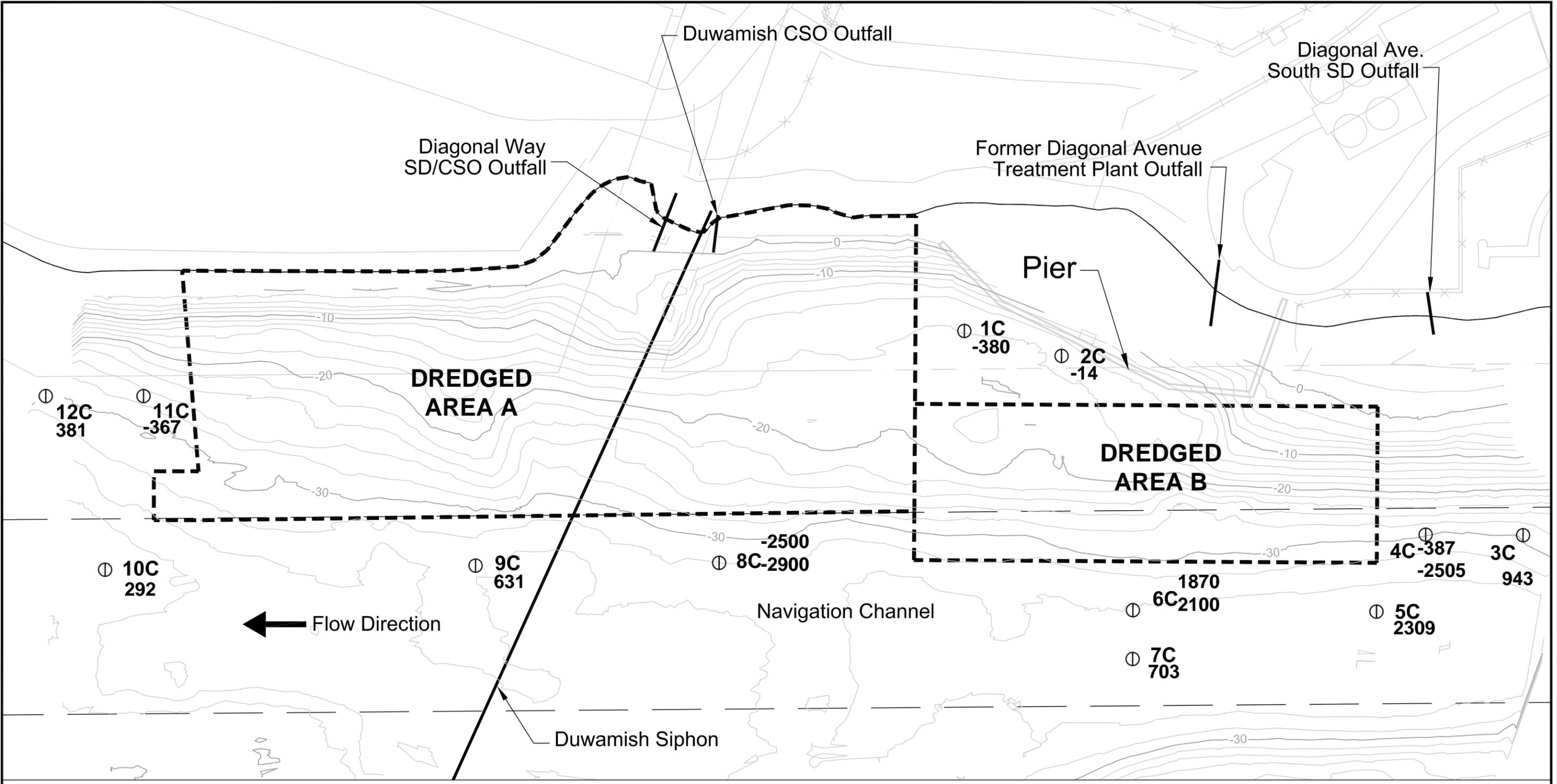
- A. Layout of Work: An accurate method of horizontal control shall be established by the Contractor before placement begins. The proposed method and maintenance of the horizontal control system shall be subject to the approval of the KCDNRP Project Representative and if, at any time, the method fails to provide accurate location for the placement operation, the Contractor may be required to suspend its placement operation. The Contractor shall lay out work from horizontal and vertical control points indicated on the drawings and shall be responsible for all measurements taken from these points. The Contractor shall furnish at its own expense all stakes, templates, platforms, equipment, range markers, transponder stations, and labor as may be required to lay out the work from the control points shown on the drawings. It shall be the responsibility of the Contractor to maintain all points established for the work until authorized to remove them. If such points are destroyed by the Contractor or disturbed through its negligence prior to authorized removal, they shall be replaced by the Contractor at own expense.
- B. Placement of Clean Material: Thin Layer Placement material shall be placed from the bottom (toe) of the slope upward. The Contractor shall pay particular attention to the conditions of issued permits and authorizations requiring minimizing turbidity and siltation and adherence to water quality requirements. Barges may be positioned utilizing spuds and/or upstream anchors.

Spudding within the placement area can only occur within unplaced portions of the area. No anchoring will be allowed within the placement area. No spudding, anchoring, or disturbance of any kind shall occur to the existing adjacent cap area completed during the 2003-2004 work window.

- C. Best Management Practices (BMPs) during Placement: To minimize the take of Puget Sound (PS) chinook salmon and PS/Coastal bull trout and siltation of the beach area and bed, the Contractor shall implement the following BMPs:
1. An experienced KCDNRP Project Representative and/or inspector will oversee work activities to ensure implementation of BMPs and adherence to all work plans.
 2. The rate of Thin Layer placement material distribution over the project area should be slow to avoid turbidity clouds, resuspension of contaminated bottom sediments into the water column, and impacts to any fish species that may be present. If the KCDNRP Project Representative directs the Contractor to slow material distribution speed, or to stop material distribution, any time delays will be at the Contractor's own expense.
 3. The Contractor will adhere to the KC-accepted material distribution rate per unit area such that the thickness of material placed will be equivalent to 7 inches evenly throughout the site.
 4. If fish kill occurs or fish are observed in distress, the project activity shall immediately cease and WDFW Habitat Program shall be notified immediately.
 5. The bucket used to distribute clean material above water shall not be used under water to change the bottom elevation of the site.
- D. Placement: No placement may occur during the period March 2 through October 31, 2005, which is the fishery closure period in the Duwamish River established for this project, unless an extension is granted by the appropriate regulatory agencies in advance.
- E. No compaction is required. Sufficient material shall be placed evenly across the site in the quantity defined on the Drawings.

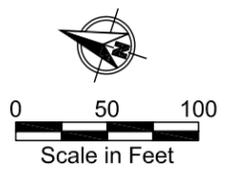
END OF SECTION

K:\Jobs\0008601-Duwamish\Final\ClosurePlan\DW-0008601-05.dwg Fig 5
Jul 29, 2004 3:37pm sdekleva



Legend:
⊙ Sample Location

703 Difference between pre- and post-dredge PCB surface sediment concentration (ug/kg dry weight)



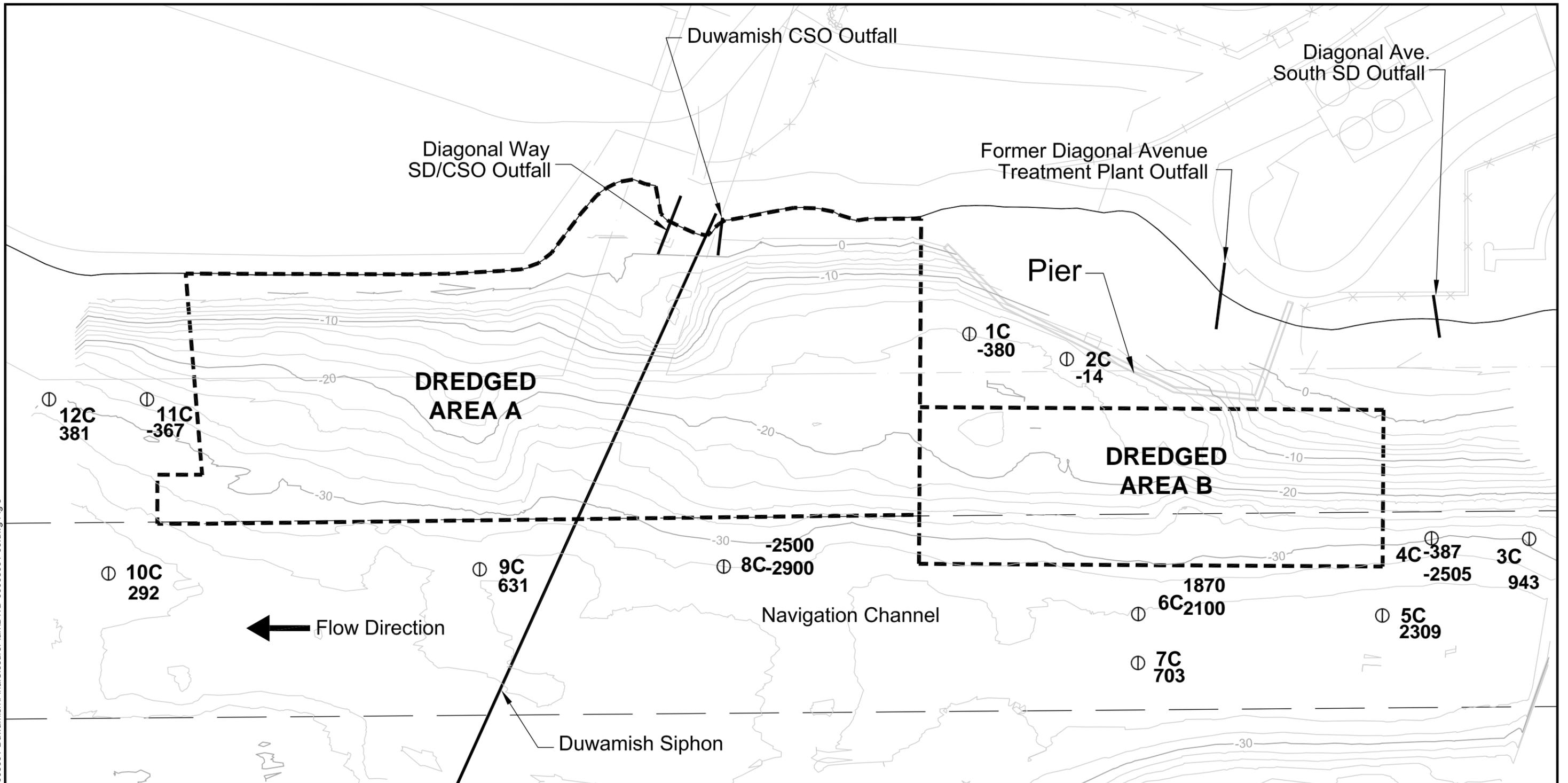
EcoChem Team

Duwamish/Diagonal Thin Layer Placement Project

Difference Between Pre- and Post-dredge PCB Surface Sediment Concentration

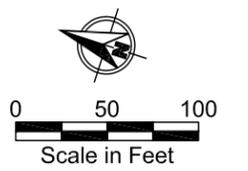
Figure 1

K:\Jobs\0008601-Duwamish\Final\ClosurePlan\DWD-0008601-05.dwg Fig 5
Jul 29, 2004 3:37pm sdekleva



Legend:
⊙ Sample Location

703 Difference between pre- and post-dredge PCB surface sediment concentration (ug/kg dry weight))



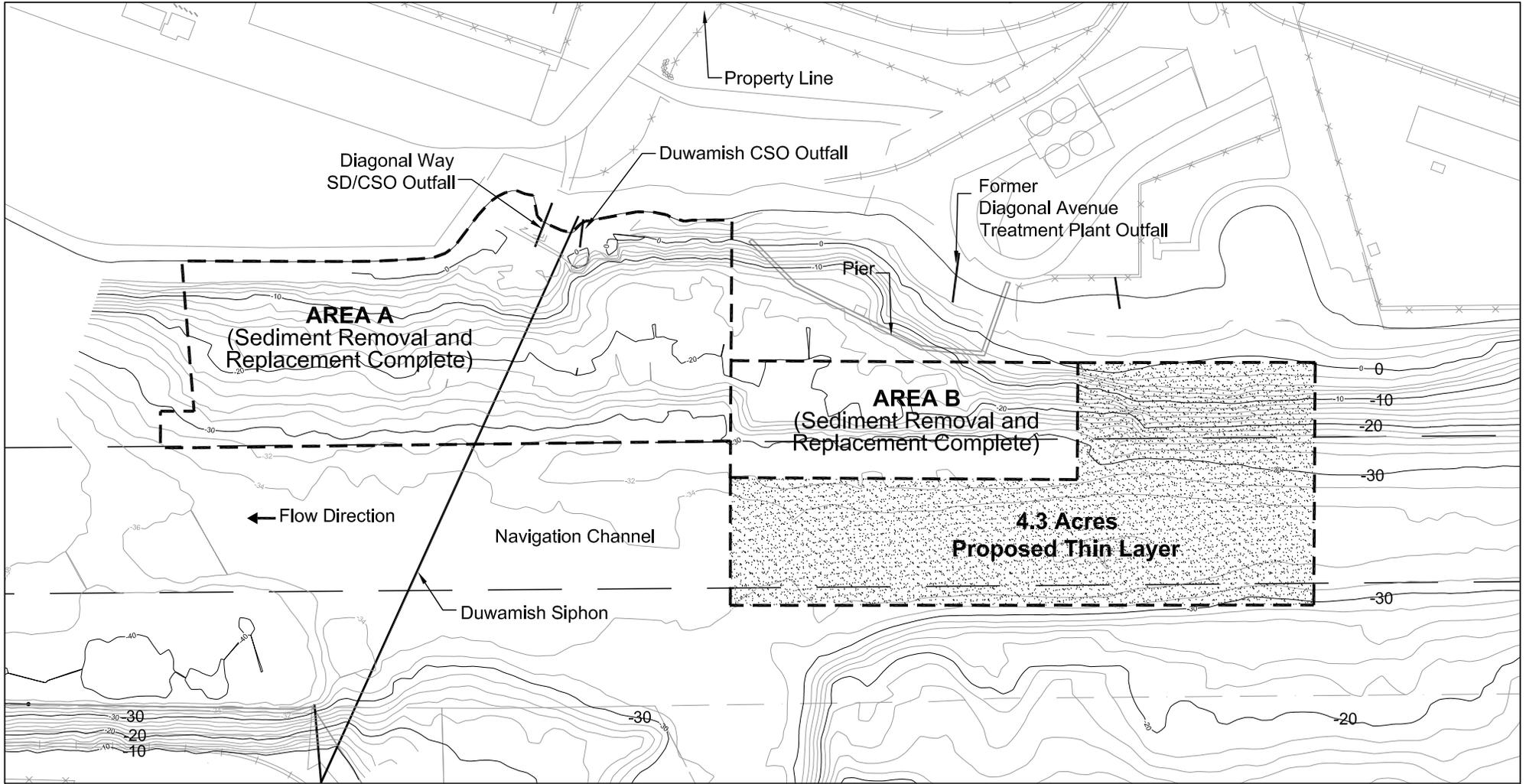
EcoChem Team

Duwamish/Diagonal Thin Layer Placement Project

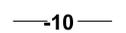
Difference Between Pre- and Post-dredge PCB Surface Sediment Concentration

Figure 1

Dec 17, 2004 3:43pm dholmer



7-Inch-Thick Layer



-10 Bathymetry Elevation Contours in Feet (2-Foot Interval)

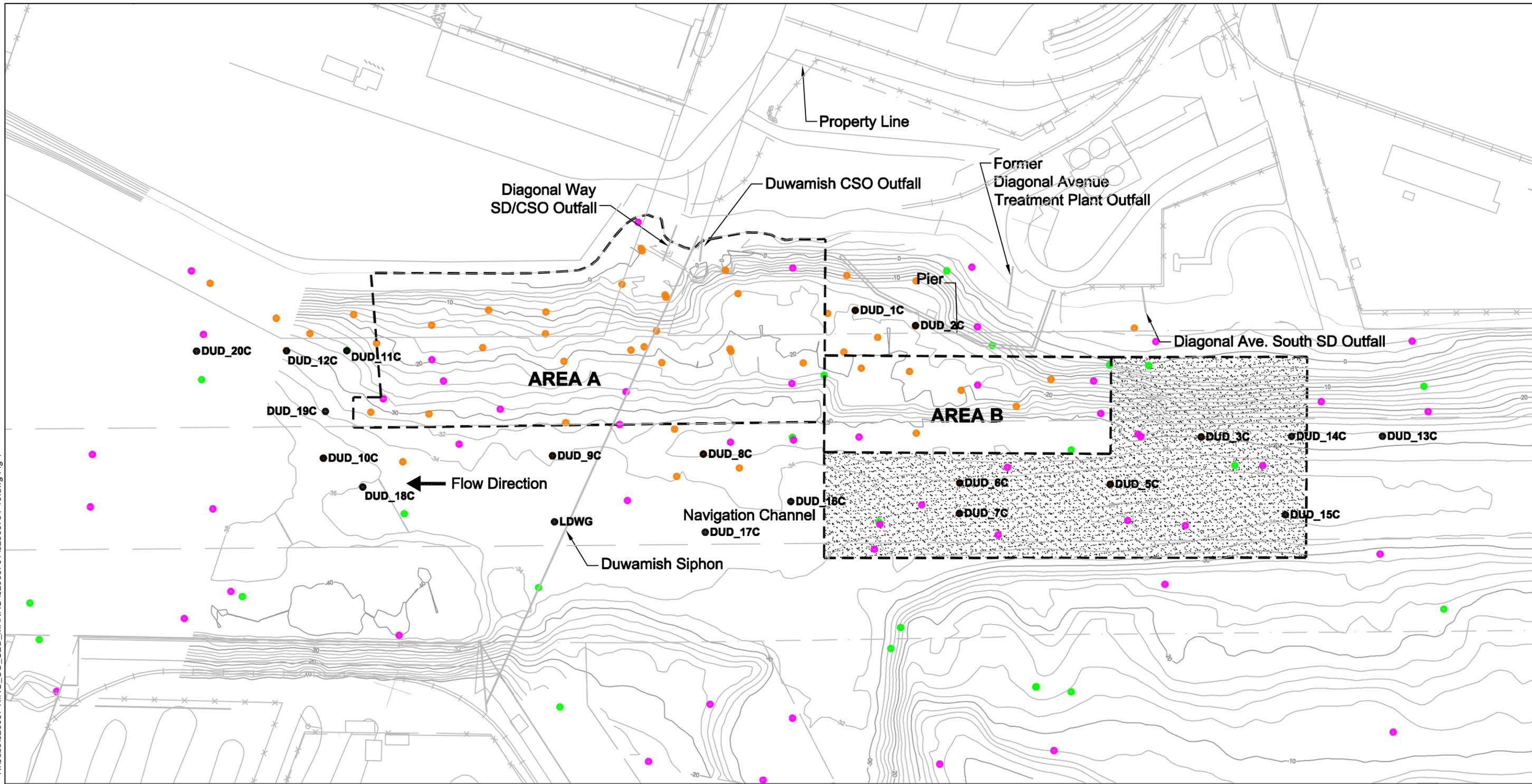
MHHW = + 11.35 Ft.



Figure 1
Thin Layer Placement Project
Duwamish Diagonal Thin Layer Placement Project

K:\Jobs\020067-KING_CO_SED_MANAG\02006701\02006701-10.dwg Fig 1

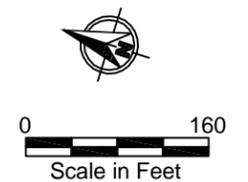
Dec 10, 2004 5:04pm dholmer



- DUD_20C ●** Proposed Chemistry Sample Location and Number
- >=SQS, <CSL, Detect Sample Location and Number
- >=CSL, Detect Sample Location and Number
- < SQS Sample Location and Number

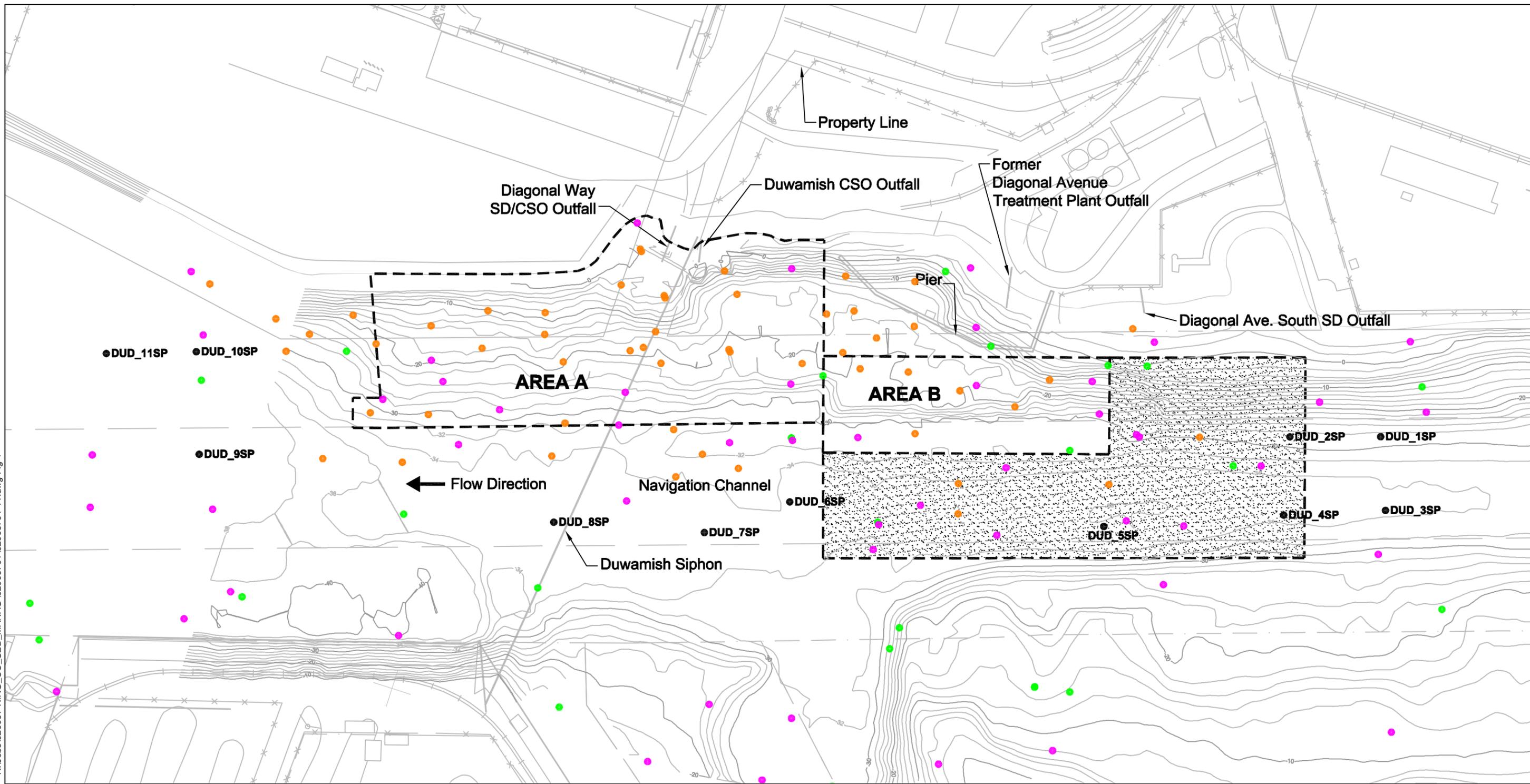
- - - -10 - - -** Bathymetry Elevation Contours in Feet (2-Foot Interval)
- [Stippled Box]** 5,500 Tons of Base Cap placed evenly in this location

Notes:
 1. Topography/Basemap provided by the Port of Seattle (1994). This data is to be used for visual reference only.
 2. Bathymetric contours created by Anchor Environmental from BWE (March 2004), Miller (March 2004), and David Evans (August 2003) surveys referenced to MLLW (NOS).



K:\Jobs\020067-KING_CO_SED_MANAG\02006701\11.dwg Fig 1

Dec 10, 2004 5:05pm dholmer



- DUD_7SP ●** Proposed Sediment Profile Imaging Sample Location and Number
- \geq SQS, $<$ CSL, Detect Sample Location and Number
- \geq CSL, Detect Sample Location and Number
- $<$ SQS Sample Location and Number

- 10** Bathymetry Elevation Contours in Feet (2-Foot Interval)
- [Stippled Box]** 5,500 Tons of Base Cap placed evenly in this location

Notes:
 1. Topography/Basemap provided by the Port of Seattle (1994). This data is to be used for visual reference only.
 2. Bathymetric contours created by Anchor Environmental from BWE (March 2004), Miller (March 2004), and David Evans (August 2003) surveys referenced to MLLW (NOS).

