APPENDIX E – COST ESTIMATE
EAST WATERWAY OPERABLE UNIT FEASIBILITY STUDY

Prepared for
Port of Seattle

Prepared by
Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, Washington 98101

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1 INTRODUCTION

This appendix contains information supporting the detailed remedial alternatives cost estimate prepared for the East Waterway (EW) Operable Unit (OU) Feasibility Study (FS). The cost estimate was developed in accordance with the U.S. Environmental Protection Agency (EPA) guidance document *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000), and is consistent with estimates prepared for other similar feasibility studies and construction bids for projects similar to the EW.

This cost estimate provides a common basis for comparing the remedial alternatives in the FS and provides a reasonable estimate of anticipated project costs. This appendix summarizes the primary cost assumptions used to complete the estimates for all alternatives, including background on methodology (Section 2), assumptions for estimating construction timeframes (Section 3), a summary of the estimated costs for remedial alternatives (Section 4).

The FS cost estimate contains six tables that are organized as follows:

- Table 1 provides the unit costs for each line item used in the cost estimate and a summary of the basis for each.
- Table 2 presents the production rates and daily cost assumptions behind the unit costs estimates for dredging and placement activities.
- Table 3 presents the monitoring and sampling costs for the alternatives based on the monitoring quantities in Appendix G.
- Table 4 presents the assumption for the construction timeframe calculation for the alternatives.
- Table 5 presents the quantities and costs for the alternatives.
- Table 6 provides an overall summary of the total cost for each alternative.

2 COST ESTIMATING METHODS AND ASSUMPTIONS

The cost estimate was developed by determining the cost items associated with remediation for each of the remedial alternatives, estimating unit costs for these items, and multiplying these unit costs by quantities for each alternative. In developing unit costs, a number of assumptions were made to define the scope of particular unit costs; Table 1 presents the unit costs and the basis for each. The following sources of information were used to estimate unit costs:

- Bids and construction estimates for recent sediment remediation projects
- Best professional judgment based on past experience with similar remedial actions and associated pricing
- Local marine contractor input

In particular, this cost estimate draws heavily from review of recent bid and estimate costs in the greater Pacific Northwest region, where a number of similar sediment remediation projects are currently, or were recently, in design or under construction. Unit costs in Table 1 rely primarily on review of the projects in the following bullets, with the final unit cost determined using the best professional judgement of remediation engineers with knowledge of the EW site. Citations are included for sites with publicly available cost information.

- Lower Duwamish Waterway Feasibility Study. Duwamish River, Seattle, Washington (AECOM 2012)
- Jorgenson Forge Sediment Remediation. Duwamish River, Seattle, Washington (Anchor QEA project experience)
- Slip 4 Early Action Area Cleanup. Duwamish River, Seattle, Washington
- Puget Sound Naval Shipyard Activated Carbon Sediment Amendment Installation. Sinclair Inlet, Bremerton, Washington (Johnston et al. 2013)
- Port of Seattle Terminal 18 (T-18) Maintenance Dredging Project. Seattle, Washington (Anchor QEA project experience)
- Port of Bellingham Whatcom Waterway Remediation. Bellingham Bay, Bellingham, Washington (Anchor QEA project experience)
- Port of Olympia Interim Action Marine Terminal Berth Remediation. Budd Inlet, Olympia, Washington (Anchor QEA project experience)

- Former Scott Mill Sediment Remediation. Anacortes, Washington (Anchor QEA project experience)
- Port of Vancouver Alcoa Facility Sediment Remediation. Vancouver, Washington (Anchor QEA project experience)
- Port of Portland Terminal 4 Sediment Remediation. Lower Willamette River, Portland, Oregon (Anchor QEA project experience)
- Esquimalt Graving Dock Waterlot Remediation Project, Esquimalt Harbour, Esquimalt, British Columbia (Anchor QEA project experience)

The following sections summarize specific key assumptions used to develop individual line items or sections of the cost estimate. Table 1 provides the basis for all unit costs.

2.1 Mobilization, Demobilization, and Other Pre-construction Activities

Mobilization and demobilization include bringing equipment and personnel to the site (mobilization) or removing equipment and personnel (demobilization) to complete the remedial action. This item is assumed to include mobilization and demobilization of removal and placement operations barges, equipment preparation, transload facility, upland equipment, ancillary equipment, procedural costs, insurance, and bonding. Because the scope of unrestricted (i.e., open water) dredging is similar for all remedial alternatives, the base mobilization/demobilization costs are assumed to be the same for all alternatives.

There is currently one sediment transload facility available near the EW that is located on the Lower Duwamish Waterway (LDW); however, the availability of this transload facility is not assured in the future. This cost estimate assumes that the construction and permitting of a transload facility prior to dredging would be a reasonable, cost-effective approach for this project. This approach would also include costs prior to each construction season to maintain or remobilize the transload facility and renew permits. Tasks involved in developing a new transload facility could include land lease or land purchase, permitting, transload crane, temporary containment vault, water treatment system, amendment delivery system, container loading area (truck or rail), and rail spur or container transload area, depending on the location of the site developed for transloading. If an existing transload facility is used, then the total transload and disposal costs are expected to be similar to those

in the FS cost estimate. In this case, the mobilization costs would go down because the transload facility would not need to be constructed specifically for the EW cleanup, but the unit transloading costs would go up to incorporate up-front costs to the entity owning/operating the transload facility for mobilization, permitting, and land lease.

Seasonal construction mobilization/demobilization costs were applied for each year of construction. Therefore, costs are higher for alternatives with more construction seasons. Additional mobilization/demobilization costs were applied to two specific remedial actions: underpier hydraulic dredging, and dredging under the West Seattle Bridge. Diver-assisted hydraulic dredging would require the mobilization of specialized equipment, personnel, and dewatering facilities. Dredging under the West Seattle Bridge would incur additional costs to address access from the uplands and mobilizing smaller equipment capable of working in the limited access area. These were applied to project costs on a construction-season basis (i.e., annually).

Additional pre-construction activities include the preparation of staging areas, stockpile areas, implementation of site controls, land lease, project management labor, office setup, and preparation of pre-construction submittals. These additional mobilization costs were also applied to project costs annually.

2.2 Removal

The unit costs for sediment removal (cost per cubic yard) were estimated based on the sediment removal rates (cubic yards per day) and daily costs (cost per day) associated with construction, as developed in Table 2. For the purpose of providing appropriate unit cost rates, three types of removal scenarios were considered: one for dredging in unrestricted areas (open water), one for dredging under the West Seattle Bridge, and one for diver-assisted hydraulic dredging. The costs for dredging in unrestricted areas were based on recent bids for similar work. The area under the West Seattle Bridge cannot be accessed from the water, but all equipment and materials must be mobilized from the upland. The dredging rate was calculated based on open-water dredging rates, adjusted assuming that the dredge would be used to remove contaminated sediment and to load trucks. The dredging rate also accounts for limited equipment access, limited space for maneuvering equipment,

and cost for truck delivery to the transload area. The costs for diver-assisted hydraulic dredging under piers could be highly variable and were estimated based on discussions with local divers and project experience on other projects. Diver-assisted hydraulic dredging in deep water (e.g., 50 feet) is not commonly performed. Costs are difficult to estimate because there are few project examples to reference. Diver-assisted hydraulic dredging was conducted for the Esquimalt Graving Dock Waterlot Remediation Project in Esquimalt, British Columbia, in 2013 to 2014. This dredging occurred in about 20 feet of open water (not underpier). Costs were approximately $1,100/cy. Few other diver-assisted dredging projects have been recently completed in the northwest. Uncertainties around the costs for diver-assisted hydraulic dredging are driven by uncertainty in conditions under piers (e.g., debris), working durations and conditions for divers, treating large quantities of water, and effectiveness of hydraulic dredging equipment.

Water management is a key cost consideration for removal operations, as varying containment and treatment methods can significantly affect final costs and production rates. The cost estimate assumes that dewatering for mechanically dredged material (i.e., material from unrestricted dredging areas) would be performed using gravity to pass water through specified passive filter material and returning water to the dredging area. Gravity dewatering is facilitated through the use of temporary holding barges equipped with weirs or ballasts and filtration systems. Water generated during the dewatering is typically discharged to receiving waters directly after settling and filtration (see Section 7.5.1.1). This method was recently used during maintenance dredge activities for contaminated sediment along T-18 in the EW and was able to meet water quality standards. If water quality standards cannot be achieved using filtration, then alternative treatment methods will need to be considered during remedial design or construction. For the large quantities of water generated by diver-assisted hydraulic dredging, water will likely need to be treated by a water treatment system installed on a barge or in the uplands. Treated water would be returned to the waterway. Water management costs for mechanical dredging are assumed to be part of unit costs for dredging; water treatment costs for hydraulic dredging are included as a separate line item and are based on recent local construction experience and discussions with contractors, considering the conditions of the EW (e.g., deep water, the need for barge-mounted equipment).

Transloading, transportation, and disposal costs are based on recent project costs in Seattle, Washington. Transportation to the disposal facility would occur by rail car directly from the transloading facility to a facility permitted to receive contaminated sediment.

2.3 Material Placement

Material placement activities include placement materials required for engineered cap, dredging residuals management cover (RMC), dredge backfill to restore elevations in required locations, enhanced natural recovery (ENR), and in situ treatment. Unit costs for furnishing materials include costs for sand (cap isolation material, RMC, backfill, and ENR), gravel (cap filter material), cap armor (assumed to be 6-inch stone), and in situ treatment material (assumed to be a mixture of powdered activated carbon, binding material, and a substrate material such as sand or gravel). Unit costs for material acquisition are based on recent bids and discussions with local suppliers (e.g., CalPortland).

Placement of materials is assumed to occur with dredging equipment in open-water areas, and with other techniques such as a Telebelt in restricted access areas (e.g., under piers and low bridges). The assumptions used to develop the unit costs for placement are provided in Table 2 and are consistent with recent bids. Unit costs for placement in restricted areas are based on the recent underpier in situ treatment pilot study at Bremerton Naval Shipyard (Johnston et al. 2013).

2.4 Contingency, Management, Oversight, and Non-construction Costs

The assumptions for contingency, management, oversight, and non-construction costs are shown in Table 1.

EPA FS cost guidance (EPA 2000) suggests that contingency be factored into a cost estimate to cover unknowns, unforeseen circumstances, and unanticipated conditions reducing the overall risk of cost overruns. For this project, 30% has been applied to the construction costs to cover potential scope and bid contingency costs. This value is in the mid-range of the values specified in the EPA cost guidance document (EPA 2000), is a typical conceptual-level contingency for similar projects.

Pre-construction costs include remedial design (including sampling) and permitting, pre-construction baseline monitoring, project management, and agency review and oversight. Design and permitting are estimated to be 5% of the total construction costs. Pre-construction baseline sampling costs are based on the sampling scope and unit costs provided in Table 3. The basis for the monitoring scope is addressed in Appendix G. Project management is assumed to be 1% of the total construction costs, and agency review and oversight are estimated to be $500,000/year.

Indirect construction costs during construction include construction management support, environmental compliance, project management, and agency review and oversight and are estimated based on project experience and best professional judgement. Construction management support is estimated to be 10% of total construction costs. Water quality monitoring is based on estimated costs per construction day. Confirmational sampling is based on alternative-specific assumptions in Table 3. Project management is estimated to be 4% of the total construction costs, and agency review and oversight are estimated to be $500,000/year during this phase of the project.

Post-construction costs include operations and maintenance and long-term monitoring costs, costs for potential adaptive management actions (contingency remedial actions), project management, and agency review and oversight. Costs for operations and maintenance and long-term monitoring are based on alternative-specific estimates in Table 3. Costs for adaptive management are based on per-acre unit costs for remediation, roughly equivalent to dredging unit capital costs either in open-water or underpier areas. Contingency remediation is assumed to be needed in 15% of MNR, ENR, and in situ treatment areas. Project management is estimated to be 1% of the total construction costs, and agency review and oversight costs are estimated to be $120,000/year during this phase of the project (equivalent to $200,000/year during 5-year reviews and $100,000 between 5-year reviews).

3 CONSTRUCTION TIMEFRAME

Construction timeframe was calculated as part of this cost estimate to determine applicable durations for project elements (Table 4). The construction timeframe was calculated for six separate construction activities based on varying production rates, including the following:

- Removal
  - Open water (unrestricted access)
  - Limited access (under the West Seattle Bridge)
  - Underpier (diver-assisted hydraulic dredging)
- Placement
  - Open-water sand or gravel (applies to engineered cap isolation and filter layers, dredge backfill, ENR)
  - Open-water engineered cap armor layer material
  - Restricted access (underpier and low bridges; in situ treatment or ENR)
  - Open-water residual management cover (assumed to occur after dredging)

For each of these areas, the total number of construction days was calculated based on the volumes to be removed or placed for each alternative and an estimated production rate for each activity. The estimated production rates include an efficiency factor of 70% that accounts for project downtime due to weather delays, equipment maintenance or repair, water quality exceedances, or other reasons (Table 2). The total number of construction days was estimated assuming that one open-water operation, one underpier operation, and one restricted access operation would occur concurrently. Following several seasons of removal, this construction timeframe estimate assumes that placement operations (capping, ENR, or in situ treatment) would happen concurrently with dredging operations, with sufficient distance and controls to avoid contamination from dredging residuals (e.g., if dredging operations start in the south part of the site and move northward, then capping could occur in the south portion of the site while dredging occurs in the north portion of the site). However, the ability to perform concurrent operations while limiting recontamination of placed material is a source of uncertainty in this construction timeframe estimate. Finally, residuals management placement is assumed to occur following all dredging and other

placement operations. Detailed phasing for the EW cleanup will be determined in remedial design.

The number of construction seasons was estimated at 100 work days per season. This corresponds to an approximate construction season (i.e., fish window) from October 1 through February 15, with holidays and weekends removed, assuming a mix of 5- and 6-day work weeks (12-hour days) to allow some contractor flexibility. Estimated construction times range from 8 to 12 years for the alternatives.

If the construction season was expanded to the Elliott Bay in-water construction window that formally applies in the EW from July 16 to February 15, the upper end of the number of work days in a construction season could increase up to around 150 days per season; however, the construction rate is expected to be slower during this time due to potential delays from active tribal fisheries. The extended construction window is estimated to reduce the total number of years of construction by about two construction seasons, consistently across the action alternatives (Table 4). Reducing the number of construction years has a small impact on costs because the number of total construction days would remain unchanged. Annual costs (e.g., annual mobilization and demobilization) would be reduced by about 20%, and all other costs would remain the same.

4 SUMMARY AND ACCURACY

Table 5 presents the detailed costs and Table 6 summarizes the total costs for the remedial alternatives. Costs for the action alternatives range from approximately $256 to $435 million, and are provided in 2016 dollars. Total costs include all contractor costs to complete construction, sales tax, contingency, and allowances for engineering design, permitting, construction monitoring, and agency review.

The *Guide to Developing and Documenting Cost Estimates during the Feasibility Study* (EPA 2000) recommends that a discount rate of 7% be used for estimating the net present value of cleanups conducted by non-federal parties. The present value is the amount of money that would need to be set aside at an initial point in time so that funds for implementing cleanup would be available in the future. The real discount rate approximates the marginal pre-tax rate of return on average investment adjusted to eliminate the effect of expected inflation. The net present value costs are not appropriate for the EW cleanup for the following two reasons:

1. First, three of the potentially responsible parties are public entities and have different capital costs than the private sector. Public entities may not be able to set aside sufficient funds for investment without incurring additional costs of bonding or borrowing and, therefore, would not be able to take advantage of the interest accumulation assumption implied by the net present value calculation.
2. Second, the lending environment has changed significantly since the EPA guidance was published in 2000. The current recommendations in the Office of Management and Budget Circular A-94 Appendix C, revised November 2016, indicates that the discount rate ranges from -0.5% for a 3-year investment to 0.7% for a 30-year investment.

Because many of the entities involved in the EW cleanup are public and the current discount rate is low, a 0% discount rate is appropriate to use for comparing the EW remedial alternatives in this FS. This approach is consistent with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance that allows for calculation of project-specific net present value calculations. In this case, the net present value cost is equal to the non-discounted cost (0% discount rate).

The costs provided represent the best estimate total costs for the proposed EW remedial alternatives. The major uncertainties between the cost estimate and the eventual actual cleanup costs include the following:

- Changes in the scope of cleanup due to additional characterization (e.g., changes to dredging volume)
- Changes in the scope of cleanup due to changes in remedial approach or adaptive management (e.g., ENR is considered viable in a larger area)
- Changes in unit costs due to changes in acceptable remediation practices (e.g., changes to dewatering or transloading practices)
- Changes in unit costs due to changes in economic conditions (e.g., cost of fuel, availability of contractors)
- Changes in unit costs due to changes in the rate of construction (e.g., additional delays from working around shipping vessels, or tribal fishing vessels associated with salmon runs. The latter may trigger additional standby costs if work is halted entirely while tribal fishing is conducted within the EW)
- Additional costs that were not considered for this FS, such as economic disruption to the Port of Seattle and fisheries mitigation

EPA guidance, according to CERCLA requirements, notes that the amount and quality of remedial investigation data needed to develop and scope remedial alternatives correspond to an expected accuracy for FS cost estimates of approximately –30 to +50% (EPA 2000). Costs provided within this appendix are intended to fall within this range of accuracy.

5 REFERENCES

AECOM, 2012. Feasibility Study, Lower Duwamish Waterway, Seattle, Washington. Final Report. Prepared for Lower Duwamish Waterway Group. October 2012.

EPA (U.S. Environmental Protection Agency), 2000. A Guide to Developing and Documenting Cost Estimates during the Feasibility Study. July 2000.

Johnston, R.K., V.J. Kirtay, D.B. Chadwick, G.H. Rosen, J.M. Guerrero, J. Collins, C. Ortega, R. Webb, R. May, J. Germano, D. Browning, E. Beaver, M. Wicklein, J. Pittz, D.E. Leisle, L. Doyle, and L. Hsu. Installing an Activated Carbon Sediment Amendment at the Puget Sound Naval Shipyard & Intermediate Maintenance Facility, Bremerton, WA. 2013.

TABLES

Table 1
Unit Costs

Item No.	Item Description	Unit Cost (2016)	Unit	Unit Cost Notes
Pre-construction				
1	**Mobilization/Demobilization**			
1a	Mobilization/Demobilization	$ 700,000	Annual	Includes mobilization and demobilization of removal and placement operations, barges, equipment preparation, ancillary equipment, and procedural costs. Equivalent to approximately 20 days of mobilization and 15 days of demobilization (assuming daily costs of 75% of the daily costs during dredging [Table 3]).
1b	Initial Transload Site Setup	$ 1,000,000	Project	Costs would be variable depending on the transload site selected and the design approach. Costs could include land lease or land purchase, permitting, transload crane, temporary containment vault, water treatment system, amendment delivery system, container loading area (truck or rail), and rail spur or container transload area.
1c	Annual Transload Site Setup and Maintenance (After Initial)	$ 500,000	Annual	Costs would be variable depending on the transload site selected and the design approach. Costs could include land lease, permit renewals, equipment setup and maintenance (crane, vault, water treatment, amendment delivery, and truck and rail routes), and demobilization (decontamination and deconstruction).
1d	Mobilization/Demobilization for Underpier Dredging Equipment	$ 250,000	Annual	Includes hydraulic dredge, water treatment facility, and diving equipment. Applied to each year that underpier dredging occurs.
1e	Mobilization/Demobilization for Equipment to Dredge under the West Seattle Bridge	$ 500,000	Annual	Includes mobilization and demobilization of limited access equipment from the uplands, development of a truck loading area under the West Seattle Bridge, and a cost to shutdown the bridge and reroute traffic. Applied to each year that dredging under the West Seattle Bridge occurs.
2	**Pre-construction Activities**			
2a	Pre-construction activities	$ 100,000	Annual	Preparation of staging areas, stockpile areas, implementation of site controls, preparation of pre-construction submittals. Applied to each construction season.
Construction				
3	**Removal, Dewatering, Offloading, and Disposal**			
3a	Open-water Dredging	$ 27	cy	Based on the production rate and daily costs presented in Table 3. The cost per cubic yard includes all equipment and labor necessary for dredging and dewatering.
3b	Restricted Access Dredging (Under West Seattle Bridge)	$ 119	cy	Based on the production rate and daily costs presented in Table 3. The cost per cubic yard includes all equipment and labor necessary for dredging and dewatering. Costs account for limited equipment access, limited space for maneuvering equipment, and cost for trucking to rail (as opposed to barge transportation).
3c	Diver-Assisted Hydraulic Dredging (Underpier)	$ 600	cy	Based on the production rate and daily costs presented in Table 3 developed from contractor input and best professional judgement. EW project conditions including deep water, limited access, and presence of rip rap. This item presents a high uncertainty (recent Anchor QEA project experience shows costs could be as high as $1,100/cy). The cost per cubic yard includes all equipment and labor necessary for dredging. Water treatment is not included.
3d	Water Treatment (Underpier Hydraulic Dredging)	$ 400	cy	Cost based on discussions with contractors involved with water treatment on the LDW, with consideration of specific needs for the EW (barge mounted treatment system and additional barges for surge capacity). With the estimated hydraulic dredging fraction of 10% sediment, 90% water by volume, the unit cost equals $0.22/gallon of water.
3e	Transload, Transportation and Disposal	$ 70	Ton	Cost includes material transfer from barge onto offloading area, water management at transloading facility, load dewatered sediment onto truck with containers, truck transport to rail facility, rail transport to the Subtitle D landfill, offloading of sediments from railcars at Subtitle D landfill. Assume 1.5 ton/cy. Costs based on recent project experience. Costs do not include mobilization, permitting and construction of the transload facility.

Table 1
Unit Costs

Item No.	Item Description	Unit Cost (2016)	Unit	Unit Cost Notes
4	**Pile Removal and Disposal**	$ 1,000	Each	Includes removal and disposal. Based on recent project experience.
5	**Engineered Capping and Residuals Management Cover**			
5a	Furnish Sand	$ 20	cy	Based on recent project experience, cost estimates and CalPortland pricing. Applies to Engineered Cap Isolation Layer, Backfill, RMC, and ENR in open-water areas. Material costs are based on the purchase from local or regional quarries. Unit costs include the cost and transportation of the material.
5b	Furnish Gravel	$ 20	cy	Based on recent project experience, cost estimates and CalPortland pricing. Applies to Engineered Cap Filter Layer. Material costs are based on the purchase from local or regional quarries. Unit costs include the cost and transportation of the material.
5c	Furnish Armor Material	$ 35	cy	Based on recent project experience, cost estimates and CalPortland pricing. Applies to Engineered Cap Armor Layer. Material costs are based on the purchase from local or regional quarries. Unit costs include the cost and transportation of the material.
5d	Furnish In situ Treatment Material (AquaGate+PAC^{TM})	$ 500	cy	Consistent with recent pilot study at the Puget Sound Naval Shipyard in Bremerton, WA. This pilot study was completed using the AquaGate+PAC^{TM} composite aggregate system. Transportation was not factored into the unit cost to account for an assumed cost reduction for a full-scale application.
5e	Place Sand - Unrestricted Access	$ 26	cy	Based on the production rate and daily costs presented in Table 3. The cost per cubic yard includes all equipment and labor necessary for placement and material handling.
5f	Place Gravel - Unrestricted Access	$ 26	cy	Based on the production rate and daily costs presented in Table 3. The cost per cubic yard includes all equipment and labor necessary for placement and material handling.
5g	Place Armor Material - Unrestricted Access	$ 43	cy	Based on the production rate and daily costs presented in Table 3. The cost per cubic yard includes all equipment and labor necessary for placement and material handling.
5h	Place in situ Material in Difficult to Access Areas - Underpier	$ 400	cy	Based on production rate consistent with recent pilot study at the Puget Sound Naval Shipyard in Bremerton, WA. This pilot study was completed using the AquaGate+PAC^{TM} composite aggregate system. See Table 3.
5i	Place ENR Material in Difficult to Access Areas - Low Bridge	$ 400	cy	Based on production rate consistent with recent pilot study at the Puget Sound Naval Shipyard in Bremerton, WA. See Table 3.
6	**Surveys and Monitoring**			
6a	**Payment Surveys**	$ 40,000	Site-wide Event	East Waterway Group project experience. Assume one event before and after each construction season.
6b	Contractor daily progress surveys	$ 2,500	Day	Based on recent project experience and cost estimates.
7	**Sales Tax and Contingency**			
7a	Sales Tax	9.5%	--	Percent of subtotal of pre-construction costs and construction base costs.
7b	Contingency	30%	--	Percent of construction costs. Typical Conceptual-level Contingency; mid-range of EPA FS Cost Guidance for contingency. Percent of pre-construction, construction, and tax.

Table 1
Unit Costs

Item No.	Item Description	Unit Cost (2016)	Unit	Unit Cost Notes
Indirect Construction Costs				
8	**Pre-construction**			
8a	Design and Permitting	5%	--	Percent of construction costs. Typical Conceptual-level Contingency; mid-range of EPA FS Cost Guidance for contingency. Percent of pre-construction, construction, and tax. Includes sampling during remedial design.
8b	Pre-Construction Base-line Monitoring	Alternative-specific	Lump Sum	See Table 4 and Appendix E.
8c	Project Management (Owners)	1%	--	Percent of construction costs.
8d	Agency Review and Oversight	$ 500,000	Annual	Assume 3 years for pre-construction activities.
9	**During Construction**			
9a	Construction Management Support	10%	--	Percent of construction costs. Typical Conceptual-level Contingency; mid-range of EPA FS Cost Guidance for contingency. Percent of pre-construction, construction, and tax.
9b	**Environmental Compliance**			
9bi	Water Quality Monitoring	$ 3,000	Day	Includes labor, equipment, materials, and analytical testing. Analytical cost: assume four monitoring stations approx. 30% of field screening samples required for chemical analysis.
9bii	Confirmational Sampling	Alternative-specific	Lump Sum	See Table 4 and Appendix E.
9c	Project Management (Owners)	4%	--	Percent of construction costs.
9d	Agency Review and Oversight	$ 500,000	Annual	Annually during construction.
10	**Post-construction Costs**			
10a	Operations and Maintenance and Long Term Monitoring 1 through 20 years post-construction	Alternative-specific	Lump Sum	See Table 4 and Appendix E.
10b	Contingency Remediation (Adaptive Management) - Open Water	$ 1,100,000	Acre	Capitol cost for dredging open water without contingencies, design, project management, etc. Assume adaptive management required over 15% of ENR areas. Based on an average neatline dredge depth of 3.5 feet and the unit costs for dredging and disposal.
10c	Contingency Remediation (Adaptive Management) - Underpier and Low Bridge	$ 4,100,000	Acre	Approximate capitol cost for dredging under piers without contingencies, design, project management, etc. Assume adaptive management required over 15% of MNR, ENR, and in situ treatment areas. Based on an average dredge depth of 2.3 feet and the unit costs for dredging, water management and disposal.
10d	Project Management (Owners)	1%	--	Percent of construction costs.
10e	Agency Review and Oversight	$ 120,000	Annual	Assume 25 years for post-construction activities. Equivalent to $200,000/yr during 5-year reviews and $100,000/yr between 5-year reviews.

Table 2
Unit Cost Assumptions for Dredging and Material Placement

Parameter	Unit	Open-water Dredging	Restricted Access Dredging (West Seattle Bridge)	Diver-Assisted Underpier Hydraulic Dredging	Sand and Gravel Placement	Armor Placement	Underpier Placement
Unit Cost Calculation							
Production Rate	cy/day	1,100	270	40	940	560	60
Daily Cost	/day	$30,000	$24,000	$24,000	$24,000	$24,000	$24,000
Additional Trucking Cost (to Rail Facility)	/cy	$0	$30	$0	$0	$0	$0
Cost per Unit Dredge Volume	**/cy**	**$27**	**$119**	**$600**	**$26**	**$43**	**$400**
Production Rate Calculation							
Cycle Time	min	2.50	3.00	n/a	1.50	2.50	n/a
Bucket Capacity	cy	8	4	n/a	4	4	n/a
Effective Bucket Capacity	%	70%	70%	n/a	70%	70%	n/a
Effective Bucket Capacity	cy	5.6	2.8	n/a	2.8	2.8	n/a
Shift Duration	hrs	12	12	n/a	12	12	n/a
Work Day	shift/day	1	1	n/a	1	1	n/a
Efficiency	%	70%	40%	n/a	70%	70%	n/a
Daily Production	cy	1,129	269	n/a	941	564	n/a
Daily Production (rounded)	**cy**	**1,100**	**270**	**40**	**940**	**560**	**60**
Daily Rate Calculation							
Daily Cost - Equipment							
Dredge or Telebelt	/day	$9,000	$6,500	$10,000	$6,500	$6,500	$6,500
Tug	/day	$5,000	$5,000	n/a	$5,000	$5,000	$5,000
Barge(s)	/day	$5,000	$2,500	n/a	$2,500	$2,500	$2,500
Work Boat	/day	$1,500	$1,500	n/a	$1,500	$1,500	$1,500
Front-end loader	/day	$800	$800	n/a	$800	$800	$800
Diving Equipment and Boats	/day	n/a	n/a	$3,500	n/a	n/a	n/a
Total - Equipment	/day	$21,300	$16,300	$13,500	$16,300	$16,300	$16,300
Fuel, Oil and Grease (FOB; 20%)	/day	$4,260	$3,260	$2,700	$3,260	$3,260	$3,260
Total - Equipment + FOB	**/day**	**$25,560**	**$19,560**	**$16,200**	**$19,560**	**$19,560**	**$19,560**
Daily Cost - Labor							
Superintendent	/day	$700	$700	$700	$700	$700	$700
Operator Foreman	/day	$680	$680	n/a	$680	$680	$680
Dredge Operator	/day	$600	$600	n/a	$600	$600	$600
Deck Hands - Dredge	/day	$1,200	$1,200	n/a	$1,200	$1,200	$1,200
Tug Operator	/day	$600	$600	n/a	$600	$600	$600
Deck Hand - Tug	/day	$600	$600	n/a	$600	$600	$600
Divers and Diver Support (6 Crew Members)	/day	n/a	n/a	$6,600	n/a	n/a	n/a
Total - Labor	**/day**	**$4,380**	**$4,380**	**$7,300**	**$4,380**	**$4,380**	**$4,380**
Grand Total Labor + Equipment	**/day**	**$29,940**	**$23,940**	**$23,500**	**$23,940**	**$23,940**	**$23,940**
Grand Total Labor + Equipment (rounded)	**/day**	**$30,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**	**$24,000**

Notes:
1. Unit cost assumptions based on engineering cost estimate methodology and bids on recent projects.

cy - cubic yard
hrs - hours
min - minute
n/a - not applicable

Table 3
Monitoring Costs

Unit Cost Estimates

Alternative	SAP and Data Report (All Analyses)	Surface Sediment	Porewater	Cores	Tissue	Surface Water	Bathymetric Survey and Physical Inspections
Analytical, data validation, data management	n/a	$1,778	$2,375	$7,112	$1,601	$380	n/a
Samples/day	n/a	10	4	6	4	4	n/a
Mob/ demob/ equipment/ reporting	$100,000	$7,500	$30,500	$2,000	$1,000	$0	$40,000
Sampling cost/day	n/a	$3,300	$3,300	$3,750	$3,300	$3,300	n/a

Note:

1. Unit cost estimates developed from recent Anchor QEA project experience.

Total Quantities and Costs by Event

	Sample Quantity							Cost				
										Sampling		
Alternative	SAP and Data Report (All Analyses)	Surface Sediment	Porewater	Cores	Tissue	Surface Water	Bathymetric Survey and Physical Inspections	Analytical, Data Validation, and Data Management Costs	Mobilization, Demobilization, Equipment, and Reporting Costs	Sampling Days	Sampling Cost	Total Cost
Pre-construction Baseline Sampling												
No Action	0	0	0	0	0	0	0	$0	$0	0	$0	$0
1A(12)	1	62	0	0	20	8	1	$145,280	$148,500	13	$43,560	$337,340
1B(12)	1	62	13	13	20	8	1	$268,606	$181,000	19	$62,410	$512,016
1C+(12)	1	62	13	13	20	8	1	$268,606	$181,000	19	$62,410	$512,016
2A(12)	1	58	0	0	20	8	1	$138,168	$148,500	13	$42,240	$328,908
2B(12)	1	58	13	13	20	8	1	$261,494	$181,000	18	$61,090	$503,584
2C(12)	1	57	11	11	20	8	1	$240,743	$181,000	17	$57,860	$479,603
2C+(12)	1	58	13	13	20	8	1	$261,494	$181,000	18	$61,090	$503,584
3B(12)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3C+(12)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3D(12)	1	50	0	0	20	8	1	$123,945	$148,500	12	$39,600	$312,045
2C+(7.5)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3C+(7.5)	1	54	13	13	20	8	1	$254,382	$181,000	18	$59,770	$495,152
3E(7.5)	1	54	13	13	20	8	1	$254,382	$181,000	18	$59,770	$495,152
2C+(5.0)	1	58	14	14	20	8	1	$270,981	$181,000	19	$62,540	$514,521
3D(5.0)	1	49	0	0	20	8	1	$122,167	$148,500	12	$39,270	$309,937
3E(5.0)	1	56	14	14	20	8	1	$267,425	$181,000	18	$61,880	$510,305

Table 3
Monitoring Costs

Alternative	Sample Quantity							Cost				
										Sampling		
	SAP and Data Report (All Analyses)	Surface Sediment	Porewater	Cores	Tissue	Surface Water	Bathymetric Survey and Physical Inspections	Analytical, Data Validation, and Data Management Costs	Mobilization, Demobilization, Equipment, and Reporting Costs	Sampling Days	Sampling Cost	Total Cost
Confirmational Sampling												
No Action	0	0	0	0	0	0	0	$0	$0	0	$0	$0
1A(12)	1	62	0	0	0	8	1	$113,266	$147,500	8	$27,060	$287,826
1B(12)	1	62	13	13	0	8	1	$236,592	$180,000	14	$45,910	$462,502
1C+(12)	1	62	13	13	0	8	1	$236,592	$180,000	14	$45,910	$462,502
2A(12)	1	58	0	0	0	8	1	$106,154	$147,500	8	$25,740	$279,394
2B(12)	1	58	13	13	0	8	1	$229,480	$180,000	13	$44,590	$454,070
2C(12)	1	57	11	11	0	8	1	$208,729	$180,000	12	$41,360	$430,089
2C+(12)	1	58	13	13	0	8	1	$229,480	$180,000	13	$44,590	$454,070
3B(12)	1	56	13	13	0	8	1	$225,924	$180,000	13	$43,930	$449,854
3C+(12)	1	56	13	13	0	8	1	$225,924	$180,000	13	$43,930	$449,854
3D(12)	1	50	0	0	0	8	1	$91,931	$147,500	7	$23,100	$262,531
2C+(7.5)	1	56	13	13	0	8	1	$225,924	$180,000	13	$43,930	$449,854
3C+(7.5)	1	54	13	13	0	8	1	$222,368	$180,000	13	$43,270	$445,638
3E(7.5)	1	55	13	13	0	8	1	$224,146	$180,000	13	$43,600	$447,746
2C+(5.0)	1	58	14	14	0	8	1	$238,967	$180,000	14	$46,040	$465,007
3D(5.0)	1	49	0	0	0	8	1	$90,153	$147,500	7	$22,770	$260,423
3E(5.0)	1	56	14	14	0	8	1	$235,411	$180,000	13	$45,380	$460,791
Operations and Maintenance Monitoring and Long-term Monitoring												
Year 1												
No Action	1	39	0	0	0	0	0	$69,338	$107,500	4	$12,870	$189,708
1A(12)	1	62	0	0	20	8	1	$145,280	$148,500	13	$43,560	$337,340
1B(12)	1	62	13	13	20	8	1	$268,606	$181,000	19	$62,410	$512,016
1C+(12)	1	62	13	13	20	8	1	$268,606	$181,000	19	$62,410	$512,016
2A(12)	1	58	0	0	20	8	1	$138,168	$148,500	13	$42,240	$328,908
2B(12)	1	58	13	13	20	8	1	$261,494	$181,000	18	$61,090	$503,584
2C(12)	1	57	11	11	20	8	1	$240,743	$181,000	17	$57,860	$479,603
2C+(12)	1	58	13	13	20	8	1	$261,494	$181,000	18	$61,090	$503,584
3B(12)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3C+(12)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3D(12)	1	50	0	0	20	8	1	$123,945	$148,500	12	$39,600	$312,045
2C+(7.5)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3C+(7.5)	1	54	13	13	20	8	1	$254,382	$181,000	18	$59,770	$495,152
3E(7.5)	1	55	13	13	20	8	1	$256,160	$181,000	18	$60,100	$497,260
2C+(5.0)	1	58	14	14	20	8	1	$270,981	$181,000	19	$62,540	$514,521
3D(5.0)	1	49	0	0	20	8	1	$122,167	$148,500	12	$39,270	$309,937
3E(5.0)	1	56	14	14	20	8	1	$267,425	$181,000	18	$61,880	$510,305

Table 3
Monitoring Costs

Alternative	Sample Quantity							Cost				
										Sampling		
	SAP and Data Report (All Analyses)	Surface Sediment	Porewater	Cores	Tissue	Surface Water	Bathymetric Survey and Physical Inspections	Analytical, Data Validation, and Data Management Costs	Mobilization, Demobilization, Equipment, and Reporting Costs	Sampling Days	Sampling Cost	Total Cost
Year 3												
No Action	0	0	0	0	0	0	0	$0	$0	0	$0	$0
1A(12)	1	31	0	0	20	0	0	$87,129	$108,500	8	$26,730	$222,359
1B(12)	1	31	13	13	20	0	0	$210,455	$141,000	14	$45,580	$397,035
1C+(12)	1	31	13	13	20	0	0	$210,455	$141,000	14	$45,580	$397,035
2A(12)	1	23	0	0	20	0	0	$72,906	$108,500	7	$24,090	$205,496
2B(12)	1	23	13	13	20	0	0	$196,232	$141,000	13	$42,940	$380,172
2C(12)	1	21	11	11	20	0	0	$173,703	$141,000	12	$39,380	$354,083
2C+(12)	1	23	13	13	20	0	0	$196,232	$141,000	13	$42,940	$380,172
3B(12)	1	19	13	13	20	0	0	$189,120	$141,000	12	$41,620	$371,740
3C+(12)	1	19	13	13	20	0	0	$189,120	$141,000	12	$41,620	$371,740
3D(12)	1	6	0	0	20	0	0	$42,681	$108,500	6	$18,480	$169,661
2C+(7.5)	1	23	13	13	20	0	0	$196,232	$141,000	13	$42,940	$380,172
3C+(7.5)	1	19	13	13	20	0	0	$189,120	$141,000	12	$41,620	$371,740
3E(7.5)	1	20	13	13	20	0	0	$190,898	$141,000	12	$41,950	$373,848
2C+(5.0)	1	24	14	14	20	0	0	$207,496	$141,000	13	$44,720	$393,216
3D(5.0)	1	6	0	0	20	0	0	$42,681	$108,500	6	$18,480	$169,661
3E(5.0)	1	20	14	14	20	0	0	$200,384	$141,000	13	$43,400	$384,784
Years 5, 10, 15, and 20												
No Action	1	39	0	0	0	0	0	$69,338	$107,500	4	$12,870	$189,708
1A(12)	1	62	0	0	20	8	1	$145,280	$148,500	13	$43,560	$337,340
1B(12)	1	62	13	13	20	8	1	$268,606	$181,000	19	$62,410	$512,016
1C+(12)	1	62	13	13	20	8	1	$268,606	$181,000	19	$62,410	$512,016
2A(12)	1	58	0	0	20	8	1	$138,168	$148,500	13	$42,240	$328,908
2B(12)	1	58	13	13	20	8	1	$261,494	$181,000	18	$61,090	$503,584
2C(12)	1	57	11	11	20	8	1	$240,743	$181,000	17	$57,860	$479,603
2C+(12)	1	58	13	13	20	8	1	$261,494	$181,000	18	$61,090	$503,584
3B(12)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3C+(12)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3D(12)	1	50	0	0	20	8	1	$123,945	$148,500	12	$39,600	$312,045
2C+(7.5)	1	56	13	13	20	8	1	$257,938	$181,000	18	$60,430	$499,368
3C+(7.5)	1	54	13	13	20	8	1	$254,382	$181,000	18	$59,770	$495,152
3E(7.5)	1	54	13	13	20	8	1	$254,382	$181,000	18	$59,770	$495,152
2C+(5.0)	1	58	14	14	20	8	1	$270,981	$181,000	19	$62,540	$514,521
3D(5.0)	1	49	0	0	20	8	1	$122,167	$148,500	12	$39,270	$309,937
3E(5.0)	1	56	14	14	20	8	1	$267,425	$181,000	18	$61,880	$510,305

Notes:
1. Monitoring sample quantities are developed in FS Appendix G.
2. Approximate sampling numbers and costs are for FS purposes only.
FS - Feasibility Study
n/a - not applicable
SAP - sampling and analysis plan

Table 4
Estimated Construction Durations

Construction Description	Unit Assumption	Notes	Unit	Alternative														
				No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Dredging																				
Open-water Dredging	1,100 cy/day	Based on dredge production calculations	cy	0	813,120	813,120	813,120	902,212	902,212	902,212	902,212	938,455	938,455	938,455	1,007,892	1,016,453	1,016,453	1,077,140	1,086,121	1,086,121
			days	0	739	739	739	820	820	820	820	853	853	853	916	924	924	979	987	987
Limited Access Dredging (Under West Seattle Bridge)	270 cy/day	Based on dredge production calculations	cy	0	0	0	0	0	0	0	0	16,651	16,651	16,651	0	19,365	19,365	0	19,737	19,737
			days	0	0	0	0	0	0	0	0	62	62	62	0	72	72	0	73	73
Hydraulic Dredging (Underpier)	40 cy/day	Vendor quote and best professional judgment	cy	0	0	0	7,016	0	0	7,016	7,016	0	7,016	43,940	7,016	7,016	46,216	7,016	48,816	48,816
			days	0	0	0	175	0	0	175	175	0	175	1,098	175	175	1,155	175	1,220	1,220
Total Dredging Time		**Assumed concurrent operations**	**days**	**0**	**739**	**739**	**739**	**820**	**820**	**820**	**820**	**853**	**853**	**1,098**	**916**	**924**	**1,155**	**979**	**1,220**	**1,220**
Placement - Capping, Backfill, ENR, and In situ Treatment																				
Placement - Sand or Gravel	940 cy/day	Based on recent Puget Sound project experience	cy	0	166,191	166,796	166,730	137,278	137,883	137,821	137,821	129,695	129,372	128,282	134,884	127,571	125,986	127,790	119,003	119,003
			days	0	177	177	177	146	147	147	147	138	138	136	143	136	134	136	127	127
Placement - Armor	560 cy/day	Based on recent Puget Sound project experience	cy	0	30,931	30,931	30,931	30,931	30,931	30,931	30,931	17,654	17,654	17,654	31,062	17,786	17,786	31,062	17,786	17,786
			days	0	55	55	55	55	55	55	55	32	32	32	55	32	32	55	32	32
Placement - Underpier or Under Low Bridge	60 cy/day	Underpier in situ or ENR under low bridges; based on recent pilot study	cy	0	811	5,678	5,678	1,421	6,288	5,506	6,288	6,288	6,288	1,421	6,675	6,675	6,675	6,963	1,562	6,963
			days	0	14	95	95	24	105	92	105	105	105	24	111	111	111	116	26	116
Total Placement Time		**Assumed concurrent operations in open-water and underpier**	**days**	**0**	**232**	**233**	**233**	**201**	**202**	**202**	**202**	**169**	**169**	**168**	**199**	**167**	**166**	**191**	**158**	**158**
Placement - Dredge Residuals Management Cover																				
Placement - Sand	940 cy/day	Based on recent Puget Sound project experience	cy	0	88,580	88,580	88,580	106,341	106,341	106,341	106,341	111,735	111,735	111,735	118,258	123,607	123,592	127,233	132,566	132,566
			days	0	94	94	94	113	113	113	113	119	119	119	126	131	131	135	141	141
Total Construction Time (Best Estimate)																				
Total construction time assuming some concurrent dredging and placement operations	**100 days/ season**	**Total of dredging and residuals management operations during the anticipated construction window (October 1 through February 15)**	**days**	**0**	**833**	**833**	**833**	**933**	**933**	**933**	**933**	**972**	**972**	**1,217**	**1,042**	**1,056**	**1,287**	**1,115**	**1,361**	**1,361**
			seasons	**0**	**8.3**	**8.3**	**8.3**	**9.3**	**9.3**	**9.3**	**9.3**	**9.7**	**9.7**	**12.2**	**10.4**	**10.6**	**12.9**	**11.1**	**13.6**	**13.6**
Total Construction Time (With Extended Construction Season)																				
Total construction time assuming some concurrent dredging and placement operations	**150 days/ season**	**Assume production during an extended construction window (July 16 to September 30) with 50% production during that time due to tribal fishing.**	**days**	**0**	**833**	**833**	**833**	**933**	**933**	**933**	**933**	**972**	**972**	**1,217**	**1,042**	**1,056**	**1,287**	**1,115**	**1,361**	**1,361**
			seasons	**0**	**6.7**	**6.7**	**6.7**	**7.5**	**7.5**	**7.5**	**7.5**	**7.8**	**7.8**	**9.7**	**8.3**	**8.4**	**10.3**	**8.9**	**10.9**	**10.9**

Notes:
1. See Table 3 for construction rate assumption.
cy - cubic yards
ENR - enhanced natural recovery

Table 5
Quantities and Costs for Alternatives

Item No.	Item Description	Unit Cost	Unit	Quantity by Alternative															
				No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Pre-construction																			
1	**Mobilization/Demobilization**																		
1a	Mobilization/Demobilization	$ 700,000	Annual	0	9	9	9	10	10	10	10	10	10	13	11	11	13	12	14	14
1b	Initial Transload Site Setup	$ 1,000,000	Project	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1c	Annual Transload Site Setup and Maintenance (After Initial)	$ 500,000	Annual	0	8	8	8	9	9	9	9	9	9	12	10	10	12	11	13	13
1d	Mobilization/Demobilization for Underpier Dredging Equipment	$ 250,000	Annual	0	0	0	2	0	0	2	2	0	2	11	2	2	12	2	13	13
1e	Mobilization/Demobilization for Equipment to Dredge under the West Seattle Bridge	$ 500,000	Annual	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	1	1
2	**Pre-construction activities**																		
2a	Pre-construction activities	$ 100,000	Annual	0	9	9	9	10	10	10	10	10	10	13	11	11	13	12	14	14
Subtotal Pre-construction				**n/a**															
Construction																			
3	**Removal, Dewatering, Offloading, and Disposal**																		
3a	Open-water Dredging	$ 27	cy	0	813,120	813,120	813,120	902,212	902,212	902,212	902,212	938,455	938,455	938,455	1,007,892	1,016,453	1,016,453	1,077,140	1,086,121	1,086,121
3b	Restricted Access Dredging (Under West Seattle Bridge)	$ 119	cy	0	0	0	0	0	0	0	0	16,651	16,651	16,651	0	19,365	19,365	0	19,737	19,737
3c	Diver-Assisted Hydraulic Dredging (Underpier)	$ 600	cy	0	0	0	7,016	0	0	7,016	7,016	0	7,016	43,940	7,016	7,016	46,216	7,016	48,816	48,816
3d	Water Treatment (Underpier Hydraulic Dredging)	$ 400	cy	0	0	0	7,016	0	0	7,016	7,016	0	7,016	43,940	7,016	7,016	46,216	7,016	48,816	48,816
3e	Transload, Transportation and Disposal	$ 70	Ton	0	1,219,680	1,219,680	1,230,203	1,353,319	1,353,319	1,363,842	1,363,842	1,432,659	1,443,182	1,498,569	1,522,362	1,564,250	1,623,050	1,626,233	1,732,012	1,732,012
4	**Pile Removal and Disposal**	$ 1,000	Each	0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
5	**Engineered Capping and Residuals Management Cover**																		
5a	Furnish Sand	$ 20	cy	0	234,961	235,566	235,500	224,420	225,025	224,962	224,962	231,082	230,759	229,669	233,995	240,883	239,282	235,876	241,274	241,274
5b	Furnish Gravel	$ 20	cy	0	20,620	20,620	20,620	20,620	20,620	20,620	20,620	11,769	11,769	11,769	20,708	11,857	11,857	20,708	11,857	11,857
5c	Furnish Armor Material	$ 35	cy	0	30,931	30,931	30,931	30,931	30,931	30,931	30,931	17,654	17,654	17,654	31,062	17,786	17,786	31,062	17,786	17,786
5d	Furnish In situ Treatment Material (AquaGate+PAC^{TM})	$ 500	cy	0	0	4,867	4,867	0	4,867	4,085	4,867	4,867	4,867	0	5,113	5,113	5,113	5,401	0	5,401
5e	Place Sand - Unrestricted Access	$ 26	cy	0	234,151	234,756	234,690	222,999	223,604	223,541	223,541	229,661	229,338	228,247	232,434	239,322	237,720	234,315	239,712	239,712
5f	Place Gravel - Unrestricted Access	$ 26	cy	0	20,620	20,620	20,620	20,620	20,620	20,620	20,620	11,769	11,769	11,769	20,708	11,857	11,857	20,708	11,857	11,857
5g	Place Armor Material - Unrestricted Access	$ 43	cy	0	30,931	30,931	30,931	30,931	30,931	30,931	30,931	17,654	17,654	17,654	31,062	17,786	17,786	31,062	17,786	17,786
5h	Place in situ Material in Difficult to Access Areas - Underpier	$ 400	cy	0	0	4,867	4,867	0	4,867	4,085	4,867	4,867	4,867	0	5,113	5,113	5,113	5,401	0	5,401
5i	Place ENR Material in Difficult to Access Areas - Low Bridge	$ 400	cy	0	811	811	811	1,421	1,421	1,421	1,421	1,421	1,421	1,421	1,562	1,562	1,562	1,562	1,562	1,562
6	**Surveys and Monitoring**																		
6a	**Payment Surveys**	$ 40,000	Site-wide Event	0	17	17	17	19	19	19	19	20	20	25	21	22	26	23	28	28
6b	Contractor daily progress surveys	$ 2,500	Day	0	833	833	833	933	933	933	933	972	972	1,217	1,042	1,056	1,287	1,115	1,361	1,361
Subtotal Construction Base Costs				**n/a**															
7	**Sales Tax and Contingency**																		
7a	Sales Tax	9.5%	--	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7b	Contingency	30%	--	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Subtotal Construction Costs				**n/a**															

Table 5
Quantities and Costs for Alternatives

Item No.	Item Description	Unit Cost	Unit	Quantity by Alternative															
				No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Indirect Construction Costs																			
8	**Pre-construction**																		
8a	Design and Permitting	5%	--	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8b	Pre-Construction Base-line Monitoring	Alternative-specific	Lump Sum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8c	Project Management (Owners)	1%	--	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8d	Agency Review and Oversight	$500,000	Annual	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
9	**During Construction**																		
9a	Construction Management Support	10%	--	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9b	**Environmental Compliance**																		
9bi	Water Quality Monitoring	$ 3,000	Day	0	833	833	833	933	933	933	933	972	972	1,217	1,042	1,056	1,287	1,115	1,361	1,361
9bii	Confirmational Sampling	Alternative-specific	Lump Sum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9c	Project Management (Owners)	4%	--	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9d	Agency Review and Oversight	$ 500,000	Annual	0	9	9	9	10	10	10	10	10	10	13	11	11	13	12	14	14
10	**Post-construction Costs**																		
10a	Operations and Maintenance and Long Term Monitoring 1 through 20 years post-construction	Alternative-specific	Lump Sum	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10b	Contingency Remediation (Adaptive Management) - Open Water	$1,100,000	Acre	0	2.6	2.7	2.7	0.2	0.3	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0
10c	Contingency Remediation (Adaptive Management) - Underpier and Low Bridge	$4,100,000	Acre	0	2.1	2.0	1.7	2.1	2.0	1.7	1.7	2.0	1.7	0.2	1.8	1.8	0.2	1.9	0.2	0.2
10d	Project Management (Owners)	1%	--	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10e	Agency Review and Oversight	$120,000	Annual	0	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Subtotal Indirect Construction Costs				**n/a**															
Total Cost				**n/a**															
Total Cost (rounded)				**n/a**															

Table 5
Quantities and Costs for Alternatives

Item No.	Item Description	Cost by Alternative															
		No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Pre-construction																		
1	**Mobilization/Demobilization**																	
1a	Mobilization/Demobilization	$ -	$ 6,300,000	$ 6,300,000	$ 6,300,000	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 7,000,000	$ 9,100,000	$ 7,700,000	$ 7,700,000	$ 9,100,000	$ 8,400,000	$ 9,800,000	$ 9,800,000
1b	Initial Transload Site Setup	$ -	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
1c	Annual Transload Site Setup and Maintenance (After Initial)	$ -	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,500,000	$ 4,500,000	$ 4,500,000	$ 4,500,000	$ 4,500,000	$ 4,500,000	$ 6,000,000	$ 5,000,000	$ 5,000,000	$ 6,000,000	$ 5,500,000	$ 6,500,000	$ 6,500,000
1d	Mobilization/Demobilization for Underpier Dredging Equipment	$ -	$ -	$ -	$ 500,000	$ -	$ -	$ 500,000	$ 500,000	$ -	$ 500,000	$ 2,750,000	$ 500,000	$ 500,000	$ 3,000,000	$ 500,000	$ 3,250,000	$ 3,250,000
1e	Mobilization/Demobilization for Equipment to Dredge under the West Seattle Bridge	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000	$ 500,000	$ 500,000	$ -	$ 500,000	$ 500,000	$ -	$ 500,000	$ 500,000
2	**Pre-construction activities**																	
2a	Pre-construction activities	$ -	$ 900,000	$ 900,000	$ 900,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,300,000	$ 1,100,000	$ 1,100,000	$ 1,300,000	$ 1,200,000	$ 1,400,000	$ 1,400,000
	Subtotal Pre-construction	**$ -**	**$ 12,200,000**	**$ 12,200,000**	**$ 12,700,000**	**$ 13,500,000**	**$ 13,500,000**	**$ 14,000,000**	**$ 14,000,000**	**$ 14,000,000**	**$ 14,500,000**	**$ 20,650,000**	**$ 15,300,000**	**$ 15,800,000**	**$ 20,900,000**	**$ 16,600,000**	**$ 22,450,000**	**$ 22,450,000**
Construction																		
3	**Removal, Dewatering, Offloading, and Disposal**																	
3a	Open-water Dredging	$ -	$ 22,175,996	$ 22,175,996	$ 22,175,996	$ 24,605,792	$ 24,605,792	$ 24,605,792	$ 24,605,792	$ 25,594,218	$ 25,594,218	$ 25,594,218	$ 27,487,971	$ 27,721,452	$ 27,721,452	$ 29,376,535	$ 29,621,487	$ 29,621,487
3b	Restricted Access Dredging (Under West Seattle Bridge)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,979,634	$ 1,979,634	$ 1,979,634	$ -	$ 2,302,259	$ 2,302,259	$ -	$ 2,346,533	$ 2,346,533
3c	Diver-Assisted Hydraulic Dredging (Underpier)	$ -	$ -	$ -	$ 4,209,372	$ -	$ -	$ 4,209,372	$ 4,209,372	$ -	$ 4,209,372	$ 26,363,963	$ 4,209,372	$ 4,209,372	$ 27,729,303	$ 4,209,372	$ 29,289,875	$ 29,289,875
3d	Water Treatment (Underpier Hydraulic Dredging)	$ -	$ -	$ -	$ 2,806,248	$ -	$ -	$ 2,806,248	$ 2,806,248	$ -	$ 2,806,248	$ 17,575,976	$ 2,806,248	$ 2,806,248	$ 18,486,202	$ 2,806,248	$ 19,526,583	$ 19,526,583
3e	Transload, Transportation and Disposal	$ -	$ 85,377,585	$ 85,377,585	$ 86,114,225	$ 94,732,297	$ 94,732,297	$ 95,468,938	$ 95,468,938	$ 100,286,107	$ 101,022,747	$ 104,899,801	$ 106,565,327	$ 109,497,535	$ 113,613,523	$ 113,836,299	$ 121,240,859	$ 121,240,859
4	**Pile Removal and Disposal**	$ -	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
5	**Engineered Capping and Residuals Management Cover**																	
5a	Furnish Sand	$ -	$ 4,699,224	$ 4,711,327	$ 4,710,006	$ 4,488,400	$ 4,500,502	$ 4,499,248	$ 4,499,248	$ 4,621,645	$ 4,615,184	$ 4,593,375	$ 4,679,908	$ 4,817,666	$ 4,785,631	$ 4,717,530	$ 4,825,470	$ 4,825,470
5b	Furnish Gravel	$ -	$ 412,407	$ 412,407	$ 412,407	$ 412,407	$ 412,407	$ 412,407	$ 412,407	$ 235,387	$ 235,387	$ 235,387	$ 414,163	$ 237,144	$ 237,145	$ 414,163	$ 237,144	$ 237,144
5c	Furnish Armor Material	$ -	$ 1,082,570	$ 1,082,570	$ 1,082,570	$ 1,082,570	$ 1,082,570	$ 1,082,570	$ 1,082,570	$ 617,891	$ 617,891	$ 617,891	$ 1,087,177	$ 622,502	$ 622,507	$ 1,087,177	$ 622,502	$ 622,502
5d	Furnish In situ Treatment Material (AquaGate+PAC^{TM})	$ -	$ -	$ 2,433,435	$ 2,433,436	$ -	$ 2,433,435	$ 2,042,296	$ 2,433,436	$ 2,433,435	$ 2,433,436	$ -	$ 2,556,650	$ 2,556,650	$ 2,556,669	$ 2,700,692	$ -	$ 2,700,692
5e	Place Sand - Unrestricted Access	$ -	$ 5,978,311	$ 5,993,761	$ 5,992,074	$ 5,693,581	$ 5,709,031	$ 5,707,430	$ 5,707,430	$ 5,863,681	$ 5,855,433	$ 5,827,592	$ 5,934,480	$ 6,110,341	$ 6,069,445	$ 5,982,507	$ 6,120,304	$ 6,120,304
5f	Place Gravel - Unrestricted Access	$ -	$ 526,478	$ 526,478	$ 526,478	$ 526,478	$ 526,478	$ 526,478	$ 526,478	$ 300,494	$ 300,494	$ 300,494	$ 528,718	$ 302,737	$ 302,739	$ 528,718	$ 302,737	$ 302,737
5g	Place Armor Material - Unrestricted Access	$ -	$ 1,325,595	$ 1,325,595	$ 1,325,595	$ 1,325,595	$ 1,325,595	$ 1,325,595	$ 1,325,595	$ 756,602	$ 756,602	$ 756,602	$ 1,331,237	$ 762,247	$ 762,253	$ 1,331,237	$ 762,247	$ 762,247
5h	Place in situ Material in Difficult to Access Areas - Underpier	$ -	$ -	$ 1,946,748	$ 1,946,749	$ -	$ 1,946,748	$ 1,633,837	$ 1,946,749	$ 1,946,748	$ 1,946,749	$ -	$ 2,045,320	$ 2,045,320	$ 2,045,335	$ 2,160,554	$ -	$ 2,160,554
5i	Place ENR Material in Difficult to Access Areas - Low Bridge	$ -	$ 324,280	$ 324,280	$ 324,280	$ 568,559	$ 568,559	$ 568,559	$ 568,559	$ 568,559	$ 568,559	$ 568,559	$ 624,644	$ 624,644	$ 624,644	$ 624,644	$ 624,644	$ 624,644
6	**Surveys and Monitoring**																	
6a	**Payment Surveys**	$ -	$ 680,000	$ 680,000	$ 680,000	$ 760,000	$ 760,000	$ 760,000	$ 760,000	$ 800,000	$ 800,000	$ 1,000,000	$ 840,000	$ 880,000	$ 1,040,000	$ 920,000	$ 1,120,000	$ 1,120,000
6b	Contractor daily progress surveys	$ -	$ 2,083,584	$ 2,083,584	$ 2,083,584	$ 2,333,304	$ 2,333,304	$ 2,333,304	$ 2,333,304	$ 2,430,019	$ 2,430,019	$ 3,043,414	$ 2,605,179	$ 2,638,864	$ 3,217,170	$ 2,786,429	$ 3,403,597	$ 3,403,597
	Subtotal Construction Base Costs	*$ -*	*$ 125,666,030*	*$ 130,073,766*	*$ 137,823,021*	*$ 137,528,983*	*$ 141,936,719*	*$ 148,982,073*	*$ 149,686,125*	*$ 149,434,421*	*$ 157,171,974*	*$ 194,356,905*	*$ 164,716,394*	*$ 169,134,982*	*$ 213,116,278*	*$ 174,482,105*	*$ 221,043,982*	*$ 225,905,228*
7	**Sales Tax and Contingency**																	
7a	Sales Tax	$ -	$ 13,097,273	$ 13,516,008	$ 14,299,687	$ 14,347,753	$ 14,766,488	$ 15,483,297	$ 15,550,182	$ 15,526,270	$ 16,308,838	$ 20,425,656	$ 17,101,557	$ 17,568,823	$ 22,231,546	$ 18,152,800	$ 23,131,928	$ 23,593,747
7b	Contingency	$ -	$ 45,288,991	$ 46,736,932	$ 49,446,812	$ 49,613,021	$ 51,060,962	$ 53,539,611	$ 53,770,892	$ 53,688,207	$ 56,394,243	$ 70,629,768	$ 59,135,386	$ 60,751,142	$ 76,874,347	$ 62,770,471	$ 79,987,773	$ 81,584,692
	Subtotal Construction Costs	**$ -**	**$ 196,252,294**	**$ 202,526,706**	**$ 214,269,521**	**$ 214,989,757**	**$ 221,264,170**	**$ 232,004,981**	**$ 233,007,199**	**$ 232,648,899**	**$ 244,375,055**	**$ 306,062,330**	**$ 256,253,337**	**$ 263,254,947**	**$ 333,122,172**	**$ 272,005,376**	**$ 346,613,683**	**$ 353,533,667**

Table 5
Quantities and Costs for Alternatives

Item No.	Item Description	Cost by Alternative																
		No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Indirect Construction Costs																		
8	**Pre-construction**																	
8a	Design and Permitting	$ -	$ 9,812,615	$ 10,126,335	$ 10,713,476	$ 10,749,488	$ 11,063,208	$ 11,600,249	$ 11,650,360	$ 11,632,445	$ 12,218,753	$ 15,303,116	$ 12,812,667	$ 13,162,747	$ 16,656,109	$ 13,600,269	$ 17,330,684	$ 17,676,683
8b	Pre-Construction Base-line Monitoring	$ -	$ 337,340	$ 512,016	$ 512,016	$ 328,908	$ 503,584	$ 479,603	$ 503,584	$ 499,368	$ 499,368	$ 312,045	$ 499,368	$ 495,152	$ 495,152	$ 514,521	$ 309,937	$ 510,305
8c	Project Management (Owners)	$ -	$ 1,962,523	$ 2,025,267	$ 2,142,695	$ 2,149,898	$ 2,212,642	$ 2,320,050	$ 2,330,072	$ 2,326,489	$ 2,443,751	$ 3,060,623	$ 2,562,533	$ 2,632,549	$ 3,331,222	$ 2,720,054	$ 3,466,137	$ 3,535,337
8d	Agency Review and Oversight	$ -	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
9	**During Construction**																	
9a	Construction Management Support	$ -	$ 12,566,603	$ 13,007,377	$ 13,782,302	$ 13,752,898	$ 14,193,672	$ 14,898,207	$ 14,968,613	$ 14,943,442	$ 15,717,197	$ 19,435,691	$ 16,471,639	$ 16,913,498	$ 21,311,628	$ 17,448,210	$ 22,104,398	$ 22,590,523
9b	**Environmental Compliance**																	
9bi	Water Quality Monitoring	$ -	$ 2,500,301	$ 2,500,301	$ 2,500,301	$ 2,799,965	$ 2,799,965	$ 2,799,965	$ 2,799,965	$ 2,916,023	$ 2,916,023	$ 3,652,097	$ 3,126,215	$ 3,166,637	$ 3,860,604	$ 3,343,715	$ 4,084,316	$ 4,084,316
9bii	Confirmational Sampling	$ -	$ 287,826	$ 462,502	$ 462,502	$ 279,394	$ 454,070	$ 430,089	$ 454,070	$ 449,854	$ 449,854	$ 262,531	$ 449,854	$ 445,638	$ 447,746	$ 465,007	$ 260,423	$ 460,791
9c	Project Management (Owners)	$ -	$ 7,850,092	$ 8,101,068	$ 8,570,781	$ 8,599,590	$ 8,850,567	$ 9,280,199	$ 9,320,288	$ 9,305,956	$ 9,775,002	$ 12,242,493	$ 10,250,133	$ 10,530,198	$ 13,324,887	$ 10,880,215	$ 13,864,547	$ 14,141,347
9d	Agency Review and Oversight	$ -	$ 4,500,000	$ 4,500,000	$ 4,500,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 5,000,000	$ 6,500,000	$ 5,500,000	$ 5,500,000	$ 6,500,000	$ 6,000,000	$ 7,000,000	$ 7,000,000
10	**Post-construction Costs**																	
10a	Operations and Maintenance and Long Term Monitoring 1 through 20 years post-construction	$ 948,541	$ 1,909,058	$ 2,957,113	$ 2,957,113	$ 1,850,037	$ 2,898,092	$ 2,752,097	$ 2,898,092	$ 2,868,581	$ 2,868,581	$ 1,729,886	$ 2,877,013	$ 2,847,502	$ 2,851,718	$ 2,965,819	$ 1,719,347	$ 2,936,308
10b	Contingency Remediation (Adaptive Management) - Open Water	$ -	$ 2,862,169	$ 2,944,686	$ 2,944,686	$ 197,878	$ 280,395	$ 280,395	$ 280,395	$ -	$ -	$ -	$ 313,544	$ -	$ -	$ 313,544	$ -	$ -
10c	Contingency Remediation (Adaptive Management) - Underpier and Low Bridge	$ -	$ 8,450,982	$ 8,143,418	$ 6,950,606	$ 8,450,982	$ 8,143,418	$ 6,950,606	$ 6,950,606	$ 8,143,418	$ 6,950,606	$ 722,446	$ 7,397,631	$ 7,397,631	$ 793,710	$ 7,836,900	$ 793,710	$ 793,710
10d	Project Management (Owners)	$ -	$ 1,962,523	$ 2,025,267	$ 2,142,695	$ 2,149,898	$ 2,212,642	$ 2,320,050	$ 2,330,072	$ 2,326,489	$ 2,443,751	$ 3,060,623	$ 2,562,533	$ 2,632,549	$ 3,331,222	$ 2,720,054	$ 3,466,137	$ 3,535,337
10e	Agency Review and Oversight	$ -	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000
	Subtotal Indirect Construction Costs	**$ 948,541**	**$ 59,502,030**	**$ 61,805,349**	**$ 62,679,172**	**$ 60,808,935**	**$ 63,112,254**	**$ 63,611,510**	**$ 63,986,116**	**$ 64,912,066**	**$ 65,782,886**	**$ 70,781,552**	**$ 69,323,132**	**$ 70,224,103**	**$ 77,403,998**	**$ 73,308,307**	**$ 78,899,637**	**$ 81,764,657**
	Total Cost	**$ 948,541**	**$ 255,754,324**	**$ 264,332,055**	**$ 276,948,693**	**$ 275,798,693**	**$ 284,376,424**	**$ 295,616,491**	**$ 296,993,315**	**$ 297,560,965**	**$ 310,157,941**	**$ 376,843,882**	**$ 325,576,469**	**$ 333,479,050**	**$ 410,526,170**	**$ 345,313,684**	**$ 425,513,320**	**$ 435,298,324**
	Total Cost (rounded)	**$ 950,000**	**$ 256,000,000**	**$ 264,000,000**	**$ 277,000,000**	**$ 276,000,000**	**$ 284,000,000**	**$ 296,000,000**	**$ 297,000,000**	**$ 298,000,000**	**$ 310,000,000**	**$ 377,000,000**	**$ 326,000,000**	**$ 333,000,000**	**$ 411,000,000**	**$ 345,000,000**	**$ 426,000,000**	**$ 435,000,000**

Table 6
Alternatives Cost Summary

Item	Alternative																
	No Action	1A(12)	1B(12)	1C+(12)	2A(12)	2B(12)	2C(12)	2C+(12)	3B(12)	3C+(12)	3D(12)	2C+(7.5)	3C+(7.5)	3E(7.5)	2C+(5.0)	3D(5.0)	3E(5.0)
Total Cost	$ 948,541	$ 255,754,324	$ 264,332,055	$ 276,948,693	$ 275,798,693	$ 284,376,424	$ 295,616,491	$ 296,993,315	$ 297,560,965	$ 310,157,941	$ 376,843,882	$ 325,576,469	$ 333,479,050	$ 410,526,170	$ 345,313,684	$ 425,513,320	$ 435,298,324
Total Cost (rounded)	$ 950,000	$ 256,000,000	$ 264,000,000	$ 277,000,000	$ 276,000,000	$ 284,000,000	$ 296,000,000	$ 297,000,000	$ 298,000,000	$ 310,000,000	$ 377,000,000	$ 326,000,000	$ 333,000,000	$ 411,000,000	$ 345,000,000	$ 426,000,000	$ 435,000,000