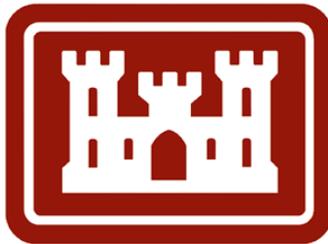


Limited Reevaluation Report
Appendix H:
Cost Engineering



U.S. Army Corps of Engineers
New York District

January 2004

NEW YORK AND NEW JERSEY HARBOR DEEPENING PROJECT

COST ENGINEERING APPENDIX

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INTRODUCTION

General

1. This appendix documents the development of the updated estimated cost for the recommended National Economic Development (NED) Plan of the New York and New Jersey Harbor Navigation Improvement Project developed for the Feasibility Report in December 1999. In order to evaluate alternatives, channel improvements were identified, preliminary plans were developed and preliminary project estimates were prepared for the feasibility Report. The NED Plan was formulated and a project cost was developed for the NED Plan, which was presented in the Feasibility Report, dated December 1999 (henceforth referred as the “Feasibility”). The purpose of this Cost Engineering Appendix is to update the costs of the LRR Recommended Plan, determine the cost benefit of consolidating the Predecessor projects with the New York and New Jersey Harbor Navigation Improvement Project and to develop estimates for the actual creditability for Local Sponsor performed activities. This appendix includes an updated MCACES cost estimate for the LRR Recommended Plan.

References

2. This appendix makes use of data from the following appendices and regulations:
 - Geotechnical Appendix (Dredgeability and distribution of materials found in the study area. The quantity of material unsuitable for placement in the ocean)
 - Channel Design Appendix (Location and size of channels, channel depths, sedimentation rates)
 - Structural Appendix (Cost of replacing or reinforcing structures impacted by the Federal Channel)
 - Non-Federal costs for berthing areas and associated land side improvements provided by the Local Sponsor
 - ER 1110-2-1302 “Civil Works Cost Engineering”
 - New York and New Jersey Harbor Navigation Improvement Project Feasibility Report, dated December 1999
 - Preliminary Assessment and Analysis of Consolidation Opportunities for the New York and New Jersey Harbor Deepening Project, dated July 2002
 - White Paper Dredged Material Characterization for the NY & NJ Harbor Deepening Project (50 feet), dated May 2003. (attached to the geotechnical appendix)



Summary of the 1999 Feasibility Project Cost Estimate

3. The development of the Feasibility preliminary project cost estimates for the various channels was conducted utilizing the concept of pathways, wherein each pathway defines the entire ship's transit from deep water to port. In addition, the cost of each channel for its particular path was developed. This was necessary since the formulation process would depend not only upon the cost of pathway, but as subsequent economical analysis was performed, the cost of each channel would be required. Final development of the destinations was subsequently modified based upon facilities proposed in the final "Without Project" and "With Project" conditions as contained in the final Feasibility Report.
4. Quantities used in the 1999 Feasibility were based upon then current surveys. A triangular irregular network (TIN) was generated for the required depths. These quantities were then used in the development of the project cost estimate.
5. Only the cost estimate from the selected alternative, the NED Plan, was developed into an MCACES cost estimate and was included in the Feasibility. Please refer to the Feasibility Study for a detailed discussion on the selection of the NED Plan.
6. The following Tables summarize the Project First Cost – Construction Estimate for the 1999 Feasibility



Table 1 First Cost Estimate (\$M) General Navigation Features – Cost shared Items, 1999 Feasibility			
	Contract Cost	Contingency Cost	Total Cost
Ambrose	114,316	17,147	131,463
Anchorage	78,522	12,818	91,340
Kill Van Kull	431,479	68,030	499,509
Newark Bay	230,376	42,364	272,740
Arthur Kill to Howland Hook	249,068	47,925	296,993
Port Jersey	80,203	12,635	92,838
Bay Ridge	89,722	16,151	105,873
SUBTOTAL	1,273,686	217,070	1,490,756
Account 01	1,700	255	1,955
Account 30	41,150	6,173	47,323
Account 31	92,055	13,808	105,863
Total Federal Cost-shared	1,408,591	237,306	1,645,897



Table 2 General Navigation Features –Non-Federal Items, 1999 Feasibility			
	Contract Cost	Contingency Cost	Total Cost
Newark Bay Channel	53,628	8,044	61,672
Arthur Kill to Howland Hook	14,573	2,186	16,758
Port Jersey Channel	14,625	2,194	16,819
Bay Ridge Channel	3,850	578	4,428
Anchorage Channel	31,010	4,652	35,662
Total Non Federal Cost	117,685	17,653	135,338

Summary Of Feasibility NED Plan

7. Channels included in the NED Plan, their currently authorized and proposed authorized depths are provided in Table 3. The channels and their respective improvements are listed below. For detailed information concerning channel design refer to the “Channels Design Appendix”. The Kill Van Kull/Newark Bay Channel 45’ plan and the Arthur Kill Channel 41’ plan, which are part of the without project condition, will require the removal of utilities. The cost estimates assumed that any utilities removed as part of those projects will, if rebuilt, be located sufficiently deep such that the utilities will not require replacement under this project.
8. A summary of the channel designs developed in the Feasibility Study are as follows:
 - a) Ambrose Channel, deepened to –53 ft MLW, will remain at its present width of 2000 ft and will follow its present alignment. It will be extended 2,400 ft seaward along its present bearing out to deep water.
 - b) Anchorage Channel, deepened to –50 MLW, will remain at its present width of 2000 ft, but will be deepened only from the Narrows to a point 1000 ft north of the junction with Port Jersey Channel.



- c) Kill Van Kull Channel, deepened to -52 MLW, will remain at its present width of 800 ft and will follow its present alignment.
- d) The Newark Bay Channel remains at its present width varying from 800 ft at its northern terminus to 2,200 ft near Bergen Point. The channel will follow its present alignment. Elizabeth Channel will also remain at its present width, which varies from 500 to 800 ft, and alignment. The 2,700 ft long South Elizabeth Channel will be significantly widened from its present 290 ft to 500 ft. Each of the aforementioned channels will be dredged to -52 ft MLW.
- e) Arthur Kill Channel will be deepened to -52 MLW from the junction with the Kill Van Kull to the western limit of the Howland Hook facility, along the alignment of the 41 ft (without project) channel. In addition, the channel will be widened to the north opposite Howland Hook to include the limits of the 35 ft channel.
- f) Port Jersey Channel, deepened to -52 MLW, will be improved to a width of 500 ft between the Global Marine Terminal and MOTBY peninsulas. The existing 1200 ft turning basin at the head of Port Jersey Channel is inadequate for the K-class container ship, which has an overall length of 1044 ft. Widening of the existing turning basin is not a practical solution since it would require the construction of sheet pile retaining structures to stabilize existing structures. Without a turning basin, vessels must either back into or out of Port Jersey. In order to facilitate the backing maneuvers, the northern channel limit is straightened, removing a narrow portion of the New Jersey flats. Deepening Anchorage Channel 1000 ft to the north will permit inbound vessels to bring the bow past Port Jersey Channel, and readily swing the stern around and then backing into the berth.
- g) The proposed width of Bay Ridge Channel, deepened to -50 MLW, will be 600 ft, reduced from the current width of 1200 to 1750 ft. The proposed turning basin, with a diameter of 1600 ft, is located opposite the terminal, enabling vessels to back out of or into port.



SIGNIFICANT CHANGES SINCE THE FEASIBILITY STUDY

11. Since the completion of the Feasibility Study there have been changes in the existing condition and refinements of the design. The major changes fall into the following categories
 - a. Refined channel design
 - b. Updated surveys and quantities
 - c. Progress of dredging the predecessor projects
 - d. Additional geotechnical information
 - e. Revision of re-sedimentation volumes
 - f. Environmental considerations
 - g. Consolidation of the predecessor projects with the New York and New Jersey Harbor Navigation Improvement Project

12. The following paragraphs will summarize these changes and discuss their importance to the cost estimate.

Refined Channel Design

13. Since the Feasibility the Corps has performed ship simulation modeling studies of critical portions of the Project. The results of these studies have been reviewed with the maritime community, including Harbor Pilots and the United States Coast Guard. These studies indicate that some minor channel realignments are required at the South Elizabeth and Port Jersey Channels. These changes are detailed in the *Channel Design Appendix*.

14. The recommended plan of improvement consists of deepening, widening, and modifying the alignment (where required) of the channels to accommodate the design vessel, a Maersk S-Class container ship with a maximum draft of 46 feet. The following summarizes the proposed improvement and describes those channel alignment modifications from that presented in the Feasibility.

15. Newark Bay South Reach, and Elizabeth Channel, deepened to -52 MLW, will largely remain at their present width and will follow its present alignment. A significant channel alignment modification from that presented in the Feasibility is the widening in South Elizabeth Channel, which will be widened to 500 ft, flaring wider at the eastern end where it connects to the Newark Bay South channel. The berthing areas along the Elizabeth Port Authority Marine Terminal will be widened to 150 ft. Improvements to the Newark Bay Channel will extend 1500 ft north of the Elizabeth Channel to facilitate vessels turning and backing into Port Elizabeth.



16. A significant channel alignment modification to Port Jersey from that presented in the Feasibility is that the entrance flare will be 1500 ft at the junction with Anchorage Channel and taper to 500 ft just to the west of the NJ Pierhead Channel. The wide flare of the approach channel is necessary due to the fact that vessels inbound on a flood tide will be turning broadside across the current.
17. Arthur Kill, the Feasibility called for the channel to be widened to the north opposite Howland Hook back to the limits of the existing -35' channel. Minor modifications to this north channel line will keep the proposed channel at least 60 ft from the existing bulkhead and marina.

Updated Surveys and Quantities

18. Preparation of the LRR required that the entire project area be resurveyed. These surveys were then used to update the project's quantities. The following Table summarizes the surveys used and describes how quantities were developed for each channel. Side scan surveys have been collected for each channel. A 3-D surface was created from the survey data and 1V:3H side slopes in non-rock and 1V:1H side slopes in rock were cut from the channel limits to the surface. Similar to that performed for the Feasibility Study a triangular irregular network (TIN) was generated for the required and maximum pay depths. These new surveys resulted in revised quantities from those originally included in the Feasibility Study.

Table 4	
Surveys used in preparation of updated quantities and costs	
Channel	Survey Used
Kill Van Kull Channel	condition survey Nov.2002
Elizabeth Channel	condition survey 30,31 Oct.2002
Newark Bay Channel	April & May 2001 and Feb-April 2002
Arthur Kill Channel	Dec.2000 - Feb 2001
Port Jersey Channel	August 2001 and June 2002
Bay Ridge Channel	Oct - Nov 2002
Anchorage Channel	Jan.-Feb-2003 Condition survey
Ambrose Channel	April 14,2003 Condition survey

19. As discussed in the main body of the LRR there are several ongoing "predecessor" dredging projects. These projects are in the same area as the subject project. These projects are the *Kill Van Kull and Newark Bay Phase II (KVK45)*, *Arthur Kill 41 (AK41)* and *Port Jersey 41 (PJ41)*. When the Feasibility was written construction on these projects had not started. At the time of this report all three projects are now in construction. Additionally, significant portions of the KVK45 have been completed.



20. The Feasibility, as part of the existing conditions, assumed that all the predecessor projects would be completed prior to the start of the 50ft project. As there is an imprecision in dredging, there was an uncertainty as to the finished depth of the channels for the predecessor projects once construction was completed. At the time of the Feasibility it was assumed that the predecessor projects would be dredged no deeper than their required depth.
21. Actual depth information is available for the completed portions of the KVK45. For these areas the actual post construction depths are now used instead of theoretical ones. Furthermore a review of actual post construction depths in the KVK45 indicates that contractors are dredging beyond the required depth. Therefore it is now assumed for uncompleted predecessor projects that they will be dredged to their maximum pay depth, which is 1.5ft beyond the required depth.
22. At the time of the Feasibility the last large rope-shovel dipper dredge was being replaced by the hydraulic backhoe. Performance and cost data for the backhoe was largely theoretical. These backhoe dredges have been used extensively on the predecessor projects and historical information has been used to better estimate the production and cost of these dredges.

Additional Geotechnical Information

23. As part of this and the predecessor projects the Corps has continued to collect borings and cores in the project area. The District has also performed several remote-sensing studies to better determine material type. In addition, the actual geology encountered by the predecessor projects has been considered. This additional information permits a more accurate prediction as to the nature and quantity of the different materials to be excavated during this project. The reader is referred to the *Geotechnical Appendix* for further information.

Revision of Re-sedimentation Volumes

24. At the time of the Feasibility the quantities were prepared in parallel with the schedule. This meant that the amount of re-sedimentation between the projects was unclear. It was therefore assumed that the 2ft of safety clearance in KVK45 and AK41 would sediment back in. The quantities for this report will consider the forecasted schedule since the PCA is scheduled for execution in May 2004. The quantity of sedimentation will be calculated utilizing the schedule and the sedimentation rates in the channel design appendix.

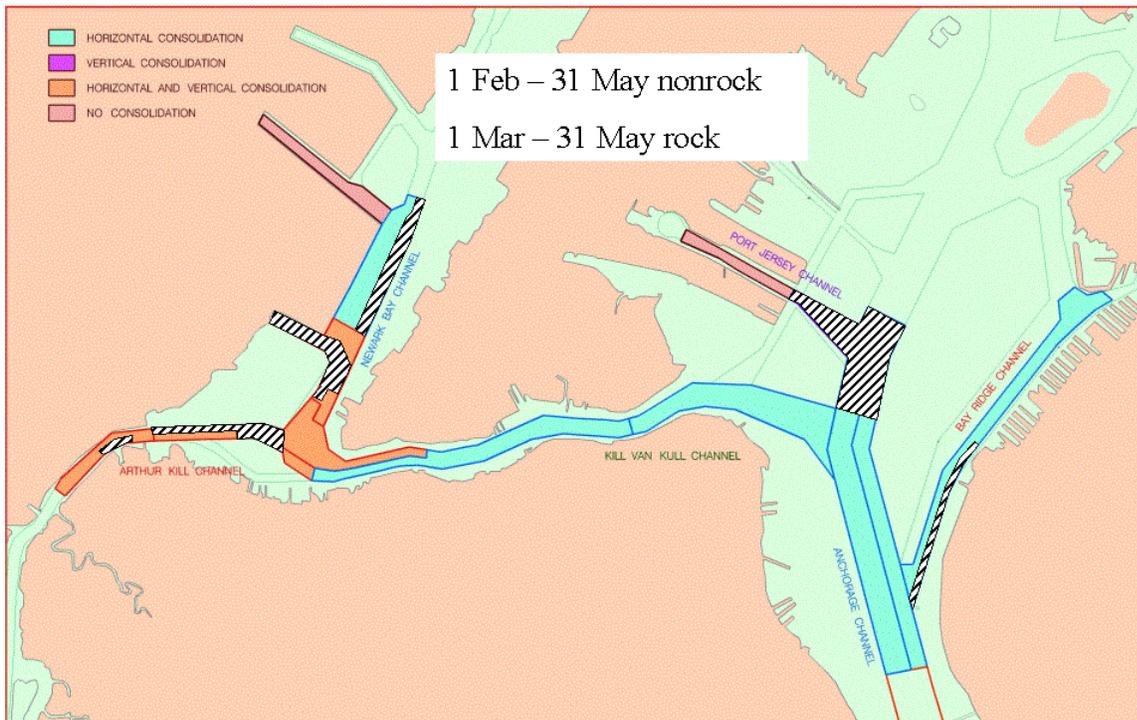
Environmental Considerations

25. The Feasibility acknowledged that the project would be in conformance with the Clean Air Act and that mitigation would be required for impacts to essential fish



habitat. Since the Feasibility, as documented in this report's *Environmental Assessment*, these compliances have been refined. The costs of compliance for the project have been updated utilizing the latest information available.

26. At the time of the Feasibility no essential fish habitat (EFH) environmental windows were included. In the interim the windows have been negotiated. The illustration below summarizes the EFH windows prohibiting dredging and blasting for this project.



Consolidation of the predecessor projects with the New York and New Jersey Harbor Navigation Improvement Project

27. After the completion of the Feasibility the Corps the Congress in the *Conference Report for the Fiscal Year (FY) 2002 Appropriations Act*, included the following language:



The conferees are aware of the urgent need to facilitate efficient construction of improvements for New York and New Jersey Harbor to meet the needs of navigation interests and save significant Federal and non-Federal resources. Therefore, the conferees direct the Secretary of the Army to combine the previously authorized Arthur Kill, Howland Hook Marine Terminal, New York and New Jersey, project; the Kill Van Kull and Newark Bay Channel, New York and New Jersey, project; the New York and Adjacent Channels, Port Jersey, New Jersey, project into a single project designated the New York and New Jersey Harbor, New York and New Jersey, project. The conferees have combined the Construction, General and General Investigations budget amounts for these projects and provided \$88,500,000 for the New York and New Jersey Harbor project. The Secretary of the Army is directed to use these funds to continue construction of the combined New York and New Jersey Harbor project to the depths authorized in the Water Resources Development Act of 2000.

The Corps therefore considered the practicality and benefits of combining predecessor projects with the 50ft project (vertical consolidation) as well as the practicality and benefits of utilizing larger contracts than envisioned in the Feasibility. The District summarized its findings in July 2002 in the *Preliminary Assessment and Analysis of Consolidation Opportunities for the New York and New Jersey Harbor Deepening Project*. In summary, the Corps found that while there were cost benefits to consolidating the predecessor and 50ft dredging, and as a result a consolidation plan was developed by the Project Delivery Team (PDT). The PDT consisted of the District, the Port Authority of New York & New Jersey, the States of New York & New Jersey, New York City, and the US Coast Guard. As a consequence the vertical consolidation opportunities available were:

- KVK45 area 4b with S-KVK-2. KVK45 area 4b is the last segment of KVK45. Located at the far western end of the Kill Van Kull channel
- KVK45 area 5. This segment is the inside of the turn at Bergen Point. The KVK45 segment of this work was awarded December 10, 2001. The Port Authority of New York and New Jersey (PANYNJ) awarded an additional contract to the Corps' contractor to dredge the contract's footprint to 52ft. As a consequence vertical consolidation of this area has already been accomplished by a PANYNJ contract. It is likely that the PANYNJ will seek reimbursement for this action after the execution of this project's PCA. This report will consider what the cost and schedule impacts of the PANYNJ's contract.

28. In addition to vertical consolidation there is additional consolidation based on the construction implementation of the feasibility recommended plan and the



timeframe of constructing the Port Jersey 41 project relative to the construction of the Port Jersey 50ft segment.

29. The PCA for the Port Jersey 41 ft project was signed in July 2002 and work is ongoing in the first Contract Area. The Predecessor Project is subdivided into four contract areas. Contract Area 1 consists of the inner channel area. Contract Areas 2a and 2b are the outer channel. Contract Area 3 consists of the turning basin and a portion of the outer channel. The Value Engineering Study for the Predecessor Project recommended that excavation of Contract Area 3 not be constructed and that the alignment of the outer channel be straightened. The timing of the construction of the predecessor project, PJ41 Contract 3, with the construction of the Port Jersey 50 ft contract allows for the construction of Port Jersey 50 ft alignment to be constructed directly to 50 ft. By sequencing the Port Jersey 50 ft contract to commence by the end of FY04 there is no need to construct the PJ41 Contract 3 and the Government realizes a savings to the overall construction cost of the harbor projects (predecessor and 50ft projects).
30. Each channel was divided into multiple contracts. Taking into consideration bonding limitations of potential Contractors, contracts for the consolidated plan were restructured and to range between \$75 and \$150 million. The unconsolidated contracts are significantly smaller, and range from \$10 to \$100 million. All contracts will be from the existing condition to project depth to the improved depth, with the contractor responsible for removing all material (silt, sand, clay, rock, etc) within the pay prism. There are savings in the construction cost of the 50ft project by reducing the number of construction contracts to be executed.

Geologic Quantities

31. Quantities were calculated for rock, non-rock, and material unsuitable for placement at the HARS (Historic Area Remediation Site). The material unsuitable for placement at the HARS is hereafter in this report referred to as “upland” material. The depths for the channels included in this project were based upon the draft of the design vessel, plus appropriate underkeel clearance as described in “Channel Design Appendix.” This depth is known as the “design depth. Quantities were then calculated for the channels in the NED Plan to the depths identified in Table 3 with channel side slopes of 1V:3H in non-rock, and 1V:1H in rock.
32. The estimated quantities assume that the Ambrose, Anchorage, and Bay Ridge channels were deepened to their currently authorized depths as listed in Table 3.
33. Kill Van Kull and Newark Bay are authorized to –45 ft MLW in soft material and –47 ft MLW in rock and hard materials. Arthur Kill and Port Jersey channels are



authorized to –41ft MLW in soft material and –43ft MLW in rock and otherwise hard material. In addition, the Corps, recognizing the imprecision of dredging, will have an additional paid (although not required) overdepth of 1.5ft. The additional 2 ft. of safety clearance in rock and hard material and the paid overdepth will not be maintained and will be allowed to shoal-in creating a soft channel bottom.

34. For channels where no rock was present, the total quantity was calculated by generating a 3D surface from a survey. A Triangular Irregular Network (TIN) was then generated. The quantity of material between the TIN and the desired channel depth was then calculated using the “INROADS” program.

Rock Quantities

35. Generating quantities in channels that contain rock beneath non-rock is more complicated. The side slope changes as the rock face rises and falls. For this reason, quantities in these channels were calculated using the average end area method. Cross-sections were generated by computer at 400ft intervals and at changes in channel direction or size. (Note that rock contours were generated from borings, and are discussed in further detail in the Geotechnical Appendix).

Material “Unsuitable for the HARS” Quantities

36. Non-rock quantities must be further divided into material that is suitable for placement at the Historic Area Remediation Site (HARS), and material unsuitable for HARS placement, that is dredged material classified as upland.
37. The reader is referred to the *White Paper Dredged Material Characterization for the NY & NJ Harbor Deepening Project (50 feet) {May 2003}*. The paper provides a detailed explanation as to how the categorization of material was determined as unsuitable for HARS placement. The paper states, in part

To facilitate developing project costs and establishing management options for dredged materials emanating from deepening activities, we have screened all proposed deepening material by performing some sampling and analysis to determine which sediments might be HARS suitable and which would require upland disposal. The primary analysis performed has been geotechnical, which has enabled the sediments from the project area to be divided into five categories: rock, red-brown clay, glacial till, HARS acceptable sediments and non-HARS sediments. This scenario provides useful information for making projections with regard to the volumes of sediment that would be available for unrestricted placement at the HARS.



and

Finally, nine percent of the new work material will be post-industrial silts. This material will be assumed to be HARS unsuitable. While on occasion this material, as part of the interim projects or Operations and Maintenance (O&M) projects, has been found suitable for HARS remediation, it is not considered reasonable to include any of this volume as HARS suitable for the purpose of establishing costs. Thus, for the sake of our projections, this material will be determined to be HARS unsuitable. In light of the limited volume under consideration, a change in this determination would have a negligible effect on project cost.

38. The volume of the upland placed material was generated from an isopach map.
39. An isopach map shows the thickness of a layer that in this case, is the layer of material requiring upland disposal. Once the area of the channel that contains this material is determined, its volume was calculated. This volume was then deducted from the total non-rock quantity.
40. Since chemical and biological testing was not performed during this phase, therefore the thickness of the upland material interval was estimated based on the presence of hydrocarbons, moisture content and color. The isopach map was generated from information contained on the boring logs and is discussed in further detail in the Geotechnical Appendix.
41. As discussed above, the Kill Van Kull, Newark Bay, Arthur Kill, and Port Jersey channels are currently being constructed. These channels' bottom depth will be constructed in rock or hard material. Therefore, an additional 2 feet of deepening will be required for safety reasons. In addition, due to inaccuracies in the dredging process there is a paid overdepth of 1.5 ft in addition to the 2ft of safety clearance. Review of actual post construction depths in the KVK45 indicates that contractors are dredging beyond the required depth. Therefore it is assumed that for uncompleted predecessor projects the Contractor will dredge to their maximum pay depth, which is 1.5ft beyond the required depth. Therefore, the estimate of material requiring upland placement assumes that this additional depth will be permitted to shoal-in with material unsuitable for placement at the HARS. For example, Kill Van Kull will be deepened to 47 ft in rock areas for safety reasons and with the paid overdepth of 1.5 ft the Contractor will be compensated to 48.5 ft. However, once the rock is removed to 48.5 ft the bottom will be allowed to shoal-in and is effectively soft, and will therefore only be maintained



to 45ft. The rock areas will accumulate silt in the time between the completion of the predecessor dredging and the start of the 50ft project. The volume material unsuitable for HARS placement is based upon the rate of sedimentation per year, and the time between the completion of dredging for the predecessor project and the commencement of dredging for the 50ft. project. The maximum volume of material unsuitable for HARS placement is capped in the areas where predecessor projects will be constructed by the amount of channel overdepth. At that point it is assumed that maintenance dredging will be performed in the channel.

Pay Quantities for Consolidation Analysis

42. The quantity removed under the PANYNJ for KVK/NB-45 Area 5 has been deducted from the overall quantity of material that needs to be removed for future harbor deepening disposal.
43. The following table summarizes the quantities contained in the feasibility with no paid overdepth and with the 1.5ft of non-paid overdepth. This table does not include predecessor dredging volume

Table 5

Feasibility Report Quantities {pay quantity – zero ft overdepth}(cy)					Feasibility Report Quantities {1.5ft non-paid overdepth}(cy)				
Channel	Rock	HARS	non-HARS	TOTAL	Rock	HARS	non-HARS	TOTAL	
Arthur Kill	2,634,000	390,000	789,000	3,813,000	3,073,000	440,000	789,000	4,301,000	
Ambrose	0	8,817,000	0	8,817,000	0	12,233,000	0	12,233,000	
Anchorage	0	2,051,000	717,000	2,768,000	0	4,084,000	717,000	4,801,000	
Bay Ridge	0	2,147,000	1,854,000	4,001,000	0	3,103,000	1,854,000	4,957,000	
Kill Van Kull	2,276,000	2,886,000	2,142,000	7,304,000	2,964,000	3,824,000	2,142,000	8,929,000	
Newark Bay	893,000	4,825,000	2,356,000	8,074,000	1,161,000	6,150,000	2,356,000	9,666,000	
Port Jersey	0	3,211,000	311,000	3,522,000	0	3,551,000	311,000	3,862,000	
TOTAL	5,803,000	24,327,000	8,169,000	38,299,000	7,197,000	33,383,000	8,169,000	48,750,000	

44. The following table summarizes the quantities contained in the LRR and takes into account the items identified above under Dredged Materials. This table does not include predecessor dredging volume



Table 6

LRR Quantities Unconsolidated (1.5ft paid overdepth except Ambrose, 2.0ft paid overdepth)(cy)				
Channel	Rock	HARS	non-HARS	TOTAL
Arthur Kill	2,145,000	1,125,000	147,000	3,417,000
Ambrose	0	11,250,000	0	11,250,000
Anchorage	0	3,685,000	756,000	4,441,000
Bay Ridge	0	2,960,000	1,853,000	4,813,000
Kill Van Kull	2,493,000	2,705,000	173,000	5,371,000
Newark Bay	231,000	5,631,000	1,878,000	7,740,000
Port Jersey	6,000	3,413,000	594,000	4,013,000
TOTAL	4,875,000	30,769,000	5,401,000	41,045,000

Based on the information provided above there is a significant change in the volume of material to be dredged. As of September 2003, there is approximately 8,343,000 cy less material to be dredged. For a detailed summary of the change in volume, please refer Table 7c of the Cost Appendix.

45. This paragraph will consider the project, both with consolidation and without consolidation of the predecessor projects. The consolidated plan will include quantities for KVK45 Area 5 and Area 4B. The following tables present the quantities by the geotechnical and disposal characterization of material in the categories from which costs will be developed. Table 7a is based upon the recommended consolidated plan, excluding predecessor projects to be completed to their interim depths. Table 7b represents the volume of the 50ft project if it were to be built as it was originally presented in the 1999 *Feasibility Report*.

Table 7a LRR Quantities (CY) Consolidated					
	ROCK	HARS		UPLAND	
Contract	Rock Volume to Pay depth	Volume Hard HARS to Pay Depth	Volume Soft HARS to Pay Depth	Upland Volume	TOTAL Volume
S-AK-1	409,000	304,000		109,000	822,000
S-AK-2	332,000	389,000		38,000	759,000
S-AK-3	1,405,000	432,000			1,837,000
S-AM-1		11,249,000			11,249,000
S-AN-1		623,000	855,000	206,000	1,684,000
S-AN-2		1,021,000	1,188,000	551,000	2,760,000
S-BR-1		2,262,000	698,000	1,853,000	4,813,000
S-KVK-1	783,000	857,000	506,000	110,000	2,256,000
S-KVK-2	2,447,000	1,860,000		261,000	4,568,000
S-E-1	28,000	898,000		593,000	1,519,000
S-NB-1	54,000	2,063,000		1,083,000	3,200,000
S-NB-2	149,000	2,484,000	186,000	202,000	3,021,000
S-PJ-1	6,000	2,306,000	1,107,000	594,000	4,013,000
	5,613,000	26,748,000	4,540,000	5,600,000	42,501,000

Notes:

1. Quantities include paid overdepth (1.5ft paid overdepth except Ambrose, which is 2.0ft paid overdepth)
2. HARS Hard includes sand, clay and glacial till
3. S-KVK-2 includes quantities from the Corps KVK45 Area 5, Area 4b



Table 7b LRR Volumes (CY) Unconsolidated					
Contract	ROCK	HARS		UPLAND	TOTAL Volume
	Rock Volume	Volume Hard HARS to Pay Depth	Volume Soft HARS to Pay Depth	Upland Volume	
AK-1	644,000				644,000
AK-2	760,000	432,000			1,192,000
AK-3	77,000	129,000		27,000	233,000
AK-4	255,000	260,000		11,000	526,000
AK-5	409,000	304,000		109,000	822,000
AM-1		3,750,000			3,750,000
AM-2		3,750,000			3,750,000
AM-3		3,750,000			3,750,000
AN-1		570,000			570,000
AN-2		1,073,000	965,000	357,000	2,395,000
AN-3			1,077,000	399,000	1,476,000
BR-1		2,262,000	315,000	836,000	3,413,000
BR-2			383,000	1,017,000	1,400,000
KVK CTA 5 45-50	1,050,000	178,000		55,000	1,283,000
KVK-1	127,000	298,000	490,000	107,000	1,022,000
KVK-2	301,000	263,000	16,000	3,000	583,000
KVK-3	355,000	295,000			650,000
KVK-4	63,000	490,000			553,000
KVK-5		480,000			480,000
KVK-6	109,000	24,000			133,000
KVK-7	154,000				154,000
KVK-8	137,000				137,000
KVK-9	197,000	171,000		8,000	376,000
NB-1		38,000		100,000	138,000
NB-2		426,000		365,000	791,000
NB-3	75,000	1,546,000	83,000	502,000	2,206,000
NB-4	96,000	2,027,000	103,000	222,000	2,448,000
NB-5	60,000	1,408,000		689,000	2,157,000
PJ-1	6,000	2,306,000	594,000	1,107,000	4,013,000
Total 50ft dredging	4,875,000	26,230,000	4,026,000	5,914,000	41,045,000
KVK 5 (predecessor)	627,000	369,000		78,000	1,074,000
KVK 4b (predecessor)	111,000	147,000		120,000	378,000
	738,000	516,000	0	198,000	1,452,000

Total HNP 5,613,000 26,746,000 4,026,000 6,112,000 42,497,000

Notes:

1. Quantities include paid overdepth (1.5ft for all channels except for Ambrose, where paid overdepth is 2.0 ft)
2. HARS Hard includes sand, clay and glacial till



46. The following table identifies the categories where change in volume occurred and their approximate reduction in volume.

Table 7C Volume Changes (CY) Since Feasibility	
Reason for Change	Reduction in Volume
1. Change from maximum sedimentation	2,781,000
2. Actual overdepth info on interims	2,189,000
3. Change in theoretical overdepth on interims	2,158,000
4. New survey of non-interim channels	1,343,000
	8,471,000
TOTAL CHANGE From 1999 to 2003 (Some categories overlap, therefore the total is slightly larger than the overall change)	7,705,000
<p>1. In 1999 It was assumed that the KVK, PJ and AK interim projects would fully sediment the 2ft of safety clearance between the Predecessor and current deepening. Based upon current schedules and predicted sedimentation rates, there will insufficient time for the channels to completely resediment.</p> <p>2. In 1999 no interim dredging had begun. It was assumed that the interim projects would not exceed authorized depth. KVK II CTAs 1, 2, 3, 4a, and 7 are now complete and actual surveys were used to develop quantities in these areas.</p> <p>3. In reviewing the interim post dredge surveys (see footnote 2 above) it was found that at a minimum, dredgers took the full pay depth. For the remaining interim contracts we now assume that the full pay overdepth (1.5 ft in all areas</p> <p>4. New surveys were taken of channels that had no interim dredging</p>	

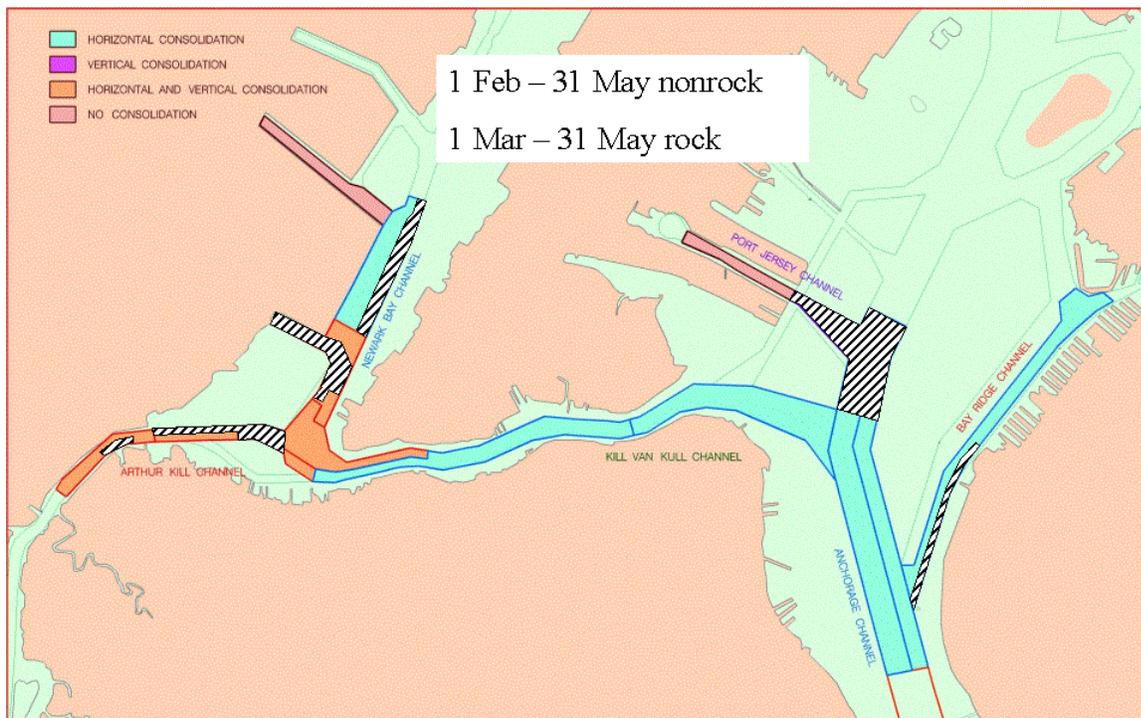


Assumptions

47. The assumptions used in developing the LRR Recommended Plan cost estimate have been broken down into the following areas of consideration: environmental, operational, placement, and equipment.

Environmental Considerations

48. The following environmental assumptions, as detailed in the *Environmental Assessment*, are used in developing the construction cost estimate.



- The illustration above summarizes the EFH windows prohibiting dredging and blasting for this project.
- Least Terns will continue to not use Shooters Island, and thus the 1,000 ft window is not in effect.
- In recognition of possible restrictions in State water quality certificates, a no barge overflow condition was assumed when removing material unsuitable for placement at the HARS (upland material).
- Turbidity will be controlled using methods similar to that used in KVK 45, AK41 and PJ41 projects.
- Use of cutterhead and hoppers north of the Verrazanno Narrows is prohibited.
- No regulatory compliance testing will be required during construction for material that is unsuitable for placement at the HARS(upland material).

- There are no restrictions on the transport or handling of dredged material that is unsuitable for placement at the HARS (upland material).
- Mitigation of EFH impacts consists of improvement of wetlands at Old Place Creek and Woodbridge as well as a lobster reef at Hoffmann and Swinburne Islands. As detailed in the *Environmental Assessment*.
- Offset of air emissions consists of the use of alternative fuels, tug repowering, and ferry boat improvements, as detailed in the *Environmental Assessment*.

Operational Considerations

49. The following operational considerations were used in developing the construction cost estimates.

- Mobilization and demobilization were based on the equipment identified below being used for the removal of HARS non-rock material, material unsuitable for placement at the HARS and rock. It was assumed that 1 calendar month would be required for mobilization and 1 calendar month would be required for demobilization.
- Drilling and blasting operations will be 12 hours per day operating 6 days a week.
- Dredging operations will be 24 hours per day operating 7 days a week.
- A closed environmental dredging bucket will be used where practicable for the removal of upland material. Hoist speed will be limited to 2 ft/second when dredging upland material (unsuitable for HARS placement) with a sealed bucket.
- Up to six inches of non rock and upland material (material unsuitable for placement at the HARS) will remain on underlying material.
- Inspections will be required for placement of material at the HARS.
- The use of alternative fuels shall not impact the efficiency of operation or reduce production rates.
- Utility relocations will be performed early enough so as not to impact the dredging operations.
- Mechanical dredges cannot completely remove the layer of non-rock from the top of rock. Up to one foot of material may remain on top of the rock and will be removed with the rock.
- It is assumed that any material above the maintained depths of the existing condition will have been removed as part of Operations and Maintenance (O&M).

Placement Considerations

50. The following placement considerations were used in developing the construction cost estimates.



- It is assumed the rock material will be placed at the Shark River Reef, which is approximately 50 nautical miles away from this project site.
- It is assumed that clean non-rock material will be utilized for remediation material and will be placed at the HARS. Restrictions based on material characterization, will not apply to this placement at the HARS. The distance to the HARS is approximately 25 miles one way.
- Disposal sites were provided by the Local Sponsor in their *July 28, 2003 email*, subject *Summary of Estimated dredging Volumes – Revised*. The cost estimates for upland disposal were based upon an OENJGP/ENCAP type operation. It is assumed that the actual disposal site for each contract will be identified by the local sponsor prior to each advertisement, and will be operational prior to award.

Equipment Considerations

51. Applicability of available equipment was evaluated. The following summarizes the applicability of equipment and the assumed use of the equipment for this project:

Hopper Dredge - The environmental restriction on barge overflow of upland material (material unsuitable for placement at the HARS), limits the applicability of the hopper dredge for the channels identified in this plan. However, the one exception is Ambrose Channel, which does not contain upland material. The dredged material of Ambrose Channel is comprised predominantly of clean sand and silty sand. For the purposes of preparing the construction cost estimate an hopper dredge will be used for Ambrose Channel.

Cutterhead Dredge – Cutterhead dredges have traditionally been environmentally restricted due to turbidity and because of turbidity concerns raised in the past they were not considered for the development of the construction cost estimate. However, the environmental community remains open to a dialogue on this issue. The Corps is continuing to work with the environmental community to determine the acceptability of the use of cutterhead dredges. However, cutterhead dredges were not used in the development of the cost estimate.

Clamshell Dredge – Clamshell dredges were used extensively during KVK I, KVK45, PJ41, AK 41 and by the Port Authority of New York and New Jersey (PANY&NJ) for the Newark Bay Confined Placement Facility and limited dredging of the Port Jersey channel and for O&M dredging. After reviewing the production records from these projects it was concluded that clamshell dredges could be used most efficiently in softer materials. A dredger equipped with a closed environmental clamshell bucket was considered applicable for dredging soft material unsuitable for placement at the HARS and was used in the



development of the construction cost estimate for all the channels that contain upland material. In addition, the construction cost estimate utilizes the clamshell dredge for the removal of HARS suitable silts and sands in Anchorage, Arthur Kill, Newark Bay and Bay Ridge Channels.

Excavator Dredge – We have reviewed dredging records for KVK45, PJ41 and AK41. Excavators dredges have been most efficient in the removal of dense/hard materials such as blasted and unblasted rock, clay, and glacial tills.

Dredging Plant Requirements

52. The dredge type and associated equipment for dredging the various types of material is as follows:

Material Unsuitable for Placement at the HARS (upland material)

- (1) 21 CY Clamshell
- (1) tug boat
- (1) launch
- (4) dump scows

Silt Suitable for Placement at the HARS

- (1) 17 CY Clamshell
- (1) tug boat
- (1) launch
- (4) dump scows

Holocene Sand (Anchorage and Bay Ridge Channels)

- (1) 14 CY Clamshell
- (1) tug boat
- (1) launch
- (4) dump scows

Pleistocene materials (Port Jersey, Arthur Kill, Kill Van Kull and Newark Bay)

- (1) Excavator with a 13cy bucket
- (1) tug boat
- (1) launch
- (2) dump scows



Non-Rock Material (Ambrose Channel)

- (1) 3500 CY Hopper per contract
- (1) survey boat

Rock Material

- (1) 10 CY Excavator Dredge
- (1) tug boat
- (1) launch
- (1) survey tug
- (2) dump scows
- (2) drill boats/contract (as necessary)

Production Rates

53. Production rates for the dredges varies and depends upon the type of material to be dredged (loose sand, dense sand, soft clay, stiff clay, etc), environmental restrictions, (barge overflow, hoist speed, etc), bucket size, pay face, and cycle time. The production rates were developed using the factors identified above and the Corps of Engineers Dredge Estimating Program (CEDEP). CEDEP considers factors such as bucket size, cycle time, pay face, and the nature of the material. These production rates were compared to historic records and found to be reasonable. In addition, upland placement of dredged material is usually controlled by the upland facility's processing rate, not the dredge's production. The Corps' experience with upland disposal in this area is that processing is typically 4,000cy/day, six days per week. The following table summarizes the production rates used in developing the construction cost estimate

	Rock (cy/month)	HARS Hard (cy/month)	HARS Soft (cy/month)	Non-HARS (cy/month)
Ambrose		270,000		
Anchorage		94,000-150,000	183,000	130,000
Arthur Kill	73,000-86,000	117,000		130,000
Bay Ridge		150,000	183,000	130,000
Kill Van Kull	55,000-79,000	106,000-114,000	183,000	130,000
Newark Bay	25,000-50,000	110,000-117,000	183,000	130,000
Port Jersey	35,000	117,000	183,000	130,000



Table 8b Production Rates Unconsolidated Plan				
	Rock (cy/month)	HARS Hard (cy/month)	HARS Soft (cy/month)	Non-HARS (cy/month)
Ambrose		270,000		
Anchorage		94,000-150,000	183,000	130,000
Arthur Kill	73,000-86,000	117,000		130,000
Bay Ridge		150,000	183,000	130,000
Kill Van Kull	55,000-69,000	95,000-114,000	183,000	130,000
Newark Bay	25,000-50,000	110,000-117,000	183,000	130,000
Port Jersey	35,000	117,000	183,000	130,000

Note: The only difference in production rates between the two plans is in the Kill Van Kull Channel, where consolidation is recommended



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CONSTRUCTION EXECUTION AND SCHEDULE

54. Each channel was divided into multiple contracts. Taking into consideration bonding limitations of potential Contractors, contracts for the consolidated plan are in the range between \$75 and \$150 million. The unconsolidated contracts are significantly smaller, and range from \$10 to \$100 million. All contracts will be from the existing condition to project depth to the improved depth, with the contractor responsible for removing all material (silt, sand, clay, rock, etc) within the pay prism.
55. Preliminary construction schedules were developed for Consolidated and Unconsolidated plans. It is a planning level schedule, used only to provide an assessment of interest during construction (IDC), economic feasibility and cumulative environmental effects.
56. The schedules are based on information available to date, predicated on the assumptions listed in this document. The New York District and the Project Sponsors will share additional information to meet the goal of expediting construction to enable the project to accrue national economic benefits as soon as possible and to satisfy the non-Federal partners' desire for early construction of the overall project. This schedule will be refined as additional information becomes available.

Figure 1 Consolidated Schedule

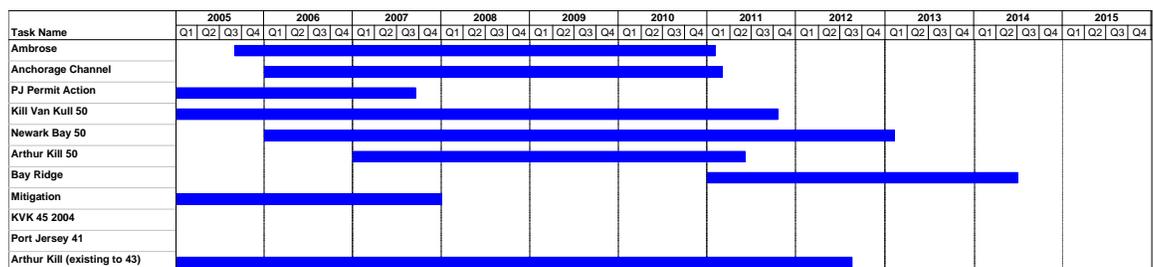


Figure 2 Unconsolidated Schedule

Task Name	2005				2006				2007				2008				2009				2010				2011				2012				2013				2014				2015			
	Q1	Q2	Q3	Q4																																								
Ambrose																																												
Anchorage Channel																																												
PJ Permit Action																																												
Kill Van Kull 50																																												
Newark Bay 50																																												
Arthur Kill 50																																												
Bay Ridge																																												
Mitigation																																												
KVK 45 2004																																												
Port Jersey 41																																												
Arthur Kill (existing to 43)																																												

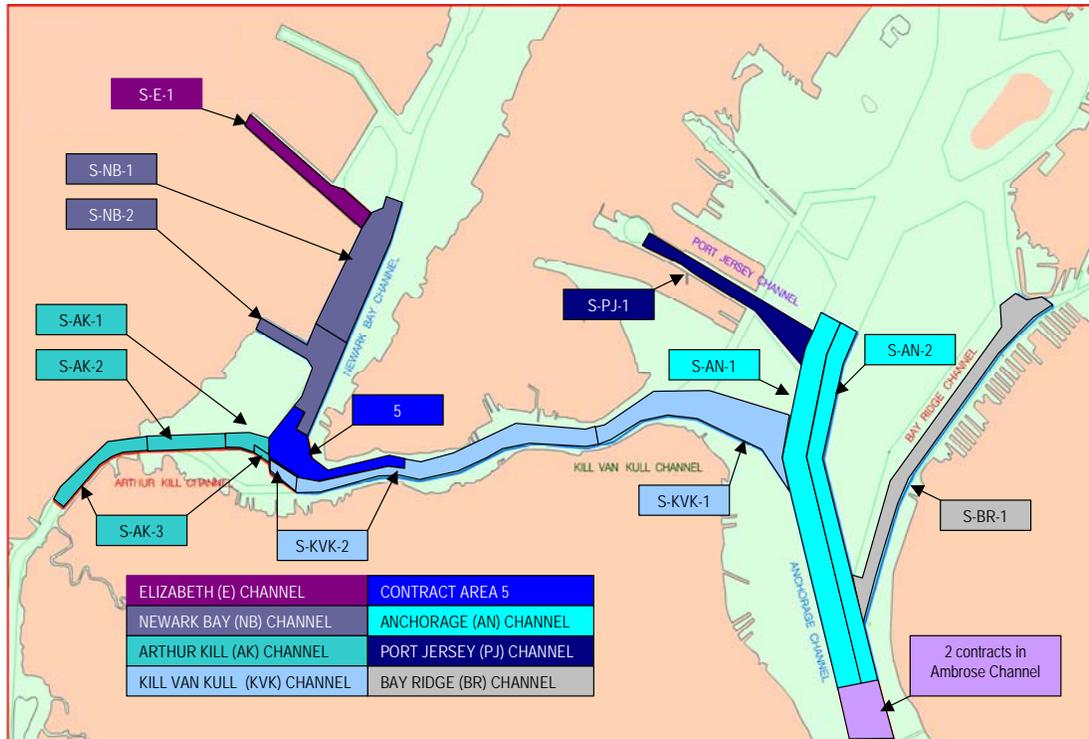
COST SUMMARY

57. As stated earlier, the Corps considered the practicality and benefits of combining predecessor projects with the 50ft project (vertical consolidation) as well as the practicality and benefits of utilizing larger contracts than envisioned in the Feasibility and the savings associated with not constructing Port Jersey 41 Contract 3.

58. The vertical consolidation opportunities evaluated as part of this analysis and included in the cost estimate are:

- KVK45 area 4b with S-KVK-2. KVK45 area 4b is the last segment of KVK45. Located at the far western end of the Kill Van Kull channel.
- KVK45 area 5. This segment is the inside of the turn at Bergen Point. The KVK45 segment of this work was awarded by the Port Authority of New York and New Jersey on September 2002.





59. To properly compare the impact of consolidation of this project with KVK45 Area 5 and Area 4B, and take into consideration the benefits of utilizing larger contracts than envisioned in the Feasibility and the savings associated with not constructing Port Jersey Contract 3, the cost of the predecessor projects for KVK Area 5, KVK Area 4B and Port Jersey 41 Contract 3 are included in the following tables.

Table 9a First Cost Estimate Unconsolidated Plan			
Item Description	Subtotal	Contingency Amount	Total
Arthur Kill	119,100	22,300	141,400
Anchorage	138,500	24,000	162,500
Bay Ridge	128,800	23,300	152,100
Kill Van Kull 50 (excluding Area 5)	219,900	33,800	253,700
Kill Van Kull 50 (Area 5)	100,500	5,000	105,500
Newark Bay	264,100	50,700	314,800
Port Jersey	81,700	15,600	97,300
Ambrose	74,400	12,500	86,900
Sub total, 50 ft dredging	1,127,000	187,200	1,314,200
Old Place Creek Wetland	1,600	300	1,900
Woodbridge Wetland	2,500	500	3,000
Hoffmann/Swinburne Lobster Reef	0	0	0
Clean Air Act Compliance	28,400	5,700	34,100
Sub total, Mitigation Costs	32,500	6,500	39,000
Engineering and Design, 50ft	71,000	11,600	82,600
Supervision and Administration, 50ft	93,000	18,600	111,600
Sub total, Labor	164,000	30,200	194,200
Real Estate	7,400	1,500	8,900
TOTAL 50 ft	1,330,900	225,400	1,556,300
KVK45 Area 4b	31,000	6,200	37,200
PJ41 Contract 3 (turning basin)	27,800	5,400	33,200
Total Interims	58,800	11,600	70,400
TOTAL ALL PROJECTS CONSTRUCTION	1,389,700	237,000	1,626,700



Table 9b First Cost Estimate			
Item Description	Subtotal	Contingency Amount	Total
Arthur Kill	115,400	21,700	137,100
Anchorage	136,500	23,700	160,200
Bay Ridge	126,800	23,000	149,800
Kill Van Kull 50 (excluding Area 5)	209,400	32,500	241,900
Kill Van Kull 50 (Area 5)	99,900	5,000	104,900
Newark Bay	261,600	46,500	308,100
Port Jersey	81,700	15,600	97,300
Ambrose	73,400	11,100	84,500
Sub total, 50 ft dredging	1,104,700	179,100	1,283,800
Old Place Creek Wetland	1,600	300	1,900
Woodbridge Wetland	2,500	500	3,000
Hoffmann/Swinburne Lobster Reef	0	0	0
Clean Air Act Compliance	28,400	5,700	34,100
Sub total, Mitigation Costs	32,500	6,500	39,000
Engineering and Design, 50ft, unexpended	71,000	11,600	82,600
Supervision and Administration, 50ft	93,000	18,600	111,600
Sub total, Labor	164,000	30,200	194,200
Real Estate	7,400	1,500	8,900
TOTAL 50 ft	1,308,600	217,300	1,525,900
KVK45 Area 4b	0	0	0
PJ41 Contract 3 (turning basin)	0	0	0
Total Interims	0	0	0
TOTAL ALL PROJECTS CONSTRUCTION	1,308,600	217,300	1,525,900

60. Based on the costs presented above the consolidated plan, the use of larger contracts and the savings associated with not constructing Port Jersey Contract 3, saves the Government \$100,800,000 in first cost and \$168,430,000 fully funded over the life of the project.



**Table 9c
Comparison of Consolidated
and Unconsolidated Costs
(\$000)**

Item Description	Consolidated	Un-Consolidated	Savings
Arthur Kill	\$137,100	\$141,400	\$4,300
Anchorage	\$160,200	\$162,500	\$2,300
Bay Ridge	\$149,800	\$152,100	\$2,300
Kill Van Kull 50 (excluding Area 5)	\$241,900	\$253,700	\$11,800
Kill Van Kull 50 (Area 5, 45-50)	\$104,900	\$105,500	\$600
Newark Bay	\$308,100	\$314,800	\$6,700
Port Jersey	\$97,300	\$97,300	\$0
Ambrose	\$84,500	\$86,900	\$2,400
Sub total, 50 ft dredging	\$1,283,800	\$1,314,200	\$30,400
Old Place Creek Wetland	\$1,900	\$1,900	\$0
Woodbridge Wetland	\$3,000	\$3,000	\$0
Hoffmann/Swinburne Lobster Reef	\$0	\$0	\$0
Clean Air Act Compliance	\$34,100	\$34,100	\$0
Sub total, Mitigation Costs	\$39,000	\$39,000	\$0
Engineering and Design, 50ft	\$0	\$0	\$0
Supervision and Administration, 50ft	\$0	\$0	\$0
Sub total, Labor	\$0	\$0	\$0
Real Estate	\$0	\$0	\$0
TOTAL 50 ft	\$1,322,800	\$1,353,200	\$30,400
KVK 45 unawarded (Area 4b)	\$0	\$37,200	\$37,200
PJ41 unawarded (CT 3)	\$0	\$33,200	\$33,200
Total Interims	\$0	\$70,400	\$70,400
TOTAL ALL PROJECTS CONSTRUCTION	\$1,322,800	\$1,423,600	\$100,800



DESCRIPTION OF THE LRR RECOMMENDED PLAN

61. The LRR Recommended Plan requires deepening the nine major navigation channels serving the Harbor. The following describes the recommended action, as summarized in Table 10.

Ambrose Channel

62. The plan requires deepening the entire 10.6 nautical miles of the Ambrose Channel extending from deep water in the Atlantic Ocean to the Narrows. The channel will be excavated (i.e., deepened) and maintained at a depth of 53 ft MLW. The existing channel will be extended along its present bearing an additional 2,400 ft toward the Atlantic Ocean in order to provide the desired depth. The trapezoidal channel will be 2,000 ft wide at its base with three horizontal to one vertical (3H:1V) side slopes excavated primarily in sand. The Ambrose Light Tower will not be impacted by the project.

Anchorage Channel

63. The Anchorage Channel will be dredged for 19,000 feet from the Narrows to the point 1,000 feet north of the junction with the Port Jersey Channel. The recommended channel will remain at its present width of 2,000 ft. The channel will be deepened and maintained at a depth of 50 ft MLW. The trapezoidal channel will be cut through soft material comprised of silt and clay in the southern portion of this channel and sand in the northern portion. The channel will be constructed with 3H:1V side slopes. Two water mains will be relocated below the proposed channel as part of this segment of the project. The relocations consist of 8,500 LF and 7,200 LF of 36-inch and 42-inch diameter water mains, respectively.



**TABLE 10
LRR Recommended Plan – Pertinent Features**

Channel Name:	Ambrose	Anchorage	Port Jersey	Kill Van Kull	Newark Bay	Elizabeth	South Elizabeth	Arthur Kill	Bay Ridge
Improvement Features									
Length of Improvement	63,600 ft	19,000 ft	10,000 ft	31,800 ft	14,000 ft	8,800 ft	2,700 ft	14,400 ft	18,000 ft
Maintained Depth (ft MLW)	53	50	50	50	50	50	50	50	50
Initial Depth Excavated (ft MLW)	53	50	52	52	52	52	52	52	50
Channel Bottom Width	2000 ft	2000 ft	500 ft	800 ft	800-2200ft	500-800 ft	500 ft	800 ft	600 ft
Predominant Side Slope:	3H:1V	3H:1V	3H:1V	Varies between 1H:1V & 3H:1V	3H:1V western side; 1H:1V eastern side	3H:1V; 1H:1V on west-ern end.	Varies between 1H:1V & 3H:1V	3H:1V & 1H:1V compound	3H:1V
Predominant Channel Bottom Material Type:	Sand- Class ified as Soft	South: silt and clay, north: sand	Sand, Pleisto- cene sand, clay	Rock, glacial till, sand and silt	Silty sand, silt and clay, rock	Silt and clay, rock	Sand, silt and clay	Rock, silt and clay, silty sand and gravel	Blk silt & clay, silty sand
Special Design Features	Extend channel 2,400 ft along bearing to sea,	Deepening 1,000 ft beyond Port Jersey Channel junction	Tape red channel width: 1,500 ft at Anch Chl junction to 500 ft at inner channel; Berth deepening(3 berths X 1,200 ft X 150 ft)	Demolish Commerce Street Pier	Channel deepening 1,500 ft north of Elizabeth Chl Berth deepening PANYNJ Marine Terminal (2 berths X 1,200 ft X 150 ft)	Berth deepening (3 berths X 1,200 ft X 150 ft)	Berth deepening (1 berth X 1,200 ft X 150 ft) Demolish or replace Allied Signal Pier	Berth deepening (1 berth X 1,200 ft X 150 ft) Demolish last 60ft of Proctor and Gamble pier	Eastern 600ft of chl deepened, 1600ft turning basin; berth deep/strength (2 berths X 1,200 ft X 150 ft)
Lands Easements & Rights-of-Way									
Permanent Easement:	None	None	None	None	None	None	None	None	None
Temporary Easement:	None	None	None	None	None	None	None	None	None
Utility Relocations									
Type:	Gas	Water	None	None	None	None	Gas	None	(see Anch)
Diameter:	26"	36" / 42"	None	None	None	None	12"	None	None
Length:	2,500 LF	8,500 LF / 7,200 LF	None	None	None	None	2,700 LF	None	None

Port Jersey Channel

64. The Port Jersey Channel is to be deepened to 52 ft MLW and maintained at a depth of 50 ft MLW allowing 2 ft of the naturally-hard bottom to fill with soft



sediments. The channel will be deepened for a distance of 10,000 ft from its juncture with the Anchorage Channel through the berthing areas at the Global Marine Terminal and MOTBY Peninsula. The berths at each of the two facilities will be deepened. The existing 1,200 ft turning basin at the head of the Port Jersey Channel will not be deepened. The turning basin is inadequate for the K-class containership, which has an overall length of 1,044 ft. Without a turning basin, vessels will be required to either back into or out of Port Jersey. In order to facilitate the backing maneuvers, the northern channel limit will be straightened, removing a narrow portion of the New Jersey Flats. Deepening the Anchorage Channel 1,000 ft to the north of the channel junction will permit inbound vessels to bring the bow past Port Jersey Channel, swing the stern around, and then back into berth.

65. The channel will be improved to a width of 500 ft between the Global Marine Terminal and MOTBY Peninsula. To facilitate turning into the channel on a flood tide, the entrance to the Port Jersey channel will flare out. The flare will be 1,500 ft at the junction with the Anchorage Channel and taper to 500 ft at the intersection with the New Jersey Pierhead Channel. The channel will be trapezoidal in shape with generally 3H:1V side slopes except in areas of where the side slopes will transition to 1H:1V. Construction of the proposed channels will remove a narrow portion of the New Jersey Flats impacting 12.35 acres of sub-littoral zone (-6 to -15 ft MLW) habitat.
66. A significant channel alignment modification to Port Jersey from that presented in the Feasibility is that entrance flare will be 1500 ft at the junction with Anchorage Channel and taper to 500 ft just to the west of the NJ Pierhead Channel. The wide flare of the approach channel is necessary due to the fact that vessels inbound on a flood tide will be turning broadside across the current. .

Kill Van Kull

67. The Kill Van Kull is to be deepened to a depth of 52 ft MLW and maintained at a depth of 50 ft MLW allowing the bottom 2 ft of the channel to fill with soft sediment over time. Extending from its juncture with the Anchorage Channel to its juncture with the Newark Bay Channel near Bergen Pont, 5.3 nautical miles of channel will be cut through a variety of geologic conditions including rock, glacial till, sand, and silt. Side slopes of the 800 ft wide trapezoidal channel will vary from 3H:1V to 1H:1V as the channel passes from soft deposits to rock with many of the sections being a compound of both. The alignment of the proposed channel will require two sections of 1,450 LF and 1,050 LF of Staten Island shoreline to be stabilized with rip rap along NYC Parks property north of Richmond Terrace and Atlantic Salt Co. property, respectively. As described in the Real Estate Appendix, construction activities associated with the bulkhead



and shoreline stabilization will require a temporary easement of 1.43 acres; 0.83 acres near to NYC Parks property north of Richmond Terrace and 0.6 acres near property owned by the Atlantic Salt Co. on Staten Island, NY. As proposed, the channel will impact 0.06 acres of littoral zone (MLW to -6 ft. MLW) and 1.41 acres of sub-littoral zone (-6 to -15 ft. MLW) habitat. Mitigation is provided for the littoral zone impact. .

Newark Bay Channels

68. The Newark Bay Channels are comprised of the Main Channel (South, Middle and North Reaches) plus numerous access channels (South Elizabeth Channel, Elizabeth Channel, Elizabeth Pierhead Channel, Port Newark Pierhead Channel and Port Newark Channel). Together, these channels service over 60 berths at the Port Newark/Elizabeth Marine Terminal on the west shore of Newark Bay. The main Newark Bay Channel will be dredged from its juncture with the Kill Van Kull near Bergen Point to a point located 1,500 ft north of the Elizabeth Channel. The channel will extend north of the Elizabeth Channel to aid vessels in turning and backing into berth. The Port Newark Pierhead Channel and Port Newark Channel are not anticipated to be deepened in connection with this investigation. The 14,000 LF of improvement proposed for the main Newark Bay Channel remains at its present width varying from 800 ft at its northern terminus to 2,200 ft near Bergen Point. The channel will follow its present alignment.
69. Similarly, the 8,800 ft long Elizabeth Channel will also remain at its present width, which varies from 500 to 800 ft, and alignment. The 2,700 ft long South Elizabeth Channel will be significantly widened from its present 290 ft to 500 ft. In addition, the berths at Port Elizabeth will be widened to 150 ft and deepened.
70. Each of the aforementioned channels will be dredged to 52 ft MLW and maintained at 50 ft MLW. The main north-south Newark Bay Channel, including the Elizabeth Pierhead Channel, will generally be constructed with a composite trapezoidal channel having side slopes of 3H:1V along its western side and as a result of rock paralleling the channel, and 1H:1V along the eastern side.
71. The South Elizabeth and Elizabeth Channels will have side slopes varying from 3H:1V to 1H:1V as the channel passes through changing strata. Construction of the South Elizabeth Channel will require relocating 2,700 LF of 12-inch diameter gas line. The line will be relocated away from the proposed channel template. The proposed channel alignments are shown in Figure 31. Newark Bay South Reach, and Elizabeth Channel, deepened to -52 MLW, will largely remain at their present width and will follow its present alignment.



72. A significant channel alignment modification from that presented in the Feasibility is the widening in South Elizabeth Channel, which will be widened to 500 ft, flaring wider at the eastern end where it connects to the Newark Bay South channel. The berthing areas along the Elizabeth Port Authority Marine Terminal will be widened to 150 ft. Improvements to the Newark Bay Channel will extend 1500 ft north of the Elizabeth Channel to facilitate vessels turning and backing into Port Elizabeth.

Arthur Kill Channel

73. The Arthur Kill Channel is proposed to be deepened from its juncture with the Kill Van Kull near Bergen Point to the Howland Hook Marine Terminal. This 2.4 nautical mile segment of channel will be dredged to a depth of 52 ft MLW and maintained at 50 ft MLW. The channel will generally follow the alignment of the 41 ft MLW channel presently under final design and anticipated to be in place in the Without-Project Condition. The existing channel varies in width from 500 to 800 ft, but will be widened to 800 ft as part of the 41 ft MLW project. This width will be maintained for this project. The trapezoidal shaped improvement is generally a compound section with 3H:1V side slopes in the softer upper portions of the excavation and 1H:1V in the underlying rock. The alignment of the channel will impact 3.23 acres of Littoral Zone habitat requiring mitigation and 3.21 acres of Sub-Littoral Zone habitat. The Feasibility called for the channel to be widened to the north opposite Howland Hook back to the limits of the existing -35' channel. Minor modifications to this north channel line will keep the proposed channel at least 60 ft from the existing bulkhead and marina.

Bay Ridge Channel

74. The nearly 3 nautical mile long Bay Ridge Channel is proposed to be improved and maintained to a depth of 50 ft MLW. The proposed channel will parallel the eastern side of current channel at a width of 600 ft, reduced from the current width of 1,200 to 1,750 ft. The width of the existing channel was based upon the fact that the existing finger piers required that a ship turn perpendicular to the channel before berthing. The 600 ft. one-way channel will be adequate for the two deep draft berths as anticipated in the Without-Project Condition. A proposed turning basin, with a diameter of 1,600 ft, is to be located opposite the terminal, enabling vessels to back out of or into berth. The development of this channel will require relocating two aids to navigation and the purchase of an additional eight. As a result of the channel alignment, 0.12 acres of Sub-Littoral Zone habitat will be impacted.



LRR Recommended Plan Cost Estimate

Definitions

75. Project first cost - construction estimate - Project cost is based on constant dollars (September 2003 P/L). The constant dollar cost estimate is used in project authorizations.
76. Fully funded cost – construction estimate – Project first cost is based on projected inflation rates. The fully funded estimate is used for appropriation purposes.
77. Background. The project first cost estimate represents the development of the estimated cost of the project at constant dollars. This is the base cost of the project. However, this cost does not properly represent the actual appropriations needed by the Federal government and Non-Federal sponsor to account for inflation over the period of construction. Cost-sharing partners need to budget to cover the fully funded cost of the project. The fully funded cost is obtained by inflating the project first cost to the mid point of construction using the current inflation factors given in the annual Fiscal Year budget regulation, EC 11-2-177, “Annual Program and Budget Request for Civil Works Activities Corps of Engineers, Fiscal Year 2001,” issued each spring. Tables 11, and 12 summarize the project’s first cost, the project’s annualized first cost and the project’s fully funded cost.

Unit Prices

Rock and Non-Rock dredging

78. The unit prices were developed using the Corps of Engineers Dredge Estimating Program (CEDEP). The unit cost is not directly proportional to each uniform depth increment as can be seen in the estimates included in the Feasibility Report. The CEDEP uses the following inputs:

- The dredgeability and area of the material (from the Geotechnical investigation)
- The volume of the material (discussed earlier in this document)
- Cycle time increases by 2 seconds per foot of dredge depth increment
- Productivity is affected by the ratio of bank height to bucket depth (bank factor), which maximizes when bank height is equal to or greater than bucket depth.



- Operational costs and ownership costs (determined from other dredging projects constructed in NY and other similar areas)
- Operating time, distance to placement and other similar factors (quantified from the underlying assumptions discussed earlier in this document)

Drilling and Blasting

79. The cost of drilling and blasting rock was based upon the Corps' experience with rock removal in the Kill Van Kull Phase I and Phase II projects.

Processing and Tipping Fees

- Material to be placed in the ocean (rock and non-rock material suitable for HARS remediation) does not have a tipping fee in accordance with the DMMP nor is processing required.
- The current cost for placement of material upland, including processing and tipping but excluding dredging, is \$42.98/cy. The local sponsor reserves the right to substitute any sites that may later prove to be more environmentally acceptable, or cost effective, or both. In addition, it is assumed that a mobilization fee to cover startup costs for the processing facility and the upland placement facility will be charged per contract.

Dredging Costs

80. The cost of excavating the improved channel is based upon the volume of rock, non-rock, and material unsuitable for placement at the HARS and their unit prices. Also included is the cost of mobilizing/demobilizing the equipment and contingencies. Where dewatering of excavated material is required prior to disposal of material, it is also included as part of the dredging cost.

Structural Costs

81. Federal Costs were included to mitigate the impact to structures due to the deepening of the Federal Channel, and are identified in the Structural Appendix. The cost of mitigating impacts to structures due to berthing area improvements are a non-Federal cost, and were provided by the Local Sponsor.

Mitigation Costs

82. The mitigation plans were developed by identifying the environmental impacts of each channels' improvement. The plans have been updated since the *Feasibility Report* to reflect the latest channel designs and consolidation. Mitigation of



littoral habitat will consist of the improvement of wetlands and the construction of a lobster reef. For details please see the *Environmental Assessment*.

83. Rock material will be beneficially reused at the Shark River artificial reef located in NJ State waters approximately 50 nautical miles away from the project site. Suitable non-rock material will be placed at the HARS. The remaining material shall be placed in designated upland sites provided by the Local Sponsor. This alternative will not require real estate acquisition.

Clean Air Act Compliance Costs

84. While the *Feasibility Report* and its *Statement of Conformity* recognized the need to be in conformance with the Clean Air Act (CAA), no plan was developed at that time. Thus, this report is the first opportunity to study in detail and the costs implications of CAA compliance.
85. As detailed in the *Environmental Assessment*, this project must be in compliance with the Clean Air Act (CAA) prior to and during construction. CAA compliance includes, but is not limited to, nitrogen oxide (NO_x) and carbon monoxide (CO). The CoE has considered a variety of compliance methods. These include the use of alternative fuels, engine replacements and upgrades for both dredging equipment, tug boats, and ferries. The current plan for compliance is a combination of these alternatives. The plan consists of fitting supplemental catalytic reactors (SCRs) to the seven Staten Island ferries and repowering four tugs in addition to the two tugs already repowered by the PANYNJ for their KVK/NB-45 “piggyback” contract. SCRs are an addition to the exhaust system analogous to an automobile’s catalytic converter. In addition contractors shall be required to use ultra low sulfur diesel (ULSD). For details please see the *Environmental Assessment*. CAA compliance will continue to evolve throughout the life of the project.
86. The use of alternative fuels shall increase the daily operational cost of the equipment, but shall not incur costs due to reduced production rates and efficiencies

Non-Federal Costs

87. Non-Federal costs include berth dredging, structural reinforcement of berths, utility relocations, construction of new facilities and other project costs that are the sole responsibility of the Local Sponsor. The Local Sponsors for this project are the State of New Jersey, the State of New York and the Port Authority of NY and NJ (PANY&NJ). The costs were provided by the PANYNJ who are acting on behalf of the 3 sponsors.



Real Estate Costs

88. Real estate costs reflect the cost of renting dewatering berths and acquiring easements or rights of entry for the construction of the littoral mitigation sites. Please see the *Real Estate Appendix* for further information.

Labor Costs

89. Costs for Engineering and Design (E&D) and Supervision and Administration (S&A) are part of this cost estimate. These costs were taken from the *Project Management Plan(PMP)* developed for the LRR. The PMP, and these costs, and will be updated to reflect the latest Recommended Plan.



LRR RECOMMENDED PLAN CONSTRUCTION EXECUTION AND SCHEDULE

90. Each channel was divided into multiple contracts. Taking into consideration bonding limitations and to maximize competition, contracts generally range between \$75 and \$150 million. All contracts will be from the existing condition to project depth to the improved depth, with the contractor responsible for removing all material (silt, sand, clay, rock, etc) within the pay prism.
91. A Preliminary construction schedule was developed for LRR Recommended Plan. It is a planning level schedule, used only to provide an assessment of interest during construction (IDC), economic feasibility and cumulative environmental effects.
92. The schedule is based on information available to date, predicated on the assumptions listed in this document. The New York District and the Project Sponsors will share additional information to meet the goal of expediting construction to enable the project to accrue national economic benefits as soon as possible and to satisfy the non-Federal partners' desire for early construction of the overall project. This schedule will be refined as additional information becomes available.

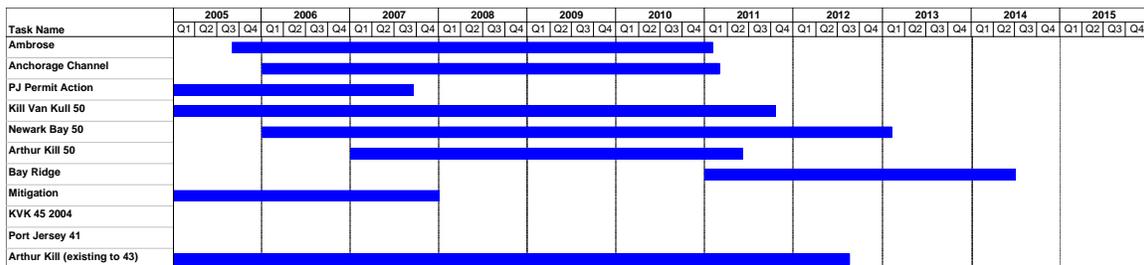


Figure 3 LRR Recommended Plan Schedule

LRR RECOMMENDED PLAN COST SUMMARY

93. The following table summaries the project's first cost – construction estimate for the LRR Recommended Plan.



**Table 11
First Cost Estimate
LRR Recommended Plan
(\$000)**

Item Description	Subtotal	Contingency Amount	Total
Arthur Kill	115,400	21,700	137,100
Anchorage	136,500	23,700	160,200
Bay Ridge	126,800	23,000	149,800
Kill Van Kull 50 (excluding Area 5)	209,400	32,500	241,900
Kill Van Kull 50 (Area 5)	99,900	5,000	104,900
Newark Bay	261,600	46,500	308,100
Port Jersey	81,700	15,600	97,300
Ambrose	73,400	11,100	84,500
Sub total, 50 ft dredging	1,104,700	179,100	1,283,800
Old Place Creek Wetland	1,600	300	1,900
Woodbridge Wetland	2,500	500	3,000
Hoffmann/Swinburne Lobster Reef	0	0	0
Clean Air Act Compliance	28,400	5,700	34,100
Sub total, Mitigation Costs	32,500	6,500	39,000
Engineering and Design, 50ft, unexpe	71,000	11,600	82,600
Supervision and Administration, 50ft	93,000	18,600	111,600
Sub total, Labor	164,000	30,200	194,200
Real Estate	7,400	1,500	8,900
TOTAL 50 ft	1,308,600	217,300	1,525,900
KVK45 Area 4b	0	0	0
PJ41 Contract 3 (turning basin)	0	0	0
Total Interims	0	0	0
TOTAL ALL PROJECTS CONSTRUCTION	1,308,600	217,300	1,525,900



Table 12 LRR Recommended Plan Annualized Total Investment Cost (\$000)			
	Federal Cost	Non- Federal Cost	Total Cost
Ambrose			
Annualized First Cost	6,859	173	7,032
Interest During Construction, Total	16,080	78	16,158
Annualized First Cost – O&M	0	0	0
TOTAL ANNUAL COST	6,859	173	7,032
No O & M cost due to sand mining in Ambrose Ch			
Anchorage			
Annualized First Cost	10,138	2,369	12,507
Interest During Construction, Total	21,318	1,064	22,382
Annualized First Cost – O&M	0	0	0
TOTAL ANNUAL COST	10,138	2,369	12,507
Kill Van Kull			
Annualized First Cost	32,410	14	32,424
Interest During Construction, Total	127,876	4	127,880
Annualized First Cost – O&M	232	0	232
TOTAL ANNUAL COST	32,642	14	32,656
Newark Bay			
Annualized First Cost	23,356	3,023	26,379
Interest During Construction, Total	66,915	8,342	75,258
Annualized First Cost – O&M	730	0	730
TOTAL ANNUAL COST	24,086	3,023	27,109

Note: Total annualized cost includes IDC, 01, 30, & 31



Table 12(Continued) LRR Recommended Plan Annualized Total Investment Cost (\$000)			
	Federal Cost	Non- Federal Cost	Total Cost
Arthur Kill to Howland Hook			
Annualized First Cost	10,426	732	11,158
Interest During Construction, Total	22,317	795	23,112
Annualized First Cost – O&M	-88	0	-88
TOTAL ANNUAL COST	10,338	732	11,070
Bay Ridge			
Annualized First Cost	11,847	0	11,847
Interest During Construction, Total	17,794	0	17,794
Annualized First Cost – O&M	-242	0	-242
TOTAL ANNUAL COST	11,605	0	11,605
Port Jersey			
Annualized First Cost	7,619	0	7,619
Interest During Construction, Total	10,413	0	10,413
Annualized First Cost – O&M	-192		-192
TOTAL ANNUAL COST	7,427	0	7,427
TOTAL PROJECT ANNUAL COST	103,093	6,311	109,404

Note: Total annualized cost includes IDC, 01, 30, & 31

94. Based on the costs presented above the LRR Recommended Plan is \$1,525,900 in first cost and \$1,750,000 the fully funded project cost.



CREDITING OF LOCAL SPONSOR PERFORMED ACTIVITIES

95. This LRR provides the information necessary to determine to what extent the local sponsor should be credited or reimbursed for local sponsor activities performed prior to the execution of the PCA. For those activities that the Local Sponsor wishes to perform after the execution of the PCA the Government shall prepare an estimate for each item of work to be performed and shall reach an agreement for the credit amount prior to the initiation of any activity. In addition, an audit may be performed by the Government to ascertain the actual cost expended for each item requested by the Local Sponsor. The credit amount for each item will not exceed the lower of actual costs expended by the Local Sponsor or the Government's estimated limit of credit. The following documents the Government's estimated limit of credit for the construction elements related to the dredging of the KVK Contract Area 5 from 45 to 50ft and the Port Jersey Contract 1 to 50ft by permit action. The additional Local Sponsor requested credit related to design and construction activities will be evaluated prior to the execution of the PCA. Once the PCA is signed, the non-Federal sponsor will be credited for the Federal share against their contribution to the total project cost, for those activities where agreement has been reached.

Dredging of Contract Area 5 to 50 ft MLW

96. The Port Authority of New York and New Jersey (PANYNJ) awarded a contract to the Corps' contractor to dredge KVK Contract 5 Area 5 from 45 to 50ft within the KVK45 Area 5's footprint. As a consequence, vertical consolidation of this area is currently being accomplished by the PANYNJ contract. It is likely that the PANYNJ will seek a credit for this action after the execution of this project's PCA.

97. The Government estimated the cost of constructing Area 5 in an unconsolidated manner utilizing two (2) contracts. The total cost of these contracts, including S&A and EDDC, is approximately \$175,500,000. In December 2001 the Government awarded KVK45 Contract 5 Area 5 to Bean Styvesant in the amount of \$57,300,000. To date the value of that contract is \$58,586,000, (excluding S&A & EDDC). Therefore, the second contract that would be required to bring the area down from 45 to 50ft is estimated to have a construction cost (excluding S&A & EDDC) of approximately \$105,500,000. The difference between \$175,500,000 and the sum of \$105,500,000 and \$58,860,000 is the approximated amount of S&A and EDDC.

98. The Government also estimated the cost of constructing Area 5 in a consolidated manner using one (1) contract. If the Government were to have constructed Area 5 directly to 50ft under one contract, the Government's estimated construction



cost of this contract, including S&A and EDDC, is approximately \$148,400,000. Assuming that the Government's KVK45 Area 5 contract and the PANYNJ's contract is executed in a consolidated manner and taking into consideration the cost of the Government's KVK45 Area 5 contract amount of \$58,586,000, the amount of the second lift to bring the area down from 45 to 50ft is estimated to have a construction cost (excluding S&A & EDDC) of approximately \$81,000,000. The difference between \$148,400,000 and the sum of \$81,000,000 and \$58,860,000 is the approximate amount of S&A and EDDC.

99. In reality, the PANYNJ negotiated a contract to "piggyback" the Government's KVK45 Area 5 contract. Since the Government would realize a savings if the PANYNJ's actual costs expended is less than the estimated cost of awarding a separate contract in an unconsolidated plan the Government's limit of credit is approximately \$112,500,000.
100. The PANYNJ's "piggyback" contract was awarded for an amount of \$99,934,000. Since this contract is ongoing the total amount of credit to the Port Authority of NY & NJ should be the lower of the actual costs expended by the PANYNJ or the Government's limit of credit, 112,500,000.

Dredging of Port Jersey Contract 1 to 50ft MLW by permit action

101. The Government estimated the cost of constructing Port Jersey Contract 1 to 50ft using one (1) contract. The Government's estimated construction cost of this contract, including S&A and EDDC, is approximately \$104,000,000. Therefore, the Government's limit of credit should be the lower of actual costs expended by the Local Sponsor or the Government's limit of credit once the OMB prerequisites are met.



CONCLUSION

102. The project first construction cost is \$1,525,000,000.
103. Consolidation has the potential to save approximately \$100,800,000 in constant dollars and \$168,430,000 fully funded.
104. Consolidation also has the effect of hastening the accrual of 50ft benefits. It allows elements of 50ft work to start earlier. For example, without consolidation the 50ft deepening at Bergen Point could not start until August 2005 due to ongoing KVK45 work in that area. By consolidating the work the PANYNJ has already commenced 50ft dredging, which is scheduled for completion in September 2004. In addition, there is a more efficient dredging, drilling and blasting operation with a larger payface, which reduces the overall time work occurs in an area. The following table indicates the schedule for accruing 50ft benefits for the consolidated and unconsolidated plans.

	Consolidated	Unconsolidated
Port Jersey	Jun-03	Sep-08
Newark Bay	Nov-12	Jan-15
Arthur Kill	Mar-11	Jan-11
Bay Ridge	Mar-14	May-14

105. The Local Sponsor requested credit related to design and construction activities will be evaluated prior to the execution of the PCA.
106. The Government's estimated construction cost of constructing Port Jersey Contract 1 to 50ft, including S&A and EDDC, is approximately \$104,000,000. Therefore, the Government's limit of credit should be the lower of actual costs expended by the Local Sponsor or the Government's limit of credit.
107. The PANYNJ's "piggyback" contract for KVK Area 5 was awarded for an amount of \$99,934,000. Since this contract is ongoing, the total amount of credit to the Port Authority of NY & NJ should be the lower of the actual costs expended by the PANYNJ or the Government's limit of credit, 112,500,000.



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*** TOTAL FEDERAL COST-SHARED SUMMARIES ***
 This Estimate is based on the scope contained in the LRR Phase dated Oct 2003

Project: New York Harbor Deepening (consolidated)
 Location: New York/New Jersey

District: New York
 POC: P Harimohan

Effective Pricing Level: September 2003				Fully Funded Estimate.....				
Acct. No.	Feature Description	Cost (\$K)	Cont. (\$K)	Cont. (%)	Total (\$K)	Feature Mid Point: % Date	Cost (\$K)	Cont. (\$K)	Total (\$K)
06	Fish & Wildlife								
06.10	Air Mitigation	28,420.0	5,684.0	20%	\$34,104.0	5.58% Q3 '05	30,004.6	6,000.9	36,005.5
06.20.05	Oldplace Creek	1,600.0	320.0	20%	\$1,920.0	7.91% Q3 '06	1,726.6	345.3	2,071.9
06.20.10	Woodbridge Creek	2,460.0	492.0	20%	\$2,952.0	9.68% Q2 '07	2,698.1	539.6	3,237.7
06.20.15	Hoffmann Swinburne	3.0	0.6	20%	\$3.6	7.91% Q3 '06	3.2	0.6	3.9
12	S-AK-1	41,748.3	7,928.0	19%	\$49,676.3	8.79% Q3 '07	45,416.0	8,624.5	54,040.5
12	S-AK-2	21,118.0	3,758.1	18%	\$24,876.1	11.30% Q3 '08	23,504.3	4,182.7	27,687.0
12	S-AK-3	43,345.6	8,215.9	19%	\$51,561.6	17.94% Q2 '10	51,121.3	9,689.8	60,811.1
12	S-AN-1	43,787.7	7,027.1	16%	\$50,814.8	7.03% Q4 '06	46,864.3	7,520.9	54,385.2
12	S-AN-2	61,684.0	10,452.7	17%	\$72,136.7	16.06% Q4 '09	71,592.1	12,131.7	83,723.8
12	S-BR-1	126,800.8	23,024.2	18%	\$149,825.1	26.89% Q3 '12	160,903.5	29,216.5	190,120.0
12	S-E-1	49,332.2	8,759.2	18%	\$58,091.4	25.85% Q2 '12	62,085.2	11,023.5	73,108.7
12	S-KVK-1	103,733.6	16,358.7	16%	\$120,092.3	16.96% Q1 '10	121,329.3	19,133.6	140,462.8
12	S-KVK-2	105,446.5	16,109.5	15%	\$121,556.0	6.44% Q3 '06	112,240.5	17,147.5	129,388.0
12	S-NB-1	107,804.2	19,229.6	18%	\$127,033.7	9.38% Q4 '07	117,918.1	21,033.6	138,951.7
12	S-NB-2	70,690.4	11,729.6	17%	\$82,420.0	19.89% Q4 '10	84,753.0	14,063.1	98,816.1
12	S-PJ-50	81,697.9	15,557.2	19%	\$97,255.1	5.27% Q1 '06	86,007.5	16,377.8	102,385.3
12	Ambrose	71,102.2	10,665.3	15%	\$81,767.5	10.66% Q2 '08	78,683.9	11,802.6	90,486.5
12	KVK Contract 5	99,934.0	4,996.7	5%	\$104,930.7				104,930.7
	Total	1,060,708.3	170,308.5		1,231,016.8		1,096,851.5	188,834.3	1,390,616.5
01---	Lands & Damages	7,413.0	1,482.6	20%	8,895.6	27.14% Q1 '09	9424.6	1,884.9	11,309.6
30---	Engineering & Design	71,000.0	11,600.0	16%	82,600.0	27.14% Q1 '09	86739.2	14,747.8	101,487.1
31---	Construction Management	93,000.0	18,600.0	20%	111,600.0	27.14% Q1 '09	118237.1	23,647.4	141,884.5
	Total Federal Cost Summary	1,232,121.3	201,991.1		1,434,112.4		1,311,252.5	229,114.5	1,645,297.6

Note:

Construction Inflation was developed using EM 1110-2-1304 dtd Mar 2003
 Hired labor inflation was developed using EC 11-2-84 dtd Mar 2003

Total Federal Costs(\$K):

Total Non-Federal Costs(\$K):

Acct 30 @ \$13M is already expended, therefore, no contingency & escalation is included

*** TOTAL NON-FEDERAL COST SUMMARIES ***
 This Estimate is based on the scope contained in the LRR Phase dated Oct 2003

Project: New York Harbor Deepening (LRR)

District: New York

Location: New York/New Jersey

POC: P Harimohan

Acct. No.	Feature Description	Effective Pricing Level: September 2003		Fully Funded Estimate.....					
		Cost (\$K)	Cont. (\$K)	Cont. (%)	Total (\$K)	Feature %	Mid Point: Date	Cost (\$K)	Cont. (\$K)	Total (\$K)
Berth Improvement										
	Port Newark	5,852.0	1,170.4	20%	\$7,022.4	25.85%	Q2 '12	7,364.8	1,473.0	8,837.8
	NJMT Maher Terminals	8,656.0	1,731.2	20%	\$10,387.2	9.38%	Q4 '07	9,468.1	1,893.6	11,361.7
	NJMT APM/Maersk	10,368.0	2,073.6	20%	\$12,441.6	19.89%	Q4 '10	12,430.5	2,486.1	14,916.7
	Howland Hook Marine Term	8,982.0	1,796.4	20%	\$10,778.4	17.94%	Q2 '10	10,593.3	2,118.7	12,711.9
Utilities Relocation										
	Newark Bay (PSE&G)	3,240.0	648.0	20%	\$3,888.0	19.89%	Q4 '10	3,884.5	776.9	4,661.5
	Anchorage 42" water main	16,560.0	3,312.0	20%	\$19,872.0	7.03%	Q4 '06	17,723.5	3,544.7	21,268.3
	Anchorage 36" water main	14,450.0	2,890.0	20%	\$17,340.0	7.03%	Q4 '06	15,465.3	3,093.1	18,558.4
	Ambrose Transco	2,270.0	454.0	20%	\$2,724.0	10.66%	Q2 '08	2,512.1	502.4	3,014.5
Structural										
	Commerce Street Pier KVK	180.1	36.0	20%	\$216.1	6.44%	Q3 '06	191.7	38.3	230.0
	Allied Signal S Elizabeth	5,629.2	1,125.8	20%	\$6,755.0	19.89%	Q4 '10	6,749.0	1,349.8	8,098.8
	P&G Piers Arthur Kill	207.4	41.5	20%	\$248.9	8.79%	Q3 '07	225.6	45.1	270.8
Total		76,394.7	15,278.9		91,673.6			86,608.5	17,321.7	103,930.2

Note: Inflation was developed using EM 1110-2-1304 dtd Mar 2003

Fully Funded Cost

*** TOTAL FEDERAL COST-SHARED SUMMARIES ***

This Estimate is based on the scope contained in the LRR Phase dated Oct 2003

Project: New York Harbor Deepening (Unconsolidated)
 Location: New York/New Jersey

District: New York
 POC: P Harimohan

Acct. No.	Feature Description	Effective Pricing Level: September 2003			Fully Funded Estimate.....				
		Cost (\$K)	Cont. (\$K)	Cont. (%)	Total (\$K)	Feature Mid Point: %	Date	Cost (\$K)	Cont. (\$K)	Total (\$K)
06	Fish & Wildlife									
06.10	Air Mitigation	28,420.0	5,684.0	20%	\$34,104.0	5.58%	Q3 '05	30,004.6	6,000.9	36,005.5
06.20.05	Oldplace Creek	1,600.0	320.0	20%	\$1,920.0	7.32%	Q2 '06	1,717.1	343.4	2,060.5
06.20.10	Woodbridge Creek	2,460.0	492.0	20%	\$2,952.0	9.68%	Q2 '07	2,698.1	539.6	3,237.7
06.20.15	Hoffmann Swinburne	3.0	0.6	20%	\$3.6	7.91%	Q3 '06	3.2	0.6	3.9
12	Navigation Ports & Harbors									
12	AK-1	17,446.2	3,402.6	20%	\$20,848.8	8.19%	Q2 '07	18,874.8	3,681.2	22,556.0
12	AK-2	27,607.6	5,068.3	18%	\$32,676.0	11.30%	Q3 '08	30,727.3	5,641.1	36,368.3
12	AK-3	8,260.9	1,428.6	17%	\$9,689.5	14.17%	Q2 '09	9,431.6	1,631.0	11,062.7
12	AK-4	14,895.9	2,652.8	18%	\$17,548.7	16.06%	Q4 '09	17,288.6	3,078.9	20,367.5
12	AK-5	41,748.3	7,928.0	19%	\$49,676.3	19.89%	Q4 '10	50,053.5	9,505.1	59,558.6
12	AN-1	17,114.6	2,584.7	15%	\$19,699.3	5.86%	Q2 '06	18,117.5	2,736.1	20,853.6
12	AN-2	57,820.0	9,457.7	16%	\$67,277.7	10.02%	Q1 '08	63,616.1	10,405.8	74,021.8
12	AN-3	32,527.7	5,754.1	18%	\$38,281.8	16.06%	Q4 '09	37,752.5	6,678.4	44,430.9
12	BR-1	74,138.1	12,939.3	17%	\$87,077.4	24.81%	Q1 '12	92,531.5	16,149.5	108,681.0
12	BR-2	54,646.1	10,399.9	19%	\$65,046.0	33.18%	Q1 '14	72,779.0	13,850.9	86,629.9
12	KVK-1	31,084.8	4,998.2	16%	\$36,082.9	36.52%	Q4 '14	42,437.0	6,823.5	49,260.5
12	KVK-2	36,711.9	5,739.5	16%	\$42,451.4	31.08%	Q3 '13	48,122.8	7,523.4	55,646.2
12	KVK-3	41,677.4	6,499.2	16%	\$48,176.6	25.85%	Q2 '12	52,451.5	8,179.4	60,630.8
12	KVK-4	20,761.3	3,114.2	15%	\$23,875.5	20.82%	Q1 '11	25,084.1	3,762.6	28,846.8
12	KVK-5	14,304.9	2,145.7	15%	\$16,450.6	17.94%	Q2 '10	16,871.0	2,530.6	19,401.6
12	KVK-6	14,021.6	2,103.2	15%	\$16,124.9	21.83%	Q2 '11	17,082.6	2,562.4	19,645.0
12	KVK-7	17,879.7	2,682.0	15%	\$20,561.6	19.89%	Q4 '10	21,436.6	3,215.5	24,652.0
12	KVK-8	16,202.8	2,430.4	15%	\$18,633.2	17.94%	Q2 '10	19,109.4	2,866.4	21,975.8
12	KVK-9	27,030.7	4,089.3	15%	\$31,120.0	14.17%	Q2 '09	30,861.3	4,668.8	35,530.1
12	KVK Area 5 second lift	100,525.4	5,026.3	5%	\$105,551.7	0.00%		100,525.4	5,026.3	105,551.7
12	NB-1	7,330.8	1,334.5	18%	\$8,665.3	5.27%	Q1 '06	7,717.4	1,404.9	9,122.4
12	NB-2	24,059.2	4,410.8	18%	\$28,469.9	6.44%	Q3 '06	25,609.3	4,694.9	30,304.3
12	NB-3	84,480.8	16,638.8	20%	\$101,119.5	10.66%	Q2 '08	93,489.0	18,413.0	111,902.0
12	NB-4	65,764.8	12,968.0	20%	\$78,732.8	27.94%	Q4 '12	84,137.0	16,590.8	100,727.8
12	NB-5	48,739.2	8,640.6	18%	\$57,379.8	34.29%	Q2 '14	65,454.3	11,603.9	77,058.2
12	PJ-50	81,697.9	15,557.2	19%	\$97,255.1	7.59%	Q1 '07	87,900.5	16,738.3	104,638.8
12	Ambrose 1	24,058.4	3,608.8	15%	\$27,667.1	5.86%	Q2 '06	25,468.2	3,820.2	29,288.4
12	Ambrose 2	24,058.4	3,608.8	15%	\$27,667.1	9.38%	Q4 '07	26,315.5	3,947.3	30,262.8
12	Ambrose 3	24,058.4	4,811.7	20%	\$28,870.0	14.17%	Q2 '09	27,467.8	5,493.6	32,961.3
12	PJ-41	27,829.8	5,396.1	19%	\$33,225.9	2.00%	Q3 '04	28,385.5	5,503.9	33,889.4
12	KVK contract 4b	30,971.6	6,194.3	20%	\$37,165.9	5.27%	Q1 '06	32,605.4	6,521.1	39,126.4
	Total	1,141,938.0	190,110.0		1,332,048.1			1,324,127.0	222,133.4	1,546,260.4
01---	Lands & Damages	7,413.0	1,482.6	20%	8,895.6	34.70%	Q3 '10	9,985.5	1,997.1	11,982.6
30---	Engineering & Design	71,000.0	11,600.0	16%	82,600.0	34.70%	Q3 '10	91,127.4	15,625.5	106,752.9
31---	Construction Management	93,000.0	18,600.0	20%	111,600.0	34.70%	Q3 '10	125,273.3	25,054.7	150,327.9
	Total Federal Cost Summary	1,313,351.0	221,792.6		1,535,143.7			1,550,513.2	264,810.6	1,815,323.8

Note:

Construction Inflation was developed using EM 1110-2-1304 dtd Mar 2003
 Hired labor inflation was developed using EC 11-2-84 dtd Mar 2003

Acct 30 @ \$13M is already expended, therefore, no contingency & escalation is included

*** TOTAL NON-FEDERAL COST SUMMARIES ***
 This Estimate is based on the scope contained in the LRR Phase dated Oct 2003

Project: New York Harbor Deepening (LRR)
 Location: New York/New Jersey

District: New York
 POC: P Harimohan

Acct. No.	Feature Description	Effective Pricing Level: September 2003			Total (\$K)Fully Funded Estimate.....				
		Cost (\$K)	Cont. (\$K)	Cont. (%)		Feature Mid Point: %	Date	Cost (\$K)	Cont. (\$K)	Total (\$K)
Berth Improvement										
	Port Newark	5,852.0	1,170.4	20%	\$7,022.4	34.29%	Q2 '14	7,858.9	1,571.8	9,430.7
	NJMT Maher Terminals	8,656.0	1,731.2	20%	\$10,387.2	10.66%	Q2 '08	9,579.0	1,915.8	11,494.8
	NJMT APM/Maersk	10,368.0	2,073.6	20%	\$12,441.6	10.66%	Q2 '08	11,473.6	2,294.7	13,768.3
	Howland Hook Marine Term	8,982.0	1,796.4	20%	\$10,778.4	8.19%	Q2 '07	9,717.5	1,943.5	11,661.0
Utilities Relocation										
	Newark Bay (PSE&G)	3,240.0	648.0	20%	\$3,888.0	6.44%	Q3 '06	3,448.8	689.8	4,138.5
	Anchorage 42" water main	16,560.0	3,312.0	20%	\$19,872.0	10.02%	Q1 '08	18,220.0	3,644.0	21,864.0
	Anchorage 36" water main	14,450.0	2,890.0	20%	\$17,340.0	10.02%	Q1 '08	15,898.5	3,179.7	19,078.2
	Ambrose Transco	2,270.0	454.0	20%	\$2,724.0	5.86%	Q2 '06	2,403.0	480.6	2,883.6
Structural										
	Commerce Street Pier KVK	180.1	36.0	20%	\$216.1	19.89%	Q4 '10	215.9	43.2	259.1
	Allied Signal S Elizabeth	5,629.2	1,125.8	20%	\$6,755.0	10.66%	Q2 '08	6,229.4	1,245.8	7,475.3
	P&G Piers Arthur Kill	207.4	41.5	20%	\$248.9	14.17%	Q2 '09	236.8	47.4	284.2
Total		76,394.7	15,278.9		91,673.6			85,281.5	17,056.3	102,337.8

Note: Inflation was developed using EM 1110-2-1304 dtd Mar 2003

NY/NJ Harbor Deepening (LRR)
Consolidated Plan

Designed By: USACE NYD ED
Estimated By: P. Harimohan

Prepared By: P. Harimohan
Checked by: John Chew, PE

Preparation Date: 09/01/03
Effective Date of Pricing: 09/01/03

Sales Tax: 0.00%

M C A C E S f o r W i n d o w s
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Release 1.2

Dredge range

Ambrose Channel -45' to -53' plus 2' pay OD
Anchorage Channel -45' to -50' plus 1.5' pay OD
Bayridge Channel -40' to -50' plus 1.5' pay OD
KVK Channel ~ -48' to -52' plus 1.5' pay OD
KVK (4B) Channel -40' to -52' plus 1.5' pay OD
KVK (5) Channel -40' to -52' plus 1.5' pay OD
Newark Bay Channel ~ -48' to -52' plus 1.5' pay OD
Arthur Kill Channel -44.5' to -52' plus 1.5' pay OD
Port Jersey (contract 1) -44.5' to -52' plus 1.5' pay OD
Port Jersey (NJ Flat) -10' to -52' plus 1.5' pay OD

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** PROJECT OWNER SUMMARY - Contract (Rounded to 100's) **

	QUANTY	UOM	CONTRACT COST	UNIT	TOTAL COST
01			7,416,000		7,416,000
06			32,483,000		32,483,000
12			1,028,221,700		1,028,221,700
30			71,000,000		71,000,000
31			93,000,000		93,000,000
TOTAL NY/NJ Harbor Deepening (LRR)			1,232,120,700		1,232,120,700

***** ALTERNATES *****

50			76,464,800		76,464,800
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** PROJECT OWNER SUMMARY - Sub Feat (Rounded to 100's) **

		QUANTY	UOM	CONTRACT COST	UNIT	TOTAL COST

01	Lands & Damages					
01.50	Temporary Berthing Rights			58,000		58,000
01.55	Lands & Damages			6,370,000		6,370,000
01.60	Administrative			988,000		988,000
	TOTAL Lands & Damages			7,416,000		7,416,000

06	Fish & Wildlife					
06.10	Air Mitigation			28,420,000		28,420,000
	TOTAL Air Mitigation			28,420,000		28,420,000

06.20	Environmental Fish Habitat					
06.20.05	Old Place Creek Plan A			1,600,000		1,600,000
06.20.10	Woodbridge Plan A			2,460,000		2,460,000
06.20.15	Hoffmann Swinburne Lobster Habit			3,000		3,000
	TOTAL Environmental Fish Habitat			4,063,000		4,063,000
	TOTAL Fish & Wildlife			32,483,000		32,483,000

12	Navigation Ports & Harbors					
12.01	Ambrose Channel					
12.01.05	Ambrose Channel	11249000	CY	71,102,200	6.32	71,102,200
	TOTAL Ambrose Channel			71,102,200		71,102,200

12.02	Anchorage Channel					
12.02.05	S-AN-1	1683000	CY	43,787,700	26.02	43,787,700
12.02.10	S-AN-2	2758000	CY	61,684,000	22.37	61,684,000
	TOTAL Anchorage Channel			105,471,600		105,471,600

12.03	Kill Van Kull Channel					
12.03.05	S-KVK-1			103,733,000		103,733,000
12.03.10	S-KVK-2			105,443,000		105,443,000
	TOTAL Kill Van Kull Channel			209,176,000		209,176,000

** PROJECT OWNER SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY	UOM	CONTRACT COST	UNIT	TOTAL COST

12.04 Newark Bay Channel					
12.04.05 S-NB-1			107,804,300		107,804,300
12.04.10 S-NB-2			70,690,000		70,690,000
			-----		-----
TOTAL Newark Bay Channel			178,494,400		178,494,400
12.05 Arthur Kill to Howland Hook					
12.05.05 S-AK-1	822000	CY	41,748,900	50.79	41,748,900
12.05.10 S-AK-2	759000	CY	21,118,000	27.82	21,118,000
12.05.15 S-AK-3	1837000	CY	43,345,600	23.60	43,345,600
			-----		-----
TOTAL Arthur Kill to Howland Hook			106,212,600		106,212,600
12.06 Port Jersey Channel					
12.06.05 S-PJ-50			81,697,900		81,697,900
			-----		-----
TOTAL Port Jersey Channel			81,697,900		81,697,900
12.07 Bay Ridge Channel					
12.07.05 S-BR-1			126,800,800		126,800,800
			-----		-----
TOTAL Bay Ridge Channel			126,800,800		126,800,800
12.08 Elizabeth Channel					
12.08.05 S-E-1	1519000	CY	49,332,200	32.48	49,332,200
			-----		-----
TOTAL Elizabeth Channel			49,332,200		49,332,200
12.10 KVK Contract 5			99,934,000		99,934,000
			-----		-----
TOTAL Navigation Ports & Harbors			1,028,221,700		1,028,221,700
30 PED			71,000,000		71,000,000
31 Construction Management			93,000,000		93,000,000
			-----		-----
TOTAL NY/NJ Harbor Deepening (LRR)			1,232,120,700		1,232,120,700

***** ALTERNATES *****

50 Non-Federal Cost

** PROJECT OWNER SUMMARY - Sub Feat (Rounded to 100's) **

		QUANTY	UOM	CONTRACT COST	UNIT	TOTAL COST

50.10 Port Newark Container Terminal						
50.10.05	Berth 57,59,61,63	112000	CY	1,232,000	11.00	1,232,000
50.10.10	Wharf Strengthening	2300.00	LF	4,600,000	2000.00	4,600,000
TOTAL Port Newark Container Terminal				5,832,000		5,832,000

50.15 Maher Terminals						
50.15.05	Berth Deepening 70 & 72	33000	CY	264,000	8.00	264,000
50.15.10	Berth Deepening 68 & 70	24000	CY	192,000	8.00	192,000
50.15.15	Berth Deepening 66-1/2 & 68	15000	CY	120,000	8.00	120,000
50.15.20	Berth Deepening 74, 76 & 78	35000	CY	280,000	8.00	280,000
50.15.25	Wharf Strengthening	3900.00	LF	7,800,000	2000.00	7,800,000
TOTAL Maher Terminals				8,656,000		8,656,000

50.20 NJMT APM/Maersk						
50.20.05	Berth Deepening 88,90,92,94,96	66000	CY	528,000	8.00	528,000
50.20.10	Berth Deepening 82,84,86	30000	CY	240,000	8.00	240,000
50.20.25	Wharf Strengthening	48000	LF	9,600,000	200.00	9,600,000
TOTAL NJMT APM/Maersk				10,368,000		10,368,000

50.25 Howland Hook Marine Terminal						
50.25.05	Berth Deepening	60000	CY	4,500,000	75.00	4,500,000
50.25.25	Wharf Strengthening	1245.00	LF	4,482,000	3600.00	4,482,000
TOTAL Howland Hook Marine Terminal				8,982,000		8,982,000

50.40 Commerce St. Pier KVK						
50.40.01	Mob & Demob for Bulkhead Const			100,000		100,000
50.40.05	Removal & Dispose Bulkhead	1766.00	EA	80,100	45.37	80,100
TOTAL Commerce St. Pier KVK				180,100		180,100

50.42 Allied Signal S. Elizabeth						
50.42.01	Mob & Demob for Bulkhead Const			100,000		100,000
50.42.05	Removal & Dispose Bulkhead	1766.00	EA	5,529,200	3130.94	5,529,200
TOTAL Allied Signal S. Elizabeth				5,629,200		5,629,200

** PROJECT OWNER SUMMARY - Sub Feat (Rounded to 100's) **

	QUANTY	UOM	CONTRACT COST	UNIT	TOTAL COST
50.44					
P&G Piers Arthur Kill					
50.44.01			100,000		100,000
50.44.05	1766.00	EA	107,400	60.82	107,400
TOTAL P&G Piers Arthur Kill			207,400		207,400
50.48			36,610,000		36,610,000
TOTAL Non-Federal Cost			76,464,800		76,464,800
