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

Summary Operation Maintenance		Costs (2015 \$)									
	N	linor Repairs	Ν	/lajor 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					

	Clo	osure Durations (Ho	urs)
	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

Component	Reason for Outage	Date of Outage
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	repalcement	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-Fra	me Lock Cha	mber 75'	x 640'		
	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation
	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
Fix As Fails	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-Fran	ne Chamber 11	LO' x 900' - Ro	utine Ma	intenance		
	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	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
Alt #1	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes
AIL#1	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

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

IHNC - Alternative #1 - 110' x 900' Concrete U-Frame Lock Chamber

	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	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
Alt #1	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

	Jan	by Louisville District, 1				IHNC - Altern	ative #1 - 110' x 900' Concrete U-Fra	me Lock Chamber					
		Construction		No Impact to			Minor Repair		Major Repair		Annual Sur		
	ear	cost (\$)		cost (\$) \$340,000	closure hours		cost (\$) closure hours \$500,000		cost (\$) closure hours \$0		cost (\$)	closure hours	
1	2015		2015	\$360,000	0	2015	\$600,000	2015	\$3,000,000	2015	\$840,000	150	2015
2	2016	მ	2016		0	2016	200	2016	425	2016	\$3,960,000	625	2016
3	2017	Planning	2017	\$300,000	0	2017	\$500,000 150	2017	\$2,000,000 400	2017	\$2,800,000	550	2017
4	2018	Ī	2018	\$800,000	0	2018	\$800,000	2018	\$5,000,000 1440	2018	\$6,600,000	1,665	2018
5	2019		2019	\$300,000	0	2019	\$1,200,000	2019	\$0 720	2019	\$1,500,000	945	2019
					, v	N	lew Chamber Construction Commend	ement	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		L		
6	2020	\$41,600,000	2020	\$340,000	0	2020	\$1,000,000	2020	\$1,500,000	2020	\$44,440,000	500	2020
7	2021	\$153,600,000	2021	\$360,000		2021	\$500,000	2021	\$3,000,000	2021	\$157,460,000	575	2021
8	2022	\$132,600,000	2022	\$300,000	0	2022	\$600,000	2022	\$1,500,000	2022	\$135,000,000	830	2022
9	2023	\$51,100,000	2023	\$800,000	0	2023	\$500,000	2023	\$4,000,000	2023	\$56,400,000	870	2023
10	2024	\$97,100,000	2024	\$300,000	0	2024	\$800,000	2023	\$0 720	2023	\$98,200,000	225	2024
11	2025	\$64,600,000	2025	\$340,000	0	2025	\$500,000	2025	\$2,000,000	2025	\$67,440,000	550	2025
12	2026	\$41,900,000	2026	\$360,000	0	2026	\$1,000,000	2026	\$3,000,000	2026	\$46,260,000	675	2026
		\$40,600,000		\$300,000	0	-	\$500,000	-	\$0 \$0		+		
13	2027	\$123,400,000	2027	\$800,000	0	2027	\$600,000	2027	\$5,000,000	2027	\$41,400,000	150	2027
14	2028	\$57,100,000	2028	\$300,000	0	2028	\$500,000	2028	\$0	2028	\$129,800,000	1,640	2028
15	2029	\$13,300,000	2029	\$340,000	0	2029	\$800,000	2029	\$1,500,000 720	2029	\$57,900,000	870	2029
16	2030	\$7,600,000	2030	\$360,000	0	2030	\$500,000	2030	\$1,500,000	2030	\$15,940,000	855	2030
17	2031	\$7,000,000	2031	\$300,000	0	2031	150	2031	175	2031	\$9,960,000	325	2031
				\$200.000		New Chamber Cor	nstruction Complete - Begin Advanced	Maintenance Schedule					
18	2032		2032	\$300,000	0	2032	\$0 0	2032	\$0	2032	\$300,000	0	2032
19	2033		2033	\$800,000	0	2033	\$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	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	2040	\$0 0	2040	\$1,015,000	150	2040
27	2041		2041	\$360,000	0	2041	\$0 0	2041	\$4,000,000	2041	\$4,360,000	1,440	2041
28	2042		2042	\$300,000	0	2042	\$0 0	2042	\$1,500,000	2042	\$1,800,000	175	2042
29	2043		2043	\$800,000		2043	\$675,000	2043	\$0	2043	\$1,475,000	150	2043
					0		150		0				

30	2044		2044		0	2044		50	2044			0		2044	φουυ,υυυ	ου	2044
31	2045		2045	\$340,000	0	2045	\$450,000	75	2045		\$0	0		2045	\$790,000	75	2045
32	2046	Complete	2046	\$360,000	0	2046	\$675,000	150	2046		\$0	0		2046	\$1,035,000	150	2046
33	2047	tion C	2047	\$300,000	0	2047	\$450,000	75	2047	\$1,	,500,000	175		2047	\$2,250,000	250	2047
34	2048	Construction	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	Chamber	2050	\$340,000	0	2050	\$0	0	2050		\$0	0		2050	\$340,000	0	2050
37	2051	- New	2051	\$360,000	0	2051	\$0		2051	\$4,	,000,000			2051	\$4,360,000	1,440	2051
38	2052		2052	\$300,000		2052	\$675,000	0	2052	\$1,	,500,000	1440		2052	\$2,475,000	325	2052
39	2053		2053	\$800,000	0	2053	\$800,000	150	2053		\$0	175		2053	\$1,600,000	100	2053
40	2054		2054	\$300,000	0	2054	\$0	100	2054		\$0	0	-	2054	\$300,000	0	2054
41	2055		2055	\$340,000	0	2055	\$675,000	0	2055		\$0	0		2055	\$1,015,000	150	2055
				\$360,000	0	2055	\$800,000	150	-		\$0	0	-				
42	2056		2056	\$300,000	0		\$0	100	2056		,000,000	0		2056	\$1,160,000	100	2056
43	2057		2057	\$800,000	0	2057	\$675,000	0	2057		\$0	175	-	2057	\$5,300,000	175	2057
44	2058		2058	\$300,000	0	2058	\$300,000	150	2058		,000,000	0		2058	\$1,475,000	150	2058
45	2059		2059		0	2059		50	2059	\$6,		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		,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
То	otals	\$824,500,000		\$21,000,000	0		\$24,175,000	5,725		67	,500,000	15,715			\$937,175,000	15,715	

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

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

	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	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
Alt #2	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

2 2016			IHNC Lock Study, Pre	epared by Louisville Di	strict, 10 August 201	5								
Control Cont						IHNC - Alternativ	ve #2 - 110' x 120	00' Concrete U-Fran	me Lock Chamber					
\$ 2015 \$460,000 \$0 \$2015 \$560,000 \$0 \$2015 \$560,000 \$120														
1 2015		cost (\$)			closure hours			closure hours						
2 2015	1 2015		2015		0	2015		150	2015	0	2015	\$840,000	150	2015
\$ 2018 2018 2018 550,0000 0 2018 550,0000 0 2018 550,0000 25 2018 550,0000 0 0 0 0 0 0 0 0	2 2016	1	2016		0	2016		200	2016	425	2016	\$3,960,000	625	2016
\$ 2018 2018 2018 550,0000 0 2018 550,0000 0 2018 550,0000 25 2018 550,0000 0 0 0 0 0 0 0 0	3 2017	lannin	2017	\$300,000	0	2017	\$500,000	150	2017		2017	\$2,800,000	550	2017
S 2019	4 2018	٩	2018	\$800,000		2018	\$800,000		2018	\$5,000,000	2018	\$6,600,000	1,665	2018
Second Construction Commencement Second Continue Commencement Second Continue Commencement Second Continue Continue Commencement Second Continue C	5 2019		2019	\$300,000		2019	\$1,200,000		2019	\$0	2019	\$1,500,000	945	2019
Second Column					0	Nev	v Chamber Const		ement	/20				
Signature Sign	6 2020	\$41,600,000	2020	\$340,000						\$1,500,000	2020	¢44.440.000	500	2020
Solid Soli		\$153,600,000		\$360,000	0		\$500,000	250						
\$ 2022 \$51,00,000 2023 \$580,000 0 2024 \$500,000 2025 \$540,000 0 2024 \$500,000 2025 \$540,000 2025 \$540,000 0 2025 \$540,000 0 2025 \$540,000 0 2025 \$540,000 2025 \$540,000 2025 \$540,000 2025					0			150		425				2021
9 2021 10 2024	8 2022		2022		0	2022		200	2022	630	2022	\$135,000,000	830	2022
11 2025	9 2023		2023		0	2023		150	2023	720	2023	\$56,400,000	870	2023
11 2025	10 2024	\$97,100,000	2024		0	2024		225	2024	0	2024	\$98,200,000	225	2024
2015	11 2025	\$64,600,000	2025	\$340,000	0	2025	\$500,000	150	2025		2025	\$67,440,000	550	2025
15 2027	12 2026	\$41,900,000	2026	\$360,000	0	2026	\$1,000,000	250	2026		2026	\$46,260,000	675	2026
\$\frac{14}{2028}\$ \begin{array}{c c c c c c c c c c c c c c c c c c c	13 2027	\$40,600,000	2027	\$300,000	0	2027	\$500,000	150	2027		2027	\$41,400,000	150	2027
15 2079 \$57,100,000 2029 \$5300,000 0 2029 \$5300,000 150 2029 \$57,900,000 870 16 2030 \$53,40,000 2031 \$5340,000 0 2031 \$5500,000 150 2031 \$51,500,000 175 2031 \$9,960,000 325	14 2028	\$123,400,000	2028	\$800,000		2028	\$600,000		2028	\$5,000,000	2028	\$129,800,000	1,640	2028
\$\begin{array}{c c c c c c c c c c c c c c c c c c c	15 2029	\$57,100,000	2029	\$300,000		2029	\$500,000		2029	\$0	2029	\$57,900,000	870	2029
17 2031 \$7,600,000 2031 \$360,000 0 2031 \$500,000 150 2031 \$5,500,000 175 2031 \$9,960,000 325	16 2030	\$13,300,000	2030	\$340,000		2030	\$800,000		2030	\$1,500,000	2030	\$15.940.000	855	2030
- New Chamber Construction Complete - Begin Advanced Maintenance Schedule 18 2032		\$7,600,000		\$360,000			\$500,000			\$1,500,000				2031
\$\begin{array}{cccccccccccccccccccccccccccccccccccc							ruction Complete					+-,,		
2032				\$300,000	-			- Begiii Advanced						
20					0			0		0				2032
20	19 2033		2033		0	2033		0	2033	0	2033	\$800,000	0	2033
21 235	20 2034		2034		0	2034		150	2034	0	2034	\$975,000	150	2034
22 236	21 2035		2035		0	2035		0	2035	0	2035	\$340,000	0	2035
23 2037	22 2036		2036		0	2036		0	2036		2036	\$1,860,000	175	2036
24 2038	23 2037		2037	\$300,000	0	2037	\$675,000	150	2037		2037	\$975,000	150	2037
25 2039	24 2038		2038	\$800,000		2038	\$0		2038		2038	\$800,000	0	2038
26 2040	25 2039		2039	\$300,000		2039	\$0		2039	\$0	2039	\$300,000	0	2039
27 2041 28 2042	26 2040		2040	\$340,000		2040	\$675,000		2040	\$0	2040	\$1,015,000	150	2040
28 2042 \$300,000 0 2042 \$0 0 2042 \$1,800,000 175	27 2041		2041	\$360,000		2041	\$0		2041	\$4,000,000	2041	\$4,360,000	1,440	2041
590,000				\$300,000			\$0			\$1,500,000			-	2042
	29 2043		2042	\$800,000	0	2042	\$675,000		2042	\$0	2042	\$1,475,000	150	2042
29 2043 0 150 2043 0 2044 5300,000 150 2043 51,4/5,000 150	29 2043		2043	\$300,000	0	2043	\$300,000	150	2043		2043			2043

				\$300,000			\$250,000			\$0					
30	2044		2044		0	2044		50	2044		0	2044	\$550,000	50	2044
31	2045	ite	2045	\$340,000	0	2045	\$500,000	75	2045	\$0	0	2045	\$840,000	75	2045
32	2046	Complete	2046	\$360,000	0	2046	\$675,000	150	2046	\$0	0	2046	\$1,035,000	150	2046
33	2047	ction C	2047	\$300,000	0	2047	\$500,000	75	2047	\$1,500,000	175	2047	\$2,300,000	250	2047
34	2048	Construction	2048	\$800,000	0	2048	\$250,000	50	2048	\$0	0	2048	\$1,050,000	50	2048
35	2049	nber Co	2049	\$300,000	0	2049	\$675,000	150	2049	\$0	0	2049	\$975,000	150	2049
36	2050	v Chamber	2050	\$340,000	0	2050	\$0	0	2050	\$0	0	2050	\$340,000	0	2050
37	2051	New	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		2063	\$750,000		2063	\$3,000,000		2063	\$4,550,000	845	2063
50	2004		2004	\$300,000	0	2054	\$675,000	125	2004	\$0	720	2054	¢075.000	150	2064
50	2064		2064		0	2064		150	2064		0	2064	\$975,000	150	2064
To	tals	\$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

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

IHNC - Alternative #3 - 75' x 900' Concrete U-Frame Lock Chamber

	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	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
Alt #3	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																	
		Construction				o Navigation				r Repair				or Repair		Annual S	•	
	ear	cost (\$)			cost (\$) \$340,000	closure hours			cost (\$) \$500,000	closure hours			cost (\$) \$0	closure hours		cost (\$)	closure hours	
1	2015			2015	6250.000	0		2015	Ć500.000	150		2015	<u> </u>	0	2015	\$840,000	150	2015
2	2016	1		2016	\$360,000	0		2016	\$600,000	200		2016	\$3,000,000	425	2016	\$3,960,000	625	2016
3	2017	Planning		2017	\$300,000	0		2017	\$500,000	150		2017	\$2,000,000	400	2017	\$2,800,000	550	2017
4	2018	- PI		2018	\$800,000			2018	\$800,000			2018	\$5,000,000		2018	\$6,600,000	1,665	2018
5	2019			2019	\$300,000	0		2019	\$1,200,000	225		2019	\$0	1440	2019	\$1,500,000	945	2019
						0			v Chamber Consti	225	omen			720		+ = /===/===	0.10	
		\$41,600,000			\$340,000				\$1,000,000	l detion comment	emen		\$1,500,000					
6	2020	\$153,600,000		2020	\$360,000	0		2020	\$500,000	250		2020	\$3,000,000	250	2020	\$44,440,000	500	2020
7	2021			2021		0		2021		150		2021		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		2026	\$46,260,000	675	2026
13	2027	\$40,600,000		2027	\$300,000			2027	\$500,000			2027	\$0		2027	\$41,400,000	150	2027
14	2028	\$123,400,000		2028	\$800,000	0		2028	\$600,000	150		2028	\$5,000,000		2028	\$129,800,000	1,640	2028
15	2029	\$57,100,000		2029	\$300,000	0		2029	\$500,000	200		2029	\$0	1440	2029	\$57,900,000	870	2029
16	2030	\$13,300,000		2030	\$340,000	0		2030	\$800,000	150		2029	\$1,500,000	720	2030	\$15,940,000	855	2030
		\$7,600,000			\$360,000	0			\$500,000	225			\$1,500,000	630				
17	2031			2031		0		2031		150		2031		175	2031	\$9,960,000	325	2031
					¢200.000	-	New	v Chamber Const		- Begin Advanced	Main	tenance 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			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			2041	\$0			2041	\$3,000,000		2041	\$3,360,000	1,440	2041
28	2042			2042	\$300,000	0		2042	\$0	0		2042	\$1,500,000	1440	2042	\$1,800,000	175	2042
20	3043			2042	\$800,000	0		2042	\$675,000	0		2042	\$0	175	2042	\$1,475,000	150	2042

29 2043	2043		0	2043		150	2043		0	2043	∪∪∪رد / 4ر1د	130	2043
30 2044	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	0 uo 11 2047	\$300,000	0	2047	\$500,000	75	2047	\$1,500,000	175	2047	\$2,300,000	250	2047
34 2048	2046 2047 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	2049 2050 Wew Chamber	\$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	-	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		62,500,000	15,715		\$931,875,000	15,715	

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

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

	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	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
Alt #4	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 Lock Study, Prepared by Louisville District, 10 August 2015 IHNC - Alternative #4 - 75' x 1200' Concrete U-Frame Lock Chamber																	
						mite	- Alternati			inc Lo	ck chamber						
Ye	ar	Construction cost (\$)		No Impact to cost (\$)	Navigation closure hours			cost (\$)	Repair closure hours			cost (\$)	r Repair closure hours		Annual S cost (\$)	ummary closure hours	
1	2015	3331 (4)	2015	\$340,000		20	15	\$500,000			2015	\$0		2015	\$840,000	150	2015
				\$360,000	0			\$600,000	150			\$3,000,000	0				
2	2016	- BL	2016		0	20	16		200		2016		425	2016	\$3,960,000	625	2016
3	2017	Planning -	2017	\$300,000	0	20	17	\$500,000	150		2017	\$2,000,000	400	2017	\$2,800,000	550	2017
4	2018	1	2018	\$800,000	0	20	18	\$800,000	225		2018	\$5,000,000	1440	2018	\$6,600,000	1,665	2018
5	2019		2019	\$300,000	0	20	19	\$1,200,000	225		2019	\$0	720	2019	\$1,500,000	945	2019
					U		New	v Chamber Const	ruction Commenc	ement	i		720				
6	2020	\$41,600,000	2020	\$340,000		20	20	\$1,000,000			2020	\$1,500,000		2020	\$44,440,000	500	2020
		\$153,600,000		\$360,000	0			\$500,000	250			\$3,000,000	250				-
7	2021	\$132,600,000	2021	\$300,000	0	20	21	\$600,000	150		2021	\$1,500,000	425	2021	\$157,460,000	575	2021
8	2022		2022		0	20	22		200		2022		630	2022	\$135,000,000	830	2022
9	2023	\$51,100,000	2023	\$800,000	0	20	23	\$500,000	150		2023	\$4,000,000	720	2023	\$56,400,000	870	2023
10	2024	\$97,100,000	2024	\$300,000	0	20	24	\$800,000	225		2024	\$0	0	2024	\$98,200,000	225	2024
11	2025	\$64,600,000	2025	\$340,000	0	20	25	\$500,000	150		2025	\$2,000,000	400	2025	\$67,440,000	550	2025
12	2026	\$41,900,000	2026	\$360,000	0	20	26	\$1,000,000	250		2026	\$3,000,000	425	2026	\$46,260,000	675	2026
13	2027	\$40,600,000	2027	\$300,000		20	27	\$500,000			2027	\$0		2027	\$41,400,000	150	2027
14	2028	\$123,400,000	2028	\$800,000	0	20		\$600,000	150		2028	\$5,000,000	0	2028	\$129,800,000	1.640	2028
		\$57,100,000		\$300,000	0			\$500,000	200			\$0	1440			, , ,	
15	2029	\$13,300,000	2029	\$340,000	0	20		\$800,000	150		2029	\$1,500,000	720	2029	\$57,900,000	870	2029
16	2030	\$7,600,000	2030	\$360,000	0	20	30	\$500,000	225		2030	\$1,500,000	630	2030	\$15,940,000	855	2030
17	2031	\$7,600,000	2031	\$300,000	0	20	31	\$500,000	150		2031	\$1,500,000	175	2031	\$9,960,000	325	2031
						New Cham	ber Constr		- Begin Advanced	d Main	tenance Schedule						
18	2032		2032	\$300,000	0	20	32	\$0	0		2032	\$0	0	2032	\$300,000	0	2032
19	2033		2033	\$800,000	0	20	33	\$0	0		2033	\$0	0	2033	\$800,000	0	2033
20	2034		2034	\$300,000	0	20	34	\$675,000	150		2034	\$0	0	2034	\$975,000	150	2034
21	2035		2035	\$340,000	0	20	35	\$0	0		2035	\$0	0	2035	\$340,000	0	2035
22	2036		2036	\$360,000	0	20	36	\$0			2036	\$1,500,000	175	2036	\$1,860,000	175	2036
23	2037		2037	\$300,000		20	37	\$675,000	0		2037	\$0		2037	\$975,000	150	2037
24	2038		2038	\$800,000	0	20		\$0	150		2038	\$0	0	2038	\$800,000	0	2038
25	2039		2039	\$300,000	0	20		\$0	0		2039	\$0	0	2039	\$300,000	0	2039
26	2039		2039	\$340,000	0	20		\$675,000	0		2039	\$0	0	2039	\$1,015,000	150	2039
				\$360,000	0			\$0	150			\$3,000,000	0				
27	2041		2041		0	20	41	\$0	0		2041		1440	2041	\$3,360,000	1,440	2041
20	2042		2042	\$300,000		20	42	\$0			2042	\$1,500,000		2042	¢1 900 000	175	2042

20 2042		2042		0	2042		0	204.			175	2042	\$1,000,000	1/3	2042
29 2043		2043	\$800,000	0	2043	\$675,000	150	204	:	\$0	0	2043	\$1,475,000	150	2043
30 2044		2044	\$300,000	0	2044	\$300,000	50	204		\$0	0	2044	\$600,000	50	2044
31 2045	į e	2045	\$340,000	0	2045	\$450,000	75	204	;	\$0	0	2045	\$790,000	75	2045
32 2046	Complete	2046	\$360,000	0	2046	\$675,000	150	204	;	\$0	0	2046	\$1,035,000	150	2046
33 2047	tion C	2047	\$300,000	0	2047	\$450,000	75	204	,	\$1,500,000	175	2047	\$2,250,000	250	2047
34 2048	Construction	2048	\$800,000	0	2048	\$300,000	50	204	;	\$0	0	2048	\$1,100,000	50	2048
35 2049		2049	\$300,000	0	2049	\$675,000	150	204	,	\$0	0	2049	\$975,000	150	2049
36 2050	New Chamber	2050	\$340,000	0	2050	\$0	0	2050	,	\$0	0	2050	\$340,000	0	2050
37 2051	Nev	2051	\$360,000	0	2051	\$0	0	205:		\$3,000,000	1440	2051	\$3,360,000	1,440	2051
38 2052		2052	\$300,000	0	2052	\$675,000	150	205	:	\$1,500,000	175	2052	\$2,475,000	325	2052
39 2053		2053	\$800,000	0	2053	\$800,000	100	205	;	\$0	0	2053	\$1,600,000	100	2053
40 2054		2054	\$300,000	0	2054	\$0	0	205		\$0	0	2054	\$300,000	0	2054
41 2055		2055	\$340,000	0	2055	\$675,000	150	205	:	\$0	0	2055	\$1,015,000	150	2055
42 2056		2056	\$360,000	0	2056	\$800,000	100	205	;	\$0	0	2056	\$1,160,000	100	2056
43 2057		2057	\$300,000	0	2057	\$0	0	205		\$5,000,000	175	2057	\$5,300,000	175	2057
44 2058		2058	\$800,000	0	2058	\$675,000	150	205	:	\$0	0	2058	\$1,475,000	150	2058
45 2059		2059	\$300,000	0	2059	\$300,000	50	205	,	\$6,000,000	825	2059	\$6,600,000	875	2059
46 2060		2060	\$340,000	0	2060	\$450,000	75	206	,	\$0	0	2060	\$790,000	75	2060
47 2061		2061	\$360,000	0	2061	\$675,000	150	206:		\$3,000,000	1440	2061	\$4,035,000	1,590	2061
48 2062		2062	\$300,000	0	2062	\$750,000	175	206		\$1,500,000	175	2062	\$2,550,000	350	2062
49 2063		2063	\$800,000		2063	\$750,000		206		\$4,000,000		2063	\$5,550,000	845	2063
50 2064		2064	\$300,000	0	2064	\$675,000	125	206-		\$0	720	2064	\$975,000	150	2064
Totals	\$824,500,000		\$21,000,000	0		\$24,175,000	150 5,725			64,500,000	0 15,715		\$934,175,000	15,715	

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

IHNC- Without Project Scenario

VC LOCK	Study, Prepared by Louisville District, 10 August 2015			IHNC- WITHOUT Project Scenario				
	Work Item	Frequency	Cost	Closure Time (Hours)	Closure Time (Days)	Closure Breakouts	Impact to Navigation	
	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	
ix As	Rewiring and Machinery Rehabilitation	20 years	\$750,000	175	15	12-hour shifts	Yes	
ails	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										
	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	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			
Alt #2	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes			
AIL#Z	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										
	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	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			
Alt #3	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes			
AIL#3	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										
	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	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			
Alt #4	Rewiring and Machinery Rehabilitation	30 years	\$750,000	175	15	12-hour shifts	Yes			
AIL #4	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 Lock Study, Prepared by Louisville District, 10 August 2015

IHNC - Without Project Scenario

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