US Army Corps of Engineers ®
St. Paul District

Appendix A – Economic & Costs

Upper St. Anthony Falls Lock and Dam

Section 216 Disposition Study

Draft Integrated Disposition Report and Environmental Assessment

December 2020

Appendix A

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Economic Appendix

1 Introduction

This appendix contains the analysis of economic benefits for the disposition of USAF Lock and Dam. Economic benefits serve as one of the criteria used for selection of an alternative for project disposition. For purposes of amortization and discounting future values to present worth, an interest rate of 2.5% is used. The period of analysis is 50 years and the price level for costs is October 2020.

This "project" is unique in that it has reached the end of its useful life in terms of carrying out its authorized mission (navigation) and no longer produces the economic benefits as intended. However, while the project no longer produces benefits, it still incurs costs to the Federal government in the form of minimal operation and maintenance to carry out its other 'secondary" purposes: water supply, hydropower, recreation, and flood control.

2 Costs

If the government takes no action toward disposition, it will continue to incur costs. Cost avoidance forms the foundation for the economic benefits of a project's disposal. These avoided costs take a variety of forms which include 1) Routine Operation and Maintenance; 2) Utilities; 3) Flood Operations; 4) Major Maintenance and 5) Inspections. Costs are expressed in average annual terms so that alternatives can be compared on an equal basis. The period of analysis for assessment of costs is 50 years. Projected future costs for items such as major maintenance or flood operations account for inflation, are discounted back to present worth, and then amortized over the 50-year period of analysis. Average annual costs for the No Action alternative are estimated at $243,500. These are the costs expected to be incurred on an average annual basis if the government retains the property. The No Action alternative serves as the base condition from which other alternatives' costs are compared to estimate cost savings benefits.

Four alternatives to No Action have been formulated to meet the study objectives. These include two alternatives involving complete disposition and two versions of partial disposition. Alternative 1 only incurs costs related to the transfer of ownership to the receiving entity. The items of the transfer or sale will be determined during the disposal process and may require significant or insignificant additional costs to the government. For the purpose of this analysis, it is assumed that the property will be transferred in an as-is condition, requiring removal of federal non-fixed property, such as security systems, furnishings, supplies, etc. The lock and dam machinery will be turned over to the new owner. Preparation of contracts for transfer requires input from Real Estate, Office of Counsel, Engineering, Operations, Contracting, and Environmental (SHPO issues). Decommissioning and removal of non-fixed Federal property would be performed by Operations Division. Average annual costs for the Complete Disposition alternative is estimated at $23,500.

Alternative 1a includes all features of Alternative 1 along with a monetary incentive after transfer of ownership to expedite disposal of the property. The amount of any incentive will be determined through negotiation and may be limited, as authorized, by Congress.

The partial disposition alternatives (versions 2 and 2a) consist of a combination of features that will either be disposed or retained. For both of these alternatives, the Corps would continue to operate the flood gate and would retain control over project features necessary to do this. Disposed features will incur the contracting and decommissioning costs related to disposition. Retained features will incur the costs related to maintenance (annual and major), flood operations, utilities, and inspections. Alternative 2 retains much of these costs. On an average annual basis these costs amount to $224,100, nearly as much as the No Action costs. Alternative 2a assumes most of these costs being funded by a new partner. Remaining costs to be funded by the Federal

government amounts to $40,2003 on an average annual basis. Table 2 indicates which activities are associated with each alternative. Table 3, Table 5, Table 7, Table.9, and Table 11 indicate the estimated costs incurred for each activity under each alternative. Table 4, Table 6, Table.8, and Table 10, and Table 12 present the calculation of average annual cost by alternative. At an interest rate of 2.5% over a 50-year project life, the amortization factor applied to the lump sum present value of scheduled costs is 0.03526. Costs are expressed in October 2020 price level.

3 Benefits

Benefits produced by disposal of the USAF project consist of the saving of costs anticipated to occur under the No-Action alternative. For this analysis the No-Action alternative can be viewed as the planning principal's "without-project" condition; where "project" typically refers to the construction of a new water resource project. The No-Action alternative serves as the basis from which the impacts of other alternatives can be assessed and is the condition or scenario expected to prevail if none of the disposition alternatives are found worthy of implementation.

The costs for the No-Action/Without Project condition serve as a basis from which costs for the alternative scenarios can be compared in order to estimate their cost savings benefits. Like traditional NED benefit analysis where the alternative that produces the greatest net benefit is deemed the "NED Plan", the disposition alternative that produces the greatest cost savings relative to the No-Action/Without Project can likewise be viewed as the NED Plan. The following table summarizes the comparison of cost savings benefits by disposition alternative. Alternative 1a includes the same disposal costs as Alternative 1. Alternative 1a would also include the additional cost of the incentive payment to the new owner; however, that amount is not yet known and is not included in this cost analysis. The amount of any incentive will be determined through negotiation and may be limited, as authorized, by Congress.

Table 1: Average Annual Life-Cycle Costs and Benefits by Alternative

	No Action Alternative	Alternative 1	Alternative 1a	Alternative 2	Alternative 2a
Average Ann Costs	$243,500	$23,500	$23,500 (plus incentive)	$224,100	$40,200
Cost Savings Benefits*	----------	$220,000	$220,000 (minus incentive)	$19,400	$203,300

* Compared to No Action costs

As the above table shows, the alternative that yields the greatest net benefits is Alternative 1, Complete Disposition. Taken at face value, Alternative 1 would be the recommended plan. However, criteria other than cost savings benefits, may be considered when recommending or selecting the final plan. These are discussed in the "Plan Formulation" section of the main report.

4 Assumptions for Alternatives' Costs

No action

- The study period is for the next fifty years.
- The facility receives electrical power free from Excel Energy.
- USACE will retain ownership and maintenance responsibility for the facility.
- The costs contained in this estimate are required to operate and maintain the facility in its current condition.
- The facility is not permanently staffed.
- The facility will be maintained and operated to fulfill the flood damage reduction mission as required.
- All current routine maintenance will continue.
- USACE will facilitate tours given by the National Park Service.
- The public restroom will be maintained and operated during the summer months.

- The St. Paul District will continue to comply with ER 1110-2-8157, "Responsibility for Hydraulic Steel Structures".
- All HSS structures will be dewatered for inspection on at least a 25 year interval.
- Estimate assumes only the upper miter gates and Tainter gates will be painted and have their seals replaced twice during the study period.
- Estimate assumes Periodic Inspections, bridge inspections, instrumentation, and diving and sounding inspections will continue on a five year interval.

Alternative 1

- All features would be sold or bequeathed to a separate individual or entity absolving the Government from any future operation or maintenance activities.
- Assume property would be sold in, "As Is" condition.
- Assume a survey for hazardous materials would be conducted prior to property sale or transfer.

Alternative 1a

- All features would be sold or bequeathed to a separate individual or entity absolving the Government from any future operation or maintenance activities.
- Assume property would be sold in, "As Is" condition.
- Assume a survey for hazardous materials would be conducted prior to property sale or transfer.
- Assume Government would provide an incentive to the new owner.

Alternative 2

- The study period is for the next fifty years.
- The facility receives electrical power free from Excel Energy.
- USACE will retain ownership and maintenance responsibility for the facility.
- The facility is not permanently staffed
- The facility will be maintained and operated to fulfill the flood damage reduction mission as required. All current routine maintenance will continue, USACE will facilitate tours given by the National Park Service.
- The St. Paul District will continue to comply with ER 1110-2-8157, "Responsibility for Hydraulic Steel Structures".
- All HSS structures will be dewatered for inspection on at least a 25 year interval.
- Estimate assumes Periodic Inspections, bridge inspections, instrumentation, and diving and sounding inspections will continue on a five year interval.

Alternative 2a

- The study period is for the next fifty years.
- A feasibility study would be conducted jointly with a local sponsor.
- Estimated total cost of the feasibility study is $400k, over two years cost shared 50 - 50 between USACE and the Local Sponsor.
- Local Sponsor would be responsible for day to day operations.
- Local Sponsor would be responsible for major maintenance.
- Local Sponsor would be responsible for Section 106 costs.
- USACE would continue to operate the Tainter Gate during Flood Events.
- USACE would continue to conduct periodic inspections, bridge inspections, diving inspections, and conduct instrumentation data collection.
- The facility would no longer receive electrical power free from Excel Energy.
- USACE will retain ownership and maintenance responsibility for the facility.
- The facility is not permanently staffed.

- The facility will be maintained and operated to fulfill the flood damage reduction mission as required. All current routine maintenance will continue, USACE will facilitate tours given by the National Park Service, the public restroom will be maintained and operated during the summer months.
- The St. Paul District will continue to comply with ER 1110-2-8157, "Responsibility for Hydraulic Steel Structures".
- All HSS structures will be dewatered for inspection on at least a 25-year interval.
- Estimate assumes Periodic Inspections, bridge inspections, instrumentation, and diving and sounding inspections will continue on a five-year interval.

Table 2: Cost Activities by Alternative

				Alternatives				
Item	Cost Category	Activity Description	Frequency (Times / year)	No Action	Alt 1	Alt 1a	Alt 2	Alt 2a
1	Routine Operation & Maint	Building and Grounds weekly site checks (4 hrs per week)	1	X			X	
2		Supplies Related to Lighting Maintenance		X			X	
3		Upper Miter Gate and Tainter Gate Exercising and Greasing	3	X			X	
4		Grease, Hydraulic Fluid, & misc. wear items		X			X	
5		Winterization & Spring Start Up	2	X			X	
6		Labor involved with National Park Service Tours	1	X			X	
7		Tainter Gate Operation for Horseshoe Dam Maintenance	1	X			X	
8		Elevator Maintenance	1	X			X	
9	Utilities	City Water & Sewer	1	X			X	
10		Phone & Internet	1	X			X	
11		Trash Pickup	1	X			X	
12		Electrical Service	1					
13	Flood Operations	Flood Event Operations (Assume a ten year frequency)	Every 10 Yrs	X			X	X
14		Sandbags/misc. flood related materials and supplies	Every 10 Yrs	X			X	X
15	Major Maintenance	Replace exterior joint material on CCS, public restroom, and control stand	Every 25 Yrs	X				
16		Replace roof on CCS, restroom, and control stand	Every 20 Yrs	X				
17		Blast & Paint Bulkheads	Every 25 Yrs	X			X	
18		Blast & Paint Tainter Gate	Every 25 Yrs	X			X	
19		Blast & Paint Upstream Miter Gates, Inspect Downstream Gates & Paint Valves	Every 25 Yrs	X			X	
20		Horizontal & Vertical Concrete Surface Repairs	Every 25 Yrs	X			X	
21		Miscellaneous Dewatering Activities	Every 25 Yrs	X			X	
22		Stair Tower Maintenance	Every 50 Yrs	X			X	
23		Blast & Paint Pedestrian Bridge	Every 50 Yrs	X			X	
24		Parking Lot Crack Sealing	Every 5 yrs	X				
45		Parking Lot Seal Coating	Every 25 Yrs	X				
26		Parking Lot Striping	Every 10 Yrs	X				
27		Parking Lot Pavement Replacement	Every 50 Yrs	X				
28	Inspections	Periodic Inspection	Every 5 yrs	X			X	X
29		Bridge Inspection	Every 5 yrs	X			X	X
30		Instrumentation	Every 5 yrs	X			X	X
31		Soundings/Diving Inspection	Every 5 yrs	X			X	X
32	Property Disposal	OC Real Property Contract Sale Coordination	One time		X	X	X	X
33		RE Real Property Contract Sale Coordination	One time		X	X	X	X
34		Ops Real Property Contract Sale Coordination	One time		X	X	X	X
35		PM Real Property Contract Sale Coordination	One time		X	X	X	X
36		EC Real Property Contract Sale Coordination	One time		X	X	X	X
37		Env Real Property Contract Sale Coordination	One time		X	X	X	X
38		HTRW Scope Prep (EC)	One time		X	X	X	X
39		HTRW Survey Cost (Contract)	One time		X	X	X	X
40	Electrical /Security	Security System Maintenance	Every 5 Yrs				X	X
41		New separate electrical systems	One time					
42	Decommissioning	Disable / Remove Gate Operating Machinery (Labor)	One time		X	X		
43		Disable / Remove Gate Operating Machinery (Machines)	One time		X	X		
44		Disable / Remove Gate Operating Machinery (Travel)	One time		X	X		
45		Disable / Remove Security System	One time		X	X		
46		Final Trash Removal	One time		X	X		
47	Incentive	Incentive to new owner	One time			X		

Table 3: Costs for No Action Alternative

		No Action Alternative										
				Labor				Material or Service Costs				
Item		Notes	Activity Description	Hours	Rate	Frequency (Times per year)	Labor Cost	Quantity	UOM	Unit Cost	Material Cost/ Contract	Amount
1	Routine Operation & Maint	Includes security fence checks, building utilities, heating/AC upkeep, waste water sump pumps, (two located in the gallery, one in the Shop and one lift station for all waste water), General lighting upkeep, U.S. Flag adjustments, security system operation and maintenance, and snow removal.	Building and Grounds weekly site checks (4 hours per week)	208	$80	1	$16,640					$16,640
2		Item includes light bulbs and other supplies need to maintain lighting at the site.	Supplies Related to Lighting Maintenance					1	each	$250	$250	$250
3		Includes greasing and fluid level checks in miter gate machinery/equipment, grease and fluid level checks in Tainter gate machinery/equipment, and operating all components to verify correct operation	Upper Miter Gate and Tainter Gate Exercising and Greasing	32	$80	3	$7,680					$7,680
4		Upper Miter Gate and Tainter Gate consumable supplies	Grease, Hydraulic Fluid, & misc. wear items					3	each	$350	$1,050	$1,050
5		Includes pinning and unpinning the Upper Miter Gates, Setting aerators above the Tainter gate, and turning on and checking heating	Winterization & Spring Start Up	64	$80	2	$10,240					$10,240
6		Includes key inventory/security system operation and public restroom/drinking fountain maintenance	Labor involved with National Park Service Tours	80	$80	1	$6,400					$6,400
7		Includes activities associated with passing flow through the lock chamber to allow Excel to perform maintenance on the horseshoe dam	Tainter Gate Operation for Horseshoe Dam Maintenance	40	$80	1	$3,200					$3,200
		CCURE and security system maintenance and upgrades. Includes replacing hardware is it wears out or becomes obsolete. Security cameras are generally replaced on a five year interval. DVR recording units also have a finite lifespan and need to be replaced periodically. Card readers at entrances will have to be replaced as well.	Security System Maintenance			Every 5 Yrs		1	each	$4,000	$4,000	$800
		CCS elevator routine maintenance and repair	Elevator Maintenance			1		1	each	$2,800	$2,800	$2,800
											Routine O&M	$49,060
	Utilities		City Water & Sewer			1		1	each	$8,144	$8,144	$8,144
			Phone & Internet			1		1	each	$3,000	$3,000	$3,000
			Trash Pickup			1		1	each	$1,200	$1,200	$1,200
		Electricity is provided free, without cost by Excel Energy. Buildings are heated with electric heat.	Electrical Service			1		1	each	$0	$0	$0
											Utilities	$12,344
	Flood	Includes operating the Tainter gate and sandbagging across cross over wall	Flood Event Operations (Assume a ten year frequency)	160	$80	Every 10 Yrs	$12,800					$12,800
		Includes sandbags and associated supplies needed during a flood event	Sandbags/misc. flood related materials and supplies			Every 10 Yrs		1	each	$5,000	$5,000	$5,000
											Flood Event	$17,800
	Major Maintenance	Assume exterior joint sealant has a life span of 25 years. Sealant will have to be replaced twice during the 50 year study period	Replace exterior joint material on CCS, public restroom, and control stand			Every 25 Yrs		1	each	$40,000	$40,000	$40,000
		Assume roofing materials with a 20 year life span will be used. Roofs will have to be replaced three times during the 50 year study period	Replace roof on CCS, restroom, and control stand			Every 20 Yrs		1	each	$100,000	$100,000	$100,000
		According to ER 1110-2-8157 all HSS structures must be dewatered for inspection on a 25 year cycle. Miter Gates and Tainter Valves were last painted and inspected approximately 15 years ago. Assume bulkheads, upper miter gates, tainter gates, will be blasted and painted if they are pulled. Assume this work will twice. Work will occur in 2030 and 2055.	Blast & Paint Bulkheads			Every 25 Yrs		1	each	$500,000	$500,000	$500,000
			Blast & Paint Tainter Gate			Every 25 Yrs		1	each	$750,000	$750,000	$750,000
			Blast & Paint Upstream Miter Gates, Inspect Downstream Gates & Paint Valves			Every 25 Yrs		1	each	$750,000	$750,000	$750,000
		Assume cracking and areas of delamination will be repaired once during the study period	Horizontal & Vertical Concrete Surface Repairs			Every 25 Yrs		1	each	$500,000	$500,000	$500,000
		Activities include design, mobe, providing instrumentation, placing bulkheads, pumping down the lock chamber, monitoring the walls for movement, pre-stressing miter gates, mucking out the bottom of the lock chamber and removing debris	Miscellaneous Dewatering Activities			Every 25 Yrs		1	each	$500,000	$500,000	$500,000
		Due to the over 50 foot head difference there are substantial stair towers located at the lower end of the landwall and the river wall. These will have to be sandblasted and painted once during the study period to guard against section loss due to corrosion.	Stair Tower Maintenance			Every 50 Yrs		2	each	$250,000	$500,000	$500,000
		Pedestrian bridge provides access to the river wall	Blast & Paint Pedestrian Bridge			Every 50 Yrs		1	each	$175,000	$175,000	$175,000
		Assume cracks will be sealed in the parking lot every five years	Parking Lot Crack Sealing			Every 5 yrs		1	each	$5,000	$5,000	$5,000
		Assume parking lot will be seal coated twice during the 50 year study period	Parking Lot Seal Coating			Every 25 Yrs		1	each	$50,000	$50,000	$50,000
		Assume parking lot will be re-striped every ten years	Parking Lot Striping			Every 10 Yrs		1	each	$5,000	$5,000	$5,000
		Assume parking lot pavement will be replaced once during the 50 year study period	Parking Lot Pavement Replacement			Every 50 Yrs		1	each	$225,000	$225,000	$225,000
											Major Maintenance	$4,100,000
	Inspections	Assume inspections will continue to occur on a five year interval	Periodic Inspection			Every 5 yrs		1	each	$80,000	$80,000	$80,000
			Bridge Inspection			Every 5 yrs		1	each	$7,500	$7,500	$7,500
			Instrumentation			Every 5 yrs		1	each	$10,000	$10,000	$10,000
			Soundings/Diving Inspection			Every 5 yrs		1	each	$10,000	$10,000	$10,000
											Inspections	$107,500

Table 4: Average Annual Costs for No Action Alternative

No Action Alternative - Calculation of Average Annual Costs									
		Cost by Item life							
								Total	PV of Total
Year	PV Factor	1 yr	5 yrs	10 yrs	20 yrs	25 yrs	50 yrs	Cost by Yr	Cost by Yr
1	0.9756	61,362						61,362	59,865
2	0.9518	61,362						61,362	58,405
3	0.9286	61,362	117,956					179,318	166,514
4	0.9060	61,362						61,362	55,591
5	0.8839	61,362		23,085	101,250			185,697	164,129
6	0.8623	61,362						61,362	52,912
7	0.8413	61,362						61,362	51,621
8	0.8207	61,362	117,956					179,318	147,174
9	0.8007	61,362						61,362	49,134
10	0.7812	61,362				3,128,625		3,189,987	2,492,012
11	0.7621	61,362						61,362	46,766
12	0.7436	61,362						61,362	45,626
13	0.7254	61,362	117,956					179,318	130,081
14	0.7077	61,362						61,362	43,427
15	0.6905	61,362		23,085				84,447	58,307
16	0.6736	61,362						61,362	41,335
17	0.6572	61,362						61,362	40,327
18	0.6412	61,362	117,956					179,318	114,972
19	0.6255	61,362						61,362	38,383
20	0.6103	61,362						61,362	37,447
21	0.5954	61,362						61,362	36,534
22	0.5809	61,362						61,362	35,643
23	0.5667	61,362	117,956					179,318	101,619
24	0.5529	61,362						61,362	33,925
25	0.5394	61,362		23,085	101,250		911,250	1,096,947	591,683
26	0.5262	61,362						61,362	32,291
27	0.5134	61,362						61,362	31,503
28	0.5009	61,362	117,956					179,318	89,816
29	0.4887	61,362						61,362	29,985
30	0.4767	61,362						61,362	29,254
31	0.4651	61,362						61,362	28,540
32	0.4538	61,362						61,362	27,844
33	0.4427	61,362	117,956					179,318	79,385
34	0.4319	61,362						61,362	26,502
35	0.4214	61,362		23,085		3,128,625		3,213,072	1,353,895
36	0.4111	61,362						61,362	25,225
37	0.4011	61,362						61,362	24,610
38	0.3913	61,362	117,956			-		179,318	70,164
39	0.3817	61,362						61,362	23,424
40	0.3724	61,362						61,362	22,853
41	0.3633	61,362						61,362	22,296
42	0.3545	61,362						61,362	21,752
43	0.3458	61,362	117,956					179,318	62,015
44	0.3374	61,362						61,362	20,704
45	0.3292	61,362		23,085	101,250			185,697	61,127
46	0.3211	61,362						61,362	19,706
47	0.3133	61,362						61,362	19,225
48	0.3057	61,362	117,956					179,318	54,812
49	0.2982	61,362						61,362	18,299
50	0.2909	61,362						61,362	17,853
Total							Lump sum PV of costs		6,906,512
							Avg ann equivalent		**$ 243,510**

Table 5: Costs for Alternative 1 or 1a (not including incentive)

	Alternative 1: Annual Cost for Full Disposal							
Item	Actvity	Notes	Responsible ORG	Hours	Rate	Amount	Contract	Sub Total
	Prepare Contract for Sale or Disposal							
29	Property Sale Coordination	OC to prepare and review contract for sale or disposal	Office of Counsel	1,000	$150	$150,000		$150,000
30	Property Sale Coordination	RE to provide input to contract for sale or disposal	Real Estate	660	$115	$75,900		$75,900
31	Property Sale Coordination	OPS to provide input to Contract for sale or disposal	Operations	400	$115	$46,000		$46,000
32	Property Sale Coordination	PM to manage process	Project Management	660	$115	$75,900		$75,900
33	Property Sale Coordination	EC to provide input to contract for sale or disposal	Engineering	660	$115	$75,900		$75,900
34	Property Sale Coordination	SHPO Coordination	Environmental	400	$115	$46,000		$46,000
35	Write Scope for Hazardous Material Survey		Engineering	120	$115	$13,800		$13,800
36	Hazardous Material Survey		Contracting				$50,000	$50,000
								$533,500
	Decomissioning							
39	Disable/Remove Gate Operating Machinery (Labor)	Assume a crew of four people for four weeks	Operations	640	$90	$57,600		$57,600
40	Disable/Remove Gate Operating Machinery (Machines)	Assume a 100 ton crane on floating plant and an additional flat topped barge for three weeks	Operations	120	$250	$30,000		$30,000
41	Disable/Remove Gate Operating Machinery (Travel)	Assume 4 travelers for four weeks	Operations				$20,000	$20,000
42	Disable/Remove Security System	Assume two people for two weeks	Operations	160	$90	$14,400		$14,400
43	Final Trash Removal		Operations				$10,000	$10,000
								$132,000

Table 6: Average Annual Costs for Alternative 1 or 1a (without incentive)

Alternative 1 - Calculation of Average Annual Cost								
Cost by Item Life								
							Total	PV of Total
Year	PV Factor	1 Yr	5 yrs	10 yrs	25 yrs	50 yrs	Cost by Yr	Cost by Yr
1	0.9756	682,100					682,100	665,463
2	0.9518	0					0	0
3	0.9286	0					0	0
4	0.9060	0					0	0
5	0.8839	0					0	0
6	0.8623	0					0	0
7	0.8413	0					0	0
8	0.8207	0					0	0
9	0.8007	0					0	0
10	0.7812	0					0	0
11	0.7621	0					0	0
12	0.7436	0					0	0
13	0.7254	0					0	0
14	0.7077	0					0	0
15	0.6905	0					0	0
16	0.6736	0					0	0
17	0.6572	0					0	0
18	0.6412	0					0	0
19	0.6255	0					0	0
20	0.6103	0					0	0
21	0.5954	0					0	0
22	0.5809	0					0	0
23	0.5667	0					0	0
24	0.5529	0					0	0
25	0.5394	0					0	0
26	0.5262	0					0	0
27	0.5134	0					0	0
28	0.5009	0					0	0
29	0.4887	0					0	0
30	0.4767	0					0	0
31	0.4651	0					0	0
32	0.4538	0					0	0
33	0.4427	0					0	0
34	0.4319	0					0	0
35	0.4214	0					0	0
36	0.4111	0					0	0
37	0.4011	0					0	0
38	0.3913	0					0	0
39	0.3817	0					0	0
40	0.3724	0					0	0
41	0.3633	0					0	0
42	0.3545	0					0	0
43	0.3458	0					0	0
44	0.3374	0					0	0
45	0.3292	0					0	0
46	0.3211	0					0	0
47	0.3133	0					0	0
48	0.3057	0					0	0
49	0.2982	0					0	0
50	0.2909	0					0	0
						Lump Sum of PV Costs		665,463
						Ave Annual Equivalent		**23,463**

Table 7: Costs for Alternative 2

		Alternative 2											
				Labor				Material or Service Costs					
Item		Notes	Activity Description	Hours	Rate	Frequency (Times per year)	Labor Cost	Quantity	UOM	Unit Cost	Material Cost/ Contract	Amount
1	Routine Operation & Maint	Includes security fence checks, building utilities, heating/AC upkeep, waste water sump pumps, (two located in the gallery, one in the Shop and one lift station for all waste water), General lighting upkeep, U.S. Flag adjustments, security system operation and maintenance, and snow removal.	Building and Grounds weekly site checks (4 hours per week)	208	$80	1	$16,640					$16,640
2		Item includes light bulbs and other supplies need to maintain lighting at the site.	Supplies Related to Lighting Maintenance					1	each	$250	$250	$250
3		Includes greasing and fluid level checks in miter gate machinery/equipment, grease and fluid level checks in Tainter gate machinery/equipment, and operating all components to verify correct operation	Upper Miter Gate and Tainter Gate Exercising and Greasing	32	$80	3	$7,680					$7,680
4		Upper Miter Gate and Tainter Gate consumable supplies	Grease, Hydraulic Fluid, & misc. wear items					3	each	$350	$1,050	$1,050
5		Includes pinning and unpinning the Upper Miter Gates, Setting aerators above the Tainter gate, and turning on and checking heating	Winterization & Spring Start Up	64	$80	2	$10,240					$10,240
6		Includes key inventory/security system operation and public restroom/drinking fountain maintenance	Labor involved with National Park Service Tours	80	$80	1	$6,400					$6,400
7		Includes activities associated with passing flow through the lock chamber to allow Excel to perform maintenance on the horseshoe dam	Tainter Gate Operation for Horseshoe Dam Maintenance	40	$80	1	$3,200					$3,200
		CCURE and security system maintenance and upgrades. Includes replacing hardware is it wears out or becomes obsolete. Security cameras are generally replaced on a five year interval. DVR recording units also have a finite lifespan and need to be replaced periodically. Card readers at entrances will have to be replaced as well.	Security System Maintenance			Every 5 Yrs		1	each	$4,000	$4,000	$800
		CCS elevator routine maintenance and repair(Assume no Elevator Maintenance)	Elevator Maintenance			1		0	each	$2,800	$0	$0
											Routine O&M	$46,260
	Utilities	Assume no sewer or water usage	City Water & Sewer			1		0	each	$8,144	$0	$0
			Phone & Internet			1		1	each	$3,000	$3,000	$3,000
		Assume no Trash Pick-up	Trash Pickup			1		0	each	$1,200	$0	$0
		Electricity is provided free, without cost by Excel Energy. Buildings are heated with electric heat.	Electrical Service			1		1	each	$0	$0	$0
											Utilities	$3,000
	Flood	Includes operating the Tainter gate and sandbagging across cross over wall	Flood Event Operations (Assume a ten year frequency)	160	$80	Every 10 Yrs	$12,800					$12,800
		Includes sandbags and associated supplies needed during a flood event	Sandbags/misc. flood related materials and supplies			Every 10 Yrs		1	each	$5,000	$5,000	$5,000
											Flood Event	$17,800
		According to ER 1110-2-8157 all HSS structures must be dewatered for inspection on a 25 year cycle. Miter Gates and Tainter Valves were last painted and inspected approximately 15 years ago. Assume bulkheads, upper miter gates, tainter gates, will be blasted and painted if they are pulled. Assume this work will twice. Work will occur in 2030 and 2055.	Blast & Paint Bulkheads			Every 25 Yrs		1	each	$500,000	$500,000	$500,000
			Blast & Paint Tainter Gate			Every 25 Yrs		1	each	$750,000	$750,000	$750,000
			Blast & Paint Upstream Miter Gates, Inspect Downstream Gates & Paint Valves			Every 25 Yrs		1	each	$750,000	$750,000	$750,000
		Assume cracking and areas of delamination will be repaired once during the study period	Horizontal & Vertical Concrete Surface Repairs			Every 25 Yrs		1	each	$500,000	$500,000	$500,000
		Activities include design, mobe, providing instrumentation, placing bulkheads, pumping down the lock chamber, monitoring the walls for movement, pre-stressing miter gates, mucking out the bottom of the lock chamber and removing debris	Miscellaneous Dewatering Activities			Every 25 Yrs		1	each	$500,000	$500,000	$500,000
		Due to the over 50 foot head difference there are substantial stair towers located at the lower end of the landwall and the river wall. These will have to be sandblasted and painted once during the study period to guard against section loss due to corrosion.	Stair Tower Maintenance			Every 50 Yrs		2	each	$250,000	$500,000	$500,000
		Pedestrian bridge provides access to the river wall	Blast & Paint Pedestrian Bridge			Every 50 Yrs		1	each	$175,000	$175,000	$175,000
											Major Maintenance	$3,675,000
	Inspections	Assume inspections will continue to occur on a five year interval	Periodic Inspection			Every 5 yrs		1	each	$80,000	$80,000	$80,000
			Bridge Inspection			Every 5 yrs		1	each	$7,500	$7,500	$7,500
			Instrumentation			Every 5 yrs		1	each	$10,000	$10,000	$10,000
			Soundings/Diving Inspection			Every 5 yrs		1	each	$10,000	$10,000	$10,000
											Inspections	$107,500
	Real Property Disposal		OC Real Property Contract Sale Coordination	320	$150	one time	$48,000					$48,000
			RE Real Property Contract Sale Coordination	660	$115	one time	$75,900					$75,900
			Ops Real Property Contrac Sale Coordination	160	$115	one time	$18,400					$18,400
			PM Real Property Contract Sale Coordination	240	$115	one time	$27,600					$27,600
			EC Real Property Contract Sale Coordination	120	$115	one time	$13,800					$13,800
			Env Real Property Contract Sale Coordination	320	$115	one time	$36,800					$36,800
			HTRW Scope Prep (EC)	80	$115	one time	$9,200					$9,200
			HTRW Survey Cost (Contract)			one time			1	each	$25,000	$25,000
		Section 106 Coordination	Federal Cost Borne by GSA			one time			1	each	$0	$0
												$254,700

Table 8: Average Annual Costs for Alternative 2

Alternative 2 - Calculation of Average Annual Costs									
				Cost by Item life					
								Total	PV of Total
Year	PV Factor	1 yr	5 yrs	10 yrs	20 yrs	25 yrs	50 yrs	Cost by Yr	Cost by Yr
1	0.9756	306,966						306,966	299,479
2	0.9518	49,066						49,066	46,701
3	0.9286	49,066	112,900					161,966	150,401
4	0.9060	49,066						49,066	44,451
5	0.8839	49,066		18,000	-			67,066	59,276
6	0.8623	49,066						49,066	42,309
7	0.8413	49,066						49,066	41,277
8	0.8207	49,066	112,900					161,966	132,933
9	0.8007	49,066						49,066	39,288
10	0.7812	49,066				3,037,500		3,086,566	2,411,220
11	0.7621	49,066						49,066	37,395
12	0.7436	49,066						49,066	36,483
13	0.7254	49,066	112,900					161,966	117,493
14	0.7077	49,066						49,066	34,725
15	0.6905	49,066		18,000				67,066	46,307
16	0.6736	49,066						49,066	33,052
17	0.6572	49,066						49,066	32,246
18	0.6412	49,066	112,900					161,966	103,847
19	0.6255	49,066						49,066	30,692
20	0.6103	49,066						49,066	29,943
21	0.5954	49,066						49,066	29,213
22	0.5809	49,066						49,066	28,501
23	0.5667	49,066	112,900					161,966	91,786
24	0.5529	49,066						49,066	27,127
25	0.5394	49,066		18,000	-		683,400	750,466	404,794
26	0.5262	49,066						49,066	25,820
27	0.5134	49,066						49,066	25,190
28	0.5009	49,066	112,900					161,966	81,125
29	0.4887	49,066						49,066	23,977
30	0.4767	49,066						49,066	23,392
31	0.4651	49,066						49,066	22,821
32	0.4538	49,066						49,066	22,265
33	0.4427	49,066	112,900					161,966	71,703
34	0.4319	49,066						49,066	21,192
35	0.4214	49,066		18,000		3,037,500		3,104,566	1,308,174
36	0.4111	49,066						49,066	20,171
37	0.4011	49,066						49,066	19,679
38	0.3913	49,066	112,900			-		161,966	63,375
39	0.3817	49,066						49,066	18,730
40	0.3724	49,066						49,066	18,274
41	0.3633	49,066						49,066	17,828
42	0.3545	49,066						49,066	17,393
43	0.3458	49,066	112,900					161,966	56,014
44	0.3374	49,066						49,066	16,555
45	0.3292	49,066		18,000	-			67,066	22,076
46	0.3211	49,066						49,066	15,757
47	0.3133	49,066						49,066	15,373
48	0.3057	49,066	112,900					161,966	49,508
49	0.2982	49,066						49,066	14,632
50	0.2909	49,066						49,066	14,275
Total							Lump sum PV of costs		6,356,239
							Avg ann equivalent		**224,109**

Table 9: Costs for Alternative 2a

		Alternative 2a											
				Labor				Material or Service Costs					
Item		Notes	Activity Description	Hours	Rate	Frequency (Times per year)	Labor Cost	Quantity	UOM	Unit Cost	Material Cost/ Contract	Amount
1	Routine Operation & Maint	Includes security fence checks, building utilities, heating/AC upkeep, waste water sump pumps, (two located in the gallery, one in the Shop and one lift station for all waste water), General lighting upkeep, U.S. Flag adjustments, security system operation and maintenance, and snow removal.	Building and Grounds weekly site checks (4 hours per week)	208	$80	0	$0					$0
2		Item includes light bulbs and other supplies need to maintain lighting at the site.	Supplies Related to Lighting Maintenance					0	each	$250	$0	$0
3		Includes greasing and fluid level checks in miter gate machinery/equipment, grease and fluid level checks in Tainter gate machinery/equipment, and operating all components to verify correct operation	Upper Miter Gate and Tainter Gate Exercising and Greasing	32	$80	0	$0					$0
4		Upper Miter Gate and Tainter Gate consumable supplies	Grease, Hydraulic Fluid, & misc. wear items					0	each	$350	$0	$0
5		Includes pinning and unpinning the Upper Miter Gates, Setting aerators above the Tainter gate, and turning on and checking heating	Winterization & Spring Start Up	64	$80	0	$0					$0
6		Includes key inventory/security system operation and public restroom/drinking fountain maintenance	Labor involved with National Park Service Tours	80	$80	0	$0					$0
7		Includes activities associated with passing flow through the lock chamber to allow Excel to perform maintenance on the horseshoe dam	Tainter Gate Operation for Horseshoe Dam Maintenance	40	$80	0	$0					$0
		CCURE and security system maintenance and upgrades. Includes replacing hardware is it wears out or becomes obsolete. Security cameras are generally replaced on a five year interval. DVR recording units also have a finite lifespan and need to be replaced periodically. Card readers at entrances will have to be replaced as well.	Security System Maintenance			Every 5 Yrs		1	each	$4,000	$4,000	$800
		CCS elevator routine maintenance and repair(Assume no Elevator Maintenance)	Elevator Maintenance			0		0	each	$2,800	$0	$0
											Routine O&M	$800
	Utilities	Assume no sewer or water usage	City Water & Sewer			1		0	each	$8,144	$0	$0
			Phone & Internet			1		0	each	$3,000	$0	$0
		Assume no Trash Pick-up	Trash Pickup			1		0	each	$1,200	$0	$0
		Electricity is provided free, without cost by Excel Energy. Buildings are heated with electric heat.	Electrical Service			1		1	each	$0	$0	$0
											Utilities	$0
	Flood	Includes operating the Tainter gate and sandbagging across cross over wall	Flood Event Operations (Assume a ten year frequency)	160	$80	Every 10 Yrs	$12,800					$12,800
		Includes sandbags and associated supplies needed during a flood event	Sandbags/misc. flood related materials and supplies			Every 10 Yrs		1	each	$5,000	$5,000	$5,000
											Flood Event	$17,800
		According to ER 1110-2-8157 all HSS structures must be dewatered for inspection on a 25 year cycle. Miter Gates and Tainter Valves were last painted and inspected approximately 15 years ago. Assume bulkheads, upper miter gates, tainter gates, will be blasted and painted if they are pulled. Assume this work will twice. Work will occur in 2030 and 2055.	Blast & Paint Bulkheads			Every 25 Yrs		0	each	$500,000	$0	$0
			Blast & Paint Tainter Gate			Every 25 Yrs		0	each	$750,000	$0	$0
			Blast & Paint Upstream Miter Gates, Inspect Downstream Gates & Paint Valves			Every 25 Yrs		0	each	$750,000	$0	$0
		Assume cracking and areas of delamination will be repaired once during the study period	Horizontal & Vertical Concrete Surface Repairs			Every 25 Yrs		0	each	$500,000	$0	$0
		Activities include design, mobe, providing instrumentation, placing bulkheads, pumping down the lock chamber, monitoring the walls for movement, pre-stressing miter gates, mucking out the bottom of the lock chamber and removing debris	Miscellaneous Dewatering Activities			Every 25 Yrs		0	each	$500,000	$0	$0
		Due to the over 50 foot head difference there are substantial stair towers located at the lower end of the landwall and the river wall. These will have to be sandblasted and painted once during the study period to guard against section loss due to corrosion.	Stair Tower Maintenance			Every 50 Yrs		0	each	$250,000	$0	$0
		Pedestrian bridge provides access to the river wall	Blast & Paint Pedestrian Bridge			Every 50 Yrs		0	each	$175,000	$0	$0
											Major Maintenance	$0
	Inspections	Assume inspections will continue to occur on a five year interval	Periodic Inspection			Every 5 yrs		1	each	$80,000	$80,000	$80,000
			Bridge Inspection			Every 5 yrs		1	each	$7,500	$7,500	$7,500
			Instrumentation			Every 5 yrs		1	each	$10,000	$10,000	$10,000
			Soundings/Diving Inspection			Every 5 yrs		1	each	$10,000	$10,000	$10,000
											Inspections	$107,500
	Real Property Disposal		OC Real Property Contract Sale Coordination	320	$150	one time	$48,000					$48,000
			RE Real Property Contract Sale Coordination	660	$115	one time	$75,900					$75,900
			Ops Real Property Contrac Sale Coordination	160	$115	one time	$18,400					$18,400
			PM Real Property Contract Sale Coordination	240	$115	one time	$27,600					$27,600
			EC Real Property Contract Sale Coordination	120	$115	one time	$13,800					$13,800
			Env Real Property Contract Sale Coordination	320	$115	one time	$36,800					$36,800
			HTRW Scope Prep (EC)	80	$115	one time	$9,200					$9,200
			HTRW Survey Cost (Contract)			one time			1	each	$25,000	$25,000
		Fed Portion of Feasibility Study	Cost will be spread over first two years of the study period			two times			2	each	$1,000	$2,000
												$256,700

Table 10: Average Annual Costs for Alterative 2a

Updated to Oct 2020 price level and to 2.5% interest rate per DQC comment									
Cost by Item life									
								Total	PV of Total
Year	PV Factor	1 yr	5 yrs	10 yrs	20 yrs	25 yrs	50 yrs	Cost by Yr	Cost by Yr
1	0.9756	361,159						361,159	352,350
2	0.9518	101,250						101,250	96,371
3	0.9286	-	112,900					112,900	104,839
4	0.9060	-						-	-
5	0.8839	-		18,000	-			18,000	15,909
6	0.8623	-						-	-
7	0.8413	-						-	-
8	0.8207	-	112,900					112,900	92,662
9	0.8007	-						-	-
10	0.7812	-				-		-	-
11	0.7621	-						-	-
12	0.7436	-						-	-
13	0.7254	-	112,900					112,900	81,900
14	0.7077	-						-	-
15	0.6905	-		18,000				18,000	12,428
16	0.6736	-						-	-
17	0.6572	-						-	-
18	0.6412	-	112,900					112,900	72,388
19	0.6255	-						-	-
20	0.6103	-						-	-
21	0.5954	-						-	-
22	0.5809	-						-	-
23	0.5667	-	112,900					112,900	63,980
24	0.5529	-						-	-
25	0.5394	-		18,000	-		-	18,000	9,709
26	0.5262	-						-	-
27	0.5134	-						-	-
28	0.5009	-	112,900					112,900	56,549
29	0.4887	-						-	-
30	0.4767	-						-	-
31	0.4651	-						-	-
32	0.4538	-						-	-
33	0.4427	-	112,900					112,900	49,981
34	0.4319	-						-	-
35	0.4214	-		18,000		-		18,000	7,585
36	0.4111	-						-	-
37	0.4011	-						-	-
38	0.3913	-	112,900			-		112,900	44,176
39	0.3817	-						-	-
40	0.3724	-						-	-
41	0.3633	-						-	-
42	0.3545	-						-	-
43	0.3458	-	112,900					112,900	39,045
44	0.3374	-						-	-
45	0.3292	-		18,000	-			18,000	5,925
46	0.3211	-						-	-
47	0.3133	-						-	-
48	0.3057	-	112,900					112,900	34,510
49	0.2982	-						-	-
50	0.2909	-						-	-
Total							Lump sum PV of costs		1,140,309
							Avg ann equivalent		**40,205**