

Memorandum

Date: March 5, 2021
To: Michael McElwee, Kevin Greenwood; Port of Hood River
From: Steven Siegel
Subj: Hood River-White Salmon Replacement Bridge: Preliminary Cost-to-Complete

Pursuant to your request, I have assembled the cost estimates prepared during Phase 1 (NEPA) for the work required to develop, finance, and construct the Replacement Bridge into a preliminary, all-in cost-to-complete estimate – shown in the attached Table 1. The cost-to-complete estimate incorporates all work following the completion of NEPA (it excludes the Phase 1 NEPA cost) through the opening of the Replacement Bridge and removal of the existing bridge, except for bond underwriting costs and the establishment of certain reserves (which will be addressed in a financing plan to be prepared at a later date). The estimate assumes the Replacement Bridge would be delivered as a public project; costs associated with a P3 project (except the cost for a preliminary P3 assessment) are not addressed. The cost estimate for each work task was prepared in 2020 dollars (2020\$) and escalated to the year when the expenditure occurs (year-of-expenditure dollars (YOE\$)) assuming an inflation rate of 3% per year. Escalation cost was estimated on a planning level, without the benefit of a detailed expenditure schedule.

Final design and construction costs were estimated by WSP as part of the engineering work prepared during Phase 1. The details of the WSP estimate are summarized in the attached Appendix A. It should be noted that the engineering underlying the WSP estimate is still at a planning level (about 5%); and therefore the final design and engineering cost estimates themselves remain preliminary. Because of their preliminary nature, the final design and construction cost estimates include contingencies of 30% (low estimate) to 40% (high estimate). The WSP final design and construction cost estimate updates and supersedes the estimate prepared by Mott McDonald (see SR-35 Columbia River Crossing Estimate Report (May 8, 2018)). The Mott McDonald estimate was in 2020\$, and did not address escalation to YOE\$.

The attached cost-to-complete also includes “programmatic costs” (all other project costs not included in the WSP estimate), which are enumerated in Table 1. These costs were not included in the 2018 Mott McDonald estimate. The “preliminary engineering” cost was estimated by OTAK; the details of which are summarized in the attached Appendix B. Other programmatic costs were estimated by Stantec, WSP, Clary Consulting, Kevin Greenwood, and myself.

As summarized below, the preliminary cost-to-complete for the Replacement Bridge is estimated at about \$331 - \$399 million in YOE\$. The WSP high estimate for final design and construction costs is about \$40M (2020\$) higher than the 2018 Mott McDonald estimate (which assumed a 40% contingency, comparable to the WSP high estimate). This difference is primarily driven by the inclusion of: (i) \$15M for additional marine (barge) support to avoid an elongated construction window caused by the in-water work windows resulting from the NEPA work, (ii) \$7M for lead paint removal associated with the removal of the existing bridge, (iii) \$2.5M in right-of-way costs (which were not addressed in the 2018 estimate), and (iv) mitigation costs resulting from the NEPA study.

Hood River-White Salmon Replacement Bridge: Preliminary Cost-to-Complete (in \$Millions)

	WSP 2021		Mott McDonald 2018
	Low	High	Comparable to WSP High
Final Design & Construction (2020\$)	\$240.6	\$292.4	\$253.8
Programmatic Costs (2020\$)	\$22.6	\$24.9	Not Addressed
Escalation to YOE\$	\$67.9	\$81.8	Not Addressed
Total (rounded)	\$331	\$399	

**Table 1: Hood River-White Salmon Replacement Bridge: Preliminary Cost-to-Complete
Costs Shown in \$Millions**

Cost Item	Low	High
Preliminary Procurement/Project Delivery: costs to procure and contract with engineering firm, undertake P3 RFI, and assess other project delivery options.	\$0.14	\$0.14
Preliminary Engineering: cost of additional engineering required for a Design Acceptance Package (DAP), equivalent to 30% engineering (breakdown shown in Appendix A). Also includes cost of additional borings to determine soil characteristics.	\$3.73	\$4.88
Traffic and Toll Revenue (T&R) Consultant: cost of a T&R consultant to evaluate toll policies, complete and Level II T&R study, investment-grade T&R study, and continuing support through bond/loan approvals. On-going costs following bond/loan approvals not included.	\$0.53	\$0.65
Finance Plan: costs of preparing the plan of finance, a certified financial advisor, acquiring credit ratings, and preparing intergovernmental agreements for receipt of grant funds. The largest component is the cost of the TIFIA loan, for which the project must pay for its own work and that of advisors retained by USDOT.	\$1.74	\$2.17
Governance: cost of preparing and seeking legislation for bi-state authority (BSA), operationalizing the BSA, implementing on-going administrative systems, and preparing agreements for services from partnering agencies.	\$0.70	\$0.85
Administration: cost of program management and administration, legal services, legislative services throughout project schedule	\$3.51	\$3.51
Public Involvement: costs of agency-led public involvement throughout project development and construction and start-up costs. Excludes public involvement in contractor's cost.	\$0.49	\$0.59
Owner's Representative: cost of a technical consultant for the bridge owner that provides oversight, project control, and administration during final design and construction.	\$6.00	\$6.00
Toll Equipment: cost to fabricate, procure, and install toll gantry, roadside toll collection equipment, and back-office equipment and software	\$2.00	\$2.00
Programmatic Contingency: Contingency for cost items not incorporated in final design and construction cost.	\$3.77	\$4.16
Final Design: cost of engineering and design from DAP through Issued-for-Construction documents. Excludes engineering support during construction, which is included in construction cost. Engineering costs differ depending on project delivery method. While not specifically estimated as such, these costs are at high-end, in line with CMGC option.	\$22.60	\$32.79
Design and Construction Contingency: 30% of final design and construction cost for low estimate, 40% for high. Excludes programmatic contingency.	\$43.46	\$62.45
Construction: cost to construct replacement bridge, including mitigation, and to remove existing bridge. Assumes extra marine support to avoid an elongated construction schedule due to the constraints of in-water work windows. Further work required to confirm feasibility of extra marine support and construction schedule. Cost breakdown shown in Appendix B.	\$174.55	\$197.17
Cost-to-Complete 2020\$: is the all-in cost in 2020\$ of all programmatic and construction costs from the start of Phase 2 (excludes NEPA work) through construction. It excludes bond issuance costs and related reserves, which will be addressed in the financing plan.	\$263.21	\$317.33
Escalation to Year-of-Expenditure (YOE\$): cost incurred due to inflation on all programmatic and construction costs from the 2020 base estimate to the year in which the expenditures occur (year-of-expenditure (YOE)). YOE costs are estimated by inflating 2020\$ costs at 3% per year through the mid-year of a cost element. For example, construction costs are inflated to 2028\$.	\$67.85	\$81.84
Cost-to-Complete YOE\$: Rounded	\$331	\$399



Memorandum

Date: February 8, 2021

Subject: Engineers Preliminary Cost Estimate Update
(80550A)

From: Stuart Bennion, PE, SE, WSP

To: Kevin Greenwood, Hood River Bridge Project Director

The Port of Hood River has requested an update of the engineers preliminary cost estimate to reflect project modifications during environmental impact statement (EIS) coordination and engineering services, as well as to modify escalation for year 2028 to match projected funding opportunities. This memorandum outlines what has been accomplished to date and outlines what changes have been made to previous versions of the preliminary engineers estimate.

BACKGROUND

For purposes of this memorandum, we will focus on two previous efforts to develop a engineers preliminary cost estimate. The first estimate was part of the “State Route 35 Type, Size, and Location Report and Cost Estimate” prepared by Parsons Brinckerhoff in 2011, which captured a low-end and high-end cost for construction year 2020. The second estimate, contained in the “State Route 35 Columbia River Crossing – Estimate Report” prepared by Mott McDonald in 2018, provided only the high-end estimate for construction year 2020. The only significant bid item change between the 2011 and 2018 estimates was the inclusion of lead paint removal.

UPDATED ESTIMATE CHANGES

The 2020 preliminary cost estimate update uses the 2011 low end and high end table format and the bid items and unit costs from the 2018 estimate with the following modifications shown in Table 1.

Modified bridge removal accounts for cofferdams to accommodate accelerated pier removal of the existing bridge foundations. Modified marine support adds additional barges to accommodate an accelerated construction schedule. Other modifications from the EIS process are assumed to be covered by contingency costs. Mitigation includes compensatory mitigation for riparian and wetland impacts, along with an allocation for unidentified mitigation measures at this time. The 2028 escalation year was selected based on an “intermediate” point for Year of Construction. The cost estimate does not include programmatic costs (i.e., administrative costs, traffic and revenue, governance, financing and other non-engineering-related expenses) that are not associated with engineering and construction of the project. Table 2 shows the cost range for the 2020 update.

Table 1. 2020 Preliminary Engineers Cost Estimate Changes

Estimate Item	Low Cost	High Cost
• Added bid items:		
- Pedestrian noise wall	5,000 sq ft	30,000 sq ft
- Right-of-Way Development & Control	\$2,000,000	\$2,500,000
- Mitigation Costs	\$300,000	\$500,000
• Modified bid items:		
- Bridge Removal; added	\$5,000,000	\$7,000,000
- Marine Support; added	\$10,000,000	\$15,000,000
• Contingency (Design & Construction)	30%	40%
• Final Design	12%	15%
• Construction Engineering Support	12%	15%
• Escalation (2020-2028), compounded Annually	3%	3%

Table 2. SR 35 Columbia River Crossing Preliminary Engineers Cost Estimate – Cost Range

Year	Cost Range Summary	
	Low range	High range
2020\$	\$240,600,000.00	\$292,400,000.00
2028\$	\$304,800,000.00	\$370,500,000.00

RECOMMENDATION

The Port has not yet received a Record of Decision and selected alternative from the EIS process, though it is anticipated to occur in the next few months. Following that record of decision, the Port plans to advance the project design to a Design Acceptance Package (DAP) submittal (15 percent to 30 percent level of design). The update to the attached pre-preliminary engineers cost estimate at that time will include an update to the bid items and unit costs not captured at this time. It is recommended that the Port use the high-end cost range numbers at this time to pursue funding opportunities.

Attachments

Preliminary - Cost Estimate – Low Range

Preliminary - Cost Estimate – High Range

SCB:llt

PRELIMINARY - COST ESTIMATE - LOW RANGE

PRELIMINARY - COST ESTIMATE - LOW RANGE					
				COUNTY	
SR-35 COLUMBIA RIVER CROSSING					
KEY NUMBER	BRIDGE NAME	BR #	DATE	ROADWAY DESIGNER	
	Hood River Bridge	--	12/30/2020	WSP	
ITEM NUMBER	ITEM DESCRIPTION	UNIT	AMOUNT	UNIT COST	TOTAL
ROADWORK					
	CLEARING AND GRUBBING	ACRE	1.34	\$16,700	\$22,377
	EMBANKMENT IN PLACE	CUYD	12,756	\$16.42	\$209,454
DRAINAGE AND SEWERS					
	CONCRETE INLETS	EACH	8	\$1,548.22	\$12,386
	DIVERSION MANHOLES	EACH	2	\$10,000.00	\$20,000
	RETURN FLOW MANHOLES	EACH	2	\$3,000.00	\$6,000
	VAULT WITH INTERNALS	EACH	2	\$200,000.00	\$400,000
	PIPE, 12 INCH DIAMETER	FOOT	740	\$219.07	\$162,112
	PIPE, 15 INCH DIAMETER	FOOT	400	\$342.30	\$136,920
	PIPE, 18 INCH DIAMETER	FOOT	5,085	\$492.91	\$2,506,447
BRIDGES					
	BRIDGE REMOVAL	SQFT	92,778	\$188.00	\$17,442,264
	ALLOCATED CONTINGENCY FOR LEAD PAINT REMOVAL	SQFT	92,778	\$107.00	\$9,927,246
	SHORING, CRIBBING AND COFFERDAMS	LS	1	\$5,440,360	\$5,440,360
	STRUCTURE EXCAVATION	CUYD	303	\$120.00	\$36,360
	GRANULAR STRUCTURE BACKFILL	CUYD	96	\$65.00	\$6,240
	FURNISH DRILLING EQUIPMENT	EACH	1	\$50,688.00	\$50,688
	DRILLED SHAFT CONCRETE	CUYD	3,514	\$374.10	\$1,314,587
	DRILLED SHAFT REINFORCEMENT	LBS	527,100	\$1.45	\$764,295
	CSL TEST ACCESS TUBES	FOOT	7,810	\$10.75	\$83,958
	CSL TESTS	EACH	38	\$2,157.89	\$82,000
	DRILLED SHAFT EXCAVATION, 72 INCH DIAMETER	FOOT	1,637	\$749.79	\$1,227,406
	DRILLED SHAFT EXCAVATION, 96 INCH DIAMETER	FOOT	1,444	\$1,109.17	\$1,601,641
	FURNISH PILE DRIVING EQUIPMENT	EACH	1	\$50,688.00	\$50,688
	FURNISH PP 48 X 0.5 STEEL PILES	FOOT	5,532	\$351.02	\$1,941,843
	FURNISH PP 48 X 0.5 STEEL TEST PILES	FOOT	923	\$351.02	\$323,991
	DRIVE PP 48 X 0.5 STEEL PILES	FOOT	5,532	\$208.06	\$1,150,988
	DRIVE TEST PILES	FOOT	923	\$208.06	\$192,039
	PILE LOAD TEST (DYNAMIC)	EACH	6	\$35,840.00	\$215,040
	PP 48 X 0.5 STEEL PILE SPLICES	EACH	112	\$1,151.94	\$129,017
	REINFORCEMENT	LBS	7,882,790	\$1.47	\$11,587,701
	COATED REINFORCEMENT	LBS	1,612,435	\$1.59	\$2,563,772
	FOUNDATION CONCRETE, CLASS 4000	CUYD	9,401	\$314.23	\$2,954,076
	GENERAL STRUCTURAL CONCRETE, CLASS 4000	CUYD	33,523	\$714.96	\$23,967,604
	REINFORCED CONCRETE END PANELS	SQYD	380	\$285.63	\$108,539
	POST-TENSIONING	LBS	2,228,617	\$4.41	\$9,828,201
	BEARING DEVICES, ABUTMENTS	EACH	2	\$3,388.68	\$6,777
	BEARING DEVICES, BENT 2 & 14	EACH	2	\$2,259.12	\$4,518
	2 INCH ELECTRICAL CONDUIT	FOOT	8,800	\$18.75	\$165,000
	MODULAR EXPANSION JOINT SEALS	FOOT	113	\$776.92	\$87,792
	COMBINATION BRIDGE RAIL	FOOT	8,780	\$397.83	\$3,492,947
	HANDRAIL PEDESTRIAN ORNAMENTAL	FOOT	4,390	\$319.67	\$1,403,351
	NOISE WALL (PED)	SQFT	5,000	\$100.00	\$500,000
	RETAINING WALLS, MSE	SQFT	12,835	\$55.67	\$714,524
	MARINE SUPPORT	LS	1	\$25,184,848	\$25,184,848
BASES					
	AGGREGATE BASE	TON	1,922	\$23.37	\$44,917
WEARING SURFACES					

	HMAC	TON	4,080	\$85.15	\$347,412
	CONCRETE WALKS	SQFT	62,960	\$5.11	\$321,726
	CONCRETE SIDEWALK RAMPS	EACH	4	\$4,000.00	\$16,000
	CONCRETE CURBS, CURB AND GUTTER	FOOT	1,640	\$12.14	\$19,910
PERMANENT TRAFFIC SAFETY AND GUIDANCE DEVICES					
	CONCRETE BARRIER	FOOT	8,780	\$67.39	\$591,684
	LONGITUDINAL PAVEMENT MARKINGS	FOOT	17,540	\$0.33	\$5,788
PERMANENT TRAFFIC CONTROL AND ILLUMINATION SYSTEMS					
	SIGNAGE	SQFT	300	\$37.55	\$11,265
RIGHT-OF-WAY DEVELOPMENT AND CONTROL					
		LS	1	\$2,000,000.00	\$2,000,000
MITIGATION COSTS					
		LS	1	\$300,000.00	\$300,000
FUTURE LIFE CYCLE COSTS					
					\$0
SUBTOTAL, Construction Items					\$131,685,000
	MOBILIZATION	LS	1	10%	\$13,169,000
SUBTOTAL, All Items					\$144,854,000
	CONTINGENCIES (Design & Construction)	LS	1	30%	\$43,457,000
SUBTOTAL, All Items + Contingencies					\$188,311,000
	SALES TAX, 7.5% for WA portion only (apply to 1/2 previous subtotal)	LS	0.5	7.50%	\$7,062,000
	FINAL DESIGN	LS	1	12%	\$22,598,000
	CONSTRUCTION ENGINEERING SUPPORT	LS	1	12%	\$22,598,000
TOTAL COST	2020\$				\$240,600,000
	ESCALATION (2020-2028), COMPOUNDED ANNUALLY	YR	8	3%	\$64,185,000
TOTAL COST	2028\$				\$304,800,000


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	SIGNAGE	SQFT	300	\$37.55	\$11,265
RIGHT-OF-WAY DEVELOPMENT AND CONTROL					
		LS	1	\$2,500,000.00	\$2,500,000
MITIGATION COSTS					
		LS	1	\$500,000.00	\$500,000
FUTURE LIFE CYCLE COSTS					
					\$0
SUBTOTAL, Construction Items					\$141,926,000
	MOBILIZATION	LS	1	10%	\$14,193,000
SUBTOTAL, All Items					\$156,119,000
	CONTINGENCIES (Design & Construction)	LS	1	40%	\$62,448,000
SUBTOTAL, All Items + Contingencies					\$218,567,000
	SALES TAX, 7.5% for WA portion only (apply to 1/2 previous subtotal)	LS	0.5	7.50%	\$8,197,000
	FINAL DESIGN	LS	1	15%	\$32,786,000
	CONSTRUCTION ENGINEERING SUPPORT	LS	1	15%	\$32,786,000
TOTAL COST	2020\$				\$292,400,000
	ESCALATION (2020-2028), COMPOUNDED ANNUALLY	YR	8	3%	\$78,004,000
TOTAL COST	2028\$				\$370,500,000



Memorandum

To: Kevin Greenwood, Project Director
From: Chuck Green, PE 
Copies: File
Date: February 3, 2021
Subject: Hood River Bridge Replacement Preliminary Engineering Cost Estimate
Contributors: Bruce Johnson, PE and Scott Nettleton, PE

This memo provides an order-of-magnitude cost estimate for a consultant team (A&E Consultant) to advance the project to a Design Acceptance Package (DAP) level, approximately 30%. The estimate is an order-of-magnitude range based on reviewing survey, design and environmental studies completed to date and identifying gaps in the work needed to achieve the Design Acceptance Package level milestone.

For the purposes of this memo, the Oregon DOT Project Delivery Manual was used as a guide for defining DAP deliverables and the Washington DOT Project Delivery process was overlaid at specific points. Assumptions were made for a variety of items as far as their readiness to be used for the next stages of design, including survey, geotechnical data, design recommendations, and mitigation projects.

A contingency factor was used to address items that need more detail and definition, including the level of bridge, foundation and structural design needed to achieve DAP, as well as other efforts requested from the A&E Consultant to support other tasks, including aesthetics and work with the Columbia Gorge Commission, preferred alternative design changes to address Tribal concerns, traffic projections to support a tolling and revenue study, and participating in project delivery industry or information forums to respond to design questions.

Based on our cost analysis, we estimate the potential range for this next phase of consultant design work to advance to DAP and the decision-making that comes at that milestone to be on the order of \$3 - \$4 million.

For the purposes of this memo, the following definitions are used:

- Architecture and Engineering Consultant (A&E): this is the project design consultant team, comprising engineering (civil, structural, stormwater/ water resources, geotechnical, traffic, etc.), architecture (bridge, landscape), and other disciplines necessary to produce a preliminary and final design for building a project.
- Preliminary Engineering (PE): advancing the design beyond the current EIS "footprint" design level to an approximate 15% concept design. This would generate a cost estimate with 30-40% cost contingency.
- Design Acceptance Package (DAP): advancing the 15% concept design to a "proof of concept" preliminary engineering design level which can be used to decide on the project delivery mechanism (design-bid-build, design/build, Public-Private Partnership), approximately at a level between 15% and 30%. This would generate a cost estimate with a 20-25% contingency range. This level design and cost estimate will be useful for funding strategies, risk analysis, grant applications, and state and federal funding/financing requests.

Owner's Representative (OR)/Program Management/Project Engineering Advisor: With this being a large and complex project, in lieu of hiring in-house, full-time staff to provide these services, this is a Consultant team reporting to the Project Director/Owner to provide independent oversight of the designer and contractor. This is not an abdication of project control or ownership, it is an extension of staff and Agency resources and expertise to provide project delivery and Program Management advice on all manner of technical, financial, public interaction issues and construction support with administration on behalf of the Port or Bridge Project Authority. The OR/Program/Engineering Advisor can be retained at any time the Port or Bridge Authority determines they need these services and is desired to stay with the project through completion and contract/grant close-out. This could be as early as this preliminary/DAP design stage, scoped to work within the existing funding and grant budget.

Estimate

The following are order-of-magnitude estimates of the A&E consultant work items to achieve the DAP milestone.

General Work Task Description	Order-of-Magnitude Estimate to Get to DAP
Additional advance design-level surveys & Record of Survey	\$220,000
Post-NEPA/Mitigation design & measures specifications, permits, railroad rights	\$720,000
Roadway/access control/ WSDOT & ODOT Coordination	\$450,000
Traffic design/work zone traffic control/ traffic management plan	\$160,000
Bike/ped: analysis, design decisions, preliminary design	\$200,000
Structural design including Geotech ¹	\$1,050,000
ROW Plans	\$55,000
Utilities plans	\$20,000
Gorge Commission/Tribes, aesthetics and cultural items	\$40,000
Public involvement	\$100,000
Cost Risk Assessment/ Value Engineering/ Updated & Refined estimates	\$150,000
DAP process, approvals	\$290,000
Total	\$3,455,000
Range	\$3.0 - \$4.0 Million

¹ Structural design includes wind load and shear studies, scour and hydraulic studies, foundation design, wall design and bridge design. To achieve DAP, at this time design details such as bridge structure, substructure, component items, etc. are intended to be advanced only to a “proof of concept” and cost estimate point with advanced design details coming after DAP, at the Advanced and Final Design stage. These are intended to refine items previously identified in the TS&L Study, EIS design, Geotech Data Report and mitigation project list. This work will also identify the scope and estimated cost of structural items to achieve advanced and final design.