

APPENDIX A

BASE PLAN

Lorain Harbor DMMP
“Base Plan” Dredging Plan

I. Introduction

The Lorain Harbor DMMP is a document that presents a plan for managing dredged material removed from Lorain Harbors rivers and channels for the next 20 years. Lorain Harbor, Lorain County, Ohio (PWI 10060), is located on the south shore of Lake Erie at the mouth of the Black River. The port is 28 miles west of Cleveland Ohio and 72 miles east of Toledo Harbor Ohio. (Figure 1.) The harbor consists of two federal channels: a lake approach channel and the Black River channel. Authorized and maintained channel dimensions are presented in Table 1. Lorain Harbor is dredged every other year. The average amount of sediment removed per dredging event during the 1992 to 2002 period is 146,300 cubic yards.

TABLE 1							
AUTHORIZED AND MAINTAINED CHANNEL DIMENSIONS(LWD)							
CWIS NUMBER	REACH OR SEGMENT	NOMINAL CHANNEL DEPTH		NOMINAL CHANNEL WIDTH		MAX. SAILING DRAFT	PROJECT SPONSOR
		(as auth.)	(as maint.)	(as auth.)	(as maint.)		
10060	Lake Approach	30' (hard) 29' (soft)	29'	800'	800'		N
	Outer Harbor	28'	28'	800'	800'		N
	East & West portion of outer o harbor	25' (soft) 26' (hard)	25/26'	Varies	Varies		N
	Municipal Pier Approach channel	16'	16'	Varies	Varies		N
	River Channel	27' (soft) 28' (hard)	27/28'	200-500'	200-500'		N
	Upper Turning Basins	17' & 21'	17' & 21'	690'	690'		N
	Downstream Turning Basin	20'	20'	650'	650'		N
PROJECT SPONSOR REACH(S)							
NAME: N/A							
ADDRESS:							
CITY:				STATE:		ZIP:	
POINT OF CONTACT:				PHONE #			

FIGURE 1. PORT LOCATION



The Lorain Harbor Dredge Material Management Plan (DMMP) will develop a number of plans that will address the need to dispose of dredged material removed from the Harbors river and approach channels for the next 20 years. These plans need to be compared to a “Base Plan” dredging plan. In other words, if there were no DMMP, how would dredge material at Lorain Harbor be disposed of for the next 20 years? The dredging plans developed by the DMMP will be compared to the “Base Plan” condition. This “Base Plan” is what Planners call the “Without Project Condition”. It can also be referred to as: “Existing Conditions”, “Base Case” and the “Federal Standard”.

II Development of The “Base Plan” Condition Components

The concept of the “Base Plan” condition is to identify future maintenance operations that would take place at Lorain Harbor, assuming no DMMP study. The goal is to identify a dredging plan that is the least costly method of managing dredged material at the harbor over a 20 year time frame, is consistent with sound engineering practice and meets all Federal Environmental Standards established by Section 404 of the Clean Water Act of 1972 or Section 103 of the Marine Protection, Research And Sanctuaries Act of 1972, as amended. The “Base Plan” will also assess the potential for proposed beneficial uses of dredged material. These uses may be undertaken as separate plan elements, implementation being governed by the various authorities

used. Sediments that meet Federal open lake standards are by law not allowed to be placed into a Federally owned Confined Disposal Facility (CDF). The placement of these sediments in open water can be part of the “Base Plan”. These activities then become the "Base Plan", "WOP" condition. All dredging alternatives developed by the DMMP would be compared to the “Base Plan”.

A. “Base Plan” Assumptions

The earliest the Lorain Harbor DMMP can become implemented is 2007. The DMMP evaluation period is 20 years. Thus the DMMP evaluation period is from 2007 to 2026. The “Base Plan” condition needs to identify how dredged material will be disposed of from 2005 through 2026. The time stream of dredging cycles, cubic yards removed per cycle, and methods of sediment disposal over this period need to be identified.

A number of pieces of information need to be identified in order to develop a time stream of future maintenance activities: the dredging cycle at Lorain Harbor (yearly, every other year), cubic yards removed per dredging cycle, where the dredging takes place (approach channels, outer harbor, river), how many cubic yards of sediment are removed from various locations per dredging cycle, how the sediment is disposed of (open lake disposal, CDF), existing CDF/Open Lake disposal site capacities, when these sites will be filled, potential new disposal options (vertical or horizontal expansion at current CDF, reclamation of space at current CDF), when must these new facilities come on line, current best management practices, and other recurring costs associated with dredging (harbor facility surveys, harbor soundings, environmental studies, real estate management, economic studies, sediment sampling, environmental compliance studies, etc.).

All of the above were discussed with Cleveland Harbor field office personnel, who have the responsibility of overseeing dredging at Lorain harbor. Given the information developed from these meetings, a sequence of dredging operations and CDF needs were identified and placed into a 20-year time horizon. Table 2 provides a summary of the assumptions developed in putting together the “Base Plan” dredging plan. The Components of this plan will now be discussed.

B. Base Plan Dredging Quantities, Disposal Methods

The “Base Plan” assumes dredging of Lorain Harbors authorized project dimensions every other year. The Dredging Cycles for Lorain Harbor over the Project Evaluation Period take place in 2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024 and 2026. Total cubic yards dredged per dredging cycle are placed at 150,000 cubic yards. This includes 120,000 cubic yards from the Black River, and 30,000 cubic yards from the Outer Harbor and Approach Channels. Starting in 2006, all sediment removed from the Outer Harbor and Approach Channels will be open lake disposed. This material passes all Federal criteria for open lake disposal. All sediment from the Black River will be placed in a Confined Disposal Area. The time stream of cubic yards dredged and method of disposal are provided in Table 3.

TABLE 2- ASSUMPTIONS USED IN DEVELOPING THE “BASE PLAN” CONDITION FOR LORAIN HARBOR DREDGING

<u>Dredging Cycle</u>	
Every Other Year	2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024, 2026
<u>Average Cubic Yards Dredged Per Cycle At Lorain Harbor</u>	
Total Cubic Yards Removed Per Dredging Cycle	150,000
Cubic Yards That Can Be Open Lake Disposed- (Outer Harbor, Entrance channel)	30,000
Cubic Yards that are placed in a CDF (Black River Sediments)	120,000
<u>Cubic Yards Dredged By Geographical Area</u>	
Cubic Yards Dredged Per Cycle From The Outer Harbor/Entrance Channel	30,000
Cubic Yards Dredged Per Cycle From The Black River	120,000
<u>Disposal Of Dredged Material By Dredging Location</u>	
Outer Harbor, Lake Approach Channel	Open Lake Disposed
Time when Outer Harbor, Lake Approach Channel Can Be Open Lake Disposed	2006
Black River Sediment	Confined Disposal Facility
<u>CDF Space/Open Lake Disposal Space And when Filled</u>	
Space left (Cubic Yards) in Current Lorain CDF (As Of 2003)	110,000
Year When Current Lorain CDF Design Capacity Is Reached	2006
Open Lake disposal Site Size (Acres)	960
Distance of Open Lake disposal Site From West Breakwater Light (Miles)	3.5
Amount of Sediment Placed In Open Lake Disposal Site Per Dredging Cycle	30,000
<u>Dredging Cycles- Sediment Placement</u>	
<u>Open Lake Disposal</u>	
Outer Harbor, Lake Approach Channel -	2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024, 2026
<u>Lorain CDF Disposal -</u>	
Best Operational Management Practices	2008, 2010, 2012, 2014, 2016, 2018
Space Creation	2020, 2022, 2024, 2026
<u>Disposal Site Usage Practices-</u>	
<u>Best Operational Management Practices (BOMP) At Existing Lorain CDF</u>	
1st Four Foot Vertical Space Creation At Current Lorain CDF	2007
2 nd Four Foot Vertical Space Creation At Current Lorain CDF	2011
3 rd Four Foot Vertical Space Creation At Current Lorain CDF	2015
<u>Space Creation at Current Lorain CDF</u>	
Create 120,000 Cubic Yards Of Space At Current CDF	2019, 2021, 2023, 2025
<u>Horizontal Expansion of Current Lorain CDF</u>	
1. Site Recommendation	2013
2. Perform U.S. Fish And Wildlife Three Season Survey	2013-2014
3. Perform EIS And NEPA Coordination As Required By law	2014-2015
4. Real Estate	2015-2016
5. Perform Design Analysis	2015-2016
6. Develop Plans And Specs	2016
7. Develop And Execute Project Cooperation Agreement	2016- 2017
8. Bid & Construction	2017-2018-2019
9. Dredging Cycles Accommodated By Horizontal Expansion.	2020, 2022, 2024, 2026
<u>Best Management Practices</u>	
Current Lorain CDF-	2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, 2025
Horizontal Expansion Adjacent To Current Lorain CDF	2021, 2023, 2025
<u>Other Recurring Activities</u>	
Harbor Facility Surveys	Yearly
Harbors Soundings-	Yearly
Environmental Studies-	2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, 2025
Real Estate Management	2010, 2015, 2020, 2025
Economic Studies -	2010, 2015, 2020, 2025
Sediment Sampling -	2010, 2015, 2020, 2025
Environmental Compliance Studies	2010, 2015, 2020, 2025

TABLE 3-“Base Plan” Time stream of Cubic Yards Removed And Disposal Method

Calendar Year	Project Year	Sediment Placed In CDF	Sediment Placed In Open Lake	Total Cubic Yards Removed
2007	1			
2008	2	120,000	30,000	150,000
2009	3			
2010	4	120,000	30,000	150,000
2011	5			
2012	6	120,000	30,000	150,000
2013	7			
2014	8	120,000	30,000	150,000
2015	9			
2016	10	120,000	30,000	150,000
2017	11			
2018	12	120,000	30,000	150,000
2019	13			
2020	14	120,000	30,000	150,000
2021	15			
2022	16	120,000	30,000	150,000
2023	17			
2024	18	120,000	30,000	150,000
2025	19			
2026	20	120,000	30,000	150,000
		----- 1,200,000	----- 300,000	----- 1,500,000

Lorain Harbor was last dredged in 2003. Approximately 100,000 cubic yards was dredged and placed in Lorain’s current CDF. After dredging in 2003, the Lorain CDF had a maximum of 110,000 cubic yards of capacity remaining out of its 1,850,000 cubic yard design capacity. It is anticipated that between 70,000 and 100,000 cubic yards will be dredged during 2006. Approximately 15,000-20,000 of these cubic yards will be placed in the open lake. The 2006 dredging cycle will essentially fill the current Lorain CDF to its design capacity. There is no more storage space in the current CDF for another dredging cycle. Therefore, after the 2006 dredging cycle, a new location will have to be found for all future sediments that need to be placed into a CDF.

C. Management Practices Needed To Accommodate Dredging

The “Base Plan” needs to identify the Management Practices that will be used to dispose of 2006 dredging and the sediment removed per cycle over the project evaluation period of 2007 to 2026. A range of Management Practices have been identified that will accomplish this from open lake disposal, to continued use of the current CDF, to existing CDF expansion, to creation of space at the current CDF.

Table 3 has indicated that over the project evaluation period approximately 300,000 cubic yards of material taken from Lorain's Outer Harbor and Approach Channels will be placed in the open lake disposal site. Starting in 2006, all sediment removed from Lorain's Outer Harbor and Approach Channels will be open lake disposed. In future dredging years, it is estimated this will be approximately 30,000 cubic yards per dredging cycle. The sediment in this area passes all Federal tests that apply to open lake disposal. The open lake disposal area has more than enough capacity to handle the estimated 300,000 cubic yards that will be placed there over the project evaluation period. The open lake disposal area is located 3.5 miles north, 10 degrees west from the west breakwater light. The site has 960 acres.

Given open lake disposal of sediment removed from Lorain's Outer Harbor and Approach Channels, the management practices used to accommodate dredging from 2006 to 2026 will concentrate on how the sediment that will be placed into a Confined Disposal Facility (CDF) will be accomplished. Disposal of sediments will now be outlined by dredging cycle.

1. 2006 Dredging Cycle

Completion of the 2003 dredging cycle resulted in about 110,000 cubic yards of space remaining in Lorain's current CDF. The current CDF would have enough capacity to accommodate dredging in 2006. It is anticipated that between 70,000 and 100,000 cubic yards will be dredged during 2006. Approximately 15,000-20,000 of these cubic yards will be placed in the open lake. The 2006 dredging cycle will essentially fill the current Lorain CDF to its design capacity. All future dredged material that needs to be placed into a CDF will have to go to a new location

2. 2008-2010 Dredging Cycles

All cubic yards removed from Lorain Harbors Outer Harbor and Approach Channels during these two cycles (60,000 cubic yards total) will be placed in the open lake disposal site. This leaves 240,000 cubic yards that need to be placed into a CDF.

The 2006 dredging cycle effectively filled the existing Lorain CDF to its design capacity. A new location for disposing of dredged material that would be placed into a CDF needs to be found. The first least expensive option for disposal of the dredge material that will be placed into a CDF is to continue to use the current Lorain CDF.

a. Best Operational Management Practices One method to continue usage of the current Lorain CDF for dredge material disposal is to build an interior berm at the existing CDF disposal site. This berm raising is considered ordinary operation and maintenance of the CDF by the Corps of Engineers.

This interior berm would be built around a designated perimeter of the existing CDF: approximately 4,900 lineal feet (See Figure 2). The berm would be built from dry dredge material already in the CDF. The perimeter would be built in lifts. Given the physical characteristics of the dredge material, a maximum of three lifts have been utilized. Preliminary space computations indicate that these three lifts will provide a maximum of 673,000 cubic yards of additional space.

FIGURE 2- BERM RAISING FOOTPRINT AT EXISTING LORAIN CDF



Each berm lift will be 4 feet high and four feet wide at the top. The berms would be constructed directly adjacent to each other. The base of the second berm would start at the top inside edge of the first berm. The third berm would start at the top inside edge of the second berm. The first berm will be about 20 feet wide, to accommodate these future lifts. Each berm lift will be sized to accommodate two dredging cycles of polluted sediments: 240,000 cubic yards.

Locals have expressed an interest in using the CDF for proposed recreational uses. The berm raisings will take place on the eastern portion of the CDF. A strip of land located on the western portion of the CDF area will be used to accommodate local near term needs. These near term needs include: access to the current small boat harbor, development of parking lot facilities for the small boat harbor, and development of a park like setting for this area in general.

The first berm lift would take place in 2007. The 2008 cycle would remove 150,000 cubic yards of dredge material. All sediment dredged from the Black River (approximately 120,000 cubic yards) would be placed into the raised berm located on the current Lorain CDF. All sediment dredged from the Outer Harbor and Approach Channels (30,000 cubic yards) would be open lake disposed. The 2010 cycle would repeat this disposal process. These two dredging cycles would remove a total of 300,000 cubic yards of dredge material; 240,000 cubic yards of which would be placed into the Lorain CDF and 60,000 cubic yards which would be open lake disposed.

3. 2012-2014 Dredging Cycles

All cubic yards removed from Lorain Harbors Outer Harbor and Approach Channels during these two cycles (60,000 cubic yards total) will be placed in the open lake disposal site. This leaves 240,000 cubic yards that need to be placed into a CDF. Again, Best Management Operational Practices would be to perform a second berm raising at the existing Lorain CDF. This second raising will accommodate sediments from these two cycles that need to be placed into a CDF. The second berm raising will take place in 2011.

The 2012 cycle would remove 150,000 cubic yards of dredge material. All sediment dredged from the Black River (approximately 120,000 cubic yards) would be placed into the raised berm located on the current Lorain CDF. All sediment dredged from the Outer Harbor and Approach Channels (30,000 cubic yards) would be open lake disposed. The 2014 cycle would repeat this disposal process. These two dredging cycles would remove a total of 300,000 cubic yards of dredge material; 240,000 cubic yards of which would be placed into the Lorain CDF and 60,000 cubic yards which would be open lake disposed.

4. 2016-2018 Dredging Cycles

All cubic yards removed from Lorain Harbors Outer Harbor and Approach Channels during these two cycles (60,000 cubic yards total) will be placed in the open lake disposal site. This leaves 240,000 cubic yards that need to be placed into a CDF. A third berm raising (Best Management Operational Practices) at the existing Lorain CDF will be constructed to accommodate sediments from these two cycles that need to be placed into a CDF. The third berm raising will take place in 2015.

The 2016 cycle would remove 150,000 cubic yards of dredge material. All sediment dredged from the Black River (approximately 120,000 cubic yards) would be placed into the raised berm located on the current Lorain CDF. All sediment dredged from the Outer Harbor and Approach Channels (30,000 cubic yards) would be open lake disposed. The 2018 cycle would repeat this disposal process. These two dredging cycles would remove a total of 300,000 cubic yards of dredge material; 240,000 cubic yards of which would be placed into the Lorain CDF and 60,000 cubic yards which would be open lake disposed.

5. 2020, 2022, 2024, 2026 Dredging Cycles

These four remaining dredging cycles will remove a total of 600,000 cubic yards of sediment. Approximately 120,000 cubic yards will be placed into the open lake disposal site. The remaining 480,000 cubic yards come from the Black River and will be placed into a CDF. Two management practices are proposed to take care of all sediments that need to be placed into a CDF. The first technique is to create space at the current Lorain CDF. The second option is to construct a new CDF adjacent to the current CDF.

a. Creation Of Space At The Current CDF. Following the 2018 dredging cycle, there will be no more berm raisings at the current Lorain CDF. However, the site may still be used for disposal of sediment that needs to be placed into a CDF. This would be accomplished by removing dry sediment from the CDF. This would create space in the current CDF that could be used for future placement of Black River sediments from future dredging cycles.

Ohio EPA and Ohio DNR have indicated that the sediment in Lorain's current CDF is suitable for a wide range of reuses. The city of Lorain has identified a number of potential uses of sediment in Lorain's CDF that range from usage as a cover, to a component in creating a manufactured soil, to creation of parklands. Starting in 2019, the city would be contacted about their potential need for dry dredge material. As their needs are identified, the required cubic yards of dry sediment would be removed from the current Lorain CDF and trucked to the new usage site. It is anticipated that there are enough potential sediment reuse projects in the immediate area to result in the removal of 120,000 cubic yards of sediments from the Lorain CDF prior to the next scheduled dredging cycle. Thus 120,000 cubic yards of material would be removed in 2019, 2021, 2023 and 2025 to accommodate dredging needs in 2020, 2022, 2024 and 2026.

b. Creation Of A New CDF Adjacent To The Current CDF The potential reuse of dredge material from Lorain's current CDF will be actively pursued over the whole project evaluation period. The usage of berms at the current CDF will allow time for various reuse projects to develop. It will also allow the size and frequency of these reuse projects to be followed and projected into the future. This will provide information on how likely it is that these reuse projects will come about in the future. However, if their likelihood of development is low or not frequent enough, sediment needing confinement from 2020, 2022, 2024 and 2026 dredging cycles could be accommodated in a new CDF created adjacent to the current CDF. This location would minimize dike construction costs as well as future dredging costs. The new CDF would be sized to accommodate 1m cubic yards of material.

Assuming this new CDF would have to come on line in 2020, approximately seven years of lead time would be needed to meet this “on line” date. Creation of a new CDF adjacent to the current CDF would have to meet all Federal requirements for design and planning studies. The creation of a new CDF adjacent to the current CDF would include, but not be limited to, the following tasks/timelines: site evaluation (2013), perform U.S. Fish and wildlife Three Season Survey (2013,2014), perform EIS and NEPA coordination (2014, 2015), Real Estate analysis (2015,2016), Design Analysis (2015, 2016), develop Plans and Specifications (2016), develop and execute local PCA (2016, 2017) and bid and construction (2017,2018, 2019).

In summary, 1,500,000 cubic yards of sediment will be dredged at Lorain Harbor over the project evaluation period (2007-2026). Approximately 20% of this total (300,000 cubic yards) will be placed in Lorain Harbors open lake disposal site. The vast majority of the sediment dredged at Lorain Harbor over the project evaluation period (80%) will be placed into a CDF (approximately 1.2m cubic yards). The design capacity of Lorain’s current CDF will be reached once the 2006 dredging cycle is completed. Vertical expansion of Lorain’s current CDF will accommodate sediment containment needs associated with the 2008, 2010, 2012, 2014, 2016 and 2018 dredging cycles. Sediment that needs to be placed in a confined disposal facility from all remaining dredging cycles (2020, 2022, 2024 and 2026) will either be placed in space created at the current Lorain CDF by the removal of sediment for use in various local reuse projects; or placed in a new CDF constructed adjacent to the current CDF. Best Management Practices and Other Recurring Costs, as outlined in Table 2, are also part of the “Base Plan”.

III Timeline of The “Base Plan” Condition Components

A timeline highlighting when the above key components of the “Base Plan” will be implemented are provided in Table 4. Figure 4 provides a visual representation over time of all tasks associated with the “Base Plan”.

TABLE 4 “BASE PLAN”- KEY TIME LINE COMPONENTS -2007-2026

Calendar Year	Project Evaluation Period Year	River Sediment Placed In CDF (Cubic Yards)	Outer Harbor Apprch chnl Sediment Placed In Open Lake (Cubic Yards)	Total Cubic Yrds Removed	Space Remaining In Existing CDF	CDF Space Created	CDF Space Left	
2005							110,000	
2006		70,000	20,000	90,000			20,000	
<hr/>								
2007	1	<u>BOMP- First Berm Raising (4 Feet) On Current Lorain CDF</u>				240,000		
2008	2	120,000	30,000	150,000			120,000	
2009	3							
2010	4	120,000	30,000	150,000			0	
2011	5	<u>BOMP Second Berm Raising (4 Feet) On Current Lorain CDF</u>				240,000		
2012	6	120,000	30,000	150,000			120,000	
2013	7	<u>New CDF- Site Evaluation</u>						
		<u>New CDF- U.S. Fish & Wildlife 3 Season Survey</u>						
2014	8	120,000	30,000	150,000			0	
		<u>New CDF- EIS And Nepa Co-Ordination</u>						
2015	9	<u>BOMP - Third Berm Raising (4 Feet) On Current Lorain CDF</u>				240,000		
		<u>New CDF- Real Estate Evaluation</u>						
		<u>New CDF- Design Analysis</u>						
2016	10	120,000	30,000	150,000			120,000	
		<u>New CDF- Plans And Specifications</u>						
		<u>New CDF- Develop & Execute PCA</u>						
2017	11	<u>New CDF- Develop Bid</u>						
2018	12	120,000	30,000	150,000			0	
		<u>New CDF- Execute CDF Construction</u>						
2019	13	<u>Execute Space Creation Project At Current Lorain CDF</u>				120,000		
2020	14	120,000	30,000	150,000			0	
2021	15	<u>Execute Space Creation Project At Current Lorain CDF</u>				120,000		
2022	16	120,000	30,000	150,000			0	
2023	17	<u>Execute Space Creation Project At Current Lorain CDF</u>				120,000		
2024	18	120,000	30,000	150,000			0	
2025	17	<u>Execute Space Creation Project At Current Lorain CDF</u>				120,000		
2026	18	120,000	30,000	150,000			0	
		-----	-----	-----		-----		
		1,200,000	300,000	1,500,000		1,200,000		

FIGURE 4. VISUAL PRESENTATION OF LORAIN HARBOR "BASE PLAN"

Figure 4. Visual Presentation of Lorain Harbor "BASE PLAN" Condition

