

Description of Willamette Falls Locks and Canal Capital Costs – Initial and Periodic

The Willamette Falls Locks and Canal were built in 1873 and purchased by the US Army Corps of Engineers in 1915. The Locks were operated by the Corps until their closure in 2011 due to conditions that posed a life/safety threat. Throughout their active operation, the Corps performed routine annual maintenance and periodic upgrades. However, over the past several decades, as marine traffic declined, there was insufficient economic benefit for the Corps to justify repairs and the condition of the facility has gradually deteriorated.

In order to understand the magnitude of the undertaking to repair and reopen the Locks to public service, the consulting firm, KPFF, was commissioned to perform an evaluation and recommend needed repairs, upgrades and annual maintenance actions. While they found the locks in remarkably good condition considering their age, they recommended the following elements of repair and upgrade as well as annual and periodic maintenance and major rehab items. Note: All costs expressed in 2018 dollars.

Recommended repairs are needed to restore the facility to a safe operating condition and to provide a facility that can be maintained at a reasonable cost, including:

• Control seepage and repair erosion	\$2.33 million
• Seismic upgrade	3.33
• Replace gudgeon anchors	1.07
• Replace pedestrian drawbridge and various walkways	1.29
• Repair/Replace Valves	0.93
• Install fire protection system	0.76
• Repair electrical system	0.28
• Misc. smaller repairs	0.82
Subtotal	\$10.81 million

In addition to repairs needed to simply operate the facility, it is recommended to upgrade certain operating systems with modern equipment, thereby allowing for more efficient operations and maintenance, including:

• Install new hydraulic power units	\$.62 million
• Replace control system	1.21
• Replace lighting system	0.78
Subtotal	\$2.61 million
Total Repairs and Upgrades	\$13.42 million

In addition to repairs and upgrades needed to return the Locks to operational condition, there should be a plan for a scheduled major rehab on a five-year cycle, including:

• Hydrographic survey and dredging	\$.19 million
• Adjust diagonals on miter gates	.03
• Correction of grounding system	.03
• Replace all hydraulic hoses	.05
• Inspect slide gates and replace ½ of the valves	.24
Total 5-year rehab.	\$0.54 million

In the long term, it is recommended that a sinking fund be established to fund expected major capital repairs, including:

<ul style="list-style-type: none"> Remove, inspect and repair all gates every 50-years at an estimated cost of \$1.215 million 	\$50k/year
<ul style="list-style-type: none"> Repair flood damage based upon a 30-year cycle at a cost of \$0.71 million 	\$25k/year

Total Cost over the next 5-year period:

<ul style="list-style-type: none"> Repairs and upgrades 	\$13.42 million
<ul style="list-style-type: none"> 5-year rehab 	0.54
<ul style="list-style-type: none"> Sinking Fund @ \$75 k/year 	0.375
<ul style="list-style-type: none"> Inflation @ 5%/year 	1.2

Grand Total **\$15.535 million**

The Locks and Canal are 146 years old and, as such, there are many unknowns and contingencies to consider. Presented here are those identified by the consultant and the manner in which they have been accounted for in the scope and cost estimate.

- Contingencies are included for all of the cost estimates since they are provided based upon a high level of engineering and design sufficient to provide a Rough Order of Magnitude (ROM) engineer’s estimate. All of the costs include a 30% contingency to account for items that are not individually specified. In the future, as further design and engineering details are developed, the size of the contingency will shrink.

In addition, a 20% contingency is added to all individual costs and the 30% contingency to provide for carrying out the needed engineering and design and completing the permitting process.

- One of the biggest unknowns is the extent of seepage and erosion and the best approach for correcting this problem. As a result, the line items dealing with seepage and erosion control have an added contingency to increase their cost from \$1.3 to \$2.3 million. This contingency is reflected in the costs shown above.
- The second major unknown is the scope and cost of needed seismic upgrades. Further examination of the issue could affect the scope and cost based upon the magnitude of the earthquake that the design should be based upon and the division of responsibilities between the scope that will be the responsibility of the Corps vs. that of the new owner. The Corps is taking responsibility for retrofits required to ensure the upper two gates don’t fail during a major seismic event since they are an integral part of the dam and would impact the flow into the hydroelectric plant and create a bypass of the falls impacting fish runs. The new owner will have responsibility for upgrading the balance of the overall facility to ensure it is operational after a

major seismic event and is available for water-based transport under conditions that could see many bridges collapse. Further engineering will be required to define the final cost and division between the Corps and the new owner.

- The Corps has completed a Section 216 Disposition Study with an integrated Environmental Assessment (EA). The consultant recommended having this assessment reviewed by a qualified environmental expert to determine whether any additional documentation to satisfy NEPA is required. The costs reflected above have included \$50,000 for this purpose.
- The upper gates are a continuation of the dam across the face of Willamette Falls and are subject to periodic licensing requirements under the Federal Energy Regulatory Commission (FERC). While PGE has this responsibility, the consultant has recommended coordinating with PGE to determine whether the new owner will bear any responsibilities during the next licensing event. This is not accounted for in the cost estimate above.
- Escalation is assumed at 5% per year. Actual costs could vary from this and add costs.
- Removal of the gates on a 50-year cycle is a major undertaking and the actual cost of repair will not be known until they are disassembled. This cost estimate is based upon likely repairs, not actual repairs.
- The sinking fund for flood damage repair of \$710,000 is recommended to be accumulated at the rate of \$25,000 per year, meaning it will take nearly 30 years to accumulate that amount. However, a major flood could happen in any year without sufficient funds in the sinking fund to execute repairs.

Planned Locks Repair Cost over time (Full Rehab)

Item	Base Cost 2018 \$	2020	2021	2022	2023	2024	Total
1 Repairs and Upgrades Needed							
A. Control seepage and repair erosion damage	\$2,338,000						
B. Seismic upgrade	\$3,330,250						
C. Replace gudgeon anchors	\$1,068,000						
D. Replace pedestrian draw bridge	\$528,000						
E. Repair/Replace various walkways	\$761,000						
F. Repair/Replace valves	\$929,250						
G. Install Fire Protection System	\$760,000						
H. Inspect, document, repair electrical system, incl. generator	\$278,500						
I. Install New Hydraulic Power Units	\$616,000						
J. Replace/Refurbish Control System	\$1,209,000						
K. Replace Lighting System	\$782,000						
L. Miscellaneous	\$816,000						
Repair Subtotal	\$13,416,000	\$6,708,000	\$6,708,000				\$13,416,000
2 Every 5-year Major Repair and Replace of critical components, including hydraulic hoses, dredging, miter gate adjustment and 50% of gate seals	\$544,000					\$544,000	\$544,000
3 Sinking Fund for future Capital to remove and repair gates on a 50-year schedule and repair flood damage on 30-year cycle (@ \$75,000 per year)	\$1,925,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$375,000
Subtotal		\$6,783,000	\$6,783,000	\$75,000	\$75,000	\$619,000	\$14,335,000
Escalation @ 5% per year		\$339,150	\$678,300	\$11,250	\$15,000	\$154,750	\$1,198,450
GRAND TOTAL		\$7,122,150	\$7,461,300	\$86,250	\$90,000	\$773,750	\$15,533,450

Note: Costs are for the capital improvements needed to return the Locks to an operating condition and maintain them in good working order into the future. Any costs to support development of a public park, groundside public access and costs associated with related development are not included.