

**Howard A. Hanson Dam
Additional Water Storage Project**
Section 902 Post Authorization Change Validation
Study – Fish Passage
King County, Washington

**APPENDIX D
ECONOMIC UPDATE AND 902 CALCULATION**

Final Integrated Validation Report and
Supplemental Environmental Impact Statement



**US Army Corps
of Engineers®**
Seattle District



Project Cost Increase Fact Sheet
(\$000's)

1. Name of Project: Howard A. Hanson Dam Additional Water Storage Project Fish Passage Facility Integrated Validation Report and Supplemental Environmental Impact Statement
2. Section and Law That Authorized or Modified the Project: Section 101(b)(15) of the Water Resource Development Act (WRDA) of 1999 (Public Law 106-53).
3. Section 902 Limit on Project Cost:
 - a. Authorized project cost: (Fiscal Year 1999 price level) \$75,600
 - b. Price level increases from date of authorized cost: * \$107,067
 - c. Current cost of modifications required by law: ** none
 - d. 20% of line 3a: \$15,120
 - e. Maximum project cost limited by Section 902: \$197,787
4. Current Project Cost Including Inflation through Construction: *** \$1,030,715
5. Computation of Percentage Increase:
 - a. Current estimate: (Line 4) \$1,030,715
 - b. Less total of lines 3a, b, and c: \$182,667
 - c. Subtotal: \$848,048
 - d. Percent increase: (line 5c/3a) 1,122%
6. **Explain cost indexes used in 3b; whether national or regional for real estate, and single state or two state average for construction.**

Price level increases for 1 Oct 1998 through 1 Oct 2021 were computed using the Quarterly Cost Indexes by CWBS Feature Code from EM 1110-2-1304, 31 March 2021 for construction expenditures. Historical Rent of primary residence in Seattle-Tacoma-Bellevue, WA, all urban consumers, not seasonally adjusted was used for price level increases for real estate expenditures.
7. **Explain increases in 3c; Legislation requiring the modification, and how accommodated. There have been no legislative modifications since the project was authorized.**

There are no applicable increases.
8. **Explain reason for cost changes other than inflation.**

The current cost estimate has been updated based on design refinements needed to meet the collection and passage survival criteria established in the 2019 BiOp.
9. **Explain changes in benefits and provide current BCR.**

The primary purpose of this effort is to restore downstream fish passage at Howard A. Hanson Dam. Design is intended to meet survival criteria established by the 2019 BiOp and committed to by the Seattle District in response to that BiOp. As a result, the study did not update benefits, but rather identified the least-cost passage design option. Additionally Phase I Water Supply features are already implemented and require no additional expenditure for implementation. Phase II cost and benefit analyses will be

* Line 1e from Table G-4, less the authorized cost

** This includes cost of external credit under Section 104 of WRDA '86, for example. (Integral Section 104 credit is included in the authorized project cost on line 3a.) (See ER 1165-2-29)

*** Line 1b from Table G-4.

evaluated in a future post authorization change report, if required. Therefore, changes in water supply benefits since authorization are not addressed. There is no updated benefit or BCR to present. See Section 4.3 of the VR/SEAS for additional detail.

10. Provide detailed explanation of the status of the project.

The plan recommended in 1998 and authorized in 1999 consists of a dual-purpose phased plan, which would modify HAHD by changing the reservoir operation to allow for raising the level of the reservoir conservation pool for additional water storage and ecosystem restoration. The recommended plan includes two phases. Phase I includes Storage of 20,000 acre-feet (ac-ft) for M&I water supply. Phase II includes additional storage of 2,400 ac-ft for M&I water supply and 9,600 ac-ft for low flow augmentation.

Phase I has been implemented and raised the conservation pool elevation from 1,147 feet to 1,167 feet. However, the fish passage facility included in the Phase I recommendation has not been constructed. Implementation of Phase II is dependent upon the evaluation of the success of Phase I and future Engineering evaluations to determine whether the embankment can safely contain an increased reservoir load. Consensus of the State and Federal resources agencies, the Muckleshoot Indian Tribe, Tacoma Public Utilities, and USACE is also required. Implementation of Phase II storage is a future action that will not be addressed by this effort.

Construction of the fish passage facility completed to date (2021) includes construction of the entrance structure and partial excavation for the remainder of the structure, which is an area approximately 60 feet wide by 180 feet long and approximately 100 feet deep. Rock anchors, shotcrete, and drains were installed to stabilize the excavation walls. A soldier pile wall with tieback anchors and permanent concrete facing was used to retain soil along the south side of the fish passage facility excavation. Contractors were able to complete construction of the cofferdam on the left bank of the river just upstream of and connected to HAHD. This cofferdam would serve to separate the construction site from the reservoir during construction of the fish passage facility. Construction of the downstream fish passage facility was suspended in 2011 due to an anticipated Section 902 cost limit exceedance; all construction was halted, and the cofferdam has remained in place. See Appendix B (Engineering) for additional design detail.

The Validation Report and Supplemental Environmental Impact Statement are scheduled for completion in August 2022.

Table G-1 (ER 1105-2-100 Appendix G)								
CWCCIS Index(s)								
			Index	Yearly Inflat Rate	Cumul Inflat Rate	Cumulative rate to Begin FY	One Half rate of Inflat FY	Tot Allow Inflat for FY
Item	(b)	(c)	(d)	(e)	(f)	(h)	(i)	(j)
Date of Price Level		10/1/1998						
Authorized Estimate		71,514	474.860		1			
First Fiscal year		FY99		0.026		1	1.013	1.013
1st Qtr, 2nd yr	FY00		487.080		1.026			
Second Fiscal year		FY00		0.007		1.026	1.003	1.029
1st Qtr, 3rd yr	FY01		490.330		1.033			
Third Fiscal year		FY01		0.018		1.033	1.009	1.042
1st Qtr, 4th yr	FY02		499.280		1.051			
Fourth Fiscal year		FY02		0.030		1.051	1.015	1.067
1st Qtr, 5th yr	FY03		514.150		1.083			
Fifth Fiscal year		FY03		0.040		1.083	1.020	1.104
1st Qtr, 6th yr	FY04		534.750		1.126			
Sixth Fiscal year		FY04		0.110		1.126	1.055	1.188
1st Qtr, 7th yr	FY05		593.350		1.250			
Seventh Fiscal year		FY05		0.052		1.250	1.026	1.282
1st Qtr, 8th yr	FY06		624.320		1.315			
Eighth Fiscal year		FY06		0.040		1.315	1.020	1.341
1st Qtr, 9th yr	FY07		649.010		1.367			
Ninth Fiscal year		FY07		0.041		1.367	1.020	1.395
1st Qtr, 10th yr	FY08		675.580		1.423			
Tenth Fiscal year		FY08		0.034		1.423	1.017	1.447
1st Qtr, 11th yr	FY09		698.290		1.471			
Eleventh Fiscal year		FY09		(0.002)		1.471	0.999	1.469
1st Qtr, 12th yr	FY10		696.930		1.468			
Twelfth Fiscal year		FY10		0.031		1.468	1.016	1.491
1st Qtr, 13th yr	FY11		718.730		1.514			
Thirteenth Fiscal year		FY11		0.036		1.514	1.018	1.541
1st Qtr, 14th yr	FY12		744.720		1.568			
Fourteenth Fiscal year		FY12		0.018		1.568	1.009	1.583
1st Qtr, 15th yr	FY13		758.430		1.597			
Fifteenth Fiscal year		FY13		0.021		1.597	1.010	1.614
1st Qtr, 16th yr	FY14		774.030		1.630			
Sixteenth Fiscal year		FY14		0.023		1.630	1.012	1.649
1st Qtr, 17th yr	FY15		792.020		1.668			
Seventeenth Fiscal year		FY15		(0.001)		1.668	0.999	1.667
1st Qtr, 18th yr	FY16		790.900		1.666			
Eighteenth Fiscal year		FY16		0.027		1.666	1.013	1.688
1st Qtr, 19th yr	FY17		811.910		1.710			
Nineteenth Fiscal year		FY17		0.026		1.710	1.013	1.732
1st Qtr, 20th yr	FY18		833.090		1.754			
Twentieth Fiscal year		FY18		0.049		1.754	1.024	1.797
1st Qtr, 21st yr	FY19		873.730		1.840			

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CWCCIS Index(s)								
			Index	Yearly Inflat Rate	Cum ul Inflat Rate	Cumu l rate to Begin FY	One Half rate of Infl FY	Tot Allow Inflat for FY
Item	(b)	(c)	(d)	(e)	(f)	(h)	(i)	(j)
Twenty-First Fiscal year		FY19		0.008		1.840	1.004	1.847
1st Qtr, 22nd yr	FY20		880.380		1.854			
Twenty-Second Fiscal yr		FY20		0.051		1.854	1.026	1.902
1st Qtr, 23rd yr	FY21		925.560		1.949			
Twenty-Third Fiscal year		FY21		0.086		1.949	1.043	2.033
1st Qtr, 24th yr	FY22		1005.520		2.118			

Table G-2 (ER 1105-2-100 Appendix G)

CPI Index(s)

			Index	Yearly Inflat Rate	Cumul Inflat Rate	Cumul rate to Begin FY	One Half rate of Infl FY	Tot Allow Inflat for FY
Item	(b)	(c)	(d)	(e)	(f)	(h)	(i)	(j)
Date of Price Level		10/1/1998						
Authorized Estimate		4,086	178.300		1			
First Fiscal year		FY 99		0.04319		1	1.02159	1.02159
1st Qtr, 2nd yr	FY 00		186.000		1.04319			
Second Fiscal year		FY 00		0.03710		1.04319	1.01855	1.06254
1st Qtr, 3rd yr	FY 01		192.900		1.08188			
Third Fiscal year		FY 01		0.05599		1.08188	1.02799	1.11217
1st Qtr, 4th yr	FY 02		203.700		1.14246			
Fourth Fiscal year		FY 02		0.02749		1.14246	1.01375	1.15816
1st Qtr, 5th yr	FY 03		209.300		1.17386			
Fifth Fiscal year		FY 03		-0.00382		1.17386	0.99809	1.17162
1st Qtr, 6th yr	FY 04		208.500		1.16938			
Sixth Fiscal year		FY 04		-0.00144		1.16938	0.99928	1.16854
1st Qtr, 7th yr	FY 05		208.200		1.16769			
Seventh Fiscal year		FY 05		0.01105		1.16769	1.00552	1.17414
1st Qtr, 8th yr	FY 06		210.500		1.18059			
Eighth Fiscal year		FY 06		0.04133		1.18059	1.02067	1.20499
1st Qtr, 9th yr	FY 07		219.200		1.22939			
Ninth Fiscal year		FY 07		0.06671		1.22939	1.03336	1.27040
1st Qtr, 10th yr	FY 08		233.823		1.31140			
Tenth Fiscal year		FY 08		0.07763		1.31140	1.03882	1.36231
1st Qtr, 11th yr	FY 09		251.975		1.41321			
Eleventh Fiscal year		FY 09		0.02787		1.41321	1.01393	1.43290
1st Qtr, 12th yr	FY 10		258.997		1.45259			
Twelfth Fiscal year		FY 10		-0.02522		1.45259	0.98739	1.43427
1st Qtr, 13th yr	FY 11		252.464		1.41595			
Thirteenth Fiscal year		FY 11		0.00566		1.41595	1.00283	1.41996
1st Qtr, 14th yr	FY 12		253.894		1.42397			
Fourteenth Fiscal year		FY 12		0.04742		1.42397	1.02371	1.45773
1st Qtr, 15th yr	FY 13		265.934		1.49150			
Fifteenth Fiscal year		FY 13		0.04533		1.49150	1.02266	1.52530
1st Qtr, 16th yr	FY 14		277.988		1.55910			
Sixteenth Fiscal year		FY 14		0.05538		1.55910	1.02769	1.60227
1st Qtr, 17th yr	FY 15		293.382		1.64544			
Seventeenth Fiscal year		FY 15		0.05511		1.64544	1.02755	1.69078
1st Qtr, 18th yr	FY 16		309.550		1.73612			
Eighteenth Fiscal year		FY 16		0.06388		1.73612	1.03194	1.79157
1st Qtr, 19th yr	FY 17		329.325		1.84703			
Nineteenth Fiscal year		FY 17		0.06869		1.84703	1.03435	1.91047
1st Qtr, 20th yr	FY 18		351.947		1.97390			
Twentieth Fiscal year		FY 18		0.06544		1.97390	1.03272	2.03849
1st Qtr, 21st yr	FY 19		374.980		2.10308			
Twenty-First Fiscal year		FY 19		0.03370		2.10308	1.01685	2.13852
1st Qtr, 22nd yr	FY 20		387.615		2.17395			
Twenty-Second Fiscal year		FY 20		0.03816		2.17395	1.01908	2.21543

Table G-2 (ER 1105-2-100 Appendix G)

CPI Index(s)

			Index	Yearly Inflat Rate	Cumul Inflat Rate	Cumul rate to Begin FY	One Half rate of Infl FY	Tot Allow Inflat for FY
Item	(b)	(c)	(d)	(e)	(f)	(h)	(i)	(j)
1st Qtr, 23rd yr	FY 21		402.408		2.25692			
Twenty-Third Fiscal year		FY 21		0.01235		2.25692	1.00617	2.27085
1st Qtr, 24th yr	FY 22		407.376		2.28478			

Table G-3 (ER 1105-2-100 Appendix G)									
Authorized Cost Increase Computation									
FY	Current Project Cost			Current Sched (%)		Authorized Cost Sched		Auth Cost Inflat	
	Total	Constr	R.E.	Constr	R.E.	Constr	R.E.	Constr	R.E.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
FY 98	\$10.62	\$10.62	\$0	0.001	0.00	\$0.89	\$0.00	\$0.89	\$0.00
FY 99	\$849.76	\$849.76	\$0	0.100	0.00	\$71.28	\$0.00	\$72.19	\$0.00
FY 00	\$2,528.34	\$2,528.34	\$0	0.297	0.00	\$212.07	\$0.00	\$218.26	\$0.00
FY 01	\$3,075.41	\$3,075.41	\$0	0.361	0.00	\$257.96	\$0.00	\$268.80	\$0.00
FY 02	\$7,997.16	\$7,997.16	\$0	0.938	0.00	\$670.79	\$0.00	\$715.79	\$0.00
FY 03	\$5,421.11	\$5,421.11	\$0	0.636	0.00	\$454.71	\$0.00	\$502.20	\$0.00
FY 04	\$13,998.02	\$13,998.02	\$0	1.642	0.00	\$1,174.13	\$0.00	\$1,394.66	\$0.00
FY 05	\$10,419.38	\$10,419.38	\$0	1.222	0.00	\$873.96	\$0.00	\$1,120.54	\$0.00
FY 06	\$15,096.15	\$15,096.15	\$0	1.771	0.00	\$1,266.24	\$0.00	\$1,697.71	\$0.00
FY 07	\$13,694.38	\$13,694.38	\$0	1.606	0.00	\$1,148.67	\$0.00	\$1,602.06	\$0.00
FY 08	\$6,137.40	\$6,137.40	\$0	0.720	0.00	\$514.80	\$0.00	\$744.71	\$0.00
FY 09	\$6,965	\$6,965	\$0	0.817	0.00	\$584	\$0	\$858.31	\$0.00
FY 10	\$10,539	\$10,539	\$0	1.236	0.00	\$884	\$0	\$1,317.71	\$0.00
FY 11	\$6,181	\$6,181	\$0	0.725	0.00	\$518	\$0	\$798.89	\$0.00
FY 12	\$3,249	\$1,795	\$1,454	0.211	56.01	\$151	\$2,289	\$238.33	\$3,336.28
FY 13	\$1,230	\$1,230	\$0	0.144	0.00	\$103	\$0	\$166.42	\$0.00
FY 14	\$242	\$242	\$0	0.028	0.00	\$20	\$0	\$33.50	\$0.00
FY 15	\$72	\$72	\$0	0.008	0.00	\$6	\$0	\$10.10	\$0.00
FY 16	\$168	\$168	\$0	0.020	0.00	\$14	\$0	\$23.73	\$0.00
FY 17	\$87	\$87	\$0	0.010	0.00	\$7	\$0	\$12.70	\$0.00
FY 18	\$484	\$37	\$447	0.004	17.22	\$3	\$704	\$5.56	\$1,434.52
FY 19	-\$5	-\$5	\$0	-0.001	0.00	\$0	\$0	-\$0.85	\$0.00
FY 20	\$6	\$6	\$0	0.001	0.00	\$1	\$0	\$0.98	\$0.00
FY 21	\$2,994	\$2,994	\$0	0.351	0.00	\$251	\$0	\$510.61	\$0.00
Balance to complete	\$743,745	\$743,050	\$695	87.152	26.76	\$62,326	\$1,094	\$131,976	\$2,499
Total	\$855,185	\$852,589	\$2,596	100.00	100.00	\$71,514	\$4,086	\$144,290	\$7,269

Table G-4 (ER 1105-2-100 Appendix G)		
MAXIMUM COST INCLUDING INFLATION THROUGH CONSTRUCTION		
FY 22	-	(000's)
Line 1		
a.	Current Project estimate at current price levels:	\$855,185
b.	Current project estimate, inflated through construction:	\$1,030,715
c.	Ratio: Line 1b / line 1a	1.2053
d.	Authorized cost at current price levels:	\$151,559
(Column (h) plus (i) from table G-3)		
e.	Authorized cost, inflated through construction:	\$182,667
(Line c x Line d)		
Line 2	Cost of modifications required by law:	\$0
Line 3	20 percent of authorized cost:	\$15,120
.20 x (table G-3, columns (f) + (g))		
Line 4	Maximum cost limited by section 902:	\$197,787
Line 1e + line 2 + line 3		