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CLEVELAND HARBOR
ECONOMIC VIABILITY ANALYSIS

INTRODUCTION

The Cleveland Harbor Dredge Material Management Plan (DMMP) looks at developing various Maintenance Plans that will allow dredging of the Harbor to continue for the next 20 years. These plans identify the amount of channel sediments that need to be dredged over the 20 year time period 2009-2028, identifies how the dredged sediment will be disposed of, and examines remaining CDF capacities and the need for more disposal space.

In order to be able to rank these various plans, and whether maintenance of the Harbor should even be continued, an economic evaluation of the viability of the harbor is needed. This part of Appendix G (Part I) documents the economic evaluation of the harbors viability. Data in this economic evaluation is based upon a Cleveland Harbor operations and maintenance economic evaluation report performed in Fiscal Year 2008. This report used a 20 year evaluation period and a 4 7/8 percent annual interest rate. Data in that evaluation was updated to reflect the Fiscal Year 09 Federal Discount rate of 4 5/8 percent. This Appendix (Appendix G, Part 1), presents a summary of this updating process.

First a description of the benefits and costs used in the operations and maintenance analysis is needed. Benefits attributable to continued maintenance of the Harbor are vessel transportation cost increases avoided. Continued maintenance of the Harbor allows vessels to move commodities through the harbor at a specific transportation cost. Discontinued maintenance of the harbor would result in channels shoaling in, vessels needing more trips to move the same amount of tonnage, and thus increasing transportation costs. This increase in <u>transportation cost avoided</u> is a proxy for the value of continuing to maintain the harbor.

Current harbor dredging costs are calculated and subtracted from the total "Vessel Transportation Cost Increases Avoided Benefits" of the harbor. This results in net benefits associated with the Harbor. These net benefits are the basis for determining the amount of new investment the harbor could support. Net Benefits are used to identify the maximum amount of money that could be invested in the harbor and still have a benefit to cost ratio of one.

This maximum expenditure that results from a benefit to cost ratio of one can be compared to various harbor improvement costs to determine the economic viability of these harbor maintenance plans. If the costs of the various harbor maintenance plans are less than the maximum expenditure the harbor can support, the plan has a benefit to cost ratio greater than one and is economically justified. If the costs of the various harbor maintenance plans are greater than the maximum expenditure the harbor can support, the plan has a benefit to cost ratio less than one and is not economically justified.

HARBOR TONNAGES

Total tonnages handled at Cleveland Harbor in 2005 were 13,641,000. The main commodities handled were: iron ore (5,974,000) limestone (3,757,000), salt (1,148,000), cement (904,000) and coal (9,000). These commodities' accounted for 86 percent of the tonnage moving through the Harbor in 2005. These commodities were used to develop net benefits

associated with continued maintenance of the harbor. The vessels actually used to move these commodities were identified, as well as the origin/destination routes that these vessels used. The 2005 vessel movements are considered representative of vessel traffic patterns and tonnages that will take place at Cleveland Harbor over the 20 year period 2009-2028. A summary of 2005 tonnages, by commodity, is provided in Table 1.

Table 1. - Cleveland Harbor Tonnages- 2005

Commodity	Tons
Iron Ore	5,974,000
Limestone	3,757,000
Salt	1,148,000
Cement	904,000
Coal	9,000
Other	1,849,000

	13,641,000

VESSEL TRANSPORTATION COSTS BY CHANNEL DEPTH

There were over 2,200 commercial vessel movements (inbound and outbound) in 2005. U.S. vessels accounted for about 66 percent of these movements and foreign vessels the remaining 34 percent. Approximately 55 percent of the inbound vessel movements drafted 23 feet of greater. This level of vessel activity and tonnage is expected to continue over the DMMP's project evaluation period 2009-2028.

The vessels actually used to move these 5 key commodities (iron ore, limestone, salt cement, and coal) were identified, as well as the origin/destination routes that these vessels used. These vessel movements and corresponding tonnages were used to develop vessel transportation costs associated with dredging Cleveland Harbor to various depths

A computer model developed by Buffalo District calculated increases in vessel transportation costs for each vessel movement given reductions in channel depth. The analysis is done in one foot increments for a maximum decrease in channel depth of 6 feet. Thus the analysis evaluated vessel transportation costs associated with existing authorized maintained depths of 28/23 feet in the Outer Harbor and Cuyahoga/Old River, as well as channels with up to 6 feet less of water column in one foot increments.

Shoaling of channels requires shippers to load their vessels with fewer commodities or use smaller ships thereby increasing transportation costs for movement of that commodity. Based on October 2007 dollars, transportation cost increases associated with reductions in channel depth from one to six feet were calculated for each of the 5 commodities. Annual transportation costs, by commodity, by channel depth are provided in Table 2.

Table 2. Cleveland Harbor- Vessel Transportation Costs, By Commodity, By Channel Depth

Commodity	Starting Channel Depth	Maintained Channel Depth 28/23	Maintained Channel Depth 27/22	Maintained Channel Depth 26/21	Maintained Channel Depth 25/20	Maintained Channel Depth 24/19	Maintained Channel Depth 23/18	Maintained Channel Depth 22/17
Iron Ore-Outer Harbor	28	$ 6,791,052	$ 7,148,942	$ 7,563,556	$ 8,047,961	$ 8,618,411	$ 9,297,887	$ 10,119,760
Iron Ore-Cuyahoga River	23	$ 33,781,088	$ 35,561,362	$ 37,623,800	$40,033,399	$ 42,871,017	$ 46,250,973	$ 50,339,256
Limestone	23	$15,633,621	$16,045,748	$16,530,151	$17,127,250	$17,893,490	$18,868,784	$20,097,864
Salt	23	$9,024,097	$9,519,308	$10,175,290	$10,984,621	$11,973,457	$13,202,542	$14,769,825
Cement	23	$9,971,754	$10,388,882	$10,945,535	$11,646,221	$12,498,219	$13,537,034	$14,809,309
Coal	23	$20,270	$20,451	$20,954	$21,839	$22,966	$24,245	$25,674
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		$75,221,882	$78,684,693	$82,859,286	$87,861,291	$93,877,560	$101,181,465	$110,161,688

Vessel transportation costs ranged from $75,221,882 for providing channels with 28/23 feet of water column, to $110,161,688 for providing channels with 22/17 feet of water column.

AVERAGE ANNUAL HARBOR BENEFITS

Benefits for this evaluation are the transportation cost increases avoided, by continuing to maintain the channels at the harbor. The difference in vessel transportation costs associated with maintaining current harbor depths (with Project Condition) and vessel transportation costs associated with discontinuing harbor dredging (without Project Condition), over a 20 year period, are the benefits associated with continuing to maintain the harbor

With Project Condition Average Annual Vessel Transportation Costs Table 2 provides the annual transportation costs associated with various maintained channel depths. The average annual transportation costs associated with continued maintenance of the harbors authorized 28/23 foot channels is presented in the column labeled “Maintained Channel Depth 28/23”. These average annual transportation costs come to $75,221,882. These are With Project Condition average annual vessel transportation costs.

Without Project Condition Average Annual Vessel Transportation Costs If dredging at Cleveland Harbor was to cease, due to lack of a suitable dredged material management plan, the channels would gradually fill in, and additional transportation costs would be incurred as estimated in Table 2.

Transportation costs associated with not maintaining the harbor is the transportation cost time stream that develops due to discontinued dredging, and the harbors annual shoaling rate. Shoaling rates at Cleveland harbor vary between the Outer Harbor (.2 of a foot per year) and the Cuyahoga/Old River (1-3 feet per year). The evaluation looked at two different shoaling rates on the river: one foot per year and 2 feet per year. Channels were allowed to shoal up 6 feet and then remain at that depth for the remainder of the 20 year evaluation period. The river channels equilibrium channel depth was assumed to be 17 feet. Transportation cost time streams were developed for a 20 year evaluation period based on these shoaling rates and the annual transportation costs by maintained channel depth provided in Table 2. Table 3 provides a summary of these transportation cost time streams, under the two shoaling rate scenarios.

Table 3. Cleveland Harbor WOP Condition Transportation Cost Time Streams

Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Foot/Year							
Project Year	Channel Depth	Outer Harbor Iron Ore	Cuyahoga River Iron Ore	Cuyahoga River Limestone	Old River Salt	Cuyahoga River Cement	Cuyahoga River Coal
1	28.0/23	$ 6,791,052	$ 33,781,088	$ 15,633,621	$ 9,024,097	$ 9,971,754	$ 20,270
2	27.8/22	$ 6,862,630	$ 35,561,362	$ 16,045,748	$ 9,519,308	$ 10,388,882	$ 20,451
3	27.6/21	$ 6,934,208	$ 37,623,800	$ 16,530,151	$ 10,175,290	$ 10,945,535	$ 20,954
4	27.4/20	$ 7,005,786	$ 40,033,399	$ 17,127,250	$ 10,984,621	$ 11,646,221	$ 21,839
5	27.2/19	$ 7,077,364	$ 42,871,017	$ 17,893,490	$ 11,973,457	$ 12,498,219	$ 22,966
6	27.0/18	$ 7,148,942	$ 46,250,973	$ 18,868,784	$ 13,202,542	$ 13,537,034	$ 24,245
7	26.8/17	$ 7,231,865	$ 50,339,256	$ 20,097,864	$ 14,769,825	$ 14,809,309	$ 25,674
8	26.6/17	$ 7,314,788	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
9	26.4/17	$ 7,397,711	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
10	26.2/17	$ 7,480,634	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
11	26.0/17	$ 7,563,556	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
12	25.8/17	$ 7,660,437	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
13	25.6/17	$ 7,757,318	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
14	25.4/17	$ 7,854,199	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
15	25.2/17	$ 7,951,080	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
16	25.0/17	$ 8,047,961	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
17	24.8/17	$ 8,162,051	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
18	24.6/17	$ 8,276,141	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
19	24.4/17	$ 8,390,231	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
20	24.2/17	$ 8,504,321	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674

Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Feet/Year							
Project Year	Channel Depth	Outer Harbor Iron Ore	Cuyahoga River Iron Ore	Cuyahoga River Limestone	Old River Salt	Cuyahoga River Cement	Cuyahoga River Coal
1	28.0/23	$ 6,791,052	$ 33,781,088	$ 15,633,621	$ 9,024,097	$ 9,971,754	$ 20,270
2	27.8/21	$ 6,862,630	$ 37,623,800	$ 16,530,151	$ 10,175,290	$ 10,945,535	$ 20,954
3	27.6/19	$ 6,934,208	$ 42,871,017	$ 17,893,490	$ 11,973,457	$ 12,498,219	$ 22,966
4	27.4/17	$ 7,005,786	$ 50,339,256	$ 20,097,864	$ 14,769,825	$ 14,809,309	$ 25,674
5	27.2/17	$ 7,077,364	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
6	27.0/17	$ 7,148,942	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
7	26.8/17	$ 7,231,865	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
8	26.6/17	$ 7,314,788	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
9	26.4/17	$ 7,397,711	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
10	26.2/17	$ 7,480,634	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
11	26.0/17	$ 7,563,556	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
12	25.8/17	$ 7,660,437	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
13	25.6/17	$ 7,757,318	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
14	25.4/17	$ 7,854,199	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
15	25.2/17	$ 7,951,080	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
16	25.0/17	$ 8,047,961	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
17	24.8/17	$ 8,162,051	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
18	24.6/17	$ 8,276,141	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
19	24.4/17	$ 8,390,231	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
20	24.2/17	$ 8,504,321	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674

These time streams were converted to average annual values using a 20 year project life and a 4.625 percent annual interest rate. Actual calculation of Without Project Condition vessel transportation costs for the five key commodities are provided in Table 4. Iron ore vessel transportation costs were broken out into Outer harbor and Cuyahoga River based on tonnages that passed through these two areas. Iron ore tonnages destined for the Cuyahoga River represent about 83 percent of all iron ore tonnages handled at the Harbor. Thus 83 percent of total iron ore transportation costs were associated with the Cuyahoga River. This allowed different shoaling rates (outer Harbor-.2 foot per year versus Cuyahoga river at 1 to 2 feet per year) to be applied to the iron ore transportation cost time streams.

Average annual WOP condition vessel transportation costs are summarized in Table 5 by commodity. The total average annual vessel transportation costs associated with not maintaining the harbor over a 20 year evaluation period range from $98,718,600 to $102,373,200.

Average Annual Harbor Transportation Benefits Average annual Harbor transportation cost savings associated with continuing to maintain harbor channel depths is the difference in average annual transportation costs between the WOP condition and providing currently maintained depths of 28 feet ($75,221,882). Average annual harbor transportation cost savings associated with maintaining a 28/23 foot channel depth are between $23,496,600 and $27,151,200 (Table 6).

NET HARBOR BENEFITS

Average annual harbor dredging costs were subtracted from total harbor transportation benefits to arrive at net harbor benefits. Average annual harbor dredging costs were based on a varying cubic yard removal schedule as outlined in the Cleveland Harbor DMMP. A removal and placement cost per cubic yard of $5.25 was used. Also included in dredging costs was, Engineering and Design, Supervision and Administration and Management of Engineering and Design. These annual dredging costs were placed into a 20 year time stream and converted to average annual costs using a 4.625 percent annual interest rate. Average annual dredging costs came to $2,054,600. Average annual dredging costs reflect a 4.625 percent annual interest rate. The calculation of average annual dredging costs is provided in Table 7.

Average annual harbor dredging costs ($2,054,600) were subtracted from total average annual harbor benefits ($23,496,600 to $27,151,200). This resulted in average annual harbor net benefits. The Harbor has average annual net benefits of between $21,442,000 and $25,096,600. (Table 8).

SUPPORTABLE IMPROVEMENT PROJECTS

These net benefits can be converted to equivalent first costs, which represent the level of new CDF investment Cleveland Harbor can support. This process is presented in Table 8. Cleveland Harbor can support new CDF investments in the $276 million to $323 million range.

Table 4- Computation Of WOP Condition Average Annual Vessel Transportation Costs

A. WOP Condition- Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyahoga/Old River=1 Foot/Year

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Iron Ore- Outer Harbor

Project Year	Channel Depth	Outer Harbor Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$6,791,052	0.9558	$ 6,490,850
2	27.8/22	$6,862,630	0.9135	$ 6,269,308
3	27.6/21	$6,934,208	0.8732	$ 6,054,670
4	27.4/20	$7,005,786	0.8346	$ 5,846,756
5	27.2/19	$7,077,364	0.7977	$ 5,645,393
6	27.0/18	$7,148,942	0.7624	$ 5,450,407
7	26.8/17	$7,231,865	0.7287	$ 5,269,896
8	26.6/17	$7,314,788	0.6965	$ 5,094,692
9	26.4/17	$7,397,711	0.6657	$ 4,924,681
10	26.2/17	$7,480,634	0.6363	$ 4,759,745
11	26.0/17	$7,563,556	0.6081	$ 4,599,767
12	25.8/17	$7,660,437	0.5813	$ 4,452,746
13	25.6/17	$7,757,318	0.5556	$ 4,309,734
14	25.4/17	$7,854,199	0.5310	$ 4,170,665
15	25.2/17	$7,951,080	0.5075	$ 4,035,469
16	25.0/17	$8,047,961	0.4851	$ 3,904,077
17	24.8/17	$8,162,051	0.4637	$ 3,784,394
18	24.6/17	$8,276,141	0.4432	$ 3,667,663
19	24.4/17	$8,390,231	0.4236	$ 3,553,857
20	24.2/17	$8,504,321	0.4048	$ 3,442,946

				$95,727,716
		Partial Payment Factor		0.0777

	Present Worth Value			$ 7,439,103
	Rounded Present Worth Value			$ 7,439,100

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Iron Ore- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$33,781,088	0.9558	$ 32,287,779
2	27.8/22	$35,561,362	0.9135	$ 32,486,838
3	27.6/21	$37,623,800	0.8732	$ 32,851,578
4	27.4/20	$40,033,399	0.8346	$ 33,410,316
5	27.2/19	$42,871,017	0.7977	$ 34,196,876
6	27.0/18	$46,250,973	0.7624	$ 35,262,090
7	26.8/17	$50,339,256	0.7287	$ 36,682,464
8	26.6/17	$50,339,256	0.6965	$ 35,060,897
9	26.4/17	$50,339,256	0.6657	$ 33,511,013
10	26.2/17	$50,339,256	0.6363	$ 32,029,642
11	26.0/17	$50,339,256	0.6081	$ 30,613,756
12	25.8/17	$50,339,256	0.5813	$ 29,260,460
13	25.6/17	$50,339,256	0.5556	$ 27,966,987
14	25.4/17	$50,339,256	0.5310	$ 26,730,692
15	25.2/17	$50,339,256	0.5075	$ 25,549,049
16	25.0/17	$50,339,256	0.4851	$ 24,419,640
17	24.8/17	$50,339,256	0.4637	$ 23,340,158
18	24.6/17	$50,339,256	0.4432	$ 22,308,395
19	24.4/17	$50,339,256	0.4236	$ 21,322,241
20	24.2/17	$50,339,256	0.4048	$ 20,379,681

				$589,670,550
		Partial Payment Factor		0.0777

	Present Worth Value			$ 45,823,928
	Rounded Present Worth Value			$ 45,823,900

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Limestone- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Limestone	Present Worth Factor	Present Worth Value
1	28.0/23	$ 15,633,621	0.9558	$ 14,942,529
2	27.8/22	$ 16,045,748	0.9135	$ 14,658,483
3	27.6/21	$ 16,530,151	0.8732	$ 14,433,458
4	27.4/20	$ 17,127,250	0.8346	$ 14,293,736
5	27.2/19	$ 17,893,490	0.7977	$ 14,273,080
6	27.0/18	$ 18,868,784	0.7624	$ 14,385,703
7	26.8/17	$ 20,097,864	0.7287	$ 14,645,412
8	26.6/17	$ 20,097,864	0.6965	$ 13,998,005
9	26.4/17	$ 20,097,864	0.6657	$ 13,379,216
10	26.2/17	$ 20,097,864	0.6363	$ 12,787,781
11	26.0/17	$ 20,097,864	0.6081	$ 12,222,491
12	25.8/17	$ 20,097,864	0.5813	$ 11,682,190
13	25.6/17	$ 20,097,864	0.5556	$ 11,165,773
14	25.4/17	$ 20,097,864	0.5310	$ 10,672,184
15	25.2/17	$ 20,097,864	0.5075	$ 10,200,415
16	25.0/17	$ 20,097,864	0.4851	$ 9,749,501
17	24.8/17	$ 20,097,864	0.4637	$ 9,318,519
18	24.6/17	$ 20,097,864	0.4432	$ 8,906,589
19	24.4/17	$ 20,097,864	0.4236	$ 8,512,869
20	24.2/17	$ 20,097,864	0.4048	$ 8,136,553

				$ 242,364,487
		Partial Payment Factor		0.0777

	Present Worth Value			$ 18,834,403
	Rounded Present Worth Value			$ 18,834,400

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Salt- Old River

Project Year	Channel Depth	Old River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,024,097	0.9558	$ 8,625,182
2	27.8/22	$ 9,519,308	0.9135	$ 8,696,298
3	27.6/21	$ 10,175,290	0.8732	$ 8,884,651
4	27.4/20	$ 10,984,621	0.8346	$ 9,167,337
5	27.2/19	$ 11,973,457	0.7977	$ 9,550,854
6	27.0/18	$ 13,202,542	0.7624	$ 10,065,717
7	26.8/17	$ 14,769,825	0.7287	$ 10,762,844
8	26.6/17	$ 14,769,825	0.6965	$ 10,287,067
9	26.4/17	$ 14,769,825	0.6657	$ 9,832,322
10	26.2/17	$ 14,769,825	0.6363	$ 9,397,680
11	26.0/17	$ 14,769,825	0.6081	$ 8,982,251
12	25.8/17	$ 14,769,825	0.5813	$ 8,585,186
13	25.6/17	$ 14,769,825	0.5556	$ 8,205,673
14	25.4/17	$ 14,769,825	0.5310	$ 7,842,938
15	25.2/17	$ 14,769,825	0.5075	$ 7,496,237
16	25.0/17	$ 14,769,825	0.4851	$ 7,164,862
17	24.8/17	$ 14,769,825	0.4637	$ 6,848,135
18	24.6/17	$ 14,769,825	0.4432	$ 6,545,410
19	24.4/17	$ 14,769,825	0.4236	$ 6,256,067
20	24.2/17	$ 14,769,825	0.4048	$ 5,979,515

				$169,176,227
		Partial Payment Factor		0.0777

	Present Worth Value			$ 13,146,865
	Rounded Present Worth Value			$ 13,146,900

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Cement- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Cement	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,971,754	0.9558	$ 9,530,948
2	27.8/22	$ 10,388,882	0.9135	$ 9,490,692
3	27.6/21	$ 10,945,535	0.8732	$ 9,557,198
4	27.4/20	$ 11,646,221	0.8346	$ 9,719,483
5	27.2/19	$ 12,498,219	0.7977	$ 9,969,440
6	27.0/18	$ 13,537,034	0.7624	$ 10,320,737
7	26.8/17	$ 14,809,309	0.7287	$ 10,791,616
8	26.6/17	$ 14,809,309	0.6965	$ 10,314,568
9	26.4/17	$ 14,809,309	0.6657	$ 9,858,607
10	26.2/17	$ 14,809,309	0.6363	$ 9,422,802
11	26.0/17	$ 14,809,309	0.6081	$ 9,006,263
12	25.8/17	$ 14,809,309	0.5813	$ 8,608,136
13	25.6/17	$ 14,809,309	0.5556	$ 8,227,610
14	25.4/17	$ 14,809,309	0.5310	$ 7,863,904
15	25.2/17	$ 14,809,309	0.5075	$ 7,516,276
16	25.0/17	$ 14,809,309	0.4851	$ 7,184,015
17	24.8/17	$ 14,809,309	0.4637	$ 6,866,443
18	24.6/17	$ 14,809,309	0.4432	$ 6,562,908
19	24.4/17	$ 14,809,309	0.4236	$ 6,272,791
20	24.2/17	$ 14,809,309	0.4048	$ 5,995,500

				$ 173,079,936
		Partial Payment Factor		0.0777

	Present Worth Value			$ 13,450,227
	Rounded Present Worth Value			$ 13,450,200

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Coal- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Coal	Present Worth Factor	Present Worth Value
1	28.0/23	$ 20,270	0.9558	$ 19,374
2	27.8/22	$ 20,451	0.9135	$ 18,683
3	27.6/21	$ 20,954	0.8732	$ 18,296
4	27.4/20	$ 21,839	0.8346	$ 18,226
5	27.2/19	$ 22,966	0.7977	$ 18,319
6	27.0/18	$ 24,245	0.7624	$ 18,485
7	26.8/17	$ 25,674	0.7287	$ 18,709
8	26.6/17	$ 25,674	0.6965	$ 17,882
9	26.4/17	$ 25,674	0.6657	$ 17,091
10	26.2/17	$ 25,674	0.6363	$ 16,336
11	26.0/17	$ 25,674	0.6081	$ 15,614
12	25.8/17	$ 25,674	0.5813	$ 14,923
13	25.6/17	$ 25,674	0.5556	$ 14,264
14	25.4/17	$ 25,674	0.5310	$ 13,633
15	25.2/17	$ 25,674	0.5075	$ 13,031
16	25.0/17	$ 25,674	0.4851	$ 12,454
17	24.8/17	$ 25,674	0.4637	$ 11,904
18	24.6/17	$ 25,674	0.4432	$ 11,378
19	24.4/17	$ 25,674	0.4236	$ 10,875
20	24.2/17	$ 25,674	0.4048	$ 10,394

				$ 309,870
		Partial Payment Facto		0.0777

	Present Worth Value			$ 24,080
	Rounded Present Worth Value			$ 24,100

Table 4- Computation Of WOP Condition Average Annual Vessel Transportation Costs

B. WOP Condition- Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyahoga/Old River=2 Feet/Year

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Iron Ore- Outer Harbor

Project Year	Channel Depth	Outer Harbor Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$6,791,052	0.9558	$ 6,490,850
2	27.8/21	$6,862,630	0.9135	$ 6,269,308
3	27.6/19	$6,934,208	0.8732	$ 6,054,670
4	27.4/17	$7,005,786	0.8346	$ 5,846,756
5	27.2/17	$7,077,364	0.7977	$ 5,645,393
6	27.0/17	$7,148,942	0.7624	$ 5,450,407
7	26.8/17	$7,231,865	0.7287	$ 5,269,896
8	26.6/17	$7,314,788	0.6965	$ 5,094,692
9	26.4/17	$7,397,711	0.6657	$ 4,924,681
10	26.2/17	$7,480,634	0.6363	$ 4,759,745
11	26.0/17	$7,563,556	0.6081	$ 4,599,767
12	25.8/17	$7,660,437	0.5813	$ 4,452,746
13	25.6/17	$7,757,318	0.5556	$ 4,309,734
14	25.4/17	$7,854,199	0.5310	$ 4,170,665
15	25.2/17	$7,951,080	0.5075	$ 4,035,469
16	25.0/17	$8,047,961	0.4851	$ 3,904,077
17	24.8/17	$8,162,051	0.4637	$ 3,784,394
18	24.6/17	$8,276,141	0.4432	$ 3,667,663
19	24.4/17	$8,390,231	0.4236	$ 3,553,857
20	24.2/17	$8,504,321	0.4048	$ 3,442,946

				$95,727,716
		Partial Payment Factor		0.0777

	Present Worth Value			$ 7,439,103
	Rounded Present Worth Value			$ 7,439,100

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Iron Ore- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$33,781,088	0.9558	$ 32,287,779
2	27.8/21	$37,623,800	0.9135	$ 34,370,964
3	27.6/19	$42,871,017	0.8732	$ 37,433,236
4	27.4/17	$50,339,256	0.8346	$ 42,011,183
5	27.2/17	$50,339,256	0.7977	$ 40,154,058
6	27.0/17	$50,339,256	0.7624	$ 38,379,028
7	26.8/17	$50,339,256	0.7287	$ 36,682,464
8	26.6/17	$50,339,256	0.6965	$ 35,060,897
9	26.4/17	$50,339,256	0.6657	$ 33,511,013
10	26.2/17	$50,339,256	0.6363	$ 32,029,642
11	26.0/17	$50,339,256	0.6081	$ 30,613,756
12	25.8/17	$50,339,256	0.5813	$ 29,260,460
13	25.6/17	$50,339,256	0.5556	$ 27,966,987
14	25.4/17	$50,339,256	0.5310	$ 26,730,692
15	25.2/17	$50,339,256	0.5075	$ 25,549,049
16	25.0/17	$50,339,256	0.4851	$ 24,419,640
17	24.8/17	$50,339,256	0.4637	$ 23,340,158
18	24.6/17	$50,339,256	0.4432	$ 22,308,395
19	24.4/17	$50,339,256	0.4236	$ 21,322,241
20	24.2/17	$50,339,256	0.4048	$ 20,379,681

				$613,811,321
		Partial Payment Factor		0.0777

	Present Worth Value			$ 47,699,933
	Rounded Present Worth Value			$ 47,699,900

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Limestone- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Limestone	Present Worth Factor	Present Worth Value
1	28.0/23	$ 15,633,621	0.9558	$ 14,942,529
2	27.8/21	$ 16,530,151	0.9135	$ 15,101,006
3	27.6/19	$ 17,893,490	0.8732	$ 15,623,871
4	27.4/17	$ 20,097,864	0.8346	$ 16,772,895
5	27.2/17	$ 20,097,864	0.7977	$ 16,031,441
6	27.0/17	$ 20,097,864	0.7624	$ 15,322,763
7	26.8/17	$ 20,097,864	0.7287	$ 14,645,412
8	26.6/17	$ 20,097,864	0.6965	$ 13,998,005
9	26.4/17	$ 20,097,864	0.6657	$ 13,379,216
10	26.2/17	$ 20,097,864	0.6363	$ 12,787,781
11	26.0/17	$ 20,097,864	0.6081	$ 12,222,491
12	25.8/17	$ 20,097,864	0.5813	$ 11,682,190
13	25.6/17	$ 20,097,864	0.5556	$ 11,165,773
14	25.4/17	$ 20,097,864	0.5310	$ 10,672,184
15	25.2/17	$ 20,097,864	0.5075	$ 10,200,415
16	25.0/17	$ 20,097,864	0.4851	$ 9,749,501
17	24.8/17	$ 20,097,864	0.4637	$ 9,318,519
18	24.6/17	$ 20,097,864	0.4432	$ 8,906,589
19	24.4/17	$ 20,097,864	0.4236	$ 8,512,869
20	24.2/17	$ 20,097,864	0.4048	$ 8,136,553

				$ 249,172,002
		Partial Payment Factor		0.0777

	Present Worth Value			$ 19,363,422
	Rounded Present Worth Value			$ 19,363,400

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Salt- Old River

Project Year	Channel Depth	Old River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,024,097	0.9558	$ 8,625,182
2	27.8/21	$ 10,175,290	0.9135	$ 9,295,566
3	27.6/19	$ 11,973,457	0.8732	$ 10,454,738
4	27.4/17	$ 14,769,825	0.8346	$ 12,326,321
5	27.2/17	$ 14,769,825	0.7977	$ 11,781,430
6	27.0/17	$ 14,769,825	0.7624	$ 11,260,626
7	26.8/17	$ 14,769,825	0.7287	$ 10,762,844
8	26.6/17	$ 14,769,825	0.6965	$ 10,287,067
9	26.4/17	$ 14,769,825	0.6657	$ 9,832,322
10	26.2/17	$ 14,769,825	0.6363	$ 9,397,680
11	26.0/17	$ 14,769,825	0.6081	$ 8,982,251
12	25.8/17	$ 14,769,825	0.5813	$ 8,585,186
13	25.6/17	$ 14,769,825	0.5556	$ 8,205,673
14	25.4/17	$ 14,769,825	0.5310	$ 7,842,938
15	25.2/17	$ 14,769,825	0.5075	$ 7,496,237
16	25.0/17	$ 14,769,825	0.4851	$ 7,164,862
17	24.8/17	$ 14,769,825	0.4637	$ 6,848,135
18	24.6/17	$ 14,769,825	0.4432	$ 6,545,410
19	24.4/17	$ 14,769,825	0.4236	$ 6,256,067
20	24.2/17	$ 14,769,825	0.4048	$ 5,979,515

				$177,930,049
		Partial Payment Factor		0.0777

	Present Worth Value			$ 13,827,134
	Rounded Present Worth Value			$ 13,827,100

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Cement- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Cement	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,971,754	0.9558	$ 9,530,948
2	27.8/21	$ 10,945,535	0.9135	$ 9,999,218
3	27.6/19	$ 12,498,219	0.8732	$ 10,912,939
4	27.4/17	$ 14,809,309	0.8346	$ 12,359,273
5	27.2/17	$ 14,809,309	0.7977	$ 11,812,925
6	27.0/17	$ 14,809,309	0.7624	$ 11,290,729
7	26.8/17	$ 14,809,309	0.7287	$ 10,791,616
8	26.6/17	$ 14,809,309	0.6965	$ 10,314,568
9	26.4/17	$ 14,809,309	0.6657	$ 9,858,607
10	26.2/17	$ 14,809,309	0.6363	$ 9,422,802
11	26.0/17	$ 14,809,309	0.6081	$ 9,006,263
12	25.8/17	$ 14,809,309	0.5813	$ 8,608,136
13	25.6/17	$ 14,809,309	0.5556	$ 8,227,610
14	25.4/17	$ 14,809,309	0.5310	$ 7,863,904
15	25.2/17	$ 14,809,309	0.5075	$ 7,516,276
16	25.0/17	$ 14,809,309	0.4851	$ 7,184,015
17	24.8/17	$ 14,809,309	0.4637	$ 6,866,443
18	24.6/17	$ 14,809,309	0.4432	$ 6,562,908
19	24.4/17	$ 14,809,309	0.4236	$ 6,272,791
20	24.2/17	$ 14,809,309	0.4048	$ 5,995,500

				$ 180,397,470
		Partial Payment Factor		0.0777

	Present Worth Value			$ 14,018,880
	Rounded Present Worth Value			$ 14,018,900

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga R
Coal- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Coal	Present Worth Factor	Present Worth Value
1	28.0/23	$ 20,270	0.9558	$ 19,374
2	27.8/21	$ 20,954	0.9135	$ 19,142
3	27.6/19	$ 22,966	0.8732	$ 20,053
4	27.4/17	$ 25,674	0.8346	$ 21,427
5	27.2/17	$ 25,674	0.7977	$ 20,479
6	27.0/17	$ 25,674	0.7624	$ 19,574
7	26.8/17	$ 25,674	0.7287	$ 18,709
8	26.6/17	$ 25,674	0.6965	$ 17,882
9	26.4/17	$ 25,674	0.6657	$ 17,091
10	26.2/17	$ 25,674	0.6363	$ 16,336
11	26.0/17	$ 25,674	0.6081	$ 15,614
12	25.8/17	$ 25,674	0.5813	$ 14,923
13	25.6/17	$ 25,674	0.5556	$ 14,264
14	25.4/17	$ 25,674	0.5310	$ 13,633
15	25.2/17	$ 25,674	0.5075	$ 13,031
16	25.0/17	$ 25,674	0.4851	$ 12,454
17	24.8/17	$ 25,674	0.4637	$ 11,904
18	24.6/17	$ 25,674	0.4432	$ 11,378
19	24.4/17	$ 25,674	0.4236	$ 10,875
20	24.2/17	$ 25,674	0.4048	$ 10,394

				$ 318,536
		Partial Payment Fact		0.0777

	Present Worth Value			$ 24,754
	Rounded Present Worth Value			$ 24,800

Table 5. Cleveland Harbor WOP Condition Average Annual Vessel Transportation Costs

Commodity	Shoaling Rate OH=.2ft/Yr R=1ft/Yr	Shoaling Rate OH=.2ft/Yr R=2ft/Yr
Iron Ore-Outer Harbor	$ 7,439,100	$ 7,439,100
Iron Ore-Cuyahoga River	$ 45,823,900	$ 47,699,900
Limestone	$ 18,834,400	$ 19,363,400
Salt	$ 13,146,900	$ 13,827,100
Cement	$ 13,450,200	$ 14,018,900
Coal	$ 24,100	$ 24,800
	---	---
WOP AA Transportation Co	$ 98,718,600	$ 102,373,200

Table 6. Cleveland Harbor Average Annual Harbor Transportation Cost Savings Associated With Maintaining a 28/23 Foot Channel Depth

Associated With Maintaining a 28/23 Foot Channel Depth			
A. Shoaling Rates- Outer Harbor=.2 Ft/Yr, River=1 Ft/Yr			
Commodity	WOP Condition Average Annual Transportation Costs	WP Condition Average Annual Transportation Costs	Average Annual Transportation Beneffits
Iron Ore-Outer Harbor	$ 7,439,100	$ 6,791,100	$ 648,000
Iron Ore-Cuyahoga River	$ 45,823,900	$ 33,781,100	$ 12,042,800
Limestone	$ 18,834,400	$ 15,633,600	$ 3,200,800
Salt	$ 13,146,900	$ 9,024,100	$ 4,122,800
Cement	$ 13,450,200	$ 9,971,800	$ 3,478,400
Coal	$ 24,100	$ 20,300	$ 3,800
	---	---	---
	$ 98,718,600	$ 75,222,000	$ 23,496,600
B. Shoaling Rates- Outer Harbor=.2 Ft/Yr, River=2 Ft/Yr			
Commodity	WOP Condition Average Annual Transportation Costs	WP Condition Average Annual Transportation Costs	Average Annual Transportation Beneffits
Iron Ore-Outer Harbor	$ 7,439,100	$ 6,791,100	$ 648,000
Iron Ore-Cuyahoga River	$ 47,699,900	$ 33,781,100	$ 13,918,800
Limestone	$ 19,363,400	$ 15,633,600	$ 3,729,800
Salt	$ 13,827,100	$ 9,024,100	$ 4,803,000
Cement	$ 14,018,900	$ 9,971,800	$ 4,047,100
Coal	$ 24,800	$ 20,300	$ 4,500
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	$ 102,373,200	$ 75,222,000	$ 27,151,200

Table 7. Average Annual Cleveland Harbor Dredging Costs

A. Yearly Dredging Costs				
		Dredging Costs Per Year	Dredging Costs Per Year	Dredging Costs Per Year
		2009-2013	2014-2020	2021-2028
Cubic Yards Removed Annually		225,000	362,000	293,500
Removal Cost Per Cubic Yard		$ 5.25	$ 5.25	$ 5.25
Variable Costs		$ 1,181,426	$ 1,900,782	$ 1,541,104
Fixed Costs		$ 168,143	$ 240,078	$ 204,110
Mob And Demob		$ 300,000	$ 300,000	$ 300,000
		---	---	---
		$ 1,649,568	$ 2,440,861	$ 2,045,214
B. Calculation Of AA Dredging Costs				
	28/23 foot channel			
Calendar Year	Project Year	Dredging Costs	PW of 1	PW Value
2009	1	$ 1,649,568	0.95579	$ 1,576,648
2010	2	$ 1,649,568	0.91354	$ 1,506,952
2011	3	$ 1,649,568	0.87316	$ 1,440,336
2012	4	$ 1,649,568	0.83456	$ 1,376,665
2013	5	$ 1,649,568	0.79767	$ 1,315,809
2014	6	$ 2,440,861	0.76241	$ 1,860,930
2015	7	$ 2,440,861	0.72870	$ 1,778,667
2016	8	$ 2,440,861	0.69649	$ 1,700,040
2017	9	$ 2,440,861	0.66570	$ 1,624,889
2018	10	$ 2,440,861	0.63628	$ 1,553,060
2019	11	$ 2,440,861	0.60815	$ 1,484,406
2020	12	$ 2,440,861	0.58127	$ 1,418,787
2021	13	$ 2,045,214	0.55557	$ 1,136,260
2022	14	$ 2,045,214	0.53101	$ 1,086,031
2023	15	$ 2,045,214	0.50754	$ 1,038,022
2024	16	$ 2,045,214	0.48510	$ 992,136
2025	17	$ 2,045,214	0.46366	$ 948,278
2026	18	$ 2,045,214	0.44316	$ 906,359
2027	19	$ 2,045,214	0.42357	$ 866,293
2028	20	$ 2,045,214	0.40485	$ 827,998
	P W of Harbor Dredging over 20 yrs			$ 26,438,569
	PPF at	4.625%		0.077711068
	AAE Dredging Cost Per Yr			$ 2,054,569
	Rounded AAE Dredging Cost Per Yr			$ 2,054,600

Table 8. Cleveland Harbor- Level Of Supportable CDF Project Costs

Plan Depth	Shoaling Rate Per Year	Average Annual Harbor Benefits	Total Average Annual Dredging Costs	Net Average Annual Benefits	Presen Worth Of 1$/Period	Coverable Annual Costs
28/23	OH=.2 R=1.0	$ 23,496,600	$2,054,600	$21,442,000	12.868180	$275,919,500
28/23	OH=.2 R=2.0	$ 27,151,200	$2,054,600	$25,096,600	12.868180	$322,947,600

APPENDIX G
Part II

CLEVELAND HARBOR DMMP
ECONOMIC EVALUATION OF ALTERNATIVE PLANS

Economic Evaluation of Alternative Plans

I. INTRODUCTION

The Cleveland Harbor Dredge Material Management Plan (DMMP) is a document that developed a number of plans that would allow dredging at Cleveland harbor to continue for the next 20 years. This Appendix documents the development of these plans, the components of the various plans and their costs. Average annual costs and average annual benefits are identified for each plan and used to develop plan benefit to cost ratios and plan net benefits. The project evaluation period for this DMMP is 2009-2028.

II. MEASURES

The Cleveland Harbor Dredge Material Management Plan (DMMP) developed a number of measures (24), including the "No Action", that could be used to develop plans that addressed the need to dispose of dredged material removed from the harbors river and approach channels for the next 20 years. These 24 measures are listed in Table 1. Figure 1 provides a schematic of potential confined disposal facility (CDF) site locations at Cleveland Harbor associated with Measure D-New CDFs. Table 2 presents a relative comparison of the physical characteristics of the eleven preliminary CDF configurations, which includes an iteration of proposed CDF 2 and CDF 3. (Note: the cost estimates date from June of 2007, and were based on a readily availability source of quarry stone – which is unlikely. These costs are "preliminary costs" and are presented in the table for comparison purposes only).

A. Preliminary Screening of Management Measures

1. Comparing Measures to Objectives – A description of the evaluation process used to determine which measures would be carried into detailed planning starts in Section 2.37 of the main report. The 24 measures identified in Table 1 were compared to the Planning Objectives (Section 2.09 of the main report) developed for this DMMP. A summary of this comparison was provided in Table 2.2 of the main report.

B. Measures Carried Into Detailed Planning

The Cleveland Harbor DMMP identified seven measures, including the No Action, which would be carried into detailed planning. A description of these seven measures follows.

1. Measure A- No Action Under this measure, the Federal Government would do nothing to address the need for future long term placement of dredged material. All USACE CDFs are essentially filled after the 2008 dredging season, given their current configurations. Consequently, all federal action at Cleveland would cease after 2008. There would be no dredging, no breakwater maintenance, no CDF maintenance and no CDF management. (Note: the No Action plan is essentially the Without Project Condition).

Table 1- Initial Measures Identified As Potential Components Of Plans

MEASURES	IN DETAILED PLANNING
1. Measure A- No Action	YES
2. Measure B1- Beneficial Use- Mine Reclamation	No
3. Measure B2-Beneficial Use-Littoral Nourishment	No
4. Measure B3-Beneficial Use- Soil Manufacture	No
5. Measure B4-Beneficial Use- Wetlands/Habitat Creation	No
6. Measure B5-Landfill Cover	No
7. Measure C-Open Lake Placement	No
8. Measure D1-New CDF- Inner Harbor-Site 4	No
9. Measure D1-New CDF- Inner Harbor-Site 5	No
10. Measure D1-New CDF- Inner Harbor-Site 6	No
11. Measure D1-New CDF- Inner Harbor-Site 8	No
12. Measure D1-New CDF- Inner Harbor-Site 9-E 55th	YES
13. Measure D2-New CDF- Outer Harbor Offshore-Site 1	No
14. Measure D2-New CDF- Outer Harbor Offshore-Site 2	YES
15. Measure D2-New CDF- Outer Harbor Offshore-Site 2a	YES
16. Measure D2-New CDF- Outer Harbor Offshore-Site 3	YES
17. Measure D2-New CDF- Outer Harbor Offshore-Site 3a	YES
18. Measure D2-New CDF- Outer Harbor Offshore-Site 7	No
19. Measure E-Existing CDF Management	YES
20. Measure F- Sediment Load Reduction	No
21. Measure G- Sediment Traps	No
22. Measure H-Utilize Nearby CDF's (Huron Harbor)	No
23. Measure I- Treatment Technology	No
24. Measure J-Upland Disposal	No

Figure 1. Existing and Potential CDF Sites at Cleveland Harbor

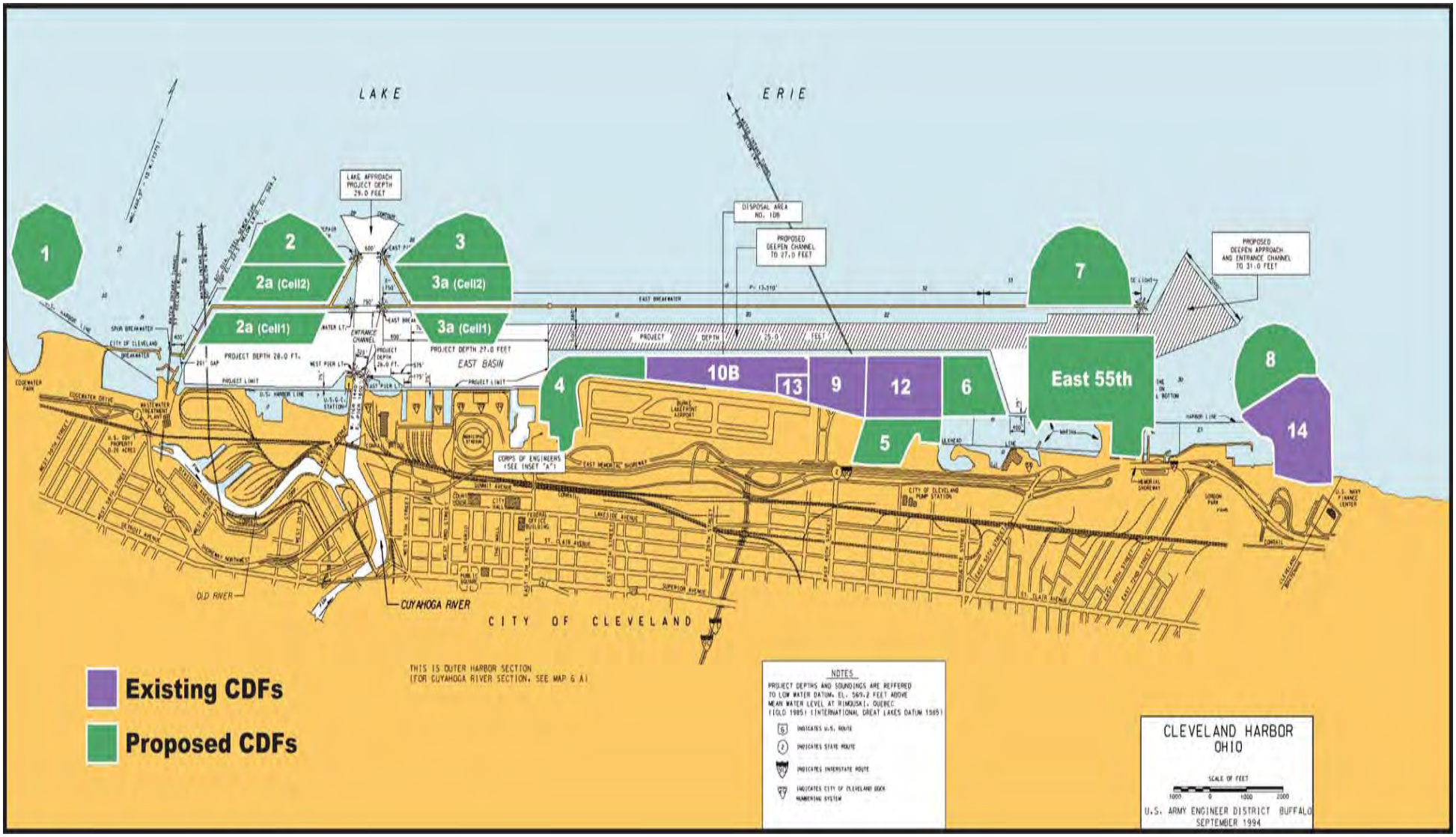


Table 2- Preliminary CDF Characteristics

Proposed Site	Area (acres)	Perimeter (Feet)	Average Existing Lakebed Elevation (feet LWD)	Final Dredge Fill Elevation (feet LWD)	New CDF Perimeter (feet)	Typical X-Sectional Area for New CDF (square feet)	Preliminary Rough Cost Estimate (Millions) (June 2007)	Design Capacity (cy)	Design Capacity (years)*
CDF 1	71	6400	-22	20	6400	4900	$198	4,300,000	13
CDF 2	108	9100	-26	20	9100	6000	$242	7,200,000	21
CDF 2a (Cell 1)	65	8300	-20	10	8300	NA**	$210	2,620,000	8
CDF 2a (Cell 2)	65	8540	-23	20	5250	6000	$115	4,490,000	13
CDF 3	117	9180	-22	20	9400	4900	$210	7,200,000	21
CDF 3a (Cell 1)	50	8300	-17	10	8400	NA**	$132	1,800,000	5
CDF 3a (Cell 2)	79	10680	-22	20	6760	4900	$197	4,650,000	14
CDF 4	61	11400	-17	8	3600	3100	$35	2,300,000	7
CDF 5	36	6600	-14	8	700	2400	$7	1,200,000	3
CDF 6	37	5200	-21	10	3900	3100	$61	1,600,000	5
CDF 7	93	8100	-34	20	8100	8400	$215	6,900,000	20
CDF 8	63	6700	-30	20	4400	7200	$100	4,200,000	12
East 55th Street (LPP)	157	7900	-22	10	7900	NA**	$246	6,850,000	20

***Based on 338,220 cubic yard annual disposal rate.**

****Cell 1 cross section for Alternatives 2a and 3a and the East 55th Street (LPP) includes both rubblemound and vertical steel sheet pile dikes (all other CDF alternatives are exclusively rubblemound; does not allow for equal comparison).**

Without dredging, the navigation channels would progressively shoal in and would result in reduced channel depths for commercial vessels. Reduced channel depths would result in light loading commercial navigation vessels over the 20-year evaluation period. Significant savings would be realized in the Federal budget as expenditures for operating and maintaining the Federal navigation project at Cleveland Harbor would no longer be required. Consistent with USACE guidance (ER 1105-2-100) this measure will be carried forward into detailed planning and fully evaluated in the array of final plans.

2. Measure 12- D1-New CDF- Inner Harbor-Site 9- E 55th The East 55th Street CDF would be approximately 157 acres and provide an estimated 20 years capacity. It met various planning objectives and did not have to be combined with other sites to provide 20 years of capacity.

3. Measure 14- Measure D2-New CDF- Outer Harbor Offshore-Site 2- Site 2 is located along and lakeward of the West Breakwater. The site is 108 acres in size, provides 7.2 million cubic yards of storage and has a lifespan of 21.3 years. It met various planning objectives and did not have to be combined with other sites to provide 20 years of capacity.

4. Measure 15- Measure D2-New CDF- Outer Harbor Offshore-Site 2a- Site 2a would involve the construction of a two celled CDF, one cell located lakeward and one cell located landward of the West Breakwater. Site 2a has a total size of 130 acres, provides 7.1 million cubic yards of space and has a lifespan: 21 years. It met various planning objectives and did not have to be combined with other sites to provide 20 years of capacity.

5. Measure 16- Measure D2-New CDF- Outer Harbor Offshore-Site 3- Site 3 is located along and lakeward of the western end of the East Breakwater. The site is 117 acres in size, provides 7.2 million cubic yards of storage and has a lifespan of 21.3 years. It met various planning objectives and did not have to be combined with other sites to provide 20 years of capacity.

6. Measure 17- Measure D2-New CDF- Outer Harbor Offshore-Site 3a- Site 3a would involve the construction of a two celled CDF, one cell located lakeward and one cell located landward of the East Breakwater. Site 3a has a total size of 123 acres, provides 6.5 million cubic yards of space and has a lifespan of 20 years. It met various planning objectives and did not have to be combined with other sites to provide 20 years of capacity.

7. Measure 19- Measure E-Existing CDF Management One method to continue disposal at existing Cleveland Harbor CDFs is to grade the in-place sediment to generate additional space. Dry sediment within the CDF is harvested to raise the perimeter elevations increasing capacity of the facility. In addition to the increased height of the perimeter, the area where sediment was harvested is now available for disposal of dredged material. Sediment used to raise the perimeter is graded to specific slope and elevation to maximize design capacity and meet design criteria. Trenches are dug to dewater the sediment more quickly and maximize sediment compaction.

Consequently, CDF Management Plans (Best Operational Management Practices-BOMPs) were developed for CDFs 10B, 12 and 9. The implementation of these CDF management plans will allow channel maintenance dredging to continue through 2014.

The use of BOMPs at existing CDFs will allow sufficient time for the planning, design and construction of a new CDF and/or development of a new alternative for dredged material disposal at Cleveland. In 2015 a new disposal site will come on line to handle sediment dredged from 2015-2028, the remaining years in the project evaluation period. A brief description of the CDF management plans for CDFs 10B, 12 and 9 follows.

a. Sediment Dredging Schedule Due to the current CDF capacity shortage, dredging will be reduced to 250,000 cubic yards per year (225,000 cubic yards Federal and 25,000 cubic yards non-Federal) from 2008 through 2013 (Table 3). Dredging quantities would likely increase in 2014 to remove accumulated sediments (410,400 annually). Once the backlog has been removed (2020), annual dredging quantities will revert back to 330,200 cubic yards annually (2021-2028). This will result in, approximately 338,220 cubic yards being dredged annually during the twenty year study period. All sediment dredged from Cleveland Harbor will be placed in a CDF. Approximately 6,764,400 cubic yards of sediment will be removed from Cleveland Harbor over the twenty year evaluation period.

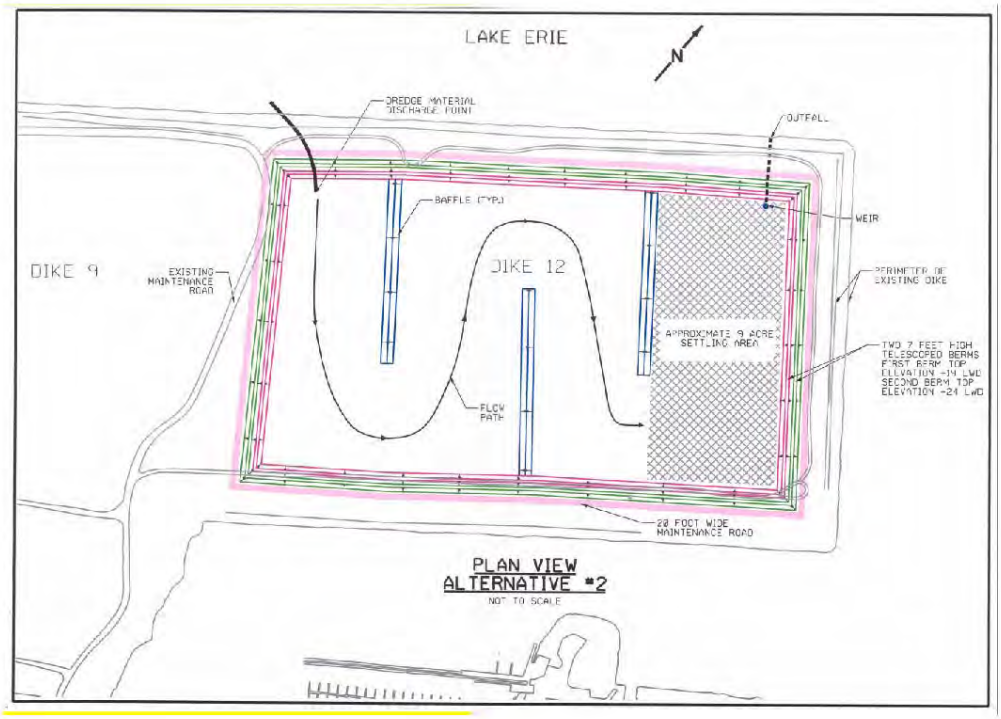
b. CDF Management Plan for CDF 10B. Since 1998, all sediment dredged at Cleveland Harbor has been deposited in CDF 10B. After dredging in 2005, CDF 10B was nearly filled with enough remaining capacity for a reduced dredging cycle in 2006. Prior to the 2006 dredging season, USACE implemented Phase I of the Fill Management Plan (FMP) at CDF 10B, and raised the southern perimeter of the CDF by constructing a gradual northward slope with existing dredge material within the CDF. Phase I of CDF 10B FMP allowed for disposal of approximately163,700 cubic yards. In 2007, Phase II of the FMP was implemented to allow for another two seasons (2007, 2008) of reduced dredging and disposal activities.

c. CDF Management Plan for CDF 12 CDF 12 is located adjacent to Burke Lakefront (BKL) Airport. Any modifications to CDF 12 will consider the operational requirements of BKL Airport and comply with Federal Aviation Administration (FAA) regulations. FAA regulations limit the height and slope of the CDF perimeter. USACE has developed FMPs to maximize the capacity of existing CDFs while maintaining compliance with FAA regulations. A two-phase FMP has been developed for CDF 12 to accommodate approximately four dredging cycles (2009 through 2010 for Phase 1 and 2013 through 2014 for Phase 2). Figure 2 illustrates the FMP for CDF 12.

Table 3. Cleveland Harbor Sediment Dredging Schedule-2009- 2028

Project Evaluation Period			2009-2028		
				Total	
		Federal	Non-Federal	Cubic	
		Sediment	Sediment	Yards	
Calander	Project	Placed In	Placed In	Placed in	
Year	Year	CDF	CDF	CDF	
2008		225,000	25,000	250,000	Dike 10B
2009	1	225,000	25,000	250,000	Dike 12
2010	2	225,000	25,000	250,000	2.0 Years
2011	3	225,000	25,000	250,000	Dike 9
2012	4	225,000	25,000	250,000	2 Years
2013	5	225,000	25,000	250,000	Dike 12
2014	6	362,000	48,400	410,400	2.0 Years
2015	7	362,000	48,400	410,400	New
2016	8	362,000	48,400	410,400	Harbor
2017	9	362,000	48,400	410,400	Sediment
2018	10	362,000	48,400	410,400	Disposal
2019	11	362,000	48,400	410,400	Site
2020	12	362,000	48,400	410,400	
2021	13	293,500	36,700	330,200	14 years
2022	14	293,500	36,700	330,200	Of
2023	15	293,500	36,700	330,200	Dredging
2024	16	293,500	36,700	330,200	Cubic
2025	17	293,500	36,700	330,200	Yards
2026	18	293,500	36,700	330,200	Placed
2027	19	293,500	36,700	330,200	5,104,000
2028	20	293,500	36,700	330,200	
		---	---	---	
Evaluation Period Disposal		6,007,000	757,400	6,764,400	
Annual Disposal		**300,350**	**37,870**	**338,220**	

Figure 2. - Fill Management Plan CDF 12



The proposed two-phased FMP at CDF 12 involves phased grading to create two 6-foot perimeter lifts (i.e., berms) using existing dredge material from the CDF. The top elevation of the first lift/berm (Phase 1) is at +18 LWD.

The second lift/berm (Phase 2) shall be graded to +24 LWD after the CDF has reached the capacity provided by the first phase of work. A minimum two-foot freeboard shall be maintained over the entire area. The FMP was also designed to reduce the area of open water in the CDF to inhibit waterfowl nesting, foraging, and loafing. The FMP will be developed and implemented in stages, dependent on funding, design issues and scheduling/coordination with dredging operations. Construction of the first phase of this FMP will be completed in FY09. Construction of the second phase of the FMP should be complete in FY13 and will be used to receive material in 2013 and 2014.

<u>d. CDF Management Plan for CDF 9</u> CDF 9 is a 21-acre facility. Proposed berms will be constructed using sediment currently within the CDF. The berms will tie into CDF 10B and CDF 12 berms on the west and east sides of the CDF, respectively. This will essentially create one large CDF to allow for more effective material deposition, decanting, and dewatering. Proposed elevations of the berms are to be approximately 587.2 feet above MWL. Some changes to the CDFs design are anticipated as coordination with the Cleveland Port Authority, a major stakeholder, continues to devise a plan to avoid disruption of the Burke Lakefront Airport Instrument Landing System (ILS) and weather station. Planned use of CDF 9 is in 2011 and 2012.

The USACE, Buffalo District has constructed a number of in-lake CDFs that have been filled or are essentially filled. These facilities can and have been managed to extend their useful life to accept dredged materials. Such measures typically involve construction of interior berms with sandy dredged material to increase the capacity of the

CDF, as described above. These measures are extremely cost effective in that they utilize existing CDF footprints.

III. PLANS DEVELOPED AND EVALUATED IN DETAIL-COMPONENTS

The seven measures carried forward to detailed planning were used to develop a range of plans that would allow the harbor to be maintained over the 20 year evaluation period 2009-2028. Seven plans were developed using these seven measures. These seven Plans are:

- Alternative Plan 1 – No Action
- Alternative Plan 2 – Management of Existing CDFs and Construction of CDF 2
- Alternative Plan 2a – Management of Existing CDFs and Construction of CDF 2a
- Alternative Plan 3 – Management of Existing CDFs and Construction of CDF 3
- Alternative Plan 3a - Management of Existing CDFs and Construction of CDF 3a
- Alternative Plan 4 – Management of Existing CDFs and Construction of new CDF at the foot of East 55th Street, Corps Configuration
- Alternative Plan 4a- Management of Existing CDFs and Construction of new CDF at the foot of East 55th Street, Locals Configuration.

These plans are presented in detail in the main report. All plan costs represent December 2008 prices. Table 4 provides the various components of the seven alternative plans and general plan characteristics such as cubic capacity, acres, average cubic yards removed per year, lifespan, CDF construction costs, and costs per cubic yard based on construction costs. Plans 2 through 4a have a common component: a FMP for CDFs 12 and 9.

A. Alternative Plan 1-No Action

The No Action Plan implies that no short term or long term measure for management of dredged material from Cleveland Harbor will be undertaken during the Planning Evaluation period (2009-2028). Under the No Action plan, all expenditures associated with dredging would cease in project year one, 2009. Future sediments deposited in commercial navigation channels from shoaling over the twenty year evaluation period (2009-2028) would not be dredged and would result in reduced channel depths for commercial vessels. Again, since dredging would cease in Project year 1, there would also be no FMP costs during the project evaluation period.

Table 4- Cleveland DMMP Plan Components

A. Plan Components

Alternative Plans	**Management Measures**		
	(A)	**(D)**	**(E)**
	No Action	**New CDF**	**Fill Mgmt Plan at Existing CDFs**
Alternative Plan 1 No Action	**X**		
Alternative Plan 2- New CDF- Site 2		**X**	**X**
Alternative Plan 2a New CDF-Site 2a		**X**	**X**
Alternative Plan 3 New CDF-Site 3		**X**	**X**
Alternative Plan 3a New CDF-Site 3a		**X**	**X**
Alternative Plan 4 New CDF-E55th St Corps Configuration		**X**	**X**
Alternative Plan 4a New CDF-E55th St Locals Configuration		**X**	**X**

B. General Plan Characteristics

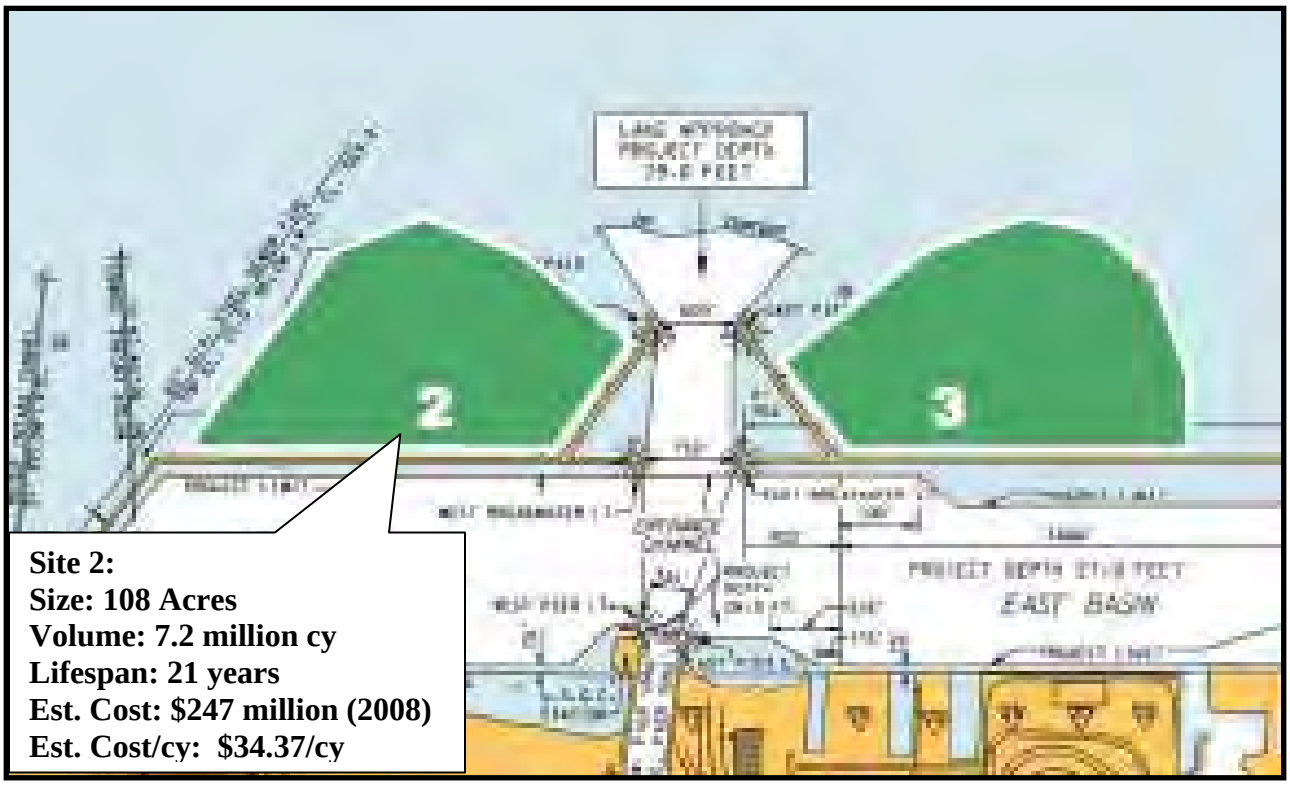
Plan Characteristics		Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
	Cubic Yards	7,200,000	7,100,000	7,200,000	6,500,000	6,850,000	6,850,000
	Acres	108	130	117	129	157	157
Cubic Yrds Removed/Yr		338,200	338,200	338,200	338,200	338,200	338,200
	Life Span	21.29	20.99	21.29	19.22	20.25	20.25
CDF Construction Costs		$ 247,448,000	$ 265,712,000	$ 205,691,000	$ 340,339,000	$ 237,929,000	$ 276,987,000
Costs/Cubic Yard		$ 34.37	$ 37.42	$ 28.57	$ 52.36	$ 34.73	$ 40.44

B. Alternative Plan 2-New CDF- Site 2

Alternative Plan 2 includes implementation of the FMP from 2009 through 2014 at CDFs 12 and 9 and construction of a new CDF at Site 2. Site 2 is located along and lakeward side of the

West Breakwater. CDF 2 is 108 acres in size and is in about 34 feet of water (Figure 3). The capacity of CDF 2 is around 7,200,000 cubic yards.

Figure 3.- Location Of Plan 2- New CDF- Site 2

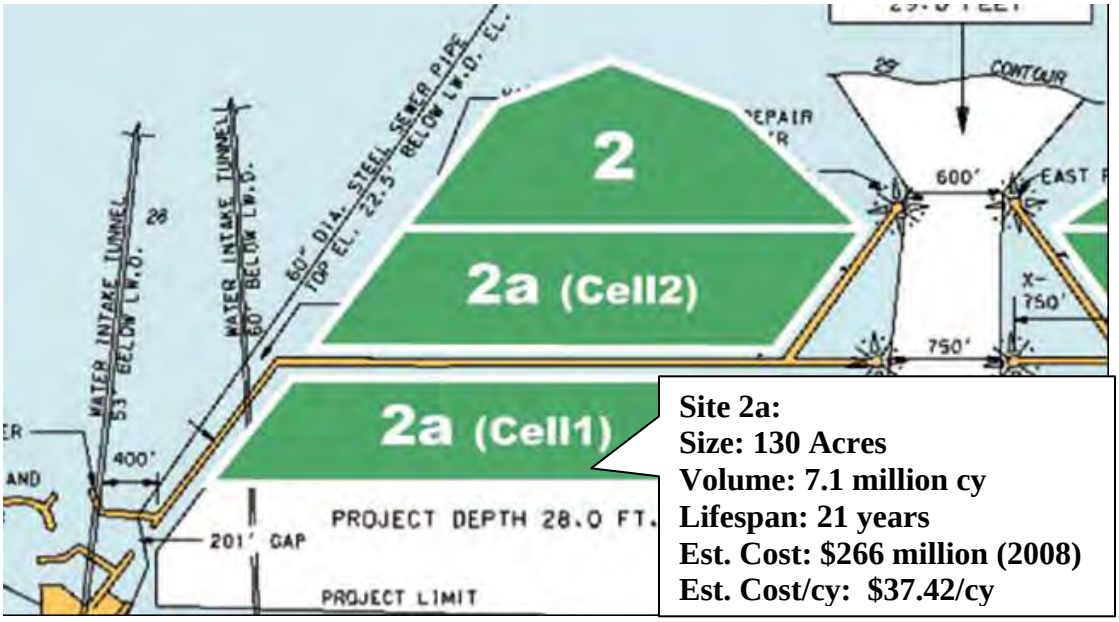


Implementation costs associated with Plan 2 include CDF management costs, dredging costs, fish habitat development and new CDF construction costs. CDF management costs for Plan 2 include FMP costs for CDFs 9 and 12. CDF management costs associated with CDF 12 are approximately $4,818,000. This money would be expended evenly in 2009 and 2013. Management costs associated with CDF 9 are approximately $2,409,000. This money would be expended in 2011. Costs associated with putting the sediments into existing Cleveland Harbor CDFs from 2009-2014 are range from $1,674,100 to $2,520,200 per dredging event. Cost associated with putting the sediments into the new CDF (2015-2028) range from $2,287,100 to $2,739,200 per dredging event. The plan also includes the development of fish spawning habitat along the outside of new and existing CDFs ($500,000). Rubblemound construction of the new CDF would take place in approximately 34 feet of water, be constructed over a three year period (2012, 2013, 2014), and cost $247,448,000.

C. Alternative Plan 2a-New CDF- Site 2a

Plan 2a includes implementation of the FMP from 2009 through 2014 at CDFs 12 and 9 and construction of a new two celled CDF at Site 2a on the West Breakwater. One cell would be located lakeward and one cell located landward of the West Breakwater. Site 2a has a total size of 130 acres, provides 7.1 million cubic yards of space, has a lifespan of 21 years, and construction costs of $265,712,000 (Figure 4).

Figure 4. Location Of Plan 2a- New CDF- Site 2a



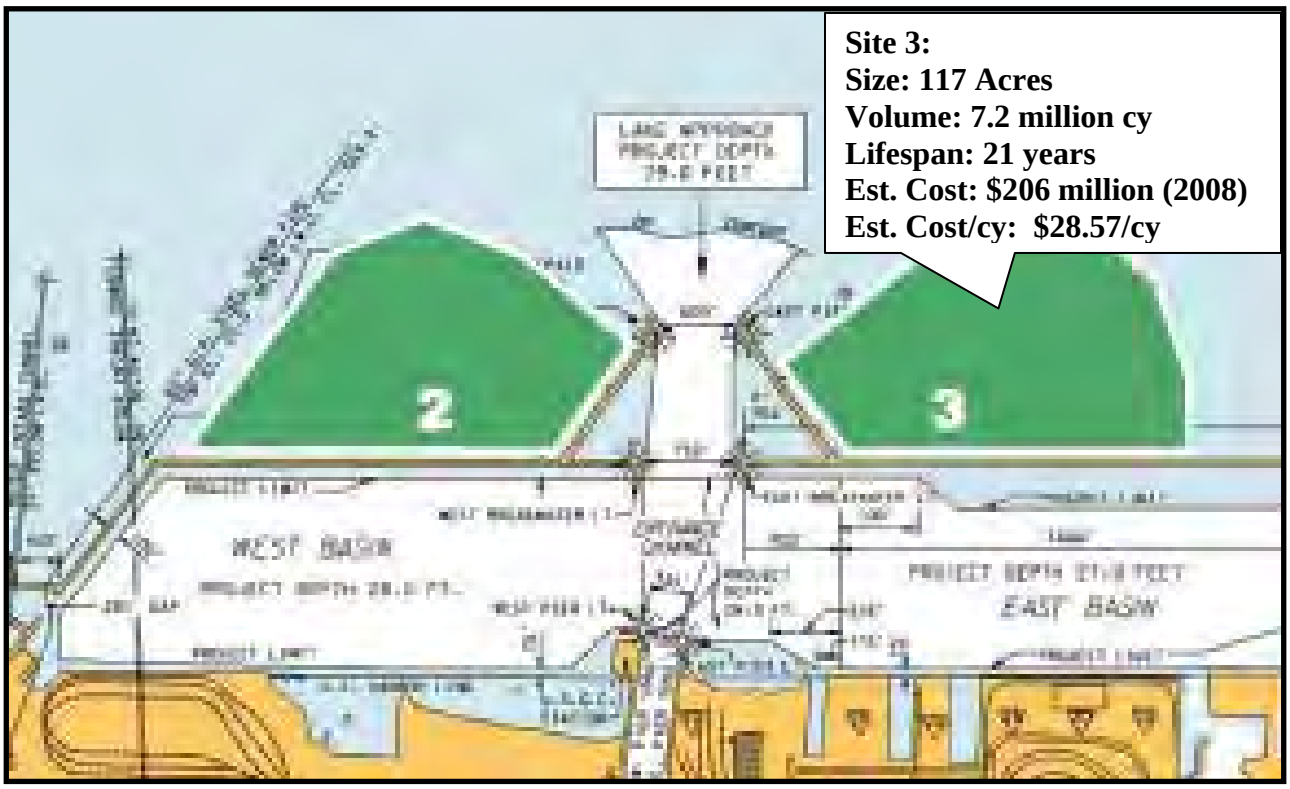
Cell 1, to be constructed and available for disposal of dredged material in 2015, would be approximately 65 acres in size. Construction of cell 1 would include the existing wall of the West Breakwater as the northern perimeter. To the east and south, cell 1 would be constructed of new perimeter walls, consisting of steel sheet pile construction. This cell would be subdivided as necessary to improve the operational aspects of dredged material disposal. Cell 1 would be designed to have a life of about eight years assuming the average annual disposal of about 390,000 cubic yards during this time (about 3,122,800 cubic yards total). Cell 1 would be operational from 2015 through 2022. Upon filling cell 1 the area would be transferred to the local sponsor. Cell 2 of alternative plan 2a would be constructed to include the West Breakwater as the southerly wall and would be operational from 2023 through 2034. It would be designed to have an estimated capacity of 4,100,000 cubic yards for a life of twelve years at 338,200 cubic yards per year. The north wall of cell 2 would probably be constructed of stone to deflect wave action present in this unprotected area. Implementation of Alternative Plan 2a would require de-authorization of the rarely used and rarely dredged portion of the harbor encroached upon by cell 1 of the CDF.

Implementation costs associated with Plan 2a include CDF management costs, dredging costs, fish habitat development and new CDF construction costs. CDF management costs for Plan 2a include CDF Management costs for CDF 12 and CDF 9. CDF management costs associated with CDF 12 are approximately $4,818,000. This money would be expended evenly in 2009 and 2013. Management costs associated with CDF 9 are approximately $2,409,000. This money would be expended in 2011. Costs associated with putting the sediments into existing Cleveland Harbor CDFs from 2009-2014 range from $1,674,100 to $2,520,200 per dredging event. Cost associated with putting the sediments into the new CDF at Cell 1(2015-2022) range from $1,948,100 to $2,321,100 per dredging event. Cost associated with putting the sediments into the new CDF at Cell 2 (2023-2028) range from $1,948,100 to $2,287,100 per dredging event. The plan also includes the development of fish spawning habitat along the outside of new and existing CDFs ($500,000). Rubblemound construction of Cell 1 would take place in approximately 28 feet of water, be constructed over a three year period (2012, 2013, 2014), and cost $119,913,000. Rubblemound construction of Cell 2 would take place in approximately 32 feet of water, be constructed over a three year period (2020, 2021, 2022), and cost $145,799,000.

D. Alternative Plan 3-New CDF- Site 3

Alternative Plan 3 includes implementation of the FMP from 2009 through 2014 at CDFs 12 and 9 and building a new CDF at Site 3. Site 3 is located along and lakeward of the western end of the East Breakwater. The site is 117 acres in size, provides 7.2 million cubic yards of storage and has a lifespan of 21 years. Figure 5 provides a schematic of the CDF location and layout.

Figure 5. Location Of Plan 3- New CDF- Site 3



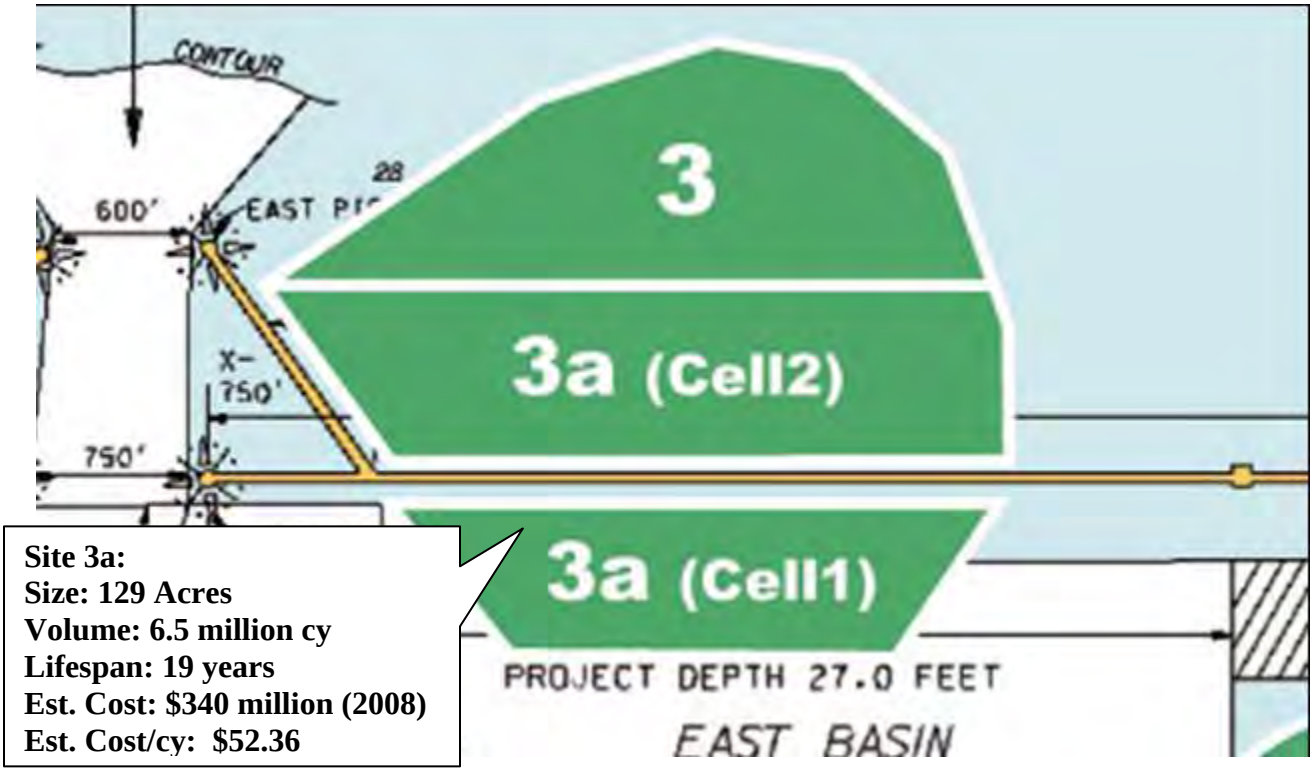
Implementation costs associated with Plan 3 include CDF management costs, dredging costs, fish habitat development and new CDF construction costs. CDF management costs for Plan 3 include CDF management costs for CDF 12 and CDF 9. CDF management costs associated with CDF 12 are approximately $4,818,000. This money would be expended evenly in 2009 and 2013. Management costs associated with CDF 9 are approximately $2,409,000. This money would be expended in 2011. Costs associated with putting the sediments into existing Cleveland Harbor CDFs from 2009-2014 range from $1,674,100 to $2,520,200 per dredging event. Cost associated with putting the sediments into the new CDF (2015-2028) range from $2,287,100 to $2,739,200 per dredging event. The plan also includes the development of fish spawning habitat along the outside of new and existing CDFs ($500,000). Rubblemound construction of the new CDF would take place in approximately 34 feet of water, be constructed over a three year period (2012, 2013, 2014), and cost $205,691,000.

E. Alternative Plan 3a-New CDF- Site 3a

Alternative Plan 3a includes implementation of the FMP from 2009 through 2014 at CDFs 12 and 9 and the construction of a two celled CDF at Site 3a, one cell located lakeward and one cell located landward of the East Breakwater (Figure 6). Site 3a has a total size of 129 acres,

provides 6.5 million cubic yards of space, has a 19 year lifespan and construction costs of $340,339,000. Site 3a would be similar in configuration to that presented for Alternative Plan 2a

Figure 6. Location Of Plan 3a- New CDF- Site 3a



The relationship between Alternative 3 and 3a is analogous to that of 2 and 2a. The primary difference is that Alternative 3a will be constructed in shallower water depths which will reduce construction costs on a per lineal foot basis. Cell 1, to be constructed and available for disposal of dredged material in 2015, would be approximately 75 acres in size. Construction of cell 1 would include the existing wall of the East Breakwater as the northern perimeter. To the east, south, and west, cell 1 would be constructed of new perimeter walls, consisting of steel sheet pile construction. This cell would be subdivided as necessary to improve the operational aspects of dredged material disposal. Cell 1 would be designed to have a life of about five years assuming the average annual disposal of about 410,000 cubic yards (about 2,000,000 cubic yards total). Cell 1 would be operational from 2015 through 2019. Upon filling cell 1 the area would be transferred to the local sponsor. Cell 2 of alternative plan 3a would be constructed to include the East Breakwater as the southerly wall and would be operational from 2020 through 2034. It would be designed to have an estimated capacity of 4,300,000 cubic yards for a life of thirteen years at 338,200 cubic yards per year. The north wall of cell 2 would probably be constructed of stone to deflect wave action present in this unprotected area. Implementation of Alternative Plan 3a would require de-authorization of the rarely used and rarely dredged portion of the harbor encroached upon by Cell 1 of the CDF.

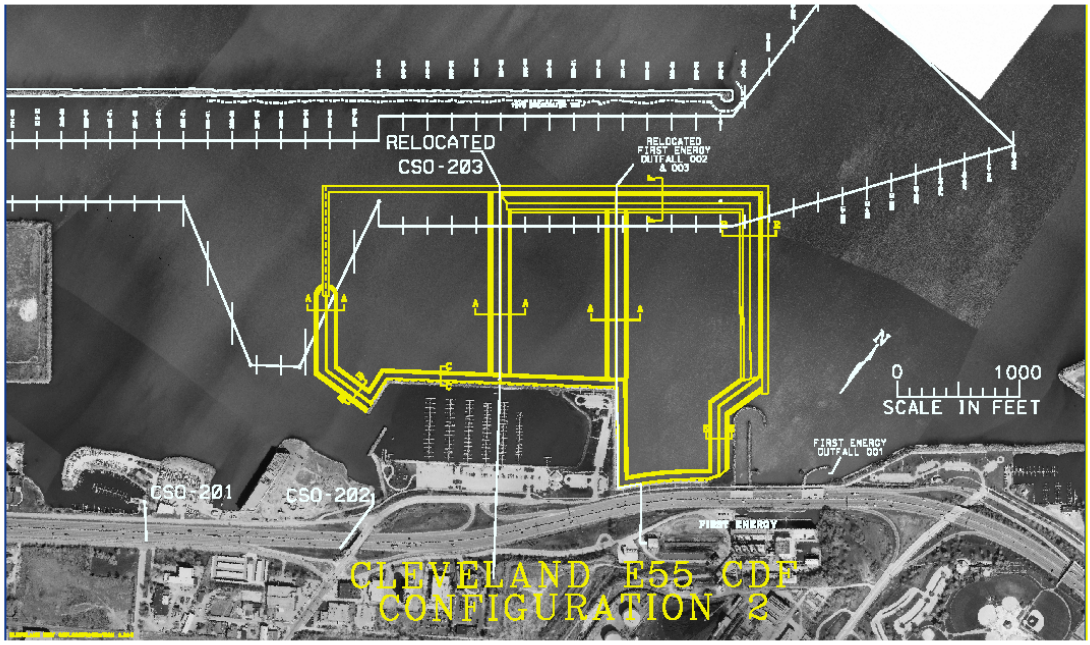
Implementation costs associated with Plan 3a include CDF management costs, dredging costs, fish habitat development and new CDF construction costs. CDF management costs for Plan 3a include CDF management costs for CDF 12 and CDF 9. CDF management costs associated with CDF 12 are approximately $4,818,000. This money would be expended evenly in 2009 and 2013. Management costs associated with CDF 9 are approximately $2,409,000. This money would be expended in 2011. Costs associated with putting the sediments into existing Cleveland

Harbor CDFs from 2009-2014 range from $1,674,100 to $2,520,200 per dredging event. Cost associated with putting the sediments into the new CDF at Cell 1 (2015-2019) are $2,360,900 per dredging event. Cost associated with putting the sediments into the new CDF at Cell 2 (2020-2028) range from $1,980,400 to $2,360,900 per dredging event. The plan also includes the development of fish spawning habitat along the outside of new and existing CDFs ($500,000). Rubblemound construction of Cell 1 would take place in approximately 28 feet of water, be constructed over a three year period (2012, 2013, 2014), and cost $138,789,000. Rubblemound construction of Cell 2 would take place in approximately 32 feet of water, be constructed over a three year period (2017, 2018, 2019), and cost $201,550,000.

F. Alternative Plan 4-New CDF- East 55th Street-Corps Configuration

Alternative Plan 4 includes implementation of the FMP from 2009 through 2014 at CDFs 12 and 9 and the construction of CDF 9 (East 55th Street CDF). This plan would involve the construction of a CDF at the East 55th Street location as illustrated in Figure 7. The CDF is approximately 157 acres in size, provides 6,850,000 cubic yards of capacity and has a 20 year life span. To the south, the East 55th Street site will be bounded by an improved State Park Marina breakwater, the natural shoreline near the terminus of East 55th Street, and a to-be-constructed perimeter wall/CDF. A portion of the eastern boundary would be formed by the existing First Energy circulating water intake (necessary improvements will be made to the structure) and the remainder of the perimeter shown will be formed by still to be constructed walls. The perimeter walls will be back to back open cell construction. The CDF will be constructed in optimally sized cells in order to spread out construction costs over time while still maintaining cost effectiveness. Three individual cells will be constructed. The combined footprint will not exceed what is shown in Figure 7. The entire facility provides 20 years of capacity assuming an annual dredging volume of about 338,220 cubic yards per year. The first cell would be constructed from 2012 through 2014, allowing filling operations to begin in FY15.

Figure 7. Location Of Plan 4- New CDF- Site 9- E. 55th Street-Corps Configuration



The proposed footprint of the East 55th Street site encroaches on the existing Federal approach channel in the east basin and eastern flared portion of the 25-foot deep dock approach channel to the former Nicholson Cleveland Terminal Company pier. These portions of the existing project

were authorized but never constructed. These portions of the channel must be de-authorized in order to implement the proposed East 55th Street CDF alternative.

Implementation costs associated with Plan 4 include CDF management costs, dredging costs, water outfall relocation costs, fish habitat development and new CDF construction costs. CDF management costs for Plan 4 include CDF management costs for CDF 12 and CDF 9. CDF management costs associated with CDF 12 are approximately $4,818,000. This money would be expended evenly in 2009 and 2013. Management costs associated with CDF 9 are approximately $2,409,000. This money would be expended in 2011. Costs associated with putting the sediments into existing Cleveland Harbor CDFs from 2009-2014 range from $1,674,100 to $2,520,200 per dredging event. Costs associated with putting sediments into the new CDF at Cell 1 (2015-2021) range from $2,174,100 to $2,599,800 per dredging event. Cost associated with putting the sediments into the new CDF at Cell 2 (2022-2026) range from $2,141,800 to $2,174,100 per dredging event. Cost associated with putting the sediments into the new CDF Cell 3 (2027-2034) are $2,141,800.

There are two water outfalls (a 42 inch diameter and a 14 foot diameter outfall) that will have to be extended approximately 1,000 feet. Extension of these outfalls have a total cost $7,591,500 and would take place in two stages. The first extension would start in 2014 ($5,091,491) and the second extension ($2,500,000) in 2021. The plan also includes the development of fish spawning habitat along the outside of the CDF ($500,000).

Construction costs for Plan 4 are $237,929,000. Construction of Cell 1 would take place in approximately 25 feet of water, be constructed over a three year period (2012, 2013, 2014), and cost $110,450,000. Construction of Cell 2 would take place in approximately 28 feet of water, be constructed over a three year period (2019, 2020, 2021), and cost $54,091,000. Construction of Cell 3 would take place in approximately 28 feet of water, be constructed over a three year period (2024, 2025, 2026), and cost $73,388,000.

G. Alternative Plan 4a-New CDF- East 55th Street-Local Configuration

This plan would be identical in acreage and capacity as Plan 4. However, the vertical perimeter walls would be required to accommodate possible future development activities on the CDF. The engineering components of the steel sheet pile (i.e. vertical and lateral strength) would thus be greater than that used to construct Alternative Plan 4. The CDF would be 157 acres in size, provide 6,850,000 cubic yards of sediment capacity and have a 20 year life span.

The CDF will be constructed in optimally sized cells in order to spread out construction costs over time while still maintaining cost effectiveness. Three individual cells will be constructed. The proposed footprint of the East 55th Street site encroaches on the existing Federal approach channel in the east basin and eastern flared portion of the 25-foot deep dock approach channel to the former Nicholson Cleveland Terminal Company pier. These portions of the existing project were authorized but never constructed. These portions of the channel must be de-authorized in order to implement the proposed East 55th Street CDF alternative.

Implementation costs associated with Plan 4a include CDF management costs, dredging costs, water outfall relocation costs, fish habitat development, and new CDF construction costs. CDF management costs for Plan 4a include CDF management costs for CDF 12 and CDF 9. CDF management costs associated with CDF 12 are approximately $4,818,000. This money would be expended evenly in 2009 and 2013. Management costs associated with CDF 9 are

approximately $2,409,000. This money would be expended in 2011. Costs associated with putting the sediments into existing Cleveland Harbor CDFs from 2009-2014 range from $1,674,100 to $2,520,200 per dredging event. Cost associated with putting sediments into the new CDF at Cell 1 (2015-2021) range from $2,174,100 to $2,599,800 per dredging event. Cost associated with putting the sediments into the new CDF at Cell 2 (2022-2026) range from $2,141,800 to $2,174,100 per dredging event. Cost associated with putting the sediments into the new CDF at Cell 3 (2027-2034) are $2,141,800.

There are two water outfalls (a 42 inch diameter and a 14 foot diameter outfall) that will have to be extended approximately 1,000 feet. Extension of these outfalls have a total cost $6,520,300 and would take place in two stages. The first extension would start in 2014 ($4,077,100) and the second extension ($2,443,200) in 2021. The plan also includes the development of fish spawning habitat along the outside of new and existing CDFs ($500,000).

Construction costs for Plan 4a are $276,987,000. Construction of Cell 1 would take place in approximately 25 feet of water, be constructed over a three year period (2012, 2013, 2014), and cost $129,667,000. Construction of Cell 2 would take place in approximately 28 feet of water, be constructed over a three year period (2019, 2020, 2021), and cost $60,513,000. Construction of Cell 3 would take place in approximately 28 feet of water, be constructed over a three year period (2024, 2025, 2026), and cost $86,807,000.

H. Alternative Plan Dredging Costs

1. Introduction Dredging costs per dredging event were calculated for each alternative. There are a number of pieces of information that need to be known before dredging costs can be calculated. These include frequency of dredging, cubic yards removed per cycle, the quality of the sediments and location of disposal sites (CDF / Open Lake). Once this information is known, fixed and variable costs for dredging associated with the various plans, can be calculated.

2. Dredging Frequency, Cubic Yards Removed Per Dredging Event, Sediment Quality The need for maintenance dredging arises from the buildup of shoal material in the navigation channels which leads to the restriction of the flow of commercial navigation. The need to dredge portions of the Outer harbor, Old River Channel, and Cuyahoga River depends upon the continued operation of the various docks that receive the major bulk commodities that use Cleveland Harbor: iron ore, limestone, cement and concrete, salt, and sand, gravel and crushed rock.

Cleveland Harbor is dredged annually in the spring and fall. Although Cleveland Harbor has dredging occurring twice in a given year, both dredging events are let under one contract and all dredging is performed by one dredge. Thus the harbor is said to be dredged annually. However, only the Cuyahoga River channel is dredged each year. The Old River and Outer Harbor, which experience much less shoaling than the Cuyahoga River, are dredged on average once every five years. All material dredged from Cleveland Harbor is deposited in a CDF.

There is an abundance of historic data on the volume of material removed from the harbor each year. The data indicate that on the average 273,500 cubic yards of material are dredged from the Cuyahoga River each year. In addition, on average 50,000 cubic yards are removed each time the Outer Harbor or the Old River channels are dredged. The latter two channels are dredged every fifth year. Therefore, together, they add, on a yearly average, an additional 20,000 cubic yards to the 273,500 cubic yards annually dredged from the Cuyahoga River. Thus in total, an average of 293,500 cubic yards of material are projected to be removed from

Cleveland Harbor Federal channels each year. It is projected that this volume will be removed each year through the 20-year evaluation period.

Non-Federal dredging activities during this same time period resulted in an average of 36,700 cubic yards. Average total in place cubic yards removed (Federal and non-Federal) per dredging event for the time period 1998-2003 was 330,200 (Table 5).

Table 5.
Recent Dredging History (In Place Cubic Yards Per Year [1])

	Year 1998	Year 1999	Year 2000	Year 2001	Year 2002	Year 2003	Average	Disposal Site
Federal Dredging	335,900	281,700	225,600	401,800	182,000 [2]	333,900 [3]	293,500	CDF
Non Federal	24,700	25,100	107,400	23,700	11,800	27,600	36,700	CDF
Total Dredging	360,600	306,800	333,000	425,500	193,800	361,500	330,200	CDF

1. All volumes are "In Place" volumes.
2. Dredging operations were limited by available funds. Actual quantities dredged in 2002 do not necessarily reflect the required dredging volumes if sufficient O&M appropriations were available.
3. Preliminary estimate of in place Federal cubic yards dredged in 2003.

Given the reduction in operation and maintenance budgets in recent years, and the growing lack of space in existing CDFs for future dredging cycles, quantities dredged at Cleveland Harbor in recent years have been well below these historical volumes. The DMMP estimated how many cubic yards of sediment would need to be dredged yearly over the project evaluation period 2009-2028. Channel maintenance of Cleveland Harbor necessitates the removal of approximately 338,220 cubic yards annually.

Due to the current CDF capacity shortage, dredging will be reduced to 250,000 cubic yards per year (225,000 cubic yards Federal and 25,000 cubic yards non-Federal) from 2008 through 2013 (Table 6). Dredging quantities would likely increase in 2014 to remove accumulated sediments (410,400 annually). Once the initial backlog has been removed (2020), annual dredging quantities will revert back to 330,200 cubic yards annually (2021-2028). This will result in, approximately 338,220 cubic yards being dredged annually during the twenty year study period. Again, all sediment dredged from Cleveland Harbor will be placed in a CDF.

3. Dredging Costs Per Dredging Event- By Disposal Location The Project Management Team has provided the variable cost per cubic yard for placement of sediment at the current CDF site 10B $5.25. These costs were then adjusted to reflect the increase/decrease in cycle times that would occur when using other CDFs. Table 7 summarizes these dredging costs per cubic yard by CDF site. Dredging costs per cubic yard for CDFs located outside the harbor breakwaters were higher than CDF 10B dredging costs. This is due to the increased wind and wave activity that would be encountered during dredging operations which would increase round trip dredge cycling times.

Table 6. Cleveland Harbor Sediment Dredging Schedule-2009- 2028

Project Evaluation Period			2009-2028		
Calander Year	Project Year	Federal Sediment Placed In CDF	Non-Federal Sediment Placed In CDF	Total Cubic Yards Placed in CDF	
2008		225,000	25,000	250,000	Dike 10B
2009	1	225,000	25,000	250,000	Dike 12
2010	2	225,000	25,000	250,000	2.0 Years
2011	3	225,000	25,000	250,000	Dike 9
2012	4	225,000	25,000	250,000	2 Years
2013	5	225,000	25,000	250,000	Dike 12
2014	6	362,000	48,400	410,400	2.0 Years
2015	7	362,000	48,400	410,400	New
2016	8	362,000	48,400	410,400	Harbor
2017	9	362,000	48,400	410,400	Sediment
2018	10	362,000	48,400	410,400	Disposal
2019	11	362,000	48,400	410,400	Site
2020	12	362,000	48,400	410,400	
2021	13	293,500	36,700	330,200	14 years
2022	14	293,500	36,700	330,200	Of
2023	15	293,500	36,700	330,200	Dredging
2024	16	293,500	36,700	330,200	Cubic
2025	17	293,500	36,700	330,200	Yards
2026	18	293,500	36,700	330,200	Placed
2027	19	293,500	36,700	330,200	5,104,000
2028	20	293,500	36,700	330,200	
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Evaluation Period Disposal		6,007,000	757,400	6,764,400	
Annual Disposal		**300,350**	**37,870**	**338,220**	

Table 7 Dredging Costs Per Cubic Yard By Disposal Site

		Dredging Component Cost				
CDF Site/ Alternative	Cycle Time Percent Increase/ Decrease	Cost Per Cubic Yrd To Dredge Sediment	Move Barge From Dredging Site to CDF	Unload Barge At CDF Site	Move Barge Back to Dredging Site	Total Cost to Remove And Place Dredged Sediment
10B	0%	$ 2.25	$ 1.00	$ 1.00	$ 1.00	$ 5.25
2	25%	$ 2.25	$ 1.25	$ 1.25	$ 1.25	$ 6.00
2a-Cell 1	15%	$ 2.25	$ 0.85	$ 1.00	$ 0.85	$ 4.95
2a- Cell 2	25%	$ 2.25	$ 1.25	$ 1.25	$ 1.25	$ 6.00
3	25%	$ 2.25	$ 1.25	$ 1.25	$ 1.25	$ 6.00
3a-Cell 1	10%	$ 2.25	$ 0.90	$ 1.00	$ 0.90	$ 5.05
3a- Cell 2	25%	$ 2.25	$ 1.25	$ 1.25	$ 1.25	$ 6.00
9	5%	$ 2.25	$ 1.05	$ 1.00	$ 1.05	$ 5.35
12	10%	$ 2.25	$ 1.10	$ 1.00	$ 1.10	$ 5.45
E. 55th St.						
Cell 1	20%	$ 2.25	$ 1.20	$ 1.00	$ 1.20	$ 5.65
Cell 2	15%	$ 2.25	$ 1.15	$ 1.00	$ 1.15	$ 5.55
Cell 3	15%	$ 2.25	$ 1.15	$ 1.00	$ 1.15	$ 5.55

These dredging costs per cubic yard by disposal site were then used with cubic yards removed per year, to develop variable dredging costs per dredging event by disposal location. Added to these variable costs were fixed costs consisting of mobilization and demobilization costs, Engineering and Design (E&D) and Supervision and Administration (S&A). Table 8 provides a summary of dredging costs per cycle by cubic yards removed by disposal location.

The cost of dredging at any one time is a function of the dredging event's variable and fixed costs. The variable costs of dredging are the product of an estimated cost per cubic yard of dredging by disposal site (Table 7), times the number of cubic yards removed that year (Table 6). Fixed costs consist of the mobilization/demobilization cost for the dredge, and the cost the District incurs in engineering, administering and supervising the entire dredging project each time the harbor is dredged. For Cleveland Harbor the mobilization/demobilization cost is $300,000. Fixed costs per dredging event (Engineering and Design, Supervision and Administration)) are set to be $50,000 plus 10 percent of variable costs.

For example, dredging costs associated with removing 225,000 cubic yards of sediment in 2009 and placing it in CDF 12 is $1,698,875. These costs consist of variable dredging costs ($5.45 per cubic yard x 225,000 cubic yards =$1,226,150) and fixed dredging costs ($300,000 for mobilization + $50,000+ 10 percent x $1,226,250=$472,625).

4. Time Steam Of Annual Dredging Costs By Alternative The cyclical dredging costs presented in Table 8, in conjunction with the dredging schedule presented in Table 6, were used to develop a time stream of dredging costs associated with each of the plans being evaluated in detail over the project evaluation period: 2009-2028. Table 9 presents the time stream of dredging costs associated with each plan being evaluated. This time stream of dredging costs was used as inputs to calculating average annual implementation costs associated with the plans evaluated. Dredging costs are just one of many components that make up implementation costs associated with each alternative.

Table 8 Summary of Dredging Costs Per Cycle, By Placement Location.

	Dike 12	Dike 12	Dike 9	Site 2	Site 2	Site 2a Cell 1	Site 2a Cell 1	Site 2a Cell 2
Cubic Yards Removed	225,000	362,000	225,000	362,000	293,000	362,000	293,500	293,500
Variable Dredging Costs								
Variable Cost Per CubicYard	$ 5.45	$ 5.45	$ 5.35	$ 6.00	$ 6.00	$ 4.95	$ 4.95	$ 6.00
Cubic Yards Removed	225,000	362,000	225,000	362,000	293,000	362,000	293,500	293,500
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Variable Dredging Costs	$ 1,226,250	$ 1,972,900	$ 1,203,750	$2,172,000	$ 1,758,000	$ 1,791,900	$ 1,452,825	$ 1,761,000
Fixed Dredging Costs								
Mobilization & Demobilization	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000
E&D And S&A	$ 172,625	$ 247,290	$ 170,375	$ 267,200	$ 225,800	$ 229,190	$ 195,283	$ 226,100
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Fixed Dredging Costs	$ 472,625	$ 547,290	$ 470,375	$ 567,200	$ 525,800	$ 529,190	$ 495,283	$ 526,100
Total Dredging Costs Per Dredging Event	$ 1,698,875	$ 2,520,190	$ 1,674,125	$2,739,200	$ 2,283,800	$ 2,321,090	$ 1,948,108	$ 2,287,100
						E 55th St	**E 55th St**	**E 55th St**
	Site 3	**Site 3**	**Site 3a Cell 1**	**Site 3a Cell 1**	**Site 3a Cell 2**	**Site 9 Cell 1**	**Site 9 Cell 1**	**Site 9 Cell 2 & 3**
Cubic Yards Removed	362,000	293,000	362,000	293,500	293,500	362,000	293,500	293,500
Variable Dredging Costs								
Variable Cost Per CubicYard	$ 6.00	$ 6.00	$ 5.05	$ 5.05	$ 6.00	$ 5.65	$ 5.65	$ 5.55
Cubic Yards Removed	362,000	293,000	362,000	293,500	293,500	362,000	293,500	293,500
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Variable Dredging Costs	$ 2,172,000	$ 1,758,000	$ 1,828,100	$1,482,175	$ 1,761,000	$ 2,045,300	$ 1,658,275	$ 1,628,925
Fixed Dredging Costs								
Mobilization & Demobilization	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000	$ 300,000
E&D And S&A	$ 267,200	$ 225,800	$ 232,810	$ 198,218	$ 226,100	$ 254,530	$ 215,828	$ 212,893
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Fixed Dredging Costs	$ 567,200	$ 525,800	$ 532,810	$ 498,218	$ 526,100	$ 554,530	$ 515,828	$ 512,893
Total Dredging Costs Per Dredging Event	$ 2,739,200	$ 2,283,800	$ 2,360,910	$1,980,393	$ 2,287,100	$ 2,599,830	$ 2,174,103	$ 2,141,818

Table 9 Timestream Of Dredging Costs Per Year By Plan

						Corps	Locals
Project						Configuration	Configuration
Evaluation	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
Year	No Action	Site 2	Site 2a	Site 3	Site 3a	E 55th St.	E 55th St.
2009	$ -	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900
2010	$ -	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900
2011	$ -	$ 1,674,100	$ 1,674,100	$ 1,674,100	$ 1,674,100	$ 1,674,100	$ 1,674,100
2012	$ -	$ 1,674,100	$ 1,674,100	$ 1,674,100	$ 1,674,100	$ 1,674,100	$ 1,674,100
2013	$ -	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900	$ 1,698,900
2014	$ -	$ 2,520,200	$ 2,520,200	$ 2,520,200	$ 2,520,200	$ 2,520,200	$ 2,520,200
2015	$ -	$ 2,739,200	$ 2,321,100	$ 2,739,200	$ 2,360,900	$ 2,599,800	$ 2,599,800
2016	$ -	$ 2,739,200	$ 2,321,100	$ 2,739,200	$ 2,360,900	$ 2,599,800	$ 2,599,800
2017	$ -	$ 2,739,200	$ 2,321,100	$ 2,739,200	$ 2,360,900	$ 2,599,800	$ 2,599,800
2018	$ -	$ 2,739,200	$ 2,321,100	$ 2,739,200	$ 2,360,900	$ 2,599,800	$ 2,599,800
2019	$ -	$ 2,739,200	$ 2,321,100	$ 2,739,200	$ 2,360,900	$ 2,599,800	$ 2,599,800
2020	$ -	$ 2,739,200	$ 2,321,100	$ 2,739,200	$ 2,360,900	$ 2,599,800	$ 2,599,800
2021	$ -	$ 2,287,100	$ 1,948,100	$ 2,287,100	$ 1,980,400	$ 2,174,100	$ 2,174,100
2022	$ -	$ 2,287,100	$ 1,948,100	$ 2,287,100	$ 1,980,400	$ 2,141,800	$ 2,141,800
2023	$ -	$ 2,287,100	$ 1,948,100	$ 2,287,100	$ 1,980,400	$ 2,141,800	$ 2,141,800
2024	$ -	$ 2,287,100	$ 1,948,100	$ 2,287,100	$ 1,980,400	$ 2,141,800	$ 2,141,800
2025	$ -	$ 2,287,100	$ 1,948,100	$ 2,287,100	$ 1,980,400	$ 2,141,800	$ 2,141,800
2026	$ -	$ 2,287,100	$ 2,287,100	$ 2,287,100	$ 2,287,100	$ 2,141,800	$ 2,141,800
2027	$ -	$ 2,287,100	$ 2,287,100	$ 2,287,100	$ 2,287,100	$ 2,141,800	$ 2,141,800
2028	$ -	$ 2,287,100	$ 2,287,100	$ 2,287,100	$ 2,287,100	$ 2,141,800	$ 2,141,800
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	$ -	$ 45,697,100	$ 41,493,500	$ 45,697,100	$ 41,893,800	$ 43,730,600	$ 43,730,600

IV. DEVELOPMENT OF PLAN AVERAGE ANNUAL COSTS

Section III described the alternative plans that would be evaluated in detail, and identified the year when various major expenditures would take place over the 20 year planning evaluation period. These major expenditures included dredging costs, implementing the FMP, and new disposal site implementation costs (real estate, land costs, CDF engineering and design, plans and specs, construction costs, etc) and fish habitat development. Other project construction and report related costs were identified (i.e. USFWS and NEPA report costs). “Other Recurring Costs” were also identified as well as the frequency of their occurrence. “Other Recurring Costs” include such items as sediment consolidation practices, harbor facility condition inspections/facility surveys, channel soundings, sediment sampling, periodic performance of baseline environmental, economic, and real estate studies, and active solicitation of sediment recycling and beneficial use projects.

Plan costs were developed for each year of the 20 year project evaluation period for each plan under with project conditions. These expenditure time streams are provided in Table 10 for each of the alternative Plans evaluated.

These time streams of costs were then brought back to their present worth values using the Federal discount rate of 4.625 percent. The Plan Evaluation Period for this analysis is 20 years, starting in 2009 and ending in 2028. Table 11 provides a summary of this procedure. These present worth values in Table 11, for the various plans, represent an estimate of Project First Costs. Project First Costs include Engineering and Design, Supervision and Administration and Land costs by Plan. However, since the land is acquired under navigational servitude, there are no Land Acquisition Costs associated with Plans 2, 2a, 3 or 3a. Nominal real estate costs are associated with Plans 4 and 4a, which involve 1-2 acres of land needed for raw material staging and fish habitat development costs. Interest during construction was added to first costs to arrive at investment costs. However, since benefits accrue immediately, there are no costs for interest during construction). Total investment costs were converted to an average annual basis using the water resources Federal discount rate of 4.625 percent, and a 20 year project life. Annual maintenance costs were calculated as a percentage of contractors earnings and contingencies. Annual maintenance costs were added to average annualized investment costs to arrive at plan average annual costs (Table 12).

V. DEVELOPMENT OF PLAN AVERAGE ANNUAL BENEFITS

Benefits for this evaluation are the commercial navigation transportation cost increases avoided, by continuing to maintain the channels at the harbor. Maintained channel depths at Cleveland Harbor are 28 feet LWD in the outer harbor and 23 feet LWD on the Cuyahoga River. The difference in vessel transportation costs associated with maintaining current harbor depths (With Project Condition[WP]) and vessel transportation costs associated with discontinuing harbor dredging (Without Project Condition[WOP]), over a 20 year period, are the benefits associated with continuing to maintain the harbor.

The increase in vessel transportation costs under the WOP condition is a function of the harbors shoaling rate. Shoaling rates in Great Lakes harbors are highly variable over time. The general pattern is for a shoal to develop at the protected side of an unattached breakwater situated in the open waters of a Great Lake that shelters the entrance channel to a riverine harbor. The shoaling rate tends to increase as one progresses upstream along a channelized river channel. Shoaling at Cleveland Harbor follows this general pattern. Shoaling rates at Cleveland harbor vary between the Outer Harbor (.2 of a foot per year) and the Cuyahoga/Old River Channels (1-3 feet per year). More critical is the fact that shoaling upstream, especially in the Cuyahoga River Channel in vicinity of the Arcelor/Mittal Steel dock, is more rapid. Shoaling in this area can be between 3 and 6 feet per year. The shoaling rate will impact the rate of increase in vessel transportation costs under the Without Project condition, when harbor channels are allowed to shoal up

Table 10 - Time Stream of Plan Costs

Alternative Plan 1- No Action

A. Alternative Plan 1- No Action Plan																				
Evaluation Period	Calandar Year	Dredging Costs	FMP Dike 12, 9 For 09-14	EIS & NEPA Coordination	Develop & Execute PCA	Real Estate	Design Analysis	Construct Mangment Plans & Specs	No Action Facility Costs Bid & Cnstrctn	Fish & Wildlife Mitigation	Best Management Practices Dike 12, 9 New CDF	Annual Harbor Surveys	Annual Channel Soundings	Envrmmntl Studies	Economic Studies	Sediment Sampling	Envrmmntl Compliance	Real Estate Mngmnt	Solicitation Sediment Recycling	Plan 1 Costs In Current Dollars
1	2009	$ -	$ -		$ -	$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -				$ -	$ -
2	2010	$ -	$ -		$ -	$ -					$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -
3	2011	$ -	$ -						$ -		$ -	$ -	$ -	$ -					$ -	$ -
4	2012	$ -	$ -						$ -		$ -	$ -	$ -						$ -	$ -
5	2013	$ -	$ -						$ -		$ -	$ -	$ -	$ -					$ -	$ -
6	2014	$ -									$ -	$ -	$ -		$ -				$ -	$ -
7	2015	$ -									$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -
8	2016	$ -									$ -	$ -	$ -						$ -	$ -
9	2017	$ -									$ -	$ -	$ -	$ -					$ -	$ -
10	2018	$ -									$ -	$ -	$ -						$ -	$ -
11	2019	$ -									$ -	$ -	$ -	$ -	$ -				$ -	$ -
12	2020	$ -									$ -	$ -	$ -			$ -	$ -	$ -	$ -	$ -
13	2021	$ -									$ -	$ -	$ -	$ -					$ -	$ -
14	2022	$ -									$ -	$ -	$ -						$ -	$ -
15	2023	$ -									$ -	$ -	$ -	$ -					$ -	$ -
16	2024	$ -									$ -	$ -	$ -		$ -				$ -	$ -
17	2025	$ -									$ -	$ -	$ -	$ -		$ -	$ -	$ -	$ -	$ -
18	2026	$ -									$ -	$ -	$ -						$ -	$ -
19	2027	$ -									$ -	$ -	$ -						$ -	$ -
20	2028	$ -									$ -	$ -	$ -						$ -	$ -
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Eval Period 2009-28		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cmpnts as% Total		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 10 - Time Stream of Plan Costs-Continued

Alternative Plan 2- Fill Management Plan, New CDF At Site 2

B. Alternative Plan 2- Construction of CDF 2 & Management of Existing CDFS																				
									CDF 2		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 2
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrmmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$ 1,698,900	$ 2,409,000	$ 100,000	$ 30,000	$ -					$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 4,350,900
2	2010	$ 1,698,900	$ -	$ 50,000	$ 30,000	$ -	$ 3,711,700	$ 7,423,450			$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 13,082,050
3	2011	$ 1,674,100	$ 2,409,000				$ 3,711,700	$ 7,423,450			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 15,296,250
4	2012	$ 1,674,100	$ -						$ 82,482,700		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 84,224,800
5	2013	$ 1,698,900	$ 2,409,000						$ 82,482,700		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 86,668,600
6	2014	$ 2,520,200							$ 82,482,600	$ 500,000	$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 85,605,800
7	2015	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,917,200
8	2016	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,807,200
9	2017	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,817,200
10	2018	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,807,200
11	2019	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 2,852,200
12	2020	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,907,200
13	2021	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
14	2022	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
15	2023	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
16	2024	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 2,390,100
17	2025	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,465,100
18	2026	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
19	2027	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
20	2028	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
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Eval Period 2009-28		$ 45,697,100	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 7,423,400	$ 14,846,900	$ 247,448,000	$ 500,000	$ 200,000	$ 100,000	$ 860,000	$ 100,000	$ 140,000	$ 340,000	$ 40,000	$ 20,000	$ 200,000	$ 325,352,400
Cmpnts as% Total		14.05%	2.22%	0.05%	0.02%	0.00%	2.28%	4.56%	76.06%	0.15%	0.06%	0.03%	0.26%	0.03%	0.04%	0.10%	0.01%	0.01%	0.06%	100.00%

Table 10 - Time Stream of Plan Costs-Continued

Alternative Plan 2a- Fill Management Plan, New CDF At Site 2a

B. Alternative Plan 2a- Construction of CDF 2a & Management of Existing CDFS																				
									CDF 2a		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 2a
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$ 1,698,900	$ 2,409,000	$ 100,000	$ 30,000	$ -					$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 4,350,900
2	2010	$ 1,698,900	$ -	$ 50,000	$ 30,000	$ -	$ 1,798,700	$ 3,597,400			$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 7,343,000
3	2011	$ 1,674,100	$ 2,409,000				$ 1,798,700	$ 3,597,400			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 9,557,200
4	2012	$ 1,674,100	$ -						$ 39,971,000		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 41,713,100
5	2013	$ 1,698,900	$ 2,409,000						$ 39,971,000		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 44,156,900
6	2014	$ 2,520,200							$ 39,971,000	$ 250,000	$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 42,844,200
7	2015	$ 2,321,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,499,100
8	2016	$ 2,321,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,389,100
9	2017	$ 2,321,100				$ -					$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,399,100
10	2018	$ 2,321,100				$ -	$ 2,187,000	$ 4,374,000			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 8,950,100
11	2019	$ 2,321,100					$ 2,187,000	$ 4,374,000			$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 8,995,100
12	2020	$ 2,321,100							$ 48,599,700		$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 51,088,800
13	2021	$ 1,948,100							$ 48,599,700		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 50,625,800
14	2022	$ 1,948,100							$ 48,599,600	$ 250,000	$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 50,865,700
15	2023	$ 1,948,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,026,100
16	2024	$ 1,948,100									$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 2,051,100
17	2025	$ 1,948,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,126,100
18	2026	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
19	2027	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
20	2028	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
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Eval Period 2009-28		$ 41,493,500	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 7,971,400	$ 15,942,800	$ 265,712,000	$ 500,000	$ 200,000	$ 100,000	$ 860,000	$ 100,000	$ 140,000	$ 340,000	$ 40,000	$ 20,000	$ 200,000	$ 341,056,700
Cmpnts as% Total		12.17%	2.12%	0.04%	0.02%	0.00%	2.34%	4.67%	77.91%	0.15%	0.06%	0.03%	0.25%	0.03%	0.04%	0.10%	0.01%	0.01%	0.06%	100.00%

Table 10 - Time Stream of Plan Costs-Continued

Alternative Plan 3- Fill Management Plan, New CDF At Site 3

C. Alternative Plan 3- Construction of CDF 3 & Management of Existing CDFS																				
									CDF 3		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 3
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$ 1,698,900	$ 2,409,000	$ 100,000	$ 30,000	$ -					$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 4,350,900
2	2010	$ 1,698,900	$ -	$ 50,000	$ 30,000	$ -	$ 3,085,400	$ 6,170,800			$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 11,203,100
3	2011	$ 1,674,100	$ 2,409,000				$ 3,085,400	$ 6,170,800			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 13,417,300
4	2012	$ 1,674,100	$ -						$ 68,563,700		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 70,305,800
5	2013	$ 1,698,900	$ 2,409,000						$ 68,563,700		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 72,749,600
6	2014	$ 2,520,200							$ 68,563,600	$ 500,000	$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 71,686,800
7	2015	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,917,200
8	2016	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,807,200
9	2017	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,817,200
10	2018	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,807,200
11	2019	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 2,852,200
12	2020	$ 2,739,200									$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,907,200
13	2021	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
14	2022	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
15	2023	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
16	2024	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 2,390,100
17	2025	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,465,100
18	2026	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
19	2027	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
20	2028	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
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Eval Period	2009-28	$ 45,697,100	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 6,170,800	$ 12,341,600	$ 205,691,000	$ 500,000	$ 200,000	$ 100,000	$ 860,000	$ 100,000	$ 140,000	$ 340,000	$ 40,000	$ 20,000	$ 200,000	$ 279,837,500
Cmpnts as% Total		16.33%	2.58%	0.05%	0.02%	0.00%	2.21%	4.41%	73.50%	0.18%	0.07%	0.04%	0.31%	0.04%	0.05%	0.12%	0.01%	0.01%	0.07%	100.00%

Table 10 - Time Stream of Plan Costs-Continued

Alternative Plan 3a- Fill Management Plan, New CDF At Site 3a

C. Alternative Plan 3a- Construction of CDF 3a & Management of Existing CDFS																				
									CDF 3a		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 3a
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrmmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$ 1,698,900	$ 2,409,000	$ 100,000	$ 30,000	$ -					$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 4,350,900
2	2010	$ 1,698,900	$ -	$ 50,000	$ 30,000	$ -	$ 2,081,850	$ 4,163,650			$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 8,192,400
3	2011	$ 1,674,100	$ 2,409,000				$ 2,081,850	$ 4,163,650			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 10,406,600
4	2012	$ 1,674,100	$ -						$ 46,263,000		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 48,005,100
5	2013	$ 1,698,900	$ 2,409,000						$ 46,263,000		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 50,448,900
6	2014	$ 2,520,200				$ -			$ 46,263,000	$ 250,000	$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 49,136,200
7	2015	$ 2,360,900				$ -	$ 3,023,300	$ 6,046,500			$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 11,608,700
8	2016	$ 2,360,900					$ 3,023,300	$ 6,046,500			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 11,498,700
9	2017	$ 2,360,900							$ 67,183,300		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 69,622,200
10	2018	$ 2,360,900							$ 67,183,300		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 69,612,200
11	2019	$ 2,360,900							$ 67,183,400	$ 250,000	$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 69,907,300
12	2020	$ 2,360,900									$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,528,900
13	2021	$ 1,980,400									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,058,400
14	2022	$ 1,980,400									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,048,400
15	2023	$ 1,980,400									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,058,400
16	2024	$ 1,980,400									$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 2,083,400
17	2025	$ 1,980,400									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,158,400
18	2026	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
19	2027	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,365,100
20	2028	$ 2,287,100									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,355,100
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Eval Period 2009-28		$ 41,893,800	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 10,210,300	$ 20,420,300	$ 340,339,000	$ 500,000	$ 200,000	$ 100,000	$ 860,000	$ 100,000	$ 140,000	$ 340,000	$ 40,000	$ 20,000	$ 200,000	$ 422,800,400
Cmpnts as% Total		9.91%	1.71%	0.04%	0.01%	0.00%	2.41%	4.83%	80.50%	0.12%	0.05%	0.02%	0.20%	0.02%	0.03%	0.08%	0.01%	0.00%	0.05%	100.00%

Table 10 - Time Stream of Plan Costs-Continued

Alternative Plan 4 Fill Management Plan, New CDF At Site 9-E 55th St. –Corps Configuration

D. Alternative Plan 4- Construction of CDF 9-E 55th St & Management of Existing CDFS- Corps Configuation BTBOC																				
									CDF 4-E 55th St.		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 4- E 55th
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrmmntl	Economic	Sediment	Envrmmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$ 1,698,900	$ 2,409,000	$ 100,000	$ 30,000	$ 22,500					$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 4,373,400
2	2010	$ 1,698,900	$ -	$ 50,000	$ 30,000	$ 22,500	$ 1,656,750	$ 3,313,500			$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 6,939,650
3	2011	$ 1,674,100	$ 2,409,000				$ 1,656,750	$ 3,313,500			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 9,131,350
4	2012	$ 1,674,100	$ -						$ 36,816,700		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 38,558,800
5	2013	$ 1,698,900	$ 2,409,000						$ 36,816,700		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 41,002,600
6	2014	$ 2,520,200							36,816,600	$ 166,700	$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 39,606,500
7	2015	$ 2,599,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,777,800
8	2016	$ 2,599,800									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,667,800
9	2017	$ 2,599,800					$ 811,400	$ 1,622,800			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 5,112,000
10	2018	$ 2,599,800					$ 811,400	$ 1,622,800			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 5,102,000
11	2019	$ 2,599,800							$ 18,030,300		$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 20,743,100
12	2020	$ 2,599,800							$ 18,030,300		$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 20,798,100
13	2021	$ 2,174,100							$ 18,030,400	$ 166,700	$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 20,449,200
14	2022	$ 2,141,800					$ 1,100,800	$ 2,201,700			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 5,512,300
15	2023	$ 2,141,800					$ 1,100,800	$ 2,201,700			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 5,522,300
16	2024	$ 2,141,800							24462700		$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 26,707,500
17	2025	$ 2,141,800							$ 24,462,700		$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 26,782,500
18	2026	$ 2,141,800							$ 24,462,600	$ 166,600	$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 26,839,000
19	2027	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,219,800
20	2028	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,209,800
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Eval Period	2009-28	$ 43,730,600	$ 7,227,000	$ 150,000	$ 60,000	$ 45,000	$ 7,137,900	$ 14,276,000	$ 237,929,000	$ 500,000	$ 200,000	$ 100,000	$ 860,000	$ 100,000	$ 140,000	$ 340,000	$ 40,000	$ 20,000	$ 200,000	$ 313,055,500
Cmpnts as% Total		13.97%	2.31%	0.05%	0.02%	0.01%	2.28%	4.56%	76.00%	0.16%	0.06%	0.03%	0.27%	0.03%	0.04%	0.11%	0.01%	0.01%	0.06%	100.00%

Table 10 - Time Stream of Plan Costs-Continued

Alternative Plan 4a Fill Management Plan, New CDF At Site 9-E 55th St. –Locals Configuration

D. Alternative Plan 4a- Construction of CDF at E 55th St & Management of Existing CDFS- Local Configuration																				
									CDF 5-E 55th St.		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 4a- E 55th
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$ 1,698,900	$ 2,409,000	$ 100,000	$ 30,000	$ 22,500					$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 4,373,400
2	2010	$ 1,698,900	$ -	$ 50,000	$ 30,000	$ 22,500	$ 1,945,000	$ 3,890,000			$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 7,804,400
3	2011	$ 1,674,100	$ 2,409,000				$ 1,945,000	$ 3,890,000			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 9,996,100
4	2012	$ 1,674,100	$ -						$ 43,222,300		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 44,964,400
5	2013	$ 1,698,900	$ 2,409,000						$ 43,222,300		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 47,408,200
6	2014	$ 2,520,200							43,222,400	$ 166,700	$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 46,012,300
7	2015	$ 2,599,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,777,800
8	2016	$ 2,599,800									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,667,800
9	2017	$ 2,599,800					$ 907,700	$ 1,815,400			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 5,400,900
10	2018	$ 2,599,800					$ 907,700	$ 1,815,400			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 5,390,900
11	2019	$ 2,599,800							$ 20,171,000		$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 22,883,800
12	2020	$ 2,599,800							$ 20,171,000		$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 22,938,800
13	2021	$ 2,174,100							$ 20,171,000	$ 166,700	$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 22,589,800
14	2022	$ 2,141,800					$ 1,302,100	$ 2,604,200			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 6,116,100
15	2023	$ 2,141,800					$ 1,302,100	$ 2,604,200			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 6,126,100
16	2024	$ 2,141,800							$ 28,935,700		$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 31,180,500
17	2025	$ 2,141,800							$ 28,935,700		$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 31,255,500
18	2026	$ 2,141,800							$ 28,935,600	$ 166,600	$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 31,312,000
19	2027	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,219,800
20	2028	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,209,800
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Eval Period 2009-28		$ 43,730,600	$ 7,227,000	$ 150,000	$ 60,000	$ 45,000	$ 8,309,600	$ 16,619,200	$ 276,987,000	$ 500,000	$ 200,000	$ 100,000	$ 860,000	$ 100,000	$ 140,000	$ 340,000	$ 40,000	$ 20,000	$ 200,000	$ 355,628,400
Cmpnts as% Total		12.30%	2.03%	0.04%	0.02%	0.01%	2.34%	4.67%	77.89%	0.14%	0.06%	0.03%	0.24%	0.03%	0.04%	0.10%	0.01%	0.01%	0.06%	100.00%

Table 11 Present Worth Of Plan Costs- Plan 1, 2, 2a, 3, 3a, 4, 4a

		Plan Costs In Current Dollars							Plan Costs In Present Worth Dollars					
						Corps	Prt Authority						Corps	Prt Authority
						Configuration	Configuration	Present					Configuration	Configuration
Evaluation	Calandar	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a	Worth	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
Period	Year	(Site 2)	(Site 2a)	(Site 3)	(Site 3a)	(E. 55th St.)	(E. 55th St.)	Factor	(Site 2)	(Site 2a)	(Site 3)	(Site 3a)	(E. 55th St.)	(E. 55th St.)
1	2009	$ 4,350,900	$ 4,350,900	$ 4,350,900	$ 4,350,900	$ 4,373,400	$ 4,373,400	0.95579	$ 4,158,600	$ 4,158,600	$ 4,158,600	$ 4,158,600	$ 4,180,100	$ 4,180,100
2	2010	$ 13,082,050	$ 7,343,000	$ 11,203,100	$ 8,192,400	$ 6,939,650	$ 7,804,400	0.91354	$ 11,951,000	$ 6,708,100	$ 10,234,500	$ 7,484,100	$ 6,339,700	$ 7,129,700
3	2011	$ 15,296,250	$ 9,557,200	$ 13,417,300	$ 10,406,600	$ 9,131,350	$ 9,996,100	0.87316	$ 13,356,100	$ 8,345,000	$ 11,715,400	$ 9,086,600	$ 7,973,100	$ 8,728,200
4	2012	$ 84,224,800	$ 41,713,100	$ 70,305,800	$ 48,005,100	$ 38,558,800	$ 44,964,400	0.83456	$ 70,290,700	$ 34,812,100	$ 58,674,500	$ 40,063,200	$ 32,179,700	$ 37,525,500
5	2013	$ 86,668,600	$ 44,156,900	$ 72,749,600	$ 50,448,900	$ 41,002,600	$ 47,408,200	0.79767	$ 69,132,800	$ 35,222,600	$ 58,030,100	$ 40,241,500	$ 32,706,500	$ 37,816,000
6	2014	$ 85,605,800	$ 42,844,200	$ 71,686,800	$ 49,136,200	$ 39,606,500	$ 46,012,300	0.76241	$ 65,266,500	$ 32,664,700	$ 54,654,600	$ 37,461,800	$ 30,196,300	$ 35,080,100
7	2015	$ 2,917,200	$ 2,499,100	$ 2,917,200	$ 11,608,700	$ 2,777,800	$ 2,777,800	0.72870	$ 2,125,800	$ 1,821,100	$ 2,125,800	$ 8,459,300	$ 2,024,200	$ 2,024,200
8	2016	$ 2,807,200	$ 2,389,100	$ 2,807,200	$ 11,498,700	$ 2,667,800	$ 2,667,800	0.69649	$ 1,955,200	$ 1,664,000	$ 1,955,200	$ 8,008,800	$ 1,858,100	$ 1,858,100
9	2017	$ 2,817,200	$ 2,399,100	$ 2,817,200	$ 69,622,200	$ 5,112,000	$ 5,400,900	0.66570	$ 1,875,400	$ 1,597,100	$ 1,875,400	$ 46,347,700	$ 3,403,100	$ 3,595,400
10	2018	$ 2,807,200	$ 8,950,100	$ 2,807,200	$ 69,612,200	$ 5,102,000	$ 5,390,900	0.63628	$ 1,786,200	$ 5,694,700	$ 1,786,200	$ 44,292,500	$ 3,246,300	$ 3,430,100
11	2019	$ 2,852,200	$ 8,995,100	$ 2,852,200	$ 69,907,300	$ 20,743,100	$ 22,883,800	0.60815	$ 1,734,600	$ 5,470,400	$ 1,734,600	$ 42,514,000	$ 12,614,900	$ 13,916,800
12	2020	$ 2,907,200	$ 51,088,800	$ 2,907,200	$ 2,528,900	$ 20,798,100	$ 22,938,800	0.58127	$ 1,689,900	$ 29,696,100	$ 1,689,900	$ 1,470,000	$ 12,089,200	$ 13,333,500
13	2021	$ 2,365,100	$ 50,625,800	$ 2,365,100	$ 2,058,400	$ 20,449,200	$ 22,589,800	0.55557	$ 1,314,000	$ 28,126,200	$ 1,314,000	$ 1,143,600	$ 11,361,000	$ 12,550,200
14	2022	$ 2,355,100	$ 50,865,700	$ 2,355,100	$ 2,048,400	$ 5,512,300	$ 6,116,100	0.53101	$ 1,250,600	$ 27,010,200	$ 1,250,600	$ 1,087,700	$ 2,927,100	$ 3,247,700
15	2023	$ 2,365,100	$ 2,026,100	$ 2,365,100	$ 2,058,400	$ 5,522,300	$ 6,126,100	0.50754	$ 1,200,400	$ 1,028,300	$ 1,200,400	$ 1,044,700	$ 2,802,800	$ 3,109,200
16	2024	$ 2,390,100	$ 2,051,100	$ 2,390,100	$ 2,083,400	$ 26,707,500	$ 31,180,500	0.48510	$ 1,159,400	$ 995,000	$ 1,159,400	$ 1,010,700	$ 12,955,800	$ 15,125,700
17	2025	$ 2,465,100	$ 2,126,100	$ 2,465,100	$ 2,158,400	$ 26,782,500	$ 31,255,500	0.46366	$ 1,143,000	$ 985,800	$ 1,143,000	$ 1,000,800	$ 12,417,900	$ 14,491,800
18	2026	$ 2,355,100	$ 2,355,100	$ 2,355,100	$ 2,355,100	$ 26,839,000	$ 31,312,000	0.44316	$ 1,043,700	$ 1,043,700	$ 1,043,700	$ 1,043,700	$ 11,894,000	$ 13,876,300
19	2027	$ 2,365,100	$ 2,365,100	$ 2,365,100	$ 2,365,100	$ 2,219,800	$ 2,219,800	0.42357	$ 1,001,800	$ 1,001,800	$ 1,001,800	$ 1,001,800	$ 940,200	$ 940,200
20	2028	$ 2,355,100	$ 2,355,100	$ 2,355,100	$ 2,355,100	$ 2,209,800	$ 2,209,800	0.40485	$ 953,500	$ 953,500	$ 953,500	$ 953,500	$ 894,600	$ 894,600
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		$ 325,352,400	$ 341,056,700	$ 279,837,500	$ 422,800,400	$ 313,055,500	$ 355,628,400		$ 254,389,200	$ 228,999,000	$ 217,701,200	$ 297,874,600	$ 205,004,600	$ 232,853,400

Table 12- Plan Average Annual Costs

	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
						Corps	Locals
						Configuration	Configuration
	No	CDF 2 &	CDF 2A &	CDF 3 &	CDF 3A &	E 55th St &	E 55th St &
	Action	FMP	FMP	FMP	FMP	FMP	FMP
Total Implementation Costs							
Contractors Earning Plus Contingencies	$ -	$ 247,448,000	$ 265,712,000	$ 205,691,000	$ 340,339,000	$ 237,929,000	$ 276,987,000
Planning Engineering & Design (PED) Costs	$ -	$ 7,423,400	$ 7,971,400	$ 6,170,700	$ 10,210,200	$ 7,137,900	$ 8,309,600
Construction Management Costs	$ -	$ 14,846,900	$ 15,942,700	$ 12,341,500	$ 20,420,300	$ 14,275,700	$ 16,619,200
Fill Management Costs-Dike 12, 9 - 2009-2014	$ -	$ 7,227,000	$ 7,227,000	$ 7,227,000	$ 7,227,000	$ 7,227,000	$ 7,227,000
Lands, Easements, Rights Of Way, Relocations & Disposal Costs	$ -	$ -	$ -	$ -	$ -	$ 45,000	$ 45,000
Sediment Transportation Costs	$ -	$ 45,697,100	$ 41,493,500	$ 45,697,100	$ 41,893,800	$ 43,730,600	$ 43,730,600
Fish & Wildlife Mitigation	$ -	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
All Other Project Costs	$ -	$ 2,210,000	$ 2,210,100	$ 2,210,200	$ 2,210,100	$ 2,210,300	$ 2,210,000
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Total Implementation Costs	$ -	$ 325,352,400	$ 341,056,700	$ 279,837,500	$ 422,800,400	$ 313,055,500	$ 355,628,400
Current Value Of Implementation Costs	$ -	$ 325,352,400	$ 341,056,700	$ 279,837,500	$ 422,800,400	$ 313,055,500	$ 355,628,400
Plan Average Annual Costs	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
						Corps	Locals
						Configuration	Configuration
	No	CDF 2 &	CDF 2A &	CDF 3 &	CDF 3A &	E 55th St &	E 55th St &
	Action	FMP	FMP	FMP	FMP	FMP	FMP
Investment Costs							
First Costs-Present Value	$ -	$ 254,389,200	$ 228,999,000	$ 217,701,200	$ 297,874,600	$ 205,004,600	$ 232,853,400
Interest During Construction (1)							
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Investment Costs	$ -	$ 254,389,200	$ 228,999,000	$ 217,701,200	$ 297,874,600	$ 205,004,600	$ 232,853,400
Average Annual Costs							
Investment Costs	$ -	$ 254,389,200	$ 228,999,000	$ 217,701,200	$ 297,874,600	$ 205,004,600	$ 232,853,400
Partial Payment Factor (2)	0.07771	0.07771	0.07771	0.07771	0.07771	0.07771	0.07771
Average Annual Costs	$ -	$ 19,768,900	$ 17,795,800	$ 16,917,800	$ 23,148,200	$ 15,931,100	$ 18,095,300
Annual Maintenance (3)	-	1,237,200	1,328,600	1,028,500	1,701,700	1,189,600	1,384,900
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Total Average Annual Costs	$ -	$ 21,006,100	$ 19,124,400	$ 17,946,300	$ 24,849,900	$ 17,120,700	$ 19,480,200
(1) There is no Interest During Construction since benefits accrue immediately							
(2) Partial Payment Factor based on 20 year project life and a 4 5/8% annual interest rate							
(3) Annual Maintenance taken as 0.5% of Contractors Earnings & Contingencies							

The Outer Harbor channels were allowed to decrease to 24 feet LWD, based on a .2 foot per year shoaling rate. The evaluation looked at two different shoaling rates on the Cuyahoga River: one foot per year and 2 feet per year. Channels were allowed to shoal up 6 feet and then remain at that depth for the remainder of the 20 year evaluation period. The Cuyahoga River channels equilibrium channel depth was assumed to be 17 feet. Transportation cost time streams were developed for a 20 year evaluation period based on these shoaling rates.

Part I of Appendix G contains an economic evaluation entitled "Cleveland Harbor Economic Viability Analysis." Table 2 of this Cleveland Harbor viability analysis provides the average annual vessel transportation costs associated with the WP Condition (continued maintenance of the harbors authorized channels of 28 feet in the outer Harbor and 23 feet on the Cuyahoga River). These average annual transportation costs are $75,222,000.

If dredging at Cleveland Harbor was to cease, due to lack of a suitable dredged material management plan, the channels would gradually fill in, and additional transportation costs would be incurred. Table 5 of Appendix G, "Cleveland Harbor Economic Viability Analysis", summarizes these WOP transportation costs, given the two different shoaling rate scenarios. WOP condition average annual transportation costs varied from $98,718,600 to $102,373,200.

Alternative plan benefits are the difference between WOP and WP condition transportation costs (Table 13). Benefits associated with any one plan can range from $23,496,600 to $27,151,200. These benefits are considered conservative since shoaling at Arcelor/Mittal Steel docks can easily be 3 feet or greater in any one year. Greater detail on the calculation of WOP and WP condition average annual vessel transportation costs can be found in Appendix G: Part I, "Cleveland Harbor Economic Viability Analysis".

VI. PLAN BENEFIT COST RATIOS

Table 14 provides Benefit Cost Ratios by alternative plan. The benefit cost ratio is the ratio developed by dividing plan average annual benefits by plan average annual costs. Plan average annual benefits are the difference in average annual transportation costs between the WOP and WP condition. The average annual benefits used for the benefit to cost ratio analysis range from $23,496,600 to $27,151,200. (Note: Project benefit calculations for implementation of any Plan do not include land creation benefits. Although Plans 2-4a do create land, the lands created by most of the plans would not be available for usage until at least 2025, the 17th year of the project evaluation period. Only Plan 4 and 4a created land area located adjacent to the current shoreline. All other created lands can only be accessed by water. Consequently, land creation benefits were not included in the analysis.)

Alternative plan costs are the difference in harbor maintenance costs between the WP condition and the WOP condition. Since the WOP condition assumes all harbor maintenance expenditures cease in project year 1, the WOP condition harbor maintenance costs are zero. Thus alternative plan costs equal WP condition average annual costs. Average annual alternative plans costs are provided in Table 12.

Table 13- Cleveland Harbor Average Annual Harbor Transportation Cost Savings Associated With Maintaining a 28/23 Foot Channel Depth Costs

Associated With Maintaining a 28/23 Foot Channel Depth			
A. Shoaling Rates- Outer Harbor=.2 Ft/Yr, River=1 Ft/Yr			
	WOP	WP	
	Condition	Condition	
	Average	Average	Average
	Annual	Annual	Annual
	Transportation	Transportation	Transportation
Commodity	Costs	Costs	Beneffits
Iron Ore-Outer Harbor	$ 7,439,100	$ 6,791,100	$ 648,000
Iron Ore-Cuyahoga River	$ 45,823,900	$ 33,781,100	$ 12,042,800
Limestone	$ 18,834,400	$ 15,633,600	$ 3,200,800
Salt	$ 13,146,900	$ 9,024,100	$ 4,122,800
Cement	$ 13,450,200	$ 9,971,800	$ 3,478,400
Coal	$ 24,100	$ 20,300	$ 3,800
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	$ 98,718,600	$ 75,222,000	$ 23,496,600
B. Shoaling Rates- Outer Harbor=.2 Ft/Yr, River=2 Ft/Yr			
	WOP	WP	
	Condition	Condition	
	Average	Average	Average
	Annual	Annual	Annual
	Transportation	Transportation	Transportation
Commodity	Costs	Costs	Beneffits
Iron Ore-Outer Harbor	$ 7,439,100	$ 6,791,100	$ 648,000
Iron Ore-Cuyahoga River	$ 47,699,900	$ 33,781,100	$ 13,918,800
Limestone	$ 19,363,400	$ 15,633,600	$ 3,729,800
Salt	$ 13,827,100	$ 9,024,100	$ 4,803,000
Cement	$ 14,018,900	$ 9,971,800	$ 4,047,100
Coal	$ 24,800	$ 20,300	$ 4,500
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	$ 102,373,200	$ 75,222,000	$ 27,151,200

Table 14 - Benefit to Cost Ratios by Plan

Benefit To Cost Ratios- 20 Year Project Evaluation Period- 4 58% Annual Interest Rate						NED Plan	
A. Benefits Costs- Shoaling Rates- Outer Harbor=.2 Ft/Yr, Cuy/Old River=1.0 Ft/Yr						Base Plan	
						Federal Standard	
	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
						Corps	Locals
						Configuration	Configuration
	No	CDF 2 &	CDF 2A &	CDF 3 &	CDF 3A &	E 55th St &	E 55th St &
	Action	FMP	FMP	FMP	FMP	FMP	FMP
Benefits							
Without Project Transportation Costs	$ 98,718,600	$ 98,718,600	$ 98,718,600	$ 98,718,600	$ 98,718,600	$ 98,718,600	$ 98,718,600
With Project Transportation costs	$ 98,718,600	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000
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Plan Benefits	$ -	$ 23,496,600	$ 23,496,600	$ 23,496,600	$ 23,496,600	$ 23,496,600	$ 23,496,600
Costs							
With Project Harbor Maintenance Costs	$ -	$ 21,006,100	$ 19,124,400	$ 17,946,300	$ 24,849,900	$ 17,120,700	$ 19,480,200
Without Project Habor Maintenance Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -
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Plan Costs	$ -	$ 21,006,100	$ 19,124,400	$ 17,946,300	$ 24,849,900	$ 17,120,700	$ 19,480,200
Plan Benefit Cost Ratios							
Plan Benefits	$ -	$ 23,496,600	$ 23,496,600	$ 23,496,600	$ 23,496,600	$ 23,496,600	$ 23,496,600
Plan Costs	$ -	$ 21,006,100	$ 19,124,400	$ 17,946,300	$ 24,849,900	$ 17,120,700	$ 19,480,200
Plan Benefit To Cost Ratio	0.00	1.12	1.23	1.31	0.95	1.37	1.21
Plan Net Benefits	$ -	$ 2,490,500	$ 4,372,200	$ 5,550,300	$ (1,353,300)	$ 6,375,900	$ 4,016,400

						NED Plan	
B. Benefits Costs- Shoaling Rates- Outer Harbor=.2 Ft/Yr, Cuy/Old River=2.0 Ft/Yr						Base Plan	
						Federal Standard	
	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
						Corps	Locals
						Configuration	Configuration
	No	CDF 2 &	CDF 2A &	CDF 3 &	CDF 3A &	E 55th St &	E 55th St &
	Action	FMP	FMP	FMP	FMP	FMP	FMP
Benefits							
Without Project Transportation Costs	$ 102,373,200	$ 102,373,200	$ 102,373,200	$ 102,373,200	$ 102,373,200	$ 102,373,200	$ 102,373,200
With Project Transportation costs	$ 102,373,200	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000
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Plan Benefits	$ -	$ 27,151,200	$ 27,151,200	$ 27,151,200	$ 27,151,200	$ 27,151,200	$ 27,151,200
Costs							
With Project Harbor Maintenance Costs	$ -	$ 21,006,100	$ 19,124,400	$ 17,946,300	$ 24,849,900	$ 17,120,700	$ 19,480,200
Without Project Habor maintenance Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -
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Plan Costs	$ -	$ 21,006,100	$ 19,124,400	$ 17,946,300	$ 24,849,900	$ 17,120,700	$ 19,480,200
Plan Benefit Cost Ratios							
Plan Benefits	$ -	$ 27,151,200	$ 27,151,200	$ 27,151,200	$ 27,151,200	$ 27,151,200	$ 27,151,200
Plan Costs	$ -	$ 21,006,100	$ 19,124,400	$ 17,946,300	$ 24,849,900	$ 17,120,700	$ 19,480,200
Plan Benefit To Cost Ratio	0.00	1.29	1.42	1.51	1.09	1.59	1.39
Plan Net Benefits	$ -	$ 6,145,100	$ 8,026,800	$ 9,204,900	$ 2,301,300	$ 10,030,500	$ 7,671,000

Table 14 shows benefit to cost ratios ranging from 0.95 to 1.59. Plan 1, the No Action Plan, has no net benefits and no net costs. However, the No Action Plan does not provide any facilities to place sediments. This alterative does not meet the major goal of providing sediment storage facilities for a 20 year evaluation period. Plan 4 has the lowest average annual costs. Thus Plan 4 is the Base Plan. Plan 4 also has the highest net benefits. Thus Plan 4 is also the NED Plan.

VII. TENTATIVELY SELECTED PLAN

The main report compares the various plans taken to detailed evaluation, in order to identify a Tentatively Selected Plan. Plans 2-4a each have benefit to cost ratios greater than 1. Thus any of these plans could have been chosen as the Tentatively Selected Plan. Given such considerations as cubic capacity provided, impact on commercial navigation, costs, ability to phase construction, local sponsor preferences, and potential for future usage of the site by the local sponsor, Plan 4a- E 55th Street Locals Configuration, is the Tentatively Selected Plan.

VIII. COST SHARING OF TENTATIVLY SELECTED PLAN

A. Introduction

The Base Plan, which may or may not be the ultimate plan selected, defines the parameters to be used when determining cost-sharing for all other alternatives which may be developed during the study and which may be eventually put forward as the Tentatively Selected Plan. If the Tentatively Selected Plan has a higher cost than the Base Plan, all costs over the Base Plan costs are borne 100 percent by the non Federal Sponsor. All costs for the Tentatively Selected Plan, up to the costs of the Base Plan, are cost shared between the Federal and non-Federal sponsor.

The Base Plan is the Plan with the lowest average annual costs. Table 14 shows that Plan 4 is the Base Plan, with average annual costs of $17,120,700. The Tentatively Selected Plan is Plan 4a-E 55th St- Locals Configuration. This is not the Base Plan, and it is more expensive than the Base Plan. Thus all costs above the Base Plan costs are 100 percent the responsibility of the non-Federal sponsor. All remaining costs are cost shared.

B. Cost Sharing Guidelines

In general, the costs for implementing dredged material management plans for existing projects such as Cleveland Harbor are shared in accordance with navigation Operations and Maintenance (O&M) cost sharing provisions applicable to the authorized navigation project. Dredged material disposal facility costs, for new CDFs are cost-shared in accordance with Section 201 of the Water Resources Development Act of 1996 (P.L. 104-303) and United States Code (33 USC 2211). For commercial navigation projects where authorized depths range from greater than 20 feet to 45 feet, non-Federal sponsors are responsible for 25 percent of the initial cost of the facility and 100 percent of the cost of all lands, easements, rights-of-way, relocations, and disposal areas (LERRD). The non-Federal sponsor must also pay an additional 10 percent of the total project cost after construction over a maximum thirty year period. The non-Federal costs of LERRD (other than utility relocations) needed for the project is credited against this extra 10 percent non-Federal cost.

Portions of plans or entire plans that involve beneficial use of dredged material would be cost-shared on a 75 percent Federal and 25 percent non-Federal basis. Non-Federal sponsors are also responsible for the cost of LERRD for construction of the project which can be credited toward their 25 percent project share and 100 percent of the cost of operation and maintenance of the beneficial use plan. Implementation of Beneficial Use plans could be accomplished under Section 204 of the Water Resources Development Act of 1992, as amended.

In cases where a state agency imposes special requirements or alternatives for the disposal of dredged material, over and above that which is considered the Federal standard for that location, the additional costs associated with such requirements must be borne 100 percent by the non-Federal sponsor (33 CFR 337.2). The Federal Standard as defined in 33 CFR 335.7 is:

> *"Federal standard means the dredged material disposal alternative or alternatives identified by the Corps which represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria."*

In accordance with Section 217 of WRDA 96, the Corps may enter into agreements to provide additional capacity in a disposal facility for non-Federal dredged or excavated material such as material from berthing areas, non-Federal navigation channels and marinas. Non-Federal interests must agree to pay all the costs associated with the non-Federal capacity. In these cases, the disposal capacity in the disposal facility will be allocated between the capacity required for the maintenance (or improvement as applicable) of the Federal project and the capacity required for the non-Federal dredged material. Non-Federal interests will pay the non-Federal share of the costs of the capacity attributed to the Federal project(s) plus 100 percent of the cost allocated to the non-Federal dredged material capacity. A similar allocation will be made for the operation and maintenance costs of the disposal facility. The operation and maintenance costs attributable to the Federal project capacity will be shared in accordance with paragraph 7.a.(3) and the operation and maintenance costs associated with the non-Federal capacity will be 100 percent non-Federal. In general, the operation and maintenance of Federal and non-Federal disposal facilities will be accomplished by the Corps with annual payments by non-Federal interests for the non-Federal share of operation and maintenance costs. Payments and fees collected from non-Federal interests will be used for the operation and maintenance of the disposal facility in accordance with Section 217 of WRDA 96. Non-Federal operation and maintenance of Federal and non-Federal disposal facilities with annual payments of the Federal share will be considered on a case-by-case basis by HQUSACE. Non-Federal interests may recover the costs assigned to the additional capacity through fees assessed on third parties whose dredged material is deposited at the facility and who enter into agreements with the non-Federal interest for the use of the facility.

For the Cleveland Harbor DMMP, the Federal dredged material disposal requirement is 300,350 cy per year and the non-Federal dredged material disposal requirement is 37,870 cy per year. Therefore, approximately 88.80 percent of the per-cubic-yard total construction costs of a new CDF will be cost shared as described above, and the remaining 11.20 percent of the total per-cubic-yard total construction costs will be borne 100 percent by the non-Federal sponsor. Additionally, 100 percent of the operations and maintenance costs attributable to the 11.20 percent of the total CDF capacity will also be borne by the non-Federal sponsor.

C. Allocation of Tentatively Selected Plan Costs Based On Cost Sharing Guidelines

All costs associated with actually constructing the CDF proposed in the Base Plan ($260,097,900) and the Tentatively Selected Plan ($302,670,800) was identified. A total of nine general construction categories were identified:

1. General Construction of the CDF
2 Outfall relocations
3. Construction Related Reports/Coordination (USFWS and NEPA Coordination)
4. Real Estate
5. Develop & Execute PCA
6. Real Estate Acquisitions
7. Design Analysis,
8. Construction Management/Plans & Specs
9. Fish & Wildlife Mitigation.

Each category was identified as to whether it was cost sharable or not. The applicable cost sharing percentages were also identified, based on space allocation for Federal and non-Federal sediment placement needs, and general cost sharing percentages. This procedure identified costs that could be cost shared up to the cost of the Federal Standard, and costs above the Federal Standard which are a 100 percent non federal responsibility. Table 15 Part A, summarizes this process.

Given that the amount of costs above the Base Plan costs are $42,572,900, these costs are a 100 percent non federal responsibility. Outfall relocations ($6,520,300) and real estate acquisitions ($45,000) are also a 100 percent non-Federal responsibility. This results in $253,532,600 that is applicable to various cost sharing percentages (See Table 15, Part B-Application of Cost Shared Percentages to Project Costs). First this amount is split into the cost of providing space for Federal and non federal use based on Federal (88.8 percent) and non-Federal (11.20 percent) sediment disposal needs over the CDFs 20 year life. Costs associated with providing CDF space for non federal sediments ($28, 387,675) is a 100 percent non-Federal cost. The remaining cost associated with providing CDF space for Federal sediments ($225,144,925) is cost shared 75 percent Federal, 25 percent non Federal. The federal cost share associated with providing space for federal sediments is $168,858,693. The non-Federal cost share associated with providing space for Federal sediments is $56,286,231.

Part C of Table 15 summarizes Federal and non-Federal costs associated with implementing the Tentatively Selected Plan. Federal costs are $168,858,693. Non Federal costs are $133,812,107. Non-federal costs have four components: 1.- costs defined as a 100 percent non federal responsibility-i.e. outfall relocations and LERRDs ($6,565,300), 2.- CDF Disposal Space used for non Federal Dredging needs ($28,387,675), 3.- cost share associated with providing CDF space for Federal disposal needs ($56,286,231), and 4.- all other costs above the Federal Standard ($42,572,900).

Total implementation costs for the Tentatively Selected plan is $302,670,800. The Federal share of these costs is approximately 55.8 percent ($168,858,700) and the non Federal share is approximately 44.2 percent ($133,812,100). In addition to these implementation costs, the non Federal sponsor is responsible for paying an additional 10 percent of the NED plans total project cost after construction over a maximum thirty year period (Plan 4). This additional 10 percent of

total project cost comes to $23,792,900 ($231,408,700 + $6,520,300 = $237,929,000 x 10 percent = $23,792,900).

Table 15- Cost Sharing Allocation of Tentatively Selected Plan.

A. Identification of Cost Shared And Non Cost Shared Components-Cost Sharing Percentages.

Construction Components	Component Cost Shared	Share Based On Space: Federal Percent	Share Based On Space: Local Percent	Cost Sharing % 75% Federal Percent	Cost Sharing % 25% Local Percent	Plan 4 Base Plan Costs	Plan 4a Tentatively Selected Plan Costs	Costs Above Base Plan Costs
1. General Construction Of the CDF	Yes	88.80%	11.20%	75%	25%	$ 231,408,700	$ 270,466,700	$ 39,058,000
2. Outfall Relocations	NO				100%	$ 6,520,300	$ 6,520,300	$ -
3. Construction Related Reports/Coordination						$ -	$ -	
US F&W Survey, EIS & NEPA Coordination	Yes	88.80%	11.20%	75%	25%	$ 150,000	$ 150,000	$ -
4. Real Estate	NO				100%	$ 45,000	$ 45,000	$ -
5. Develop & Execute PCA	Yes	88.80%	11.20%	75%	25%	$ 60,000	$ 60,000	$ -
6. Real Estate Acquistions	NO				100%	$ -	$ -	$ -
7. Design Analysis	Yes	88.80%	11.20%	75%	25%	$ 7,137,900	$ 8,309,600	$ 1,171,700
8. Construction Management-Plans & Specs	Yes	88.80%	11.20%	75%	25%	$ 14,276,000	$ 16,619,200	$ 2,343,200
9. Fish & Wildlife Mitigation	Yes	88.80%	11.20%	75%	25%	$ 500,000	$ 500,000	$ -
						$ 260,097,900	$ 302,670,800	$ 42,572,900
Additional 10% Payable Over 30 Years(1&2 Only	NO				*100%*	*$ 23,792,900*		

B. Application Of Cost Shared Percentages to Project Costs

Construction Components	Cost Shared Amounts Up To Federal Standard: Cost Shared Amounts	Split Based On CDF Disposal Space Usage: Non Federal 11%	Split Based On CDF Disposal Space Usage: Federal 89%	Split Based On Federal Disposal Space Costs: Federal 75%	Split Based On Federal Disposal Space Costs: Non Federal 25%
1. General Construction Of the CDF	$ 231,408,700	$ 25,910,495	$ 205,498,205	$ 154,123,654	$ 51,374,551
2. Outfall Relocations					
3. Construction Related Reports/Coordination					
US F&W Survey, EIS & NEPA Coordination	$ 150,000	$ 16,795	$ 133,205	$ 99,904	$ 33,301
4. Real Estate					
5. Develop & Execute PCA	$ 60,000	$ 6,718	$ 53,282	$ 39,961	$ 13,320
6. Real Estate Acquistions					
7. Design Analysis	$ 7,137,900	$ 799,220	$ 6,338,680	$ 4,754,010	$ 1,584,670
8. Construction Management-Plans & Specs	$ 14,276,000	$ 1,598,463	$ 12,677,537	$ 9,508,153	$ 3,169,384
9. Fish & Wildlife Mitigation	$ 500,000	$ 55,984	$ 444,016	$ 333,012	$ 111,004
	$ 253,532,600	$ 28,387,675	$ 225,144,925	$ 168,858,693	$ 56,286,231

C. Summary Of Federal, Non Federal Costs- Plan 4a- Tentatively Selected Plan- Phase 1, 2 and 3 Costs

	Federal: Federal Share Of Federal Space	Non Federal Costs: 100% Non Federal Reponsibility	Non Federal Costs: Based On Non Federal Disposal Needs	Non Federal Costs: Cost Shared Federal Disposal Needs	Non Federal Costs: Costs Above Base Plan	Total Non Federal Costs	Plan 4a Tentatively Selected Plan Implementation Costs
1. General Construction Of the CDF	$ 154,123,654		$ 25,910,495	$ 51,374,551	$ 39,058,000	$ 116,343,046	$ 270,466,700
2. Outfall Relocations		$ 6,520,300				$ 6,520,300	$ 6,520,300
3. Construction Related Reports/Coordination						$ -	$ -
US F&W Survey, EIS & NEPA Coordination	$ 99,904		$ 16,795	$ 33,301	$ -	$ 50,096	$ 150,000
4. Real Estate		$ 45,000			$ -	$ 45,000	$ 45,000
5. Develop & Execute PCA	$ 39,961		$ 6,718	$ 13,320	$ -	$ 20,039	$ 60,000
6. Real Estate Acquistions							$ -
7. Design Analysis	$ 4,754,010		$ 799,220	$ 1,584,670	$ 1,171,700	$ 3,555,590	$ 8,309,600
8. Construction Management-Plans & Specs	$ 9,508,153		$ 1,598,463	$ 3,169,384	$ 2,343,200	$ 7,111,047	$ 16,619,200
9. Fish & Wildlife Mitigation	$ 333,012		$ 55,984	$ 111,004	$ -	$ 166,988	$ 500,000
	$ 168,858,693	$ 6,565,300	$ 28,387,675	$ 56,286,231	$ 42,572,900	$ 133,812,107	$ 302,670,800
	55.79%					44.21%	
Additional 10% Payable Over 30 Years(1&2 Only)						*$ 23,792,900*	

APPENDIX G
Part III

CLEVELAND HARBOR DMMP
ECONOMIC EVALUATION
SENSITIVITY ANALYSIS

Cleveland Harbor DMMP
Economic Evaluation of Alternative Plans
Sensitivity Analysis

I. INTRODUCTION

The Planning Guidance Notebook (ER 1105-2-100, Appendix E, page 68, 22 April, 2000) says all Federally maintained projects must demonstrate that there is sufficient dredged material disposal capacity for a minimum of 20 years. The guidance (Appendix E, page 70) goes on to state that:

"Management Plans shall identify specific measures necessary to manage the volume of material likely to be dredged over a 20 year period, from both construction and maintenance dredging of Federal channel and harbor projects. Non-federal, permitted dredging within the related geographic area shall be considered in formulating Management Plans to the extent that disposal of material from these sources affects the size and capacity of disposal areas required for the Federal Project(s)."

Consequently Dredge Material Management Plans were developed for Cleveland Harbor that would accommodate all Federal and non federal dredging that would take place over the 20 year period 2009-2028. The plans developed were a combination of management of existing disposal sites to extend their useful life and the development of new disposal sites. The Plans included six years of CDF Dredge Material Management at CDFs that currently exist at Cleveland. The final array of DMMP Plans included new CDFs that would hold at least 20 years of dredging. Thus at the end of the 20 year evaluation period, the new CDFs still had 6 years of useful life remaining. Benefits and costs associated with these six years were not used in the economic evaluation.

However, the project evaluation period does not have to be limited to the next 20 years. The project evaluation period could be defined as continuing until the new CDFs design capacity was reached. This would allow all benefits and costs that accrue during the "Design Life" of the CDF to be accounted for. This Sensitivity Evaluation provides average annual benefits, average annual costs, benefit to cost ratios, and net benefits for all final plans (2, 2a, 3, 3a, 4 and 4a) based on a project evaluation period that continues for the "Design life" of the new CDFs.

For evaluation purposes it is assumed that all new CDFs can hold 20 years of dredging. This would place all new CDFs on the same basis with respect to usable life, when comparing benefits and costs associated with any one plan. Determination of the project evaluation period based on a 20 year new CDF "Useful Life" is provided in Table 1. Table 1 indicates the project evaluation period would be is 26 years long and run from 2009-2034. The actual components of this 26 year evaluation follow.

II. PROJECT BENEFITS

Benefits for this evaluation are the transportation cost increases avoided, by continuing to maintain the channels at Cleveland harbor. The difference in vessel transportation costs associated with maintaining current harbor depths (with Project Condition) and vessel transportation costs associated with discontinuing harbor dredging (without Project Condition), over a 26 year period, are the benefits associated with continuing to maintain the harbor.

Table 1. Determination of Project Evaluation Period Based on NEW CDF Design Life

Project Year	Project Evaluation Period	Year CDF Comes On Line	20 Year Usable CDF Life
2009	1		
2010	2		
2011	3		
2012	4		
2013	5		
2014	6		
2015	7	CDF On Line	1
2016	8		2
2017	9		3
2018	10		4
2019	11		5
2020	12		6
2021	13		7
2022	14		8
2023	15		9
2024	16		10
2025	17		11
2026	18		12
2027	19		13
2028	20		14
2029	21		15
2030	22		16
2031	23		17
2032	24		18
2033	25		19
2034	26		20

A. Harbor Tonnages

Total tonnages handled at Cleveland Harbor in 2005 were 13,641,000. The main commodities handled were: iron ore (5,974,000) limestone (3,757,000), salt (1,148,000), cement (904,000) and coal (9,000). These commodities' accounted for 86 percent of the tonnage

moving through the Harbor in 2005. These five commodities were used to develop net benefits associated with continued maintenance of the harbor. The vessels actually used to move these commodities were identified, as well as the origin/destination routes that these vessels used. The 2005 vessel movements are considered representative of vessel traffic patterns and tonnages that will take place at Cleveland Harbor over the 26 year evaluation period 2009-2034. A summary of 2005 tonnages, by commodity, is provided in Table 2.

Table 2. - Cleveland Harbor Tonnages- 2005

Commodity	Tons
Iron Ore	5,974,000
Limestone	3,757,000
Salt	1,148,000
Cement	904,000
Coal	9,000
Other	1,849,000

	13,641,000

B. With Project Condition Average Annual Vessel Transportation Costs

A computer model developed by Buffalo District calculated increases in vessel transportation costs for each vessel movement given reductions in channel depth. The analysis is done in one foot increments for a maximum decrease in channel depth of 6 feet. Thus the analysis evaluated vessel transportation costs associated with existing authorized maintained depths of 28/23 feet in the Outer Harbor and Cuyahoga/Old River, as well as channels with up to 6 feet less of water column in one foot increments.

Table 3 provides the annual transportation costs, for the five key commodities evaluated, for a range of maintained channel depths. The average annual transportation costs associated with continued maintenance of the harbors authorized 28/23 foot channels is equal to the annual transportation costs presented in the column labeled “Maintained Channel Depth 28/23”. These annual transportation costs come to $75,221,882. Thus With Project Condition average annual vessel transportation costs are $75,221,882.

Table 3. Cleveland Harbor- Vessel Transportation Costs, By Commodity, By Channel Depth

Commodity	Starting Channel Depth	Maintained Channel Depth 28/23	Maintained Channel Depth 27/22	Maintained Channel Depth 26/21	Maintained Channel Depth 25/20	Maintained Channel Depth 24/19	Maintained Channel Depth 23/18	Maintained Channel Depth 22/17
Iron Ore-Outer Harbor	28	$ 6,791,052	$ 7,148,942	$ 7,563,556	$ 8,047,961	$ 8,618,411	$ 9,297,887	$ 10,119,760
Iron Ore-Cuyahoga River	23	$ 33,781,088	$ 35,561,362	$ 37,623,800	$40,033,399	$ 42,871,017	$ 46,250,973	$ 50,339,256
Limestone	23	$15,633,621	$16,045,748	$16,530,151	$17,127,250	$17,893,490	$18,868,784	$20,097,864
Salt	23	$9,024,097	$9,519,308	$10,175,290	$10,984,621	$11,973,457	$13,202,542	$14,769,825
Cement	23	$9,971,754	$10,388,882	$10,945,535	$11,646,221	$12,498,219	$13,537,034	$14,809,309
Coal	23	$20,270	$20,451	$20,954	$21,839	$22,966	$24,245	$25,674
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		$75,221,882	$78,684,693	$82,859,286	$87,861,291	$93,877,560	$101,181,465	$110,161,688

C. Without Project Condition Average Annual Vessel Transportation Costs

If dredging at Cleveland Harbor was to cease, due to lack of a suitable dredged material management plan, the channels would gradually fill in, and additional transportation costs would be incurred as estimated in Table 3. Transportation costs associated with not maintaining the harbor is the transportation cost time stream that develops due to discontinued dredging, and the harbors annual shoaling rate. Shoaling rates at Cleveland harbor vary between the Outer Harbor (.2 of a foot per year) and the Cuyahoga/Old River (1-3 feet per year).

The evaluation looked at two different shoaling rates on the River: one foot per year and 2 feet per year. Channels were allowed to shoal up 6 feet and then remain at that depth for the remainder of the 26 year evaluation period. The River channels equilibrium channel depth was assumed to be 17 feet. Transportation cost time streams were developed for a 26 year evaluation period based on these shoaling rates and the annual transportation costs by maintained channel depth provided in Table 3. Table 4 provides a summary of these transportation cost time streams, under the two shoaling rate scenarios.

These time streams were converted to average annual values using a 26 year project life and a 4.625 percent annual interest rate. Actual calculation of Without Project Condition vessel transportation costs for the five key commodities are provided in Table 5. Iron ore vessel transportation costs were broken out into Outer harbor and Cuyahoga River based on tonnages that passed through these two areas. Iron ore tonnages destined for the Cuyahoga River represent about 83 percent of all iron ore tonnages handled at the Harbor. Thus 83 percent of total iron ore transportation costs were associated with the Cuyahoga River. This allowed different shoaling rates (outer Harbor-.2 foot per year versus Cuyahoga river at 1 to 2 feet per year) to be applied to the iron ore transportation cost time streams.

Average annual WOP condition vessel transportation costs are summarized in Table 6 by commodity. The total average annual vessel transportation costs associated with not maintaining the harbor over a 26 year evaluation period range from $101,146,700 to $103,292,900.

D. Average Annual Harbor Transportation Benefits

Average annual harbor transportation cost savings associated with continuing to maintain harbor channel depths is the difference in average annual transportation costs between the WOP condition and providing currently maintained depths of 28 feet ($75,221,882). Average annual harbor transportation cost savings associated with maintaining a 28/23 foot channel depth are between $24,924,700 and $28,070,900 (See Table 7).

III. DEVELOPMENT OF PLAN AVERAGE ANNUAL COSTS

All of the expenditures by plan that would take over the 26 year project evaluation period were identified and placed into a time stream. These major expenditures included dredging costs, implementing the FMP, new disposal site implementation costs (real estate, land costs, CDF engineering and design, plans and specs, construction costs, etc) and fish habitat development. Other project construction/report related costs were identified (USFWS and NEPA report costs).

Table 4. Cleveland Harbor WOP Condition Transportation Cost Time Streams

Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Foot/Year							
Project Year	Channel Depth	Outer Harbor Iron Ore	Cuyahoga River Iron Ore	Cuyahoga River Limestone	Old River Salt	Cuyahoga River Cement	Cuyahoga River Coal
1	28.0/23	$ 6,791,052	$ 33,781,088	$15,633,621	$ 9,024,097	$ 9,971,754	$ 20,270
2	27.8/22	$ 6,862,630	$ 35,561,362	$16,045,748	$ 9,519,308	$ 10,388,882	$ 20,451
3	27.6/21	$ 6,934,208	$ 37,623,800	$16,530,151	$ 10,175,290	$ 10,945,535	$ 20,954
4	27.4/20	$ 7,005,786	$ 40,033,399	$17,127,250	$ 10,984,621	$ 11,646,221	$ 21,839
5	27.2/19	$ 7,077,364	$ 42,871,017	$17,893,490	$ 11,973,457	$ 12,498,219	$ 22,966
6	27.0/18	$ 7,148,942	$ 46,250,973	$18,868,784	$ 13,202,542	$ 13,537,034	$ 24,245
7	26.8/17	$ 7,231,865	$ 50,339,256	$20,097,864	$ 14,769,825	$ 14,809,309	$ 25,674
8	26.6/17	$ 7,314,788	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
9	26.4/17	$ 7,397,711	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
10	26.2/17	$ 7,480,634	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
11	26.0/17	$ 7,563,556	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
12	25.8/17	$ 7,660,437	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
13	25.6/17	$ 7,757,318	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
14	25.4/17	$ 7,854,199	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
15	25.2/17	$ 7,951,080	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
16	25.0/17	$ 8,047,961	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
17	24.8/17	$ 8,162,051	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
18	24.6/17	$ 8,276,141	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
19	24.4/17	$ 8,390,231	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
20	24.2/17	$ 8,504,321	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
21	24.0/17	$ 8,618,411	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
22	23.8/17	$ 8,754,306	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
23	23.6/17	$ 8,890,201	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
24	23.4/17	$ 9,026,097	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
25	23.2/17	$ 9,161,992	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
26	23.0/17	$ 9,297,887	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674

Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Feet/Year							
Project Year	Channel Depth	Outer Harbor Iron Ore	Cuyahoga River Iron Ore	Cuyahoga River Limestone	Old River Salt	Cuyahoga River Cement	Cuyahoga River Coal
1	28.0/23	$ 6,791,052	$ 33,781,088	$15,633,621	$ 9,024,097	$ 9,971,754	$ 20,270
2	27.8/21	$ 6,862,630	$ 37,623,800	$16,530,151	$ 10,175,290	$ 10,945,535	$ 20,954
3	27.6/19	$ 6,934,208	$ 42,871,017	$17,893,490	$ 11,973,457	$ 12,498,219	$ 22,966
4	27.4/17	$ 7,005,786	$ 50,339,256	$20,097,864	$ 14,769,825	$ 14,809,309	$ 25,674
5	27.2/17	$ 7,077,364	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
6	27.0/17	$ 7,148,942	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
7	26.8/17	$ 7,231,865	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
8	26.6/17	$ 7,314,788	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
9	26.4/17	$ 7,397,711	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
10	26.2/17	$ 7,480,634	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
11	26.0/17	$ 7,563,556	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
12	25.8/17	$ 7,660,437	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
13	25.6/17	$ 7,757,318	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
14	25.4/17	$ 7,854,199	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
15	25.2/17	$ 7,951,080	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
16	25.0/17	$ 8,047,961	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
17	24.8/17	$ 8,162,051	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
18	24.6/17	$ 8,276,141	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
19	24.4/17	$ 8,390,231	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
20	24.2/17	$ 8,504,321	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
21	24.0/17	$ 8,618,411	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
22	23.8/17	$ 8,754,306	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
23	23.6/17	$ 8,890,201	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
24	23.4/17	$ 9,026,097	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
25	23.2/17	$ 9,161,992	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674
26	23.0/17	$ 9,297,887	$ 50,339,256	$20,097,864	$14,769,825	$14,809,309	$25,674

Table 5- Computation Of WOP Condition Average Annual Vessel Transportation Costs

A. WOP Condition- Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyahoga/Old River=1 Foot/Year

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Iron Ore- Outer Harbor

Project Year	Channel Depth	Outer Harbor Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 6,791,052	0.9558	$ 6,490,850
2	27.8/22	$ 6,862,630	0.9135	$ 6,269,308
3	27.6/21	$ 6,934,208	0.8732	$ 6,054,670
4	27.4/20	$ 7,005,786	0.8346	$ 5,846,756
5	27.2/19	$ 7,077,364	0.7977	$ 5,645,393
6	27.0/18	$ 7,148,942	0.7624	$ 5,450,407
7	26.8/17	$ 7,231,865	0.7287	$ 5,269,896
8	26.6/17	$ 7,314,788	0.6965	$ 5,094,692
9	26.4/17	$ 7,397,711	0.6657	$ 4,924,681
10	26.2/17	$ 7,480,634	0.6363	$ 4,759,745
11	26.0/17	$ 7,563,556	0.6081	$ 4,599,767
12	25.8/17	$ 7,660,437	0.5813	$ 4,452,746
13	25.6/17	$ 7,757,318	0.5556	$ 4,309,734
14	25.4/17	$ 7,854,199	0.5310	$ 4,170,665
15	25.2/17	$ 7,951,080	0.5075	$ 4,035,469
16	25.0/17	$ 8,047,961	0.4851	$ 3,904,077
17	24.8/17	$ 8,162,051	0.4637	$ 3,784,394
18	24.6/17	$ 8,276,141	0.4432	$ 3,667,663
19	24.4/17	$ 8,390,231	0.4236	$ 3,553,857
20	24.2/17	$ 8,504,321	0.4048	$ 3,442,946
21	24.0/17	$ 8,618,411	0.3870	$ 3,334,896
22	23.8/17	$ 8,754,306	0.3698	$ 3,237,735
23	23.6/17	$ 8,890,201	0.3535	$ 3,142,648
24	23.4/17	$ 9,026,097	0.3379	$ 3,049,641
25	23.2/17	$ 9,161,992	0.3229	$ 2,958,715
26	23.0/17	$ 9,297,887	0.3087	$ 2,869,869

				$ 114,321,220
		Partial Payment Factor		0.0669

	Present Worth Value			$ 7,647,962
	Rounded Present Worth Value			$ 7,648,000

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Iron Ore- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 33,781,088	0.9558	$ 32,287,779
2	27.8/22	$ 35,561,362	0.9135	$ 32,486,838
3	27.6/21	$ 37,623,800	0.8732	$ 32,851,578
4	27.4/20	$ 40,033,399	0.8346	$ 33,410,316
5	27.2/19	$ 42,871,017	0.7977	$ 34,196,876
6	27.0/18	$ 46,250,973	0.7624	$ 35,262,090
7	26.8/17	$ 50,339,256	0.7287	$ 36,682,464
8	26.6/17	$ 50,339,256	0.6965	$ 35,060,897
9	26.4/17	$ 50,339,256	0.6657	$ 33,511,013
10	26.2/17	$ 50,339,256	0.6363	$ 32,029,642
11	26.0/17	$ 50,339,256	0.6081	$ 30,613,756
12	25.8/17	$ 50,339,256	0.5813	$ 29,260,460
13	25.6/17	$ 50,339,256	0.5556	$ 27,966,987
14	25.4/17	$ 50,339,256	0.5310	$ 26,730,692
15	25.2/17	$ 50,339,256	0.5075	$ 25,549,049
16	25.0/17	$ 50,339,256	0.4851	$ 24,419,640
17	24.8/17	$ 50,339,256	0.4637	$ 23,340,158
18	24.6/17	$ 50,339,256	0.4432	$ 22,308,395
19	24.4/17	$ 50,339,256	0.4236	$ 21,322,241
20	24.2/17	$ 50,339,256	0.4048	$ 20,379,681
21	24.0/17	$ 50,339,256	0.3870	$ 19,478,787
22	23.8/17	$ 50,339,256	0.3698	$ 18,617,717
23	23.6/17	$ 50,339,256	0.3535	$ 17,794,712
24	23.4/17	$ 50,339,256	0.3379	$ 17,008,088
25	23.2/17	$ 50,339,256	0.3229	$ 16,256,237
26	23.0/17	$ 50,339,256	0.3087	$ 15,537,622

				$ 694,363,713
		Partial Payment Factor		0.0669

	Present Worth Value			$ 46,452,160
	Rounded Present Worth Value			$ 46,452,200

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Limestone- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Limestone	Present Worth Factor	Present Worth Value
1	28.0/23	$ 15,633,621	0.9558	$ 14,942,529
2	27.8/22	$ 16,045,748	0.9135	$ 14,658,483
3	27.6/21	$ 16,530,151	0.8732	$ 14,433,458
4	27.4/20	$ 17,127,250	0.8346	$ 14,293,736
5	27.2/19	$ 17,893,490	0.7977	$ 14,273,080
6	27.0/18	$ 18,868,784	0.7624	$ 14,385,703
7	26.8/17	$ 20,097,864	0.7287	$ 14,645,412
8	26.6/17	$ 20,097,864	0.6965	$ 13,998,005
9	26.4/17	$ 20,097,864	0.6657	$ 13,379,216
10	26.2/17	$ 20,097,864	0.6363	$ 12,787,781
11	26.0/17	$ 20,097,864	0.6081	$ 12,222,491
12	25.8/17	$ 20,097,864	0.5813	$ 11,682,190
13	25.6/17	$ 20,097,864	0.5556	$ 11,165,773
14	25.4/17	$ 20,097,864	0.5310	$ 10,672,184
15	25.2/17	$ 20,097,864	0.5075	$ 10,200,415
16	25.0/17	$ 20,097,864	0.4851	$ 9,749,501
17	24.8/17	$ 20,097,864	0.4637	$ 9,318,519
18	24.6/17	$ 20,097,864	0.4432	$ 8,906,589
19	24.4/17	$ 20,097,864	0.4236	$ 8,512,869
20	24.2/17	$ 20,097,864	0.4048	$ 8,136,553
21	24.0/17	$ 20,097,864	0.3870	$ 7,776,873
22	23.8/17	$ 20,097,864	0.3698	$ 7,433,093
23	23.6/17	$ 20,097,864	0.3535	$ 7,104,509
24	23.4/17	$ 20,097,864	0.3379	$ 6,790,451
25	23.2/17	$ 20,097,864	0.3229	$ 6,490,275
26	23.0/17	$ 20,097,864	0.3087	$ 6,203,370

				$ 284,163,057
		Partial Payment Factor		0.0669

	Present Worth Value			$ 19,010,192
	Rounded Present Worth Value			$ 19,010,200

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Salt- Old River

Project Year	Channel Depth	Old River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,024,097	0.9558	$ 8,625,182
2	27.8/22	$ 9,519,308	0.9135	$ 8,696,298
3	27.6/21	$ 10,175,290	0.8732	$ 8,884,651
4	27.4/20	$ 10,984,621	0.8346	$ 9,167,337
5	27.2/19	$ 11,973,457	0.7977	$ 9,550,854
6	27.0/18	$ 13,202,542	0.7624	$ 10,065,717
7	26.8/17	$ 14,769,825	0.7287	$ 10,762,844
8	26.6/17	$ 14,769,825	0.6965	$ 10,287,067
9	26.4/17	$ 14,769,825	0.6657	$ 9,832,322
10	26.2/17	$ 14,769,825	0.6363	$ 9,397,680
11	26.0/17	$ 14,769,825	0.6081	$ 8,982,251
12	25.8/17	$ 14,769,825	0.5813	$ 8,585,186
13	25.6/17	$ 14,769,825	0.5556	$ 8,205,673
14	25.4/17	$ 14,769,825	0.5310	$ 7,842,938
15	25.2/17	$ 14,769,825	0.5075	$ 7,496,237
16	25.0/17	$ 14,769,825	0.4851	$ 7,164,862
17	24.8/17	$ 14,769,825	0.4637	$ 6,848,135
18	24.6/17	$ 14,769,825	0.4432	$ 6,545,410
19	24.4/17	$ 14,769,825	0.4236	$ 6,256,067
20	24.2/17	$ 14,769,825	0.4048	$ 5,979,515
21	24.0/17	$ 14,769,825	0.3870	$ 5,715,187
22	23.8/17	$ 14,769,825	0.3698	$ 5,462,544
23	23.6/17	$ 14,769,825	0.3535	$ 5,221,070
24	23.4/17	$ 14,769,825	0.3379	$ 4,990,270
25	23.2/17	$ 14,769,825	0.3229	$ 4,769,673
26	23.0/17	$ 14,769,825	0.3087	$ 4,558,827

				$ 199,893,798
		Partial Payment Factor		0.0669

	Present Worth Value			$ 13,372,673
	Rounded Present Worth Value			$ 13,372,700

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Cement- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Cement	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,971,754	0.9558	$ 9,530,948
2	27.8/22	$ 10,388,882	0.9135	$ 9,490,692
3	27.6/21	$ 10,945,535	0.8732	$ 9,557,198
4	27.4/20	$ 11,646,221	0.8346	$ 9,719,483
5	27.2/19	$ 12,498,219	0.7977	$ 9,969,440
6	27.0/18	$ 13,537,034	0.7624	$ 10,320,737
7	26.8/17	$ 14,809,309	0.7287	$ 10,791,616
8	26.6/17	$ 14,809,309	0.6965	$ 10,314,568
9	26.4/17	$ 14,809,309	0.6657	$ 9,858,607
10	26.2/17	$ 14,809,309	0.6363	$ 9,422,802
11	26.0/17	$ 14,809,309	0.6081	$ 9,006,263
12	25.8/17	$ 14,809,309	0.5813	$ 8,608,136
13	25.6/17	$ 14,809,309	0.5556	$ 8,227,610
14	25.4/17	$ 14,809,309	0.5310	$ 7,863,904
15	25.2/17	$ 14,809,309	0.5075	$ 7,516,276
16	25.0/17	$ 14,809,309	0.4851	$ 7,184,015
17	24.8/17	$ 14,809,309	0.4637	$ 6,866,443
18	24.6/17	$ 14,809,309	0.4432	$ 6,562,908
19	24.4/17	$ 14,809,309	0.4236	$ 6,272,791
20	24.2/17	$ 14,809,309	0.4048	$ 5,995,500
21	24.0/17	$ 14,809,309	0.3870	$ 5,730,466
22	23.8/17	$ 14,809,309	0.3698	$ 5,477,147
23	23.6/17	$ 14,809,309	0.3535	$ 5,235,027
24	23.4/17	$ 14,809,309	0.3379	$ 5,003,610
25	23.2/17	$ 14,809,309	0.3229	$ 4,782,423
26	23.0/17	$ 14,809,309	0.3087	$ 4,571,014

				$ 203,879,624
		Partial Payment Factor		0.0669

	Present Worth Value			$ 13,639,320
	Rounded Present Worth Value			$ 13,639,300

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=1 Ft/Yr
Coal- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Coal	Present Worth Factor	Present Worth Value
1	28.0/23	$ 20,270	0.9558	$ 19,374
2	27.8/22	$ 20,451	0.9135	$ 18,683
3	27.6/21	$ 20,954	0.8732	$ 18,296
4	27.4/20	$ 21,839	0.8346	$ 18,226
5	27.2/19	$ 22,966	0.7977	$ 18,319
6	27.0/18	$ 24,245	0.7624	$ 18,485
7	26.8/17	$ 25,674	0.7287	$ 18,709
8	26.6/17	$ 25,674	0.6965	$ 17,882
9	26.4/17	$ 25,674	0.6657	$ 17,091
10	26.2/17	$ 25,674	0.6363	$ 16,336
11	26.0/17	$ 25,674	0.6081	$ 15,614
12	25.8/17	$ 25,674	0.5813	$ 14,923
13	25.6/17	$ 25,674	0.5556	$ 14,264
14	25.4/17	$ 25,674	0.5310	$ 13,633
15	25.2/17	$ 25,674	0.5075	$ 13,031
16	25.0/17	$ 25,674	0.4851	$ 12,454
17	24.8/17	$ 25,674	0.4637	$ 11,904
18	24.6/17	$ 25,674	0.4432	$ 11,378
19	24.4/17	$ 25,674	0.4236	$ 10,875
20	24.2/17	$ 25,674	0.4048	$ 10,394
21	24.0/17	$ 25,674	0.3870	$ 9,935
22	23.8/17	$ 25,674	0.3698	$ 9,495
23	23.6/17	$ 25,674	0.3535	$ 9,076
24	23.4/17	$ 25,674	0.3379	$ 8,674
25	23.2/17	$ 25,674	0.3229	$ 8,291
26	23.0/17	$ 25,674	0.3087	$ 7,924

				$ 363,265
		Partial Payment Factor		0.0669

	Present Worth Value			$ 24,302
	Rounded Present Worth Value			$ 24,300

Table 5- Computation Of WOP Condition Average Annual Vessel Transportation Costs

B. WOP Condition- Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyahoga/Old River=2 Feet/Year

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Iron Ore- Outer Harbor

Project Year	Channel Depth	Outer Harbor Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 6,791,052	0.9558	$ 6,490,850
2	27.8/21	$ 6,862,630	0.9135	$ 6,269,308
3	27.6/19	$ 6,934,208	0.8732	$ 6,054,670
4	27.4/17	$ 7,005,786	0.8346	$ 5,846,756
5	27.2/17	$ 7,077,364	0.7977	$ 5,645,393
6	27.0/17	$ 7,148,942	0.7624	$ 5,450,407
7	26.8/17	$ 7,231,865	0.7287	$ 5,269,896
8	26.6/17	$ 7,314,788	0.6965	$ 5,094,692
9	26.4/17	$ 7,397,711	0.6657	$ 4,924,681
10	26.2/17	$ 7,480,634	0.6363	$ 4,759,745
11	26.0/17	$ 7,563,556	0.6081	$ 4,599,767
12	25.8/17	$ 7,660,437	0.5813	$ 4,452,746
13	25.6/17	$ 7,757,318	0.5556	$ 4,309,734
14	25.4/17	$ 7,854,199	0.5310	$ 4,170,665
15	25.2/17	$ 7,951,080	0.5075	$ 4,035,469
16	25.0/17	$ 8,047,961	0.4851	$ 3,904,077
17	24.8/17	$ 8,162,051	0.4637	$ 3,784,394
18	24.6/17	$ 8,276,141	0.4432	$ 3,667,663
19	24.4/17	$ 8,390,231	0.4236	$ 3,553,857
20	24.2/17	$ 8,504,321	0.4048	$ 3,442,946
21	24.0/17	$ 8,618,411	0.3870	$ 3,334,896
22	23.8/17	$ 8,754,306	0.3698	$ 3,237,735
23	23.6/17	$ 8,890,201	0.3535	$ 3,142,648
24	23.4/17	$ 9,026,097	0.3379	$ 3,049,641
25	23.2/17	$ 9,161,992	0.3229	$ 2,958,715
26	23.0/17	$ 9,297,887	0.3087	$ 2,869,869

				$ 114,321,220
		Partial Payment Factor		0.0669

	Present Worth Value			$ 7,647,962
	Rounded Present Worth Value			$ 7,648,000

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Iron Ore- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 33,781,088	0.9558	$ 32,287,779
2	27.8/21	$ 37,623,800	0.9135	$ 34,370,964
3	27.6/19	$ 42,871,017	0.8732	$ 37,433,236
4	27.4/17	$ 50,339,256	0.8346	$ 42,011,183
5	27.2/17	$ 50,339,256	0.7977	$ 40,154,058
6	27.0/17	$ 50,339,256	0.7624	$ 38,379,028
7	26.8/17	$ 50,339,256	0.7287	$ 36,682,464
8	26.6/17	$ 50,339,256	0.6965	$ 35,060,897
9	26.4/17	$ 50,339,256	0.6657	$ 33,511,013
10	26.2/17	$ 50,339,256	0.6363	$ 32,029,642
11	26.0/17	$ 50,339,256	0.6081	$ 30,613,756
12	25.8/17	$ 50,339,256	0.5813	$ 29,260,460
13	25.6/17	$ 50,339,256	0.5556	$ 27,966,987
14	25.4/17	$ 50,339,256	0.5310	$ 26,730,692
15	25.2/17	$ 50,339,256	0.5075	$ 25,549,049
16	25.0/17	$ 50,339,256	0.4851	$ 24,419,640
17	24.8/17	$ 50,339,256	0.4637	$ 23,340,158
18	24.6/17	$ 50,339,256	0.4432	$ 22,308,395
19	24.4/17	$ 50,339,256	0.4236	$ 21,322,241
20	24.2/17	$ 50,339,256	0.4048	$ 20,379,681
21	24.0/17	$ 50,339,256	0.3870	$ 19,478,787
22	23.8/17	$ 50,339,256	0.3698	$ 18,617,717
23	23.6/17	$ 50,339,256	0.3535	$ 17,794,712
24	23.4/17	$ 50,339,256	0.3379	$ 17,008,088
25	23.2/17	$ 50,339,256	0.3229	$ 16,256,237
26	23.0/17	$ 50,339,256	0.3087	$ 15,537,622

				$ 718,504,484
		Partial Payment Factor		0.0669

	Present Worth Value			$ 48,067,150
	Rounded Present Worth Value			$ 48,067,200

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Limestone- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Limestone	Present Worth Factor	Present Worth Value
1	28.0/23	$ 15,633,621	0.9558	$ 14,942,529
2	27.8/21	$ 16,530,151	0.9135	$ 15,101,006
3	27.6/19	$ 17,893,490	0.8732	$ 15,623,871
4	27.4/17	$ 20,097,864	0.8346	$ 16,772,895
5	27.2/17	$ 20,097,864	0.7977	$ 16,031,441
6	27.0/17	$ 20,097,864	0.7624	$ 15,322,763
7	26.8/17	$ 20,097,864	0.7287	$ 14,645,412
8	26.6/17	$ 20,097,864	0.6965	$ 13,998,005
9	26.4/17	$ 20,097,864	0.6657	$ 13,379,216
10	26.2/17	$ 20,097,864	0.6363	$ 12,787,781
11	26.0/17	$ 20,097,864	0.6081	$ 12,222,491
12	25.8/17	$ 20,097,864	0.5813	$ 11,682,190
13	25.6/17	$ 20,097,864	0.5556	$ 11,165,773
14	25.4/17	$ 20,097,864	0.5310	$ 10,672,184
15	25.2/17	$ 20,097,864	0.5075	$ 10,200,415
16	25.0/17	$ 20,097,864	0.4851	$ 9,749,501
17	24.8/17	$ 20,097,864	0.4637	$ 9,318,519
18	24.6/17	$ 20,097,864	0.4432	$ 8,906,589
19	24.4/17	$ 20,097,864	0.4236	$ 8,512,869
20	24.2/17	$ 20,097,864	0.4048	$ 8,136,553
21	24.0/17	$ 20,097,864	0.3870	$ 7,776,873
22	23.8/17	$ 20,097,864	0.3698	$ 7,433,093
23	23.6/17	$ 20,097,864	0.3535	$ 7,104,509
24	23.4/17	$ 20,097,864	0.3379	$ 6,790,451
25	23.2/17	$ 20,097,864	0.3229	$ 6,490,275
26	23.0/17	$ 20,097,864	0.3087	$ 6,203,370

				$ 290,970,572
		Partial Payment Factor		0.0669

	Present Worth Value			$ 19,465,607
	Rounded Present Worth Value			$ 19,465,600

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Salt- Old River

Project Year	Channel Depth	Old River Iron Ore	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,024,097	0.9558	$ 8,625,182
2	27.8/21	$ 10,175,290	0.9135	$ 9,295,566
3	27.6/19	$ 11,973,457	0.8732	$ 10,454,738
4	27.4/17	$ 14,769,825	0.8346	$ 12,326,321
5	27.2/17	$ 14,769,825	0.7977	$ 11,781,430
6	27.0/17	$ 14,769,825	0.7624	$ 11,260,626
7	26.8/17	$ 14,769,825	0.7287	$ 10,762,844
8	26.6/17	$ 14,769,825	0.6965	$ 10,287,067
9	26.4/17	$ 14,769,825	0.6657	$ 9,832,322
10	26.2/17	$ 14,769,825	0.6363	$ 9,397,680
11	26.0/17	$ 14,769,825	0.6081	$ 8,982,251
12	25.8/17	$ 14,769,825	0.5813	$ 8,585,186
13	25.6/17	$ 14,769,825	0.5556	$ 8,205,673
14	25.4/17	$ 14,769,825	0.5310	$ 7,842,938
15	25.2/17	$ 14,769,825	0.5075	$ 7,496,237
16	25.0/17	$ 14,769,825	0.4851	$ 7,164,862
17	24.8/17	$ 14,769,825	0.4637	$ 6,848,135
18	24.6/17	$ 14,769,825	0.4432	$ 6,545,410
19	24.4/17	$ 14,769,825	0.4236	$ 6,256,067
20	24.2/17	$ 14,769,825	0.4048	$ 5,979,515
21	24.0/17	$ 14,769,825	0.3870	$ 5,715,187
22	23.8/17	$ 14,769,825	0.3698	$ 5,462,544
23	23.6/17	$ 14,769,825	0.3535	$ 5,221,070
24	23.4/17	$ 14,769,825	0.3379	$ 4,990,270
25	23.2/17	$ 14,769,825	0.3229	$ 4,769,673
26	23.0/17	$ 14,769,825	0.3087	$ 4,558,827

				$ 208,647,621
		Partial Payment Factor		0.0669

	Present Worth Value			$ 13,958,294
	Rounded Present Worth Value			$ 13,958,300

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Cement- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Cement	Present Worth Factor	Present Worth Value
1	28.0/23	$ 9,971,754	0.9558	$ 9,530,948
2	27.8/21	$ 10,945,535	0.9135	$ 9,999,218
3	27.6/19	$ 12,498,219	0.8732	$ 10,912,939
4	27.4/17	$ 14,809,309	0.8346	$ 12,359,273
5	27.2/17	$ 14,809,309	0.7977	$ 11,812,925
6	27.0/17	$ 14,809,309	0.7624	$ 11,290,729
7	26.8/17	$ 14,809,309	0.7287	$ 10,791,616
8	26.6/17	$ 14,809,309	0.6965	$ 10,314,568
9	26.4/17	$ 14,809,309	0.6657	$ 9,858,607
10	26.2/17	$ 14,809,309	0.6363	$ 9,422,802
11	26.0/17	$ 14,809,309	0.6081	$ 9,006,263
12	25.8/17	$ 14,809,309	0.5813	$ 8,608,136
13	25.6/17	$ 14,809,309	0.5556	$ 8,227,610
14	25.4/17	$ 14,809,309	0.5310	$ 7,863,904
15	25.2/17	$ 14,809,309	0.5075	$ 7,516,276
16	25.0/17	$ 14,809,309	0.4851	$ 7,184,015
17	24.8/17	$ 14,809,309	0.4637	$ 6,866,443
18	24.6/17	$ 14,809,309	0.4432	$ 6,562,908
19	24.4/17	$ 14,809,309	0.4236	$ 6,272,791
20	24.2/17	$ 14,809,309	0.4048	$ 5,995,500
21	24.0/17	$ 14,809,309	0.3870	$ 5,730,466
22	23.8/17	$ 14,809,309	0.3698	$ 5,477,147
23	23.6/17	$ 14,809,309	0.3535	$ 5,235,027
24	23.4/17	$ 14,809,309	0.3379	$ 5,003,610
25	23.2/17	$ 14,809,309	0.3229	$ 4,782,423
26	23.0/17	$ 14,809,309	0.3087	$ 4,571,014

				$ 211,197,158
		Partial Payment Factor		0.0669

	Present Worth Value			$ 14,128,855
	Rounded Present Worth Value			$ 14,128,900

Average Annual Transportation Cost Time Streams
Shoaling Rate-Outer Harbor=.2 Foot/Year, Cuyaoga River=2 Ft/Yr
Coal- Cuyahoga River

Project Year	Channel Depth	Cuyahoga River Coal	Present Worth Factor	Present Worth Value
1	28.0/23	$ 20,270	0.9558	$ 19,374
2	27.8/21	$ 20,954	0.9135	$ 19,142
3	27.6/19	$ 22,966	0.8732	$ 20,053
4	27.4/17	$ 25,674	0.8346	$ 21,427
5	27.2/17	$ 25,674	0.7977	$ 20,479
6	27.0/17	$ 25,674	0.7624	$ 19,574
7	26.8/17	$ 25,674	0.7287	$ 18,709
8	26.6/17	$ 25,674	0.6965	$ 17,882
9	26.4/17	$ 25,674	0.6657	$ 17,091
10	26.2/17	$ 25,674	0.6363	$ 16,336
11	26.0/17	$ 25,674	0.6081	$ 15,614
12	25.8/17	$ 25,674	0.5813	$ 14,923
13	25.6/17	$ 25,674	0.5556	$ 14,264
14	25.4/17	$ 25,674	0.5310	$ 13,633
15	25.2/17	$ 25,674	0.5075	$ 13,031
16	25.0/17	$ 25,674	0.4851	$ 12,454
17	24.8/17	$ 25,674	0.4637	$ 11,904
18	24.6/17	$ 25,674	0.4432	$ 11,378
19	24.4/17	$ 25,674	0.4236	$ 10,875
20	24.2/17	$ 25,674	0.4048	$ 10,394
21	24.0/17	$ 25,674	0.3870	$ 9,935
22	23.8/17	$ 25,674	0.3698	$ 9,495
23	23.6/17	$ 25,674	0.3535	$ 9,076
24	23.4/17	$ 25,674	0.3379	$ 8,674
25	23.2/17	$ 25,674	0.3229	$ 8,291
26	23.0/17	$ 25,674	0.3087	$ 7,924

				$ 371,932
		Partial Payment Factor		0.0669

	Present Worth Value			$ 24,882
	Rounded Present Worth Value			$ 24,900

Table 6- Cleveland Harbor WOP Condition Average Annual Vessel Transportation Costs

26 Year Project Evaluation Period			
		Shoaling Rate OH=.2ft/Yr R=1ft/Yr	Shoaling Rate OH=.2ft/Yr R=2ft/Yr
Commodity			
Iron Ore-Outer Harbor		$ 7,648,000	$ 7,648,000
Iron Ore-Cuyahoga River		$ 46,452,200	$ 48,067,200
Limestone		$ 19,010,200	$ 19,465,600
Salt		$ 13,372,700	$ 13,958,300
Cement		$ 13,639,300	$ 14,128,900
Coal		$ 24,300	$ 24,900
		---	---
WOP AA Transportation Costs		$ 100,146,700	$ 103,292,900

Table 7- Cleveland Harbor Average Annual Harbor Transportation Cost Savings Associated With Maintaining a 28/23 Foot Channel Depth

26 Year Project Evaluation Period				
A. Shoaling Rates- Outer Harbor=.2 Ft/Yr, River=1 Ft/Yr				
		WOP Condition Average Annual Transportation Costs	WP Condition Average Annual Transportation Costs	Average Annual Transportation Beneffits
Commodity				
Iron Ore-Outer Harbor		$ 7,648,000	$ 6,791,100	$ 856,900
Iron Ore-Cuyahoga River		$ 46,452,200	$ 33,781,100	$ 12,671,100
Limestone		$ 19,010,200	$ 15,633,600	$ 3,376,600
Salt		$ 13,372,700	$ 9,024,100	$ 4,348,600
Cement		$ 13,639,300	$ 9,971,800	$ 3,667,500
Coal		$ 24,300	$ 20,300	$ 4,000
		---	---	---
		$ 100,146,700	$ 75,222,000	$ 24,924,700
B. Shoaling Rates- Outer Harbor=.2 Ft/Yr, River=2 Ft/Yr				
		WOP Condition Average Annual Transportation Costs	WP Condition Average Annual Transportation Costs	Average Annual Transportation Beneffits
Commodity				
Iron Ore-Outer Harbor		$ 7,648,000	$ 6,791,100	$ 856,900
Iron Ore-Cuyahoga River		$ 48,067,200	$ 33,781,100	$ 14,286,100
Limestone		$ 19,465,600	$ 15,633,600	$ 3,832,000
Salt		$ 13,958,300	$ 9,024,100	$ 4,934,200
Cement		$ 14,128,900	$ 9,971,800	$ 4,157,100
Coal		$ 24,900	$ 20,300	$ 4,600
		---	---	---
		$ 103,292,900	$ 75,222,000	$ 28,070,900

"Other Recurring Costs" were also identified as well as the frequency of their occurrence. "Other Recurring Costs" include such items as sediment consolidation practices, harbor facility condition inspections/facility surveys, channel soundings, sediment sampling, periodic performance of baseline environmental, economic, and real estate studies, and active solicitation of sediment recycling and beneficial use projects. Table 8 provides these expenditure time streams, by plan, over the 26 year project evaluation period.

These time streams of costs were then brought back to their present worth values using the Federal discount rate of 4.625 percent. The plan evaluation period for this analysis is 26 years, starting in 2009 and ending in 2034. Table 9 provides a summary of this procedure.

These present worth values in Table 9, for the various plans, represent an estimate of project first costs. Interest during construction was added to first costs to arrive at investment costs. (Since benefits accrue immediately, there are no "Interest During Construction" costs). Total investment costs were converted to an average annual basis using the water resources Federal discount rate of 4.625 percent, and a 26 year project life. Annual maintenance costs were calculated as a percentage of contractor earnings and contingencies. Annual maintenance costs were added to average annualized investment costs to arrive at plan average annual costs. Table 10 provides average annual costs by alternative plan.

IV. PLAN EVALUATION- BENEFIT TO COST RATIOS, NET BENEFITS

Table 11 provides benefit cost ratios by alternative plan. The benefit cost ratio is the ratio developed by dividing plan average annual benefits by plan average annual costs. Plan average annual benefits are the difference in average annual transportation costs between the WOP and WP condition. The average annual benefits used for the benefit to cost ratio analysis range from $24,924,700 to $28,070,900.

Alternative Plan costs are the difference in harbor maintenance costs between the WP condition and the WOP condition. Since the WOP condition assumes all harbor maintenance expenditures cease in project year 1, the WOP condition harbor maintenance costs are zero. Thus alternative plan costs equal WP condition average annual costs. Average annual alternative plans costs are provided in Table 10.

Table 11 shows benefit to cost ratios ranging from 1.13 to 1.84. Plan 1, the No Action Plan, has no net benefits and no net costs. Plan 4 has the lowest average annual costs. Thus Plan 4 is the Base Plan. Plan 4 also has the highest net benefits. Thus Plan 4 is also the NED Plan. The usage of a 26 year project evaluation period did not change the relative ranking of the various plans. The benefit to cost ratio for the NED plan ranged from 1.37 to 1.59 using a 20 year project evaluation period (See Appendix G, Part II). The benefit to cost ratio for the NED plan ranged from 1.64 to 1.84 using a 26 year project evaluation period.

Table 8- Time Stream of Plan Costs

Alternative Plan 1- No Action

A. Alternative Plan 1- No Action Plan																				
									No Action		Best									
								Construct	Facility		Management									Plan 1
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordinatio	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$0	$0		$0	$0	$0	$0			$0	$0	$0	$0	$0				$0	$0
2	2010	$0	$0		$0	$0					$0	$0	$0			$0	$0	$0	$0	$0
3	2011	$0	$0						$0		$0	$0	$0	$0					$0	$0
4	2012	$0	$0						$0		$0	$0	$0						$0	$0
5	2013	$0	$0						$0	$0	$0	$0	$0	$0					$0	$0
6	2014	$0									$0	$0	$0		$0				$0	$0
7	2015	$0									$0	$0	$0	$0		$0	$0	$0	$0	$0
8	2016	$0									$0	$0	$0						$0	$0
9	2017	$0									$0	$0	$0	$0					$0	$0
10	2018	$0									$0	$0	$0						$0	$0
11	2019	$0									$0	$0	$0	$0	$0				$0	$0
12	2020	$0									$0	$0	$0			$0	$0	$0	$0	$0
13	2021	$0									$0	$0	$0	$0					$0	$0
14	2022	$0									$0	$0	$0						$0	$0
15	2023	$0									$0	$0	$0	$0					$0	$0
16	2024	$0									$0	$0	$0		$0				$0	$0
17	2025	$0									$0	$0	$0	$0		$0	$0	$0	$0	$0
18	2026	$0									$0	$0	$0						$0	$0
19	2027	$0									$0	$0	$0						$0	$0
20	2028	$0									$0	$0	$0						$0	$0
21	2029																			
22	2030																			
23	2031																			
24	2032																			
25	2033																			
26	2034																			
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Eval Period 2009-34		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cmpnts as% Total		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 8- Time Stream of Plan Costs

Alternative Plan 2-

B. Alternative Plan 2- Construction of CDF 2 & Management of Existing CDFS																				
				Plan, Design, Construct New Outer Harbor CDF				Construct	CDF 2		Best									
			FMP	EIS &	Develop &			Mangment	Facility Costs	Fish &	Management Practices	Annual	Annual					Real	Solicitation	Plan 2 Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$1,698,900	$2,409,000	$100,000	$30,000	$0					$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$4,350,900
2	2010	$1,698,900	$0	$50,000	$30,000	$0	$3,711,700	$7,423,450			$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$13,082,050
3	2011	$1,674,100	$2,409,000				$3,711,700	$7,423,450			$10,000	$5,000	$43,000	$10,000					$10,000	$15,296,250
4	2012	$1,674,100	$0						$82,482,700		$10,000	$5,000	$43,000						$10,000	$84,224,800
5	2013	$1,698,900	$2,409,000						$82,482,700		$10,000	$5,000	$43,000	$10,000					$10,000	$86,668,600
6	2014	$2,520,200							$82,482,600	$500,000	$10,000	$5,000	$43,000		$35,000				$10,000	$85,605,800
7	2015	$2,739,200									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,917,200
8	2016	$2,739,200									$10,000	$5,000	$43,000						$10,000	$2,807,200
9	2017	$2,739,200									$10,000	$5,000	$43,000	$10,000					$10,000	$2,817,200
10	2018	$2,739,200									$10,000	$5,000	$43,000						$10,000	$2,807,200
11	2019	$2,739,200									$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$2,852,200
12	2020	$2,739,200									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,907,200
13	2021	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
14	2022	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
15	2023	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
16	2024	$2,287,100									$10,000	$5,000	$43,000		$35,000				$10,000	$2,390,100
17	2025	$2,287,100									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,465,100
18	2026	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
19	2027	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
20	2028	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
21	2029	$2,287,100									$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$2,400,100
22	2030	$2,287,100									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,455,100
23	2031	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
24	2032	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
25	2033	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
26	2034	$2,287,100									$10,000	$5,000	$43,000		$35,000				$10,000	$2,390,100
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Eval Period 2009-34		$ 59,419,700	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 7,423,400	$ 14,846,900	$ 247,448,000	$ 500,000	$ 260,000	$ 130,000	$ 1,118,000	$ 130,000	$ 210,000	$ 425,000	$ 50,000	$ 25,000	$ 260,000	$ 339,683,000
Cmpnts as% Total		17.49%	2.13%	0.04%	0.02%	0.00%	2.19%	4.37%	72.85%	0.15%	0.08%	0.04%	0.33%	0.04%	0.06%	0.13%	0.01%	0.01%	0.08%	100.00%

Table 8- Time Stream of Plan Costs

Alternative Plan 2a-

B. Alternative Plan 2a- Construction of CDF 2a & Management of Existing CDFS																				
									CDF 2a		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 2a
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrmmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$1,698,900	$2,409,000	$100,000	$30,000	$0					$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$4,350,900
2	2010	$1,698,900	$0	$50,000	$30,000	$0	$1,798,700	$3,597,400			$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$7,343,000
3	2011	$1,674,100	$2,409,000				$1,798,700	$3,597,400			$10,000	$5,000	$43,000	$10,000					$10,000	$9,557,200
4	2012	$1,674,100	$0						$39,971,000		$10,000	$5,000	$43,000						$10,000	$41,713,100
5	2013	$1,698,900	$2,409,000						$39,971,000		$10,000	$5,000	$43,000	$10,000					$10,000	$44,156,900
6	2014	$2,520,200							$39,971,000	$250,000	$10,000	$5,000	$43,000		$35,000				$10,000	$42,844,200
7	2015	$2,321,100									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,499,100
8	2016	$2,321,100									$10,000	$5,000	$43,000						$10,000	$2,389,100
9	2017	$2,321,100				$0					$10,000	$5,000	$43,000	$10,000					$10,000	$2,399,100
10	2018	$2,321,100				$0	$2,187,000	$4,374,000			$10,000	$5,000	$43,000						$10,000	$8,950,100
11	2019	$2,321,100					$2,187,000	$4,374,000			$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$8,995,100
12	2020	$2,321,100							$48,599,700		$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$51,088,800
13	2021	$1,948,100							$48,599,700		$10,000	$5,000	$43,000	$10,000					$10,000	$50,625,800
14	2022	$1,948,100							$48,599,600	$250,000	$10,000	$5,000	$43,000						$10,000	$50,865,700
15	2023	$1,948,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,026,100
16	2024	$1,948,100									$10,000	$5,000	$43,000		$35,000				$10,000	$2,051,100
17	2025	$1,948,100									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,126,100
18	2026	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
19	2027	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
20	2028	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
21	2029	$2,287,100									$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$2,400,100
22	2030	$2,287,100									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,455,100
23	2031	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
24	2032	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
25	2033	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
26	2034	$2,287,100									$10,000	$5,000	$43,000		$35,000				$10,000	$2,390,100
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Eval Period 2009-34		$ 55,216,100	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 7,971,400	$ 15,942,800	$ 265,712,000	$ 500,000	$ 260,000	$ 130,000	$ 1,118,000	$ 130,000	$ 210,000	$ 425,000	$ 50,000	$ 25,000	$ 260,000	$ 355,387,300
Cmpnts as% Total		15.54%	2.03%	0.04%	0.02%	0.00%	2.24%	4.49%	74.77%	0.14%	0.07%	0.04%	0.31%	0.04%	0.06%	0.12%	0.01%	0.01%	0.07%	100.00%

Table 8- Time Stream of Plan Costs

Alternative Plan 3-

C. Alternative Plan 3- Construction of CDF 3 & Management of Existing CDFS																				
									CDF 3		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 3
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$1,698,900	$2,409,000	$100,000	$30,000	$0					$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$4,350,900
2	2010	$1,698,900	$0	$50,000	$30,000	$0	$3,085,400	$6,170,800			$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$11,203,100
3	2011	$1,674,100	$2,409,000				$3,085,400	$6,170,800			$10,000	$5,000	$43,000	$10,000					$10,000	$13,417,300
4	2012	$1,674,100	$0						$68,563,700		$10,000	$5,000	$43,000						$10,000	$70,305,800
5	2013	$1,698,900	$2,409,000						$68,563,700		$10,000	$5,000	$43,000	$10,000					$10,000	$72,749,600
6	2014	$2,520,200							$68,563,600	$500,000	$10,000	$5,000	$43,000		$35,000				$10,000	$71,686,800
7	2015	$2,739,200									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,917,200
8	2016	$2,739,200									$10,000	$5,000	$43,000						$10,000	$2,807,200
9	2017	$2,739,200									$10,000	$5,000	$43,000	$10,000					$10,000	$2,817,200
10	2018	$2,739,200									$10,000	$5,000	$43,000						$10,000	$2,807,200
11	2019	$2,739,200									$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$2,852,200
12	2020	$2,739,200									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,907,200
13	2021	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
14	2022	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
15	2023	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
16	2024	$2,287,100									$10,000	$5,000	$43,000		$35,000				$10,000	$2,390,100
17	2025	$2,287,100									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,465,100
18	2026	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
19	2027	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
20	2028	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
21	2029	$2,287,100									$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$2,400,100
22	2030	$2,287,100									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,455,100
23	2031	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
24	2032	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
25	2033	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
26	2034	$2,287,100									$10,000	$5,000	$43,000		$35,000				$10,000	$2,390,100
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Eval Period 2009-34		$ 59,419,700	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 6,170,800	$ 12,341,600	$ 205,691,000	$ 500,000	$ 260,000	$ 130,000	$ 1,118,000	$ 130,000	$ 210,000	$ 425,000	$ 50,000	$ 25,000	$ 260,000	$ 294,168,100
Cmpnts as% Total		20.20%	2.46%	0.05%	0.02%	0.00%	2.10%	4.20%	69.92%	0.17%	0.09%	0.04%	0.38%	0.04%	0.07%	0.14%	0.02%	0.01%	0.09%	100.00%

Table 8- Time Stream of Plan Costs

Alternative Plan 3a-

C. Alternative Plan 3a- Construction of CDF 3a & Management of Existing CDFS																				
									CDF 3a		Best									
		Plan, Design, Construct New Outer Harbor CDF						Construct	Facility		Management									Plan 3a
			FMP	EIS &	Develop &			Mangment	Costs	Fish &	Practices	Annual	Annual					Real	Solicitation	Costs In
Evaluation	Calandar	Dredging	Dike 12, 9	NEPA	Execute	Real	Design	Plans &	Bid &	Wildlife	Dike 12, 9	Harbor	Channel	Envrnmntl	Economic	Sediment	Envrnmntl	Estate	Sediment	Current
Period	Year	Costs	For 09-14	Coordination	PCA	Estate	Analysis	Specs	Cnstrctn	Mitigation	New CDF	Surveys	Soundings	Studies	Studies	Sampling	Compliance	Mngmnt	Recycling	Dollars
1	2009	$1,698,900	$2,409,000	$100,000	$30,000	$0					$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$4,350,900
2	2010	$1,698,900	$0	$50,000	$30,000	$0	$2,081,850	$4,163,650			$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$8,192,400
3	2011	$1,674,100	$2,409,000				$2,081,850	$4,163,650			$10,000	$5,000	$43,000	$10,000					$10,000	$10,406,600
4	2012	$1,674,100	$0						$46,263,000		$10,000	$5,000	$43,000						$10,000	$48,005,100
5	2013	$1,698,900	$2,409,000						$46,263,000		$10,000	$5,000	$43,000	$10,000					$10,000	$50,448,900
6	2014	$2,520,200				$0			$46,263,000	$250,000	$10,000	$5,000	$43,000		$35,000				$10,000	$49,136,200
7	2015	$2,360,900				$0	$3,023,300	$6,046,500			$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$11,608,700
8	2016	$2,360,900					$3,023,300	$6,046,500			$10,000	$5,000	$43,000						$10,000	$11,498,700
9	2017	$2,360,900							$67,183,300		$10,000	$5,000	$43,000	$10,000					$10,000	$69,622,200
10	2018	$2,360,900							$67,183,300		$10,000	$5,000	$43,000						$10,000	$69,612,200
11	2019	$2,360,900							$67,183,400	$250,000	$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$69,907,300
12	2020	$2,360,900									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,528,900
13	2021	$1,980,400									$10,000	$5,000	$43,000	$10,000					$10,000	$2,058,400
14	2022	$1,980,400									$10,000	$5,000	$43,000						$10,000	$2,048,400
15	2023	$1,980,400									$10,000	$5,000	$43,000	$10,000					$10,000	$2,058,400
16	2024	$1,980,400									$10,000	$5,000	$43,000		$35,000				$10,000	$2,083,400
17	2025	$1,980,400									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,158,400
18	2026	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
19	2027	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
20	2028	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
21	2029	$2,287,100									$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$2,400,100
22	2030	$2,287,100									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,455,100
23	2031	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
24	2032	$2,287,100									$10,000	$5,000	$43,000						$10,000	$2,355,100
25	2033	$2,287,100									$10,000	$5,000	$43,000	$10,000					$10,000	$2,365,100
26	2034	$2,287,100									$10,000	$5,000	$43,000		$35,000				$10,000	$2,390,100
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Eval Period	2009-34	$ 55,616,400	$ 7,227,000	$ 150,000	$ 60,000	$ -	$ 10,210,300	$ 20,420,300	$ 340,339,000	$ 500,000	$ 260,000	$ 130,000	$ 1,118,000	$ 130,000	$ 210,000	$ 425,000	$ 50,000	$ 25,000	$ 260,000	$ 437,131,000
Cmpnts as% Total		12.72%	1.65%	0.03%	0.01%	0.00%	2.34%	4.67%	77.86%	0.11%	0.06%	0.03%	0.26%	0.03%	0.05%	0.10%	0.01%	0.01%	0.06%	100.00%

Table 8- Time Stream of Plan Costs

Alternative Plan 4-

D. Alternative Plan 4- Construction of CDF 9-E 55th St & Management of Existing CDFS- Corps Configuation BTBOC																				
Evaluation Period	Calandar Year	Dredging Costs	Plan, Design, Construct New Outer Harbor CDF FMP Dike 12, 9 For 09-14	EIS & NEPA Coordination	Develop & Execute PCA	Real Estate	Design Analysis	Construct Mangment Plans & Specs	CDF 4-E 55th St. Facility Costs Bid & Cnstrctn	Fish & Wildlife Mitigation	Best Management Practices Dike 12, 9 New CDF	Annual Harbor Surveys	Annual Channel Soundings	Envmmntl Studies	Economic Studies	Sediment Sampling	Envmmntl Compliance	Real Estate Mngmnt	Solicitation Sediment Recycling	Plan 4- E 55th Costs In Current Dollars
1	2009	$1,698,900	$2,409,000	$100,000	$30,000	$22,500					$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$4,373,400
2	2010	$1,698,900	$0	$50,000	$30,000	$22,500	$1,656,750	$3,313,500			$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$6,939,650
3	2011	$1,674,100	$2,409,000				$1,656,750	$3,313,500			$10,000	$5,000	$43,000	$10,000					$10,000	$9,131,350
4	2012	$1,674,100	$0						$36,816,700		$10,000	$5,000	$43,000						$10,000	$38,558,800
5	2013	$1,698,900	$2,409,000						$36,816,700		$10,000	$5,000	$43,000	$10,000					$10,000	$41,002,600
6	2014	$2,520,200							$36,816,600	$ 166,700	$10,000	$5,000	$43,000		$35,000				$10,000	$39,606,500
7	2015	$2,599,800									$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$2,777,800
8	2016	$2,599,800									$10,000	$5,000	$43,000						$10,000	$2,667,800
9	2017	$2,599,800					$811,400	$1,622,800			$10,000	$5,000	$43,000	$10,000					$10,000	$5,112,000
10	2018	$2,599,800					$811,400	$1,622,800			$10,000	$5,000	$43,000						$10,000	$5,102,000
11	2019	$2,599,800							$18,030,300		$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$20,743,100
12	2020	$2,599,800							$18,030,300		$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$20,798,100
13	2021	$2,174,100							$18,030,400	$ 166,700	$10,000	$5,000	$43,000	$10,000					$10,000	$20,449,200
14	2022	$2,141,800					$1,100,800	$2,201,700			$10,000	$5,000	$43,000						$10,000	$5,512,300
15	2023	$2,141,800					$1,100,800	$2,201,700			$10,000	$5,000	$43,000	$10,000					$10,000	$5,522,300
16	2024	$2,141,800							$24,462,700		$10,000	$5,000	$43,000		$35,000				$10,000	$26,707,500
17	2025	$2,141,800							$24,462,700		$10,000	$5,000	$43,000	$10,000		$85,000	$10,000	$5,000	$10,000	$26,782,500
18	2026	$2,141,800							$24,462,600	$ 166,600	$10,000	$5,000	$43,000						$10,000	$26,839,000
19	2027	$2,141,800									$10,000	$5,000	$43,000	$10,000					$10,000	$2,219,800
20	2028	$2,141,800									$10,000	$5,000	$43,000						$10,000	$2,209,800
21	2029	$2,141,800									$10,000	$5,000	$43,000	$10,000	$35,000				$10,000	$2,254,800
22	2030	$2,141,800									$10,000	$5,000	$43,000			$85,000	$10,000	$5,000	$10,000	$2,309,800
23	2031	$2,141,800									$10,000	$5,000	$43,000	$10,000					$10,000	$2,219,800
24	2032	$2,141,800									$10,000	$5,000	$43,000						$10,000	$2,209,800
25	2033	$2,141,800									$10,000	$5,000	$43,000	$10,000					$10,000	$2,219,800
26	2034	$2,141,800									$10,000	$5,000	$43,000		$35,000				$10,000	$2,244,800
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Eval Period 2009-34		$56,581,400	$7,227,000	$150,000	$60,000	$45,000	$7,137,900	$14,276,000	$237,929,000	$500,000	$260,000	$130,000	$1,118,000	$130,000	$210,000	$425,000	$50,000	$25,000	$260,000	$326,514,300
Cmpnts as% Total		17.33%	2.21%	0.05%	0.02%	0.01%	2.19%	4.37%	72.87%	0.15%	0.08%	0.04%	0.34%	0.04%	0.06%	0.13%	0.02%	0.01%	0.08%	100.00%

Table 8- Time Stream of Plan Costs

Alternative Plan 4a-

D. Alternative Plan 4a- Construction of CDF at E 55th St & Management of Existing CDFS- Local Configuration

Evaluation Period	Calandar Year	Plan, Design, Construct New Outer Harbor CDF: Dredging Costs	FMP Dike 12, 9 For 09-14	EIS & NEPA Coordination	Develop & Execute PCA	Real Estate	Design Analysis	Construct Mangment Plans & Specs	CDF 5-E 55th St. Facility Costs Bid & Cnstrctn	Fish & Wildlife Mitigation	Best Management Practices Dike 12, 9 New CDF	Annual Harbor Surveys	Annual Channel Soundings	Envrmmntl Studies	Economic Studies	Sediment Sampling	Envrmmntl Compliance	Real Estate Mngmnt	Solicitation Sediment Recycling	Plan 4a- E 55th Costs In Current Dollars
1	2009	$ 1,698,900	$ 2,409,000	$ 100,000	$ 30,000	$ 22,500					$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 4,373,400
2	2010	$ 1,698,900	$ -	$ 50,000	$ 30,000	$ 22,500	$ 1,945,000	$ 3,890,000			$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 7,804,400
3	2011	$ 1,674,100	$ 2,409,000				$ 1,945,000	$ 3,890,000			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 9,996,100
4	2012	$ 1,674,100	$ -						$ 43,222,300		$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 44,964,400
5	2013	$ 1,698,900	$ 2,409,000						$ 43,222,300		$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 47,408,200
6	2014	$ 2,520,200							43,222,400	$ 166,700	$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 46,012,300
7	2015	$ 2,599,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,777,800
8	2016	$ 2,599,800									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,667,800
9	2017	$ 2,599,800					$ 907,700	$ 1,815,400			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 5,400,900
10	2018	$ 2,599,800					$ 907,700	$ 1,815,400			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 5,390,900
11	2019	$ 2,599,800							$ 20,171,000		$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 22,883,800
12	2020	$ 2,599,800							$ 20,171,000		$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 22,938,800
13	2021	$ 2,174,100							$ 20,171,000	$ 166,700	$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 22,589,800
14	2022	$ 2,141,800					$ 1,302,100	$ 2,604,200			$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 6,116,100
15	2023	$ 2,141,800					$ 1,302,100	$ 2,604,200			$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 6,126,100
16	2024	$ 2,141,800							$ 28,935,700		$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 31,180,500
17	2025	$ 2,141,800							$ 28,935,700		$ 10,000	$ 5,000	$ 43,000	$ 10,000		$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 31,255,500
18	2026	$ 2,141,800							$ 28,935,600	$ 166,600	$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 31,312,000
19	2027	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,219,800
20	2028	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,209,800
21	2029	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000	$ 35,000				$ 10,000	$ 2,254,800
22	2030	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000			$ 85,000	$ 10,000	$ 5,000	$ 10,000	$ 2,309,800
23	2031	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,219,800
24	2032	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000						$ 10,000	$ 2,209,800
25	2033	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000	$ 10,000					$ 10,000	$ 2,219,800
26	2034	$ 2,141,800									$ 10,000	$ 5,000	$ 43,000		$ 35,000				$ 10,000	$ 2,244,800
Eval Period	2009-34	$ 56,581,400	$ 7,227,000	$ 150,000	$ 60,000	$ 45,000	$ 8,309,600	$ 16,619,200	$ 276,987,000	$ 500,000	$ 260,000	$ 130,000	$ 1,118,000	$ 130,000	$ 210,000	$ 425,000	$ 50,000	$ 25,000	$ 260,000	$ 369,087,200
Cmpnts as% Total		15.33%	1.96%	0.04%	0.02%	0.01%	2.25%	4.50%	75.05%	0.14%	0.07%	0.04%	0.30%	0.04%	0.06%	0.12%	0.01%	0.01%	0.07%	100.00%

Table 9- Present Worth Of Plan Costs- Plan 1, 2, 2a, 3, 3a, 4, 4a

		Plan Costs In Current Dollars								Plan Costs In Present Worth Dollars						
Evaluation Period	Calandar Year	Plan 1 (No Action)	Plan 2 (Site 2)	Plan 2a (Site 2a)	Plan 3 (Site 3)	Plan 3a (Site 3a)	Federal Standard Corps Configuration Plan 4 (E. 55th St.)	Prt Authority Configuration Plan 4a (E. 55th St.)	Present Worth Factor	Plan 1 (No Action)	Plan 2 (Site 2)	Plan 2a (Site 2a)	Plan 3 (Site 3)	Plan 3a (Site 3a)	Federal Standard Corps Configuration Plan 4 (E. 55th St.)	Prt Authority Configuration Plan 4a (E. 55th St.)
1	2009	$0	$4,350,900	$4,350,900	$4,350,900	$4,350,900	$4,373,400	$4,373,400	0.955795	$0	$4,158,600	$4,158,600	$4,158,600	$4,158,600	$4,180,100	$4,180,100
2	2010	$0	$13,082,050	$7,343,000	$11,203,100	$8,192,400	$6,939,650	$7,804,400	0.913543	$0	$11,951,000	$6,708,100	$10,234,500	$7,484,100	$6,339,700	$7,129,700
3	2011	$0	$15,296,250	$9,557,200	$13,417,300	$10,406,600	$9,131,350	$9,996,100	0.87316	$0	$13,356,100	$8,345,000	$11,715,400	$9,086,600	$7,973,100	$8,728,200
4	2012	$0	$84,224,800	$41,713,100	$70,305,800	$48,005,100	$38,558,800	$44,964,400	0.834561	$0	$70,290,700	$34,812,100	$58,674,500	$40,063,200	$32,179,700	$37,525,500
5	2013	$0	$86,668,600	$44,156,900	$72,749,600	$50,448,900	$41,002,600	$47,408,200	0.797669	$0	$69,132,800	$35,222,600	$58,030,100	$40,241,500	$32,706,500	$37,816,000
6	2014	$0	$85,605,800	$42,844,200	$71,686,800	$49,136,200	$39,606,500	$46,012,300	0.762408	$0	$65,266,500	$32,664,700	$54,654,600	$37,461,800	$30,196,300	$35,080,100
7	2015	$0	$2,917,200	$2,499,100	$2,917,200	$11,608,700	$2,777,800	$2,777,800	0.728705	$0	$2,125,800	$1,821,100	$2,125,800	$8,459,300	$2,024,200	$2,024,200
8	2016	$0	$2,807,200	$2,389,100	$2,807,200	$11,498,700	$2,667,800	$2,667,800	0.696492	$0	$1,955,200	$1,664,000	$1,955,200	$8,008,800	$1,858,100	$1,858,100
9	2017	$0	$2,817,200	$2,399,100	$2,817,200	$69,622,200	$5,112,000	$5,400,900	0.665703	$0	$1,875,400	$1,597,100	$1,875,400	$46,347,700	$3,403,100	$3,595,400
10	2018	$0	$2,807,200	$8,950,100	$2,807,200	$69,612,200	$5,102,000	$5,390,900	0.636276	$0	$1,786,200	$5,694,700	$1,786,200	$44,292,500	$3,246,300	$3,430,100
11	2019	$0	$2,852,200	$8,995,100	$2,852,200	$69,907,300	$20,743,100	$22,883,800	0.608149	$0	$1,734,600	$5,470,400	$1,734,600	$42,514,000	$12,614,900	$13,916,800
12	2020	$0	$2,907,200	$51,088,800	$2,907,200	$2,528,900	$20,798,100	$22,938,800	0.581265	$0	$1,689,900	$29,696,100	$1,689,900	$1,470,000	$12,089,200	$13,333,500
13	2021	$0	$2,365,100	$50,625,800	$2,365,100	$2,058,400	$20,449,200	$22,589,800	0.55557	$0	$1,314,000	$28,126,200	$1,314,000	$1,143,600	$11,361,000	$12,550,200
14	2022	$0	$2,355,100	$50,865,700	$2,355,100	$2,048,400	$5,512,300	$6,116,100	0.531011	$0	$1,250,600	$27,010,200	$1,250,600	$1,087,700	$2,927,100	$3,247,700
15	2023	$0	$2,365,100	$2,026,100	$2,365,100	$2,058,400	$5,522,300	$6,126,100	0.507537	$0	$1,200,400	$1,028,300	$1,200,400	$1,044,700	$2,802,800	$3,109,200
16	2024	$0	$2,390,100	$2,051,100	$2,390,100	$2,083,400	$26,707,500	$31,180,500	0.485101	$0	$1,159,400	$995,000	$1,159,400	$1,010,700	$12,955,800	$15,125,700
17	2025	$0	$2,465,100	$2,126,100	$2,465,100	$2,158,400	$26,782,500	$31,255,500	0.463657	$0	$1,143,000	$985,800	$1,143,000	$1,000,800	$12,417,900	$14,491,800
18	2026	$0	$2,355,100	$2,355,100	$2,355,100	$2,355,100	$26,839,000	$31,312,000	0.443161	$0	$1,043,700	$1,043,700	$1,043,700	$1,043,700	$11,894,000	$13,876,300
19	2027	$0	$2,365,100	$2,365,100	$2,365,100	$2,365,100	$2,219,800	$2,219,800	0.423571	$0	$1,001,800	$1,001,800	$1,001,800	$1,001,800	$940,200	$940,200
20	2028	$0	$2,355,100	$2,355,100	$2,355,100	$2,355,100	$2,209,800	$2,209,800	0.404847	$0	$953,500	$953,500	$953,500	$953,500	$894,600	$894,600
21	2029	$0	$2,400,100	$2,400,100	$2,400,100	$2,400,100	$2,254,800	$2,254,800	0.38695	$0	$928,700	$928,700	$928,700	$928,700	$872,500	$872,500
22	2030	$0	$2,455,100	$2,455,100	$2,455,100	$2,455,100	$2,309,800	$2,309,800	0.36984	$0	$908,000	$908,000	$908,000	$908,000	$854,300	$854,300
23	2031	$0	$2,365,100	$2,365,100	$2,365,100	$2,365,100	$2,219,800	$2,219,800	0.35350	$0	$836,100	$836,100	$836,100	$836,100	$784,700	$784,700
24	2032	$0	$2,355,100	$2,355,100	$2,355,100	$2,355,100	$2,209,800	$2,209,800	0.33787	$0	$795,700	$795,700	$795,700	$795,700	$746,600	$746,600
25	2033	$0	$2,365,100	$2,365,100	$2,365,100	$2,365,100	$2,219,800	$2,219,800	0.32293	$0	$763,800	$763,800	$763,800	$763,800	$716,800	$716,800
26	2034	$0	$2,390,100	$2,390,100	$2,390,100	$2,390,100	$2,244,800	$2,244,800	0.30866	$0	$737,700	$737,700	$737,700	$737,700	$692,900	$692,900
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		$ -	$ 339,683,000	$ 355,387,300	$ 294,168,100	$ 437,131,000	$ 326,514,300	$ 369,087,200		$ -	$ 259,359,200	$ 233,969,000	$ 222,671,200	$ 302,844,600	$ 209,672,400	$ 237,521,200

Table 10 - Plan Average Annual Costs- 26 Year Project Evaluation Period

Average Annual Costs By Plan-26 Year Project Evaluation Period- 4 5/8%							
						Base Plan Federal Standard	
	Plan 1	**Plan 2**	**Plan 2a**	**Plan 3**	**Plan 3a**	**Plan 4**	**Plan 4a**
						Corps Configuration	**Locals Configuration**
	No Action	**CDF 2 & FMP**	**CDF 2A & FMP**	**CDF 3 & FMP**	**CDF 3A & FMP**	**E 55th St & FMP**	**E 55th St & FMP**
Total Implementation Costs							
Contractors Earning Plus Contingencies	$ -	$ 247,448,000	$ 265,712,000	$ 205,691,000	$ 340,339,000	$ 237,929,000	$ 276,987,000
Planning Engineering & Design (PED) Costs	$ -	$ 7,423,400	$ 7,971,400	$ 6,170,700	$ 10,210,200	$ 7,137,900	$ 8,309,600
Construction Management Costs	$ -	$ 14,846,900	$ 15,942,700	$ 12,341,500	$ 20,420,300	$ 14,275,700	$ 16,619,200
Fill Management Costs-Dike 12, 9 - 2009-2014	$ -	$ 7,227,000	$ 7,227,000	$ 7,227,000	$ 7,227,000	$ 7,227,000	$ 7,227,000
Lands, Easements, Rights Of Way, Relocations & Dispos	$ -	$ -	$ -	$ -	$ -	$ 45,000	$ 45,000
Sediment Transportation Costs	$ -	$ 59,419,700	$ 55,216,100	$ 59,419,700	$ 55,616,400	$ 56,581,400	$ 56,581,400
Fish & Wildlife Mitigation	$ -	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
All Other Project Costs	$ -	$ 2,818,000	$ 2,818,100	$ 2,818,200	$ 2,818,100	$ 2,818,300	$ 2,818,000
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Total Implementation Costs	$ -	$ 339,683,000	$ 355,387,300	$ 294,168,100	$ 437,131,000	$ 326,514,300	$ 369,087,200
Current Value Of Implementation Costs	$ -	$ 339,683,000	$ 355,387,300	$ 294,168,100	$ 437,131,000	$ 326,514,300	$ 369,087,200
Plan Average Annual Costs	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
						Corps Configuration	Locals Configuration
	No Action	CDF 2 & FMP	CDF 2A & FMP	CDF 3 & FMP	CDF 3A & FMP	E 55th St & FMP	E 55th St & FMP
Investment Costs							
First Costs-Present Value	$ -	$ 259,359,200	$ 233,969,000	$ 222,671,200	$ 302,844,600	$ 209,672,400	$ 237,521,200
Interest During Construction (1)							
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Investment Costs	$ -	$ 259,359,200	$ 233,969,000	$ 222,671,200	$ 302,844,600	$ 209,672,400	$ 237,521,200
Average Annual Costs							
Investment Costs	$ -	$ 259,359,200	$ 233,969,000	$ 222,671,200	$ 302,844,600	$ 209,672,400	$ 237,521,200
Partial Payment Factor (2)	0.06690	0.06690	0.06690	0.06690	0.06690	0.06690	0.06690
Average Annual Costs	$ -	$ 17,350,800	$ 15,652,300	$ 14,896,500	$ 20,260,000	$ 14,026,900	$ 15,889,900
Annual Maintenance (3)	-	1,237,200	1,328,600	1,028,500	1,701,700	1,189,600	1,384,900
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Total Average Annual Costs	$ -	$ 18,588,000	$ 16,980,900	$ 15,925,000	$ 21,961,700	$ 15,216,500	$ 17,274,800
(1) There is no Interest During Construction since benefits accrue immediately							
(2) Partial Payment Factor based on 26 year project life and a 4 5/8% annual interest rate							
(3) Annual Maintenance taken as 0.5% of Contractors Earnings & Contingencies							

Table 11- Benefit to Cost Ratios by Plan

Benefit To Cost Ratios- 26 Year Project Evaluation Period- 4 58% Annual Interest Rate						NED Plan	
A. Benefits Costs- Shoaling Rates- Outer Harbor=.2 Ft/Yr, Cuy/Old River=1.0 Ft/Yr						Base Plan	
						Federal Standard	
	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
						Corps	Locals
						Configuration	Configuration
	No	CDF 2 &	CDF 2A &	CDF 3 &	CDF 3A &	E 55th St &	E 55th St &
	Action	FMP	FMP	FMP	FMP	FMP	FMP
Benefits							
Without Project Transportation Costs	$ 100,146,700	$ 100,146,700	$ 100,146,700	$ 100,146,700	$ 100,146,700	$ 100,146,700	$ 100,146,700
With Project Transportation costs	$ 100,146,700	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000
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Plan Benefits	$ -	$ 24,924,700	$ 24,924,700	$ 24,924,700	$ 24,924,700	$ 24,924,700	$ 24,924,700
Costs							
With Project Harbor Maintenance Costs	$ -	$ 18,588,000	$ 16,980,900	$ 15,925,000	$ 21,961,700	$ 15,216,500	$ 17,274,800
Without Project Habor Maintenance Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -
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Plan Costs	$ -	$ 18,588,000	$ 16,980,900	$ 15,925,000	$ 21,961,700	$ 15,216,500	$ 17,274,800
Plan Benefit Cost Ratios							
Plan Benefits	$ -	$ 24,924,700	$ 24,924,700	$ 24,924,700	$ 24,924,700	$ 24,924,700	$ 24,924,700
Plan Costs	$ -	$ 18,588,000	$ 16,980,900	$ 15,925,000	$ 21,961,700	$ 15,216,500	$ 17,274,800
Plan Benefit To Cost Ratio	0.00	1.34	1.47	1.57	1.13	1.64	1.44
Plan Net Benefits	$ -	$ 6,336,700	$ 7,943,800	$ 8,999,700	$ 2,963,000	$ 9,708,200	$ 7,649,900

						NED Plan	
B. Benefits Costs- Shoaling Rates- Outer Harbor=.2 Ft/Yr, Cuy/Old River=2.0 Ft/Yr						Base Plan	
						Federal Standard	
	Plan 1	Plan 2	Plan 2a	Plan 3	Plan 3a	Plan 4	Plan 4a
						Corps	Locals
						Configuration	Configuration
	No	CDF 2 &	CDF 2A &	CDF 3 &	CDF 3A &	E 55th St &	E 55th St &
	Action	FMP	FMP	FMP	FMP	FMP	FMP
Benefits							
Without Project Transportation Costs	$ 103,292,900	$ 103,292,900	$ 103,292,900	$ 103,292,900	$ 103,292,900	$ 103,292,900	$ 103,292,900
With Project Transportation costs	$ 103,292,900	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000	$ 75,222,000
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Plan Benefits	$ -	$ 28,070,900	$ 28,070,900	$ 28,070,900	$ 28,070,900	$ 28,070,900	$ 28,070,900
Costs							
With Project Harbor Maintenance Costs	$ -	$ 18,588,000	$ 16,980,900	$ 15,925,000	$ 21,961,700	$ 15,216,500	$ 17,274,800
Without Project Habor maintenance Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -
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Plan Costs	$ -	$ 18,588,000	$ 16,980,900	$ 15,925,000	$ 21,961,700	$ 15,216,500.00	$ 17,274,800.00
Plan Benefit Cost Ratios							
Plan Benefits	$ -	$ 28,070,900	$ 28,070,900	$ 28,070,900	$ 28,070,900	$ 28,070,900	$ 28,070,900
Plan Costs	$ -	$ 18,588,000	$ 16,980,900	$ 15,925,000	$ 21,961,700	$ 15,216,500	$ 17,274,800
Plan Benefit To Cost Ratio	0.00	1.51	1.65	1.76	1.28	1.84	1.62
Plan Net Benefits	$ -	$ 9,482,900	$ 11,090,000	$ 12,145,900	$ 6,109,200	$ 12,854,400	$ 10,796,100