

**IHNC Lock Study, Prepared by Louisville District, 10 August 2015**

**Summary Operation Maintenance**

	<b>Costs (2015 \$)</b>		
	Minor Repairs	Major Repairs	Total
Without Project	\$ 36,500,000	\$ 106,000,000	\$ 142,500,000
Alternative #1 -110' x 900'	\$ 23,875,000	\$ 65,500,000	\$ 89,375,000
Alternative #2 -110' x 1200'	\$ 24,175,000	\$ 67,500,000	\$ 91,675,000
Alternative #3 - 75' x 900'	\$ 23,875,000	\$ 62,500,000	\$ 86,375,000
Alternative #4 - 75' x 1200'	\$ 24,175,000	\$ 64,500,000	\$ 88,675,000

	<b>Closure Durations (Hours)</b>		
	Minor Repairs	Major Repairs	Total
Without Project	9,800	24,750	34,550
Alternative #1 -110' x 900'	5,725	15,715	21,440
Alternative #2 -110' x 1200'	5,725	15,715	21,440
Alternative #3 - 75' x 900'	5,725	15,715	21,440
Alternative #4 - 75' x 1200'	5,725	15,715	21,440

**IHNC Lock Study, Prepared by Louisville District, 10 August 2015**  
**Record of Maintenance**

<b>Component</b>	<b>Reason for Outage</b>	<b>Date of Outage</b>
Miter gate	general repairs	1952
NW guidewall and dolphin	replacement	1952
SW fender system	replacement	1960
Mooring System	installation	1964
Dolphin	repair	1976
NW dolphin	replacement	1976
Gates 7 & 8	repair/paint	1980
Dolphin	repair/replace	1981
Gates 9 & 10	repair/paint	1986
SW guidewall	construction	1989
Gates 5 & 6	repair/paint	1992
Valve machinery	replacement	1993
Dolphin	replacement	1995
NW guidewall and dolphin	replacement	1996
Sluice Gate Frame	replacement	1996
Crane	replacement	2000
SE Guidewall and dolphin	replacement	2001
Electric	general repairs	2006
SW guidewall	replacement	2006
Miter gate	replacement	2012

Without Project Condition: Concrete U-Frame Lock Chamber 75' x 640'							
	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
Fix As Fails	Dewatering & Monitoring / Major Repairs / Gates	10 years	\$5,000,000	1440	60	24-hour shifts	Yes
	Rehabilitation of Chamber Guidewall (W & E)	20 years	\$4,000,000	720	60	12-hour shifts	Yes
	Rehabilitation of Guidewall (NW & SW)	20 years	\$4,000,000	630	53	12-hour shifts	Yes
	Rehabilitation of Guidewall (NE & SE)	20 years	\$2,000,000	400	34	12-hour shifts	Yes
	Rehabilitation of Dolphin (NE, NW, SE, SW)	15 years	\$1,500,000	250	21	12-hour shifts	Yes
	Hurrican Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurrican Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	20 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	Annually	\$500,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	12 years	\$500,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	12 years	\$300,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	12 years	\$100,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No	
ED Instrumentation Cost	Annually	\$20,000	0	0	None	No	

Alternative #1: Concrete U-Frame Chamber 110' x 900' - Routine Maintenance							
	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
Alt #1	Dewatering & Monitoring / Major Repairs / Gates	10 years	\$4,000,000	1440	60	24-hour shifts	Yes
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$4,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$3,000,000	720	60	12-hour shifts	Yes
	Hurrican Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurrican Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$650,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$500,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$250,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
ED Instrumentation Cost	Annually	\$20,000	0	0	None	No	

	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
Alt #1	Dewatering & Monitoring / Major Repairs / Gates	10 years	\$4,000,000	1440	60	24-hour shifts	Yes
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$4,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$3,000,000	720	60	12-hour shifts	Yes
	Hurricane Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurricane Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$650,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$500,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$250,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
	ED Instrumentation Cost	Annually	\$20,000	0	0	None	No

\*\*Columns F, K, Q, S, X and Z are hidden component breakdowns, select Unhide to view

IHNC - Alternative #1 - 110' x 900' Concrete U-Frame Lock Chamber															
Year	Construction cost (\$)		No Impact to Navigation			Minor Repair			Major Repair			Annual Summary			
			cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours		
1	2015	-- Planning --	2015	\$340,000	0	2015	\$500,000	150	2015	\$0	0	2015	\$840,000	150	2015
2	2016		2016	\$360,000	0	2016	\$600,000	200	2016	\$3,000,000	425	2016	\$3,960,000	625	2016
3	2017		2017	\$300,000	0	2017	\$500,000	150	2017	\$2,000,000	400	2017	\$2,800,000	550	2017
4	2018		2018	\$800,000	0	2018	\$800,000	225	2018	\$5,000,000	1440	2018	\$6,600,000	1,665	2018
5	2019		2019	\$300,000	0	2019	\$1,200,000	225	2019	\$0	720	2019	\$1,500,000	945	2019
-- New Chamber Construction Commencement --															
6	2020	\$41,600,000	2020	\$340,000	0	2020	\$1,000,000	250	2020	\$1,500,000	250	2020	\$44,440,000	500	2020
7	2021	\$153,600,000	2021	\$360,000	0	2021	\$500,000	150	2021	\$3,000,000	425	2021	\$157,460,000	575	2021
8	2022	\$132,600,000	2022	\$300,000	0	2022	\$600,000	200	2022	\$1,500,000	630	2022	\$135,000,000	830	2022
9	2023	\$51,100,000	2023	\$800,000	0	2023	\$500,000	150	2023	\$4,000,000	720	2023	\$56,400,000	870	2023
10	2024	\$97,100,000	2024	\$300,000	0	2024	\$800,000	225	2024	\$0	0	2024	\$98,200,000	225	2024
11	2025	\$64,600,000	2025	\$340,000	0	2025	\$500,000	150	2025	\$2,000,000	400	2025	\$67,440,000	550	2025
12	2026	\$41,900,000	2026	\$360,000	0	2026	\$1,000,000	250	2026	\$3,000,000	425	2026	\$46,260,000	675	2026
13	2027	\$40,600,000	2027	\$300,000	0	2027	\$500,000	150	2027	\$0	0	2027	\$41,400,000	150	2027
14	2028	\$123,400,000	2028	\$800,000	0	2028	\$600,000	200	2028	\$5,000,000	1440	2028	\$129,800,000	1,640	2028
15	2029	\$57,100,000	2029	\$300,000	0	2029	\$500,000	150	2029	\$0	720	2029	\$57,900,000	870	2029
16	2030	\$13,300,000	2030	\$340,000	0	2030	\$800,000	225	2030	\$1,500,000	630	2030	\$15,940,000	855	2030
17	2031	\$7,600,000	2031	\$360,000	0	2031	\$500,000	150	2031	\$1,500,000	175	2031	\$9,960,000	325	2031
-- New Chamber Construction Complete - Begin Advanced Maintenance Schedule --															
18	2032		2032	\$300,000	0	2032	\$0	0	2032	\$0	0	2032	\$300,000	0	2032
19	2033		2033	\$800,000	0	2033	\$0	0	2033	\$0	0	2033	\$800,000	0	2033
20	2034		2034	\$300,000	0	2034	\$675,000	150	2034	\$0	0	2034	\$975,000	150	2034
21	2035		2035	\$340,000	0	2035	\$0	0	2035	\$0	0	2035	\$340,000	0	2035
22	2036		2036	\$360,000	0	2036	\$0	0	2036	\$1,500,000	175	2036	\$1,860,000	175	2036
23	2037		2037	\$300,000	0	2037	\$675,000	150	2037	\$0	0	2037	\$975,000	150	2037
24	2038		2038	\$800,000	0	2038	\$0	0	2038	\$0	0	2038	\$800,000	0	2038
25	2039		2039	\$300,000	0	2039	\$0	0	2039	\$0	0	2039	\$300,000	0	2039
26	2040		2040	\$340,000	0	2040	\$675,000	150	2040	\$0	0	2040	\$1,015,000	150	2040
27	2041		2041	\$360,000	0	2041	\$0	0	2041	\$4,000,000	1440	2041	\$4,360,000	1,440	2041
28	2042		2042	\$300,000	0	2042	\$0	0	2042	\$1,500,000	175	2042	\$1,800,000	175	2042
29	2043		2043	\$800,000	0	2043	\$675,000	150	2043	\$0	0	2043	\$1,475,000	150	2043

30	2044	--- New Chamber Construction Complete ---	2044	\$340,000	0	2044	\$450,000	50	2044	\$0	0	2044	\$800,000	50	2044	
31	2045		2045	\$360,000	0	2045	\$675,000	75	2045	\$0	0	2045	\$790,000	75	2045	
32	2046		2046	\$360,000	0	2046	\$675,000	150	2046	\$0	0	2046	\$1,035,000	150	2046	
33	2047		2047	\$300,000	0	2047	\$450,000	75	2047	\$1,500,000	175	2047	\$2,250,000	250	2047	
34	2048		2048	\$800,000	0	2048	\$300,000	50	2048	\$0	0	2048	\$1,100,000	50	2048	
35	2049		2049	\$300,000	0	2049	\$675,000	150	2049	\$0	0	2049	\$975,000	150	2049	
36	2050		2050	\$340,000	0	2050	\$0	0	2050	\$0	0	2050	\$340,000	0	2050	
37	2051		2051	\$360,000	0	2051	\$0	0	2051	\$4,000,000	1440	2051	\$4,360,000	1,440	2051	
38	2052		2052	\$300,000	0	2052	\$675,000	150	2052	\$1,500,000	175	2052	\$2,475,000	325	2052	
39	2053		2053	\$800,000	0	2053	\$800,000	100	2053	\$0	0	2053	\$1,600,000	100	2053	
40	2054		2054	\$300,000	0	2054	\$0	0	2054	\$0	0	2054	\$300,000	0	2054	
41	2055		2055	\$340,000	0	2055	\$675,000	150	2055	\$0	0	2055	\$1,015,000	150	2055	
42	2056		2056	\$360,000	0	2056	\$800,000	100	2056	\$0	0	2056	\$1,160,000	100	2056	
43	2057		2057	\$300,000	0	2057	\$0	0	2057	\$5,000,000	175	2057	\$5,300,000	175	2057	
44	2058		2058	\$800,000	0	2058	\$675,000	150	2058	\$0	0	2058	\$1,475,000	150	2058	
45	2059		2059	\$300,000	0	2059	\$300,000	50	2059	\$6,000,000	825	2059	\$6,600,000	875	2059	
46	2060		2060	\$340,000	0	2060	\$450,000	75	2060	\$0	0	2060	\$790,000	75	2060	
47	2061		2061	\$360,000	0	2061	\$675,000	150	2061	\$4,000,000	1440	2061	\$5,035,000	1,590	2061	
48	2062		2062	\$300,000	0	2062	\$750,000	175	2062	\$1,500,000	175	2062	\$2,550,000	350	2062	
49	2063		2063	\$800,000	0	2063	\$750,000	125	2063	\$4,000,000	720	2063	\$5,550,000	845	2063	
50	2064		2064	\$300,000	0	2064	\$675,000	150	2064	\$0	0	2064	\$975,000	150	2064	
Totals				\$824,500,000		\$21,000,000	0		\$24,175,000	5,725		67,500,000	15,715		\$937,175,000	15,715

	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
Alt #2	Dewatering & Monitoring / Major Repairs / Gates	10 years	\$4,000,000	1440	60	24-hour shifts	Yes
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$6,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$4,000,000	720	60	12-hour shifts	Yes
	Hurrican Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurrican Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$800,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$450,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$300,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
	ED Instrumentation Cost	Annually	\$20,000	0	0	None	No

\*\*Columns F, K, Q, S, X and Z are hidden component breakdowns, select Unhide to view

IHNC - Alternative #2 - 110' x 1200' Concrete U-Frame Lock Chamber

Year	2015	Construction cost (\$)	2015	No Impact to Navigation		2015	Minor Repair		2015	Major Repair		2015	Annual Summary		2015
				cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours	
1	2015	Planning -	2015	\$340,000	0	2015	\$500,000	150	2015	\$0	0	2015	\$840,000	150	2015
2	2016		2016	\$360,000	0	2016	\$600,000	200	2016	\$3,000,000	425	2016	\$3,960,000	625	2016
3	2017		2017	\$300,000	0	2017	\$500,000	150	2017	\$2,000,000	400	2017	\$2,800,000	550	2017
4	2018		2018	\$800,000	0	2018	\$800,000	225	2018	\$5,000,000	1440	2018	\$6,600,000	1,665	2018
5	2019		2019	\$300,000	0	2019	\$1,200,000	225	2019	\$0	720	2019	\$1,500,000	945	2019
-- New Chamber Construction Commencement --															
6	2020	\$41,600,000	2020	\$340,000	0	2020	\$1,000,000	250	2020	\$1,500,000	250	2020	\$44,440,000	500	2020
7	2021	\$153,600,000	2021	\$360,000	0	2021	\$500,000	150	2021	\$3,000,000	425	2021	\$157,460,000	575	2021
8	2022	\$132,600,000	2022	\$300,000	0	2022	\$600,000	200	2022	\$1,500,000	630	2022	\$135,000,000	830	2022
9	2023	\$51,100,000	2023	\$800,000	0	2023	\$500,000	150	2023	\$4,000,000	720	2023	\$56,400,000	870	2023
10	2024	\$97,100,000	2024	\$300,000	0	2024	\$800,000	225	2024	\$0	0	2024	\$98,200,000	225	2024
11	2025	\$64,600,000	2025	\$340,000	0	2025	\$500,000	150	2025	\$2,000,000	400	2025	\$67,440,000	550	2025
12	2026	\$41,900,000	2026	\$360,000	0	2026	\$1,000,000	250	2026	\$3,000,000	425	2026	\$46,260,000	675	2026
13	2027	\$40,600,000	2027	\$300,000	0	2027	\$500,000	150	2027	\$0	0	2027	\$41,400,000	150	2027
14	2028	\$123,400,000	2028	\$800,000	0	2028	\$600,000	200	2028	\$5,000,000	1440	2028	\$129,800,000	1,640	2028
15	2029	\$57,100,000	2029	\$300,000	0	2029	\$500,000	150	2029	\$0	720	2029	\$57,900,000	870	2029
16	2030	\$13,300,000	2030	\$340,000	0	2030	\$800,000	225	2030	\$1,500,000	630	2030	\$15,940,000	855	2030
17	2031	\$7,600,000	2031	\$360,000	0	2031	\$500,000	150	2031	\$1,500,000	175	2031	\$9,960,000	325	2031
-- New Chamber Construction Complete - Begin Advanced Maintenance Schedule --															
18	2032		2032	\$300,000	0	2032	\$0	0	2032	\$0	0	2032	\$300,000	0	2032
19	2033		2033	\$800,000	0	2033	\$0	0	2033	\$0	0	2033	\$800,000	0	2033
20	2034		2034	\$300,000	0	2034	\$675,000	150	2034	\$0	0	2034	\$975,000	150	2034
21	2035		2035	\$340,000	0	2035	\$0	0	2035	\$0	0	2035	\$340,000	0	2035
22	2036		2036	\$360,000	0	2036	\$0	0	2036	\$1,500,000	175	2036	\$1,860,000	175	2036
23	2037		2037	\$300,000	0	2037	\$675,000	150	2037	\$0	0	2037	\$975,000	150	2037
24	2038		2038	\$800,000	0	2038	\$0	0	2038	\$0	0	2038	\$800,000	0	2038
25	2039		2039	\$300,000	0	2039	\$0	0	2039	\$0	0	2039	\$300,000	0	2039
26	2040		2040	\$340,000	0	2040	\$675,000	150	2040	\$0	0	2040	\$1,015,000	150	2040
27	2041		2041	\$360,000	0	2041	\$0	0	2041	\$4,000,000	1440	2041	\$4,360,000	1,440	2041
28	2042		2042	\$300,000	0	2042	\$0	0	2042	\$1,500,000	175	2042	\$1,800,000	175	2042
29	2043		2043	\$800,000	0	2043	\$675,000	150	2043	\$0	0	2043	\$1,475,000	150	2043
30	2044		2044	\$300,000	0	2044	\$300,000		2044	\$0		2044	\$600,000	0	2044



30	2044	--- New Chamber Construction Complete ---	2044	\$300,000	0	2044	\$250,000	50	2044	\$0	0	2044	\$550,000	50	2044		
31	2045		2045	\$340,000	0	2045	\$500,000	75	2045	\$0	0	2045	\$840,000	75	2045		
32	2046		2046	\$360,000	0	2046	\$675,000	150	2046	\$0	0	2046	\$1,035,000	150	2046		
33	2047		2047	\$300,000	0	2047	\$500,000	75	2047	\$1,500,000	175	2047	\$2,300,000	250	2047		
34	2048		2048	\$800,000	0	2048	\$250,000	50	2048	\$0	0	2048	\$1,050,000	50	2048		
35	2049		2049	\$300,000	0	2049	\$675,000	150	2049	\$0	0	2049	\$975,000	150	2049		
36	2050		2050	\$340,000	0	2050	\$0	0	2050	\$0	0	2050	\$340,000	0	2050		
37	2051		2051	\$360,000	0	2051	\$0	0	2051	\$4,000,000	1440	2051	\$4,360,000	1,440	2051		
38	2052		2052	\$300,000	0	2052	\$675,000	150	2052	\$1,500,000	175	2052	\$2,475,000	325	2052		
39	2053		2053	\$800,000	0	2053	\$650,000	100	2053	\$0	0	2053	\$1,450,000	100	2053		
40	2054		2054	\$300,000	0	2054	\$0	0	2054	\$0	0	2054	\$300,000	0	2054		
41	2055		2055	\$340,000	0	2055	\$675,000	150	2055	\$0	0	2055	\$1,015,000	150	2055		
42	2056		2056	\$360,000	0	2056	\$650,000	100	2056	\$0	0	2056	\$1,010,000	100	2056		
43	2057		2057	\$300,000	0	2057	\$0	0	2057	\$5,000,000	175	2057	\$5,300,000	175	2057		
44	2058		2058	\$800,000	0	2058	\$675,000	150	2058	\$0	0	2058	\$1,475,000	150	2058		
45	2059		2059	\$300,000	0	2059	\$250,000	50	2059	\$5,000,000	825	2059	\$5,550,000	875	2059		
46	2060		2060	\$340,000	0	2060	\$500,000	75	2060	\$0	0	2060	\$840,000	75	2060		
47	2061		2061	\$360,000	0	2061	\$675,000	150	2061	\$4,000,000	1440	2061	\$5,035,000	1,590	2061		
48	2062		2062	\$300,000	0	2062	\$750,000	175	2062	\$1,500,000	175	2062	\$2,550,000	350	2062		
49	2063		2063	\$800,000	0	2063	\$750,000	125	2063	\$3,000,000	720	2063	\$4,550,000	845	2063		
50	2064		2064	\$300,000	0	2064	\$675,000	150	2064	\$0	0	2064	\$975,000	150	2064		
Totals				\$824,500,000			\$21,000,000	0		\$23,875,000	5,725		65,500,000	15,715		\$934,875,000	15,715

\* Hurricane Damages could be captured during dewaterings, but included for worst-case option  
 \* Guidewall and dolphin repair outside of range but playing worst-case advocate that they are damaged less than and require repair  
 \* Chamber guidewall damage is significantly outside the range of needing repair 33 versus 50

	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
Alt #3	Dewatering & Monitoring / Major Repairs / Gates	10 years	\$3,000,000	1440	60	24-hour shifts	Yes
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$4,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$3,000,000	720	60	12-hour shifts	Yes
	Hurrican Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurrican Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$650,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$500,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$250,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
	ED Instrumentation Cost	Annually	\$20,000	0	0	None	No

\*\*Columns F, K, Q, S, X and Z are hidden component breakdowns, select Unhide to view

IHNC - Alternative #3 - 75' x 900' Concrete U-Frame Lock Chamber															
Year	Construction cost (\$)		No Impact to Navigation			Minor Repair			Major Repair			Annual Summary			
			cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours		
1	2015	-- Planning --	2015	\$340,000	0	2015	\$500,000	150	2015	\$0	0	2015	\$840,000	150	2015
2	2016		2016	\$360,000	0	2016	\$600,000	200	2016	\$3,000,000	425	2016	\$3,960,000	625	2016
3	2017		2017	\$300,000	0	2017	\$500,000	150	2017	\$2,000,000	400	2017	\$2,800,000	550	2017
4	2018		2018	\$800,000	0	2018	\$800,000	225	2018	\$5,000,000	1440	2018	\$6,600,000	1,665	2018
5	2019		2019	\$300,000	0	2019	\$1,200,000	225	2019	\$0	720	2019	\$1,500,000	945	2019
-- New Chamber Construction Commencement --															
6	2020	\$41,600,000	2020	\$340,000	0	2020	\$1,000,000	250	2020	\$1,500,000	250	2020	\$44,440,000	500	2020
7	2021	\$153,600,000	2021	\$360,000	0	2021	\$500,000	150	2021	\$3,000,000	425	2021	\$157,460,000	575	2021
8	2022	\$132,600,000	2022	\$300,000	0	2022	\$600,000	200	2022	\$1,500,000	630	2022	\$135,000,000	830	2022
9	2023	\$51,100,000	2023	\$800,000	0	2023	\$500,000	150	2023	\$4,000,000	720	2023	\$56,400,000	870	2023
10	2024	\$97,100,000	2024	\$300,000	0	2024	\$800,000	225	2024	\$0	0	2024	\$98,200,000	225	2024
11	2025	\$64,600,000	2025	\$340,000	0	2025	\$500,000	150	2025	\$2,000,000	400	2025	\$67,440,000	550	2025
12	2026	\$41,900,000	2026	\$360,000	0	2026	\$1,000,000	250	2026	\$3,000,000	425	2026	\$46,260,000	675	2026
13	2027	\$40,600,000	2027	\$300,000	0	2027	\$500,000	150	2027	\$0	0	2027	\$41,400,000	150	2027
14	2028	\$123,400,000	2028	\$800,000	0	2028	\$600,000	200	2028	\$5,000,000	1440	2028	\$129,800,000	1,640	2028
15	2029	\$57,100,000	2029	\$300,000	0	2029	\$500,000	150	2029	\$0	720	2029	\$57,900,000	870	2029
16	2030	\$13,300,000	2030	\$340,000	0	2030	\$800,000	225	2030	\$1,500,000	630	2030	\$15,940,000	855	2030
17	2031	\$7,600,000	2031	\$360,000	0	2031	\$500,000	150	2031	\$1,500,000	175	2031	\$9,960,000	325	2031
-- New Chamber Construction Complete - Begin Advanced Maintenance Schedule --															
18	2032		2032	\$300,000	0	2032	\$0	0	2032	\$0	0	2032	\$300,000	0	2032
19	2033		2033	\$800,000	0	2033	\$0	0	2033	\$0	0	2033	\$800,000	0	2033
20	2034		2034	\$300,000	0	2034	\$675,000	150	2034	\$0	0	2034	\$975,000	150	2034
21	2035		2035	\$340,000	0	2035	\$0	0	2035	\$0	0	2035	\$340,000	0	2035
22	2036		2036	\$360,000	0	2036	\$0	0	2036	\$1,500,000	175	2036	\$1,860,000	175	2036
23	2037		2037	\$300,000	0	2037	\$675,000	150	2037	\$0	0	2037	\$975,000	150	2037
24	2038		2038	\$800,000	0	2038	\$0	0	2038	\$0	0	2038	\$800,000	0	2038
25	2039		2039	\$300,000	0	2039	\$0	0	2039	\$0	0	2039	\$300,000	0	2039
26	2040		2040	\$340,000	0	2040	\$675,000	150	2040	\$0	0	2040	\$1,015,000	150	2040
27	2041		2041	\$360,000	0	2041	\$0	0	2041	\$3,000,000	1440	2041	\$3,360,000	1,440	2041
28	2042		2042	\$300,000	0	2042	\$0	0	2042	\$1,500,000	175	2042	\$1,800,000	175	2042
29	2043		2043	\$800,000	0	2043	\$675,000	150	2043	\$0	150	2043	\$1,475,000	150	2043

29	2043			2043		0		2043		0		2043	\$1,413,000	100	2043				
30	2044	--- New Chamber Construction Complete ---		2044		\$300,000	0	2044		\$250,000	50	2044	\$0	0	2044	\$550,000	50	2044	
31	2045			2045		\$340,000	0	2045		\$500,000	75	2045	\$0	0	2045	\$840,000	75	2045	
32	2046			2046		\$360,000	0	2046		\$675,000	150	2046	\$0	0	2046	\$1,035,000	150	2046	
33	2047			2047		\$300,000	0	2047		\$500,000	75	2047	\$1,500,000	175	2047	\$2,300,000	250	2047	
34	2048			2048		\$800,000	0	2048		\$250,000	50	2048	\$0	0	2048	\$1,050,000	50	2048	
35	2049			2049		\$300,000	0	2049		\$675,000	150	2049	\$0	0	2049	\$975,000	150	2049	
36	2050			2050		\$340,000	0	2050		\$0	0	2050	\$0	0	2050	\$340,000	0	2050	
37	2051			2051		\$360,000	0	2051		\$0	0	2051	\$3,000,000	1440	2051	\$3,360,000	1,440	2051	
38	2052			2052		\$300,000	0	2052		\$675,000	150	2052	\$1,500,000	175	2052	\$2,475,000	325	2052	
39	2053			2053		\$800,000	0	2053		\$650,000	100	2053	\$0	0	2053	\$1,450,000	100	2053	
40	2054			2054		\$300,000	0	2054		\$0	0	2054	\$0	0	2054	\$300,000	0	2054	
41	2055			2055		\$340,000	0	2055		\$675,000	150	2055	\$0	0	2055	\$1,015,000	150	2055	
42	2056			2056		\$360,000	0	2056		\$650,000	100	2056	\$0	0	2056	\$1,010,000	100	2056	
43	2057			2057		\$300,000	0	2057		\$0	0	2057	\$5,000,000	175	2057	\$5,300,000	175	2057	
44	2058			2058		\$800,000	0	2058		\$675,000	150	2058	\$0	0	2058	\$1,475,000	150	2058	
45	2059			2059		\$300,000	0	2059		\$250,000	50	2059	\$5,000,000	825	2059	\$5,550,000	875	2059	
46	2060		2060		\$340,000	0	2060		\$500,000	75	2060	\$0	0	2060	\$840,000	75	2060		
47	2061		2061		\$360,000	0	2061		\$675,000	150	2061	\$3,000,000	1440	2061	\$4,035,000	1,590	2061		
48	2062		2062		\$300,000	0	2062		\$750,000	175	2062	\$1,500,000	175	2062	\$2,550,000	350	2062		
49	2063		2063		\$800,000	0	2063		\$750,000	125	2063	\$3,000,000	720	2063	\$4,550,000	845	2063		
50	2064		2064		\$300,000	0	2064		\$675,000	150	2064	\$0	0	2064	\$975,000	150	2064		
Totals						\$824,500,000	0			\$23,875,000	5,725			62,500,000	15,715		\$931,875,000	15,715	

	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
Alt #4	Dewatering & Monitoring / Major Repairs / Gates	10 years	\$3,000,000	1440	60	24-hour shifts	Yes
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$6,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$4,000,000	720	60	12-hour shifts	Yes
	Hurricane Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurricane Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$800,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$450,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$300,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No	
ED Instrumentation Cost	Annually	\$20,000	0	0	None	No	

\*\*Columns F, K, Q, S, X and Z are hidden component breakdowns, select Unhide to view

IHNC - Alternative #4 - 75' x 1200' Concrete U-Frame Lock Chamber

Year		Construction cost (\$)	No Impact to Navigation cost (\$)		closure hours		Minor Repair cost (\$)		closure hours		Major Repair cost (\$)		closure hours		Annual Summary cost (\$)		closure hours	
1	2015	-- Planning --	2015	\$340,000	0	2015	\$500,000	150	2015	\$0	0	2015	\$840,000	150	2015			
2	2016		2016	\$360,000	0	2016	\$600,000	200	2016	\$3,000,000	425	2016	\$3,960,000	625	2016			
3	2017		2017	\$300,000	0	2017	\$500,000	150	2017	\$2,000,000	400	2017	\$2,800,000	550	2017			
4	2018		2018	\$800,000	0	2018	\$800,000	225	2018	\$5,000,000	1440	2018	\$6,600,000	1,665	2018			
5	2019		2019	\$300,000	0	2019	\$1,200,000	225	2019	\$0	720	2019	\$1,500,000	945	2019			
-- New Chamber Construction Commencement --																		
6	2020	\$41,600,000	2020	\$340,000	0	2020	\$1,000,000	250	2020	\$1,500,000	250	2020	\$44,440,000	500	2020			
7	2021	\$153,600,000	2021	\$360,000	0	2021	\$500,000	150	2021	\$3,000,000	425	2021	\$157,460,000	575	2021			
8	2022	\$132,600,000	2022	\$300,000	0	2022	\$600,000	200	2022	\$1,500,000	630	2022	\$135,000,000	830	2022			
9	2023	\$51,100,000	2023	\$800,000	0	2023	\$500,000	150	2023	\$4,000,000	720	2023	\$56,400,000	870	2023			
10	2024	\$97,100,000	2024	\$300,000	0	2024	\$800,000	225	2024	\$0	0	2024	\$98,200,000	225	2024			
11	2025	\$64,600,000	2025	\$340,000	0	2025	\$500,000	150	2025	\$2,000,000	400	2025	\$67,440,000	550	2025			
12	2026	\$41,900,000	2026	\$360,000	0	2026	\$1,000,000	250	2026	\$3,000,000	425	2026	\$46,260,000	675	2026			
13	2027	\$40,600,000	2027	\$300,000	0	2027	\$500,000	150	2027	\$0	0	2027	\$41,400,000	150	2027			
14	2028	\$123,400,000	2028	\$800,000	0	2028	\$600,000	200	2028	\$5,000,000	1440	2028	\$129,800,000	1,640	2028			
15	2029	\$57,100,000	2029	\$300,000	0	2029	\$500,000	150	2029	\$0	720	2029	\$57,900,000	870	2029			
16	2030	\$13,300,000	2030	\$340,000	0	2030	\$800,000	225	2030	\$1,500,000	630	2030	\$15,940,000	855	2030			
17	2031	\$7,600,000	2031	\$360,000	0	2031	\$500,000	150	2031	\$1,500,000	175	2031	\$9,960,000	325	2031			
-- New Chamber Construction Complete - Begin Advanced Maintenance Schedule --																		
18	2032		2032	\$300,000	0	2032	\$0	0	2032	\$0	0	2032	\$300,000	0	2032			
19	2033		2033	\$800,000	0	2033	\$0	0	2033	\$0	0	2033	\$800,000	0	2033			
20	2034		2034	\$300,000	0	2034	\$675,000	150	2034	\$0	0	2034	\$975,000	150	2034			
21	2035		2035	\$340,000	0	2035	\$0	0	2035	\$0	0	2035	\$340,000	0	2035			
22	2036		2036	\$360,000	0	2036	\$0	0	2036	\$1,500,000	175	2036	\$1,860,000	175	2036			
23	2037		2037	\$300,000	0	2037	\$675,000	150	2037	\$0	0	2037	\$975,000	150	2037			
24	2038		2038	\$800,000	0	2038	\$0	0	2038	\$0	0	2038	\$800,000	0	2038			
25	2039		2039	\$300,000	0	2039	\$0	0	2039	\$0	0	2039	\$300,000	0	2039			
26	2040		2040	\$340,000	0	2040	\$675,000	150	2040	\$0	0	2040	\$1,015,000	150	2040			
27	2041		2041	\$360,000	0	2041	\$0	0	2041	\$3,000,000	1440	2041	\$3,360,000	1,440	2041			
28	2042		2042	\$300,000	0	2042	\$0	0	2042	\$1,500,000	175	2042	\$1,800,000	175	2042			

28	2042		2042		2042		2042		2042		2042		2042		2042
29	2043	--- New Chamber Construction Complete ---	2043	\$800,000	0	2043	\$675,000	150	2043	\$0	175	2043	\$1,000,000	175	2043
30	2044		2044	\$300,000	0	2044	\$300,000	50	2044	\$0	0	2044	\$600,000	50	2044
31	2045		2045	\$340,000	0	2045	\$450,000	75	2045	\$0	0	2045	\$790,000	75	2045
32	2046		2046	\$360,000	0	2046	\$675,000	150	2046	\$0	0	2046	\$1,035,000	150	2046
33	2047		2047	\$300,000	0	2047	\$450,000	75	2047	\$1,500,000	175	2047	\$2,250,000	250	2047
34	2048		2048	\$800,000	0	2048	\$300,000	50	2048	\$0	0	2048	\$1,100,000	50	2048
35	2049		2049	\$300,000	0	2049	\$675,000	150	2049	\$0	0	2049	\$975,000	150	2049
36	2050		2050	\$340,000	0	2050	\$0	0	2050	\$0	0	2050	\$340,000	0	2050
37	2051		2051	\$360,000	0	2051	\$0	0	2051	\$3,000,000	1440	2051	\$3,360,000	1,440	2051
38	2052		2052	\$300,000	0	2052	\$675,000	150	2052	\$1,500,000	175	2052	\$2,475,000	325	2052
39	2053		2053	\$800,000	0	2053	\$800,000	100	2053	\$0	0	2053	\$1,600,000	100	2053
40	2054		2054	\$300,000	0	2054	\$0	0	2054	\$0	0	2054	\$300,000	0	2054
41	2055		2055	\$340,000	0	2055	\$675,000	150	2055	\$0	0	2055	\$1,015,000	150	2055
42	2056		2056	\$360,000	0	2056	\$800,000	100	2056	\$0	0	2056	\$1,160,000	100	2056
43	2057		2057	\$300,000	0	2057	\$0	0	2057	\$5,000,000	175	2057	\$5,300,000	175	2057
44	2058		2058	\$800,000	0	2058	\$675,000	150	2058	\$0	0	2058	\$1,475,000	150	2058
45	2059		2059	\$300,000	0	2059	\$300,000	50	2059	\$6,000,000	825	2059	\$6,600,000	875	2059
46	2060		2060	\$340,000	0	2060	\$450,000	75	2060	\$0	0	2060	\$790,000	75	2060
47	2061		2061	\$360,000	0	2061	\$675,000	150	2061	\$3,000,000	1440	2061	\$4,035,000	1,590	2061
48	2062		2062	\$300,000	0	2062	\$750,000	175	2062	\$1,500,000	175	2062	\$2,550,000	350	2062
49	2063	2063	\$800,000	0	2063	\$750,000	125	2063	\$4,000,000	720	2063	\$5,550,000	845	2063	
50	2064	2064	\$300,000	0	2064	\$675,000	150	2064	\$0	0	2064	\$975,000	150	2064	
Totals				\$824,500,000	\$21,000,000		\$24,175,000	5,725		64,500,000	15,715		\$934,175,000	15,715	

	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
Fix As Fails	Dewatering & Monitoring / Major Repairs / Gates	10 years	\$5,000,000	1440	60	24-hour shifts	Yes
	Rehabilitation of Chamber Guidewall (W & E)	20 years	\$4,000,000	720	60	12-hour shifts	Yes
	Rehabilitation of Guidewall (NW & SW)	20 years	\$4,000,000	630	53	12-hour shifts	Yes
	Rehabilitation of Guidewall (NE & SE)	20 years	\$2,000,000	400	34	12-hour shifts	Yes
	Rehabilitation of Dolphin (NE, NW, SE, SW)	15 years	\$1,500,000	250	21	12-hour shifts	Yes
	Hurricane Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurricane Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	20 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	Annually	\$500,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	12 years	\$500,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	12 years	\$300,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	12 years	\$100,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
ED Instrumentation Cost	Annually	\$20,000	0	0	None	No	

\*\*Columns F, L, N, S and U are hidden component breakdowns, select Unhide to view



Alternative #2 : Concrete U-Frame Chamber 110' x 1200' - Routine Maintenance							
Alt #2	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
		Dewatering & Monitoring / Major Repairs / Gates	10 years	\$4,000,000	1440	60	24-hour shifts
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$6,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$4,000,000	720	60	12-hour shifts	Yes
	Hurrican Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurrican Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$800,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$450,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$300,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
	ED Instrumentation Cost	Annually	\$20,000	0	0	None	No

Alternative #3 : Concrete U-Frame Chamber 75' x 900' - Routine Maintenance							
Alt #3	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
		Dewatering & Monitoring / Major Repairs / Gates	10 years	\$3,000,000	1440	60	24-hour shifts
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$4,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$3,000,000	720	60	12-hour shifts	Yes
	Hurrican Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurrican Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$650,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$500,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$250,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
	ED Instrumentation Cost	Annually	\$20,000	0	0	None	No

Alternative #4 : Concrete U-Frame Chamber 75' x 1200' - Routine Maintenance							
Alt #4	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
		Dewatering & Monitoring / Major Repairs / Gates	10 years	\$3,000,000	1440	60	24-hour shifts
	Rehabilitation of Chamber Guidewall (W & E)	50 years	\$5,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NW & SW)	35 years	\$6,000,000	825	69	12-hour shifts	Yes
	Rehabilitation of Guidewall & Dolphin (NE & SE)	35 years	\$4,000,000	720	60	12-hour shifts	Yes
	Hurricane Damage	5 years	\$1,500,000	175	8	24-hour shifts	Yes
	Hurricane Damage ***	25 years	\$5,000,000	175	8	24-hour shifts	Yes
	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
	Maintenance by Hired Labor Units	3 years	\$675,000	150	13	12-hour shifts	Yes
	Rehabilitation of Chamber Guidewall Armoring (W & E)	25 years	\$800,000	100	9	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NW & SW)	15 years	\$450,000	75	7	12-hour shifts	Yes
	Rehabilitation of Guidewall Face Timber (NE & SE)	15 years	\$300,000	50	5	12-hour shifts	Yes
	PLC System Upgrade	5 years	\$500,000	10	1	random < 2 hours	No
	Routine Maintenance	Annually	\$250,000	75	7	random < 2 hours	No
	Periodic Inspection (PI) Program	5 years	\$60,000	0	0	None	No
	A/E Instrumentation (Pre-PI)	5 years	\$40,000	0	0	None	No
	Security Maintenance Contract w/ ACE-IT	Annually	\$30,000	0	0	None	No
	ED Instrumentation Cost	Annually	\$20,000	0	0	None	No

IHNC - Without Project Scenario

Year	No Impact to Navigation			Minor Repair			Major Repair			Annual Summary		
	cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours		cost (\$)	closure hours	
1 2015	\$340,000	0	2015	\$500,000	150	2015	\$0	0	2015	\$840,000	150	2015
2 2016	\$360,000	0	2016	\$600,000	200	2016	\$3,000,000	425	2016	\$3,960,000	625	2016
3 2017	\$300,000	0	2017	\$500,000	150	2017	\$2,000,000	400	2017	\$2,800,000	550	2017
4 2018	\$800,000	0	2018	\$800,000	225	2018	\$5,000,000	1440	2018	\$6,600,000	1,665	2018
5 2019	\$300,000	0	2019	\$1,200,000	225	2019	\$0	720	2019	\$1,500,000	945	2019
6 2020	\$340,000	0	2020	\$1,000,000	250	2020	\$1,500,000	250	2020	\$2,840,000	500	2020
7 2021	\$360,000	0	2021	\$500,000	150	2021	\$3,000,000	425	2021	\$3,860,000	575	2021
8 2022	\$300,000	0	2022	\$600,000	200	2022	\$1,500,000	630	2022	\$2,400,000	830	2022
9 2023	\$800,000	0	2023	\$500,000	150	2023	\$4,000,000	720	2023	\$5,300,000	870	2023
10 2024	\$300,000	0	2024	\$800,000	225	2024	\$0	0	2024	\$1,100,000	225	2024
11 2025	\$340,000	0	2025	\$500,000	150	2025	\$2,000,000	400	2025	\$2,840,000	550	2025
12 2026	\$360,000	0	2026	\$1,000,000	250	2026	\$3,000,000	425	2026	\$4,360,000	675	2026
13 2027	\$300,000	0	2027	\$500,000	150	2027	\$0	0	2027	\$800,000	150	2027
14 2028	\$800,000	0	2028	\$600,000	200	2028	\$5,000,000	1440	2028	\$6,400,000	1,640	2028
15 2029	\$300,000	0	2029	\$500,000	150	2029	\$0	720	2029	\$800,000	870	2029
16 2030	\$340,000	0	2030	\$800,000	225	2030	\$1,500,000	630	2030	\$2,640,000	855	2030
17 2031	\$360,000	0	2031	\$500,000	150	2031	\$1,500,000	630	2031	\$2,640,000	855	2031
18 2032	\$300,000	0	2032	\$1,000,000	250	2032	\$0	175	2032	\$1,300,000	250	2032
19 2033	\$800,000	0	2033	\$500,000	150	2033	\$4,000,000	720	2033	\$5,300,000	870	2033
20 2034	\$300,000	0	2034	\$600,000	200	2034	\$0	0	2034	\$900,000	200	2034
21 2035	\$340,000	0	2035	\$500,000	150	2035	\$3,000,000	500	2035	\$3,840,000	650	2035
22 2036	\$360,000	0	2036	\$800,000	225	2036	\$5,000,000	175	2036	\$6,160,000	400	2036
23 2037	\$300,000	0	2037	\$500,000	150	2037	\$2,000,000	400	2037	\$2,800,000	550	2037
24 2038	\$800,000	0	2038	\$1,000,000	250	2038	\$5,000,000	1440	2038	\$6,800,000	1,690	2038
25 2039	\$300,000	0	2039	\$1,200,000	225	2039	\$0	720	2039	\$1,500,000	945	2039
26 2040	\$340,000	0	2040	\$600,000	200	2040	\$1,500,000	250	2040	\$2,440,000	450	2040
27 2041	\$360,000	0	2041	\$1,200,000	225	2041	\$1,500,000	175	2041	\$3,060,000	400	2041
28 2042	\$300,000	0	2042	\$800,000	225	2042	\$1,500,000	630	2042	\$2,600,000	855	2042
29 2043	\$800,000	0	2043	\$500,000	150	2043	\$4,000,000	720	2043	\$5,300,000	870	2043
30 2044	\$300,000	0	2044	\$1,000,000	250	2044	\$0	0	2044	\$1,300,000	250	2044
31 2045	\$340,000	0	2045	\$500,000	150	2045	\$2,000,000	400	2045	\$2,840,000	550	2045
32 2046	\$360,000	0	2046	\$600,000	200	2046	\$3,000,000	225	2046	\$3,960,000	425	2046
33 2047	\$300,000	0	2047	\$500,000	150	2047	\$0	0	2047	\$800,000	150	2047
34 2048	\$800,000	0	2048	\$800,000	225	2048	\$5,000,000	1440	2048	\$6,600,000	1,665	2048
35 2049	\$300,000	0	2049	\$500,000	150	2049	\$1,500,000	970	2049	\$2,300,000	1,120	2049
36 2050	\$340,000	0	2050	\$1,000,000	250	2050	\$3,000,000	880	2050	\$4,340,000	1,130	2050
37 2051	\$360,000	0	2051	\$500,000	150	2051	\$1,500,000	175	2051	\$2,360,000	325	2051
38 2052	\$300,000	0	2052	\$600,000	200	2052	\$0	0	2052	\$900,000	200	2052
39 2053	\$800,000	0	2053	\$1,200,000	225	2053	\$4,000,000	720	2053	\$6,000,000	945	2053
40 2054	\$300,000	0	2054	\$800,000	225	2054	\$1,500,000	250	2054	\$2,600,000	475	2054
41 2055	\$340,000	0	2055	\$500,000	150	2055	\$0	0	2055	\$840,000	150	2055
42 2056	\$360,000	0	2056	\$1,000,000	250	2056	\$1,500,000	175	2056	\$2,860,000	425	2056
43 2057	\$300,000	0	2057	\$500,000	150	2057	\$2,000,000	400	2057	\$2,800,000	550	2057
44 2058	\$800,000	0	2058	\$600,000	200	2058	\$5,000,000	1440	2058	\$6,400,000	1,640	2058
45 2059	\$300,000	0	2059	\$1,200,000	225	2059	\$0	720	2059	\$1,500,000	945	2059
46 2060	\$340,000	0	2060	\$800,000	225	2060	\$2,000,000	400	2060	\$3,140,000	625	2060
47 2061	\$360,000	0	2061	\$500,000	150	2061	\$5,000,000	175	2061	\$5,860,000	325	2061
48 2062	\$300,000	0	2062	\$1,000,000	250	2062	\$3,000,000	880	2062	\$4,300,000	1,130	2062
49 2063	\$800,000	0	2063	\$1,200,000	225	2063	\$4,000,000	720	2063	\$6,000,000	945	2063
50 2064	\$300,000	0	2064	\$600,000	200	2064	\$1,500,000	250	2064	\$2,400,000	450	2064
Totals	\$21,000,000	0		\$36,500,000	9,800		106,000,000	24,750		\$163,500,000	34,550	