Port of Hood River Project Cost Estimate Memorandum

Date: December 3, 2021

Subject: Preliminary Project Cost Estimate Update – Overview
WSP Job No. 80550A

From: Stuart Bennion, PE, SE

To: Kevin Greenwood, Hood River Bridge Project Director

The Port of Hood River (POHR) has requested an update of the engineer's preliminary project cost estimate (PCE) with associated construction schedule and scoping (assumptions) documentation for the proposed Hood River – White Salmon Replacement Bridge project (the project). The Port's goal is to qualify the project work elements, design and construction assumptions, construction schedule, identify risks and associated contingencies, address current year to construction escalation and market variability, and capture programmatic costs into one PCE that can be tracked and adjusted as the project progresses. This document outlines this PCE update effort, references supporting documentation, and discusses the background for PCE cost not captured in the construction costs.

Project development is assumed to be managed by the Port, or some other organization like the Bi-State Bridge Authority (BSBA) (if formed), with management support from a Replacement Bridge Management Contract (RBMC) to assist in engineering oversight and programmatic efforts. Engineering will be provided by a consulting firm to take the project through Oregon Department of Transportation (ODOT) design acceptance package (DAP) process and traditional Design, Bid, Build (DBB) contact document development.

The main sections of this memorandum are in line with the main sections of the PCE with accompanying document support as attachments.

PCE CONSTRUCTION COST UPDATE AND SUPORT DOCUMENTS

The PCE update is recreated from previous cost estimating efforts in 2008, 2011, 2018 and summarized in two documents available at the Port:

- Engineers Preliminary Cost Estimate Update Memorandum, by WSP, February 2021
- Hood River-White Salmon Replacement Bridge: Preliminary Cost-to-Complete Memorandum, by Steven Siegel, March 2021

The project was tracking to advance engineering in 2021-2022 and develop a cost estimate based on DAP level of engineering. Funding opportunities and economical stimulus packages have accelerated the port's need for an updated PCE. This effort utilizes the work from previous efforts and validates high cost/high risk items, such as superstructure and substructure quantiles,

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contractor construction access, and work methods to build the new bridge, construct the approach roadways, and remove the existing bridge.

The PCE update is tied to the attached document titled "Scope Definition of Hood River Bridge Replacement Project." This document outlines the current design and construction assumptions in a level of detail to quantify the work. As the design advances and quantities or assumptions are adjusted, this document can be used as a tool to identify when the construction costs are impacted.

WPS partnered with KMC Construction Consulting (KMC) to develop the attached "Contractor Style Construction Estimate" using InEight Software methodology for discrete high risk/high dollar activities including labor, equipment, material, supplies, and specialty subs. The construction style cost estimate includes pay items, proposal of bid items estimates, and associated bid item assumptions. The detail breakout of this work includes 10-Percent project profit and indirect costs including, but not limited to, commercial and job related overhead, craft supported services, temporary and construction engineering, and surveying. Key work activities include trestle and marine access, access roads, navigation safety devices, moorage and anchorage, concrete delivery, marine taxi services, support equipment, demolition activities, traffic control, roadwork, drainage, bridge elements, utilities, and bridge aesthetics. Assumptions that inform cost are included in the description of each work activity. Where the work is built out, the costs per labor, supplies, materials, and owned equipment are broken out. The updated PCE is broken down to project bid items, so the contractor methodology has to be rolled into each relative bid item. The challenge for this is that profit has to be redistributed to the relative bid items as well. This is developed in the PCE Summary sheets at the end of the document. KMC provide a POHR PCE Basis Project Doc Review Report that explains how the contractor style estimate was generated.

Construction costs herein are related to the Class 4 Estimate level currently developed. A link to defined levels of cost estimate classification is found in the following link provided by The Association for the Advancement of Cost Engineering (AACE):
https://www.costengineering.eu/Downloads/articles/AACE_CLASSIFICATION_SYSTEM.pdf

The quantities are based on a review of high-cost bid items for the bridge, work trestles, and cofferdams. The other quantities are still pulled from the previous preliminary cost estimate efforts on the project. Unit costs for the items not developed to a contractor style estimate were also pulled from the preliminary cost estimate efforts performed previously but reviewed and updated to current market prices.

Mobilization

The mobilization developed in the contractor style estimate was not based on 10% of the overall project cost. It was tied to the work and equipment needed to be mobilized to the site. It did not include work activities like marine barges or tugboat where the mobilization coasts area already included in in the price. The mobilization cost is rolled into the bid item unit prices. Therefore, no additional mobilization is included in the PCE update.

Sales Tax

Sales tax is already developed in the contractor style estimate based on 7.5-Percent tax in Washington State for respective materials. The estimate assumes conservatively that all materials are purchased in Washington State. Actual amount of materials that have Washington Sales tax applied to the project will need to be negotiated with the Department of Revenue Services. No additional tax is included in the PCE update.

Design Engineering Costs

The current level of effort is about 5% design, with the EIS process further along. Additional engineering services are currently based on Design, Bid, Build (DBB) contracting methods and includes the Draft Design Acceptance Package (DAP) submittal process for the Oregon Department of Transportation (ODOT), followed by a 60-, 90-, and 100-Percent submittal/review process, then a final submittal, and support during the advertisement and award (AD) period. Engineering design cost will be included as a percentage of contingency-loaded construction cost. Several key factors play into the selection of a percent of the construction dollars, specifically public interest, project size, project complexity, and overall construction costs. The PCE update assumes a lower percent of construction costs, based on the project factors. Post-Design Services (PDS) are also shown, where the information was available, and discussed below.

Bridge Reference Projects:

Jeremiah Morrow DBB (OH):
Bridge Type: CIP balanced cantilever segmental concrete box girder
Total Length: 2,252’
Max Span length: 440’
Year Completed: 2016
Bid Construction Amount = $88.1M
Actual Construction Amount = $100M (estimated)
Eng./Bid Percent = 3.4 (Design) / 1.1 (PDS)

Gravina Island Access DBB (AK):
Bridge Type: CIP balanced cantilever segmental concrete box girder main spans / PC concrete girder approaches
Total Length: 4,190’
Max Span length: 700’
Year Completed: NA*
Bid Construction Amount = $400M in 2008
Actual Construction Amount = NA*
Eng./Bid Percent = 4.6 (Design)
* Project canceled for political reasons

Corpus Christi DB (TX):
Bridge Type: segmental concrete box girder approaches and segmental concrete box girder cable-stayed channel span
Total Length: 5,818’

Max Span length:1651'(channel)
Year Completed: 2023 (est.)
Bid Construction Amount = $800M
Actual Construction Amount = Undetermined at this time with major claims due to design issues and change in EOR in the middle of the project
Eng./Bid Percent = 3.2 (Design) / 1.2 (PDS)

HART (WOFH & KAM Segments) DB (HI):
Bridge Type: PC span-by-span (typical spans) and balanced cantilever (long spans) segmental concrete box girder
Total Length: ~7mi (WOFH) / ~4mi (KAM)
Max Span length: 145' (span-by-span) / 338' (balanced cantilever)
Year Completed: 2018
Bid Construction Amount = $482M (WOFH) / $382M (KAM)
Actual Construction Amount = $668M (WOFH) / Unavailable (KAM)
Eng./Bid Percent = 5 (Design) / 1 (PDS)

I-95/Rte. 895 Interchange P3 (VA):
Bridge Type: River crossing was CIP balanced cantilever with 672ft main span. Approach units were span-by-span precast segmental.
Total Length: 17,349ft of segmental
Max Span length: 672ft
Year Completed: 2002
Bid Construction Amount = $314M
Actual Construction Amount = $314M
Eng./Bid Percent = 5 (Design) / 1 (PDS)

Each of these projects are unique and were impacted by the nature and size of the project, type of bridge, and geographic and market factors. Whether the fees were adequate for the services provided was also taken into consideration. We recommend 5-percent of the construction costs to complete the design for the bridge portion of the project. Additional consideration is required for the environmental, public involvement (PI), removal of the existing bridge, and uncertainty for when construction will occur. This percentage is bumped up 1.5-percent to account for the removal of the existing bridge, for the environmental, permitting and PI efforts, and for the Oregon side approach design effort. Recommend using 6.5-percent of the construction dollars.

<u>Roadway Reference Projects:</u>
Tremont Street Widening (WA): ~10% design
2018 project completion. Roadway widening project with new round-about intersection for 4-lane road.

Port of Tacoma Road - Phase II (WA) ~13% design
2022 expected advertisement date. Interchange improvements with on- and off-ramps to I-5 and a new bridge over I-5.

These projects each had specific challenges related to traffic control, phasing the project, staging construction, environmentally sensitive areas, utility relocations and storm drainage that created higher than normal engineering costs for each project. This is consistent with the expected challenges for the Washington approach work. Recommend using 10% of the construction dollars, which is approximated as 1.5% of total project costs.

Assumed Estimated E/A Costs:
Oregon Landside & River Bridge Design: Assuming 6.5%
Washington Landside Design: Assuming 10% of landside work = 1.5% of total construction
Recommends using **8-percent of total construction cost** for the project to cover engineering effort up to advertisement.

It is to be assumed that funds needed for design and construction are present at the beginning of each respective phase of the project and will remain fully funded through the lifetime of the project.

Post-Design Engineering Costs

The engineering PDS efforts are broken out into two subsections: support of RBMC efforts through construction and Construction Support Services (CCS) by the design engineering team. Note that support of RBMC efforts are included in the Programmatic Costs below. CCS services include response to request for information (RFI) review and response, contractor submittal reviews, and design change support during construction. Based on the example projects above and the engineering support needed during construction of the balanced cantilever bridge with 4-sets of form travelers, a recommendation of **2-percent of total construction cost** for the project be included to cover the CSS PDS outside of costs covered under the RBMC.

RISK MANAGEMENT

Risk considerations are an important component in the development of project costs. As the scope assumptions were documented, the construction schedule updated, and the new PCE developed, the team tracked risk items. Two separate risk registers are included; one each for when cost or schedule are the primary impact consideration. A few items are captured in both risk registers when the risk impact or mitigation responsibility warranted the separation. Risk items are primary related to out-of-scope potential impacts. A mitigation plan is presented to minimize the risk for the project and where possible keep these items from becoming part of the project scope. The risk register also identifies a currently assumed probability of occurrence and magnitude of impact. The party responsible for monitoring and addressing the mitigation plan is identified along with a monitoring interval. Any notes that added clarification were included.

CONTINGENCIES

The PCE contingencies used for both design and construction are still coupled at this early design phase. Contingencies as a percentage of construction costs herein are related to the Class 4 Estimate level currently developed. Key project factors that impact the contingency recommendation are as follows:

Immaturity of design

The design effort thus far is generally less than 5-percent. The Design contract has yet to be awarded. This estimate is based upon very preliminary sketches with limited in-water geologic/geotechnical information. Project quantities can grow, and new scope items can be identified, as the design matures.

Lack of needed permits and local group inputs
Future permit / local group input could change configuration and aesthetics of the bridge and could change the means of construction.

Uncertainty of staging areas and approaches
Real estate leases for meeting prefabrication and staging areas are allowances at this time. Reality could have significant impacts on both cost and schedule values. Approaches on both sides of the river are very constrained. Interface of construction equipment with general public is a safety concern. The estimate has assumed traffic control but could be very understated.

Needed tribal interface agreements
Lack of tribal agreements hold a significant uncertainty and could easily delay this project and/or require significant design changes.

Lack of project funding values and timing certainty
The project currently has very limited funding. Delays will have a direct impact on award of contracts and corresponding productions. Delays would likely be impacted by additional project inflation.

Owner's major project experience
The Port of Hood River has net managed a transportation contract of this magnitude and is inexperienced in the FHWA/ODOT process for transportation projects. The Port, Bi-State Bridge Authority, or other entity will need to assemble the right professional advice and council through the RMBC contract to help make important decisions at critical times. There is a risk that even with the right professional advice and council, pour decisions are still sometimes made that can cause delays, increase costs, and impact stakeholder coordination.

Tight in water work windows
Preparation work in support of these in-water work windows (IWWW) are critical, specifically for foundation work and construction access. The amount of work scheduled in the first window is significant. If that work is not accomplished the schedule could easily be pushed 1 year with subsequent delays in the following years.

Material availability
There is uncertainty regarding the supply chain for heavy construction materials. While this is need is not required for 3 or so years, it needs to be closely monitored as other projects compete for these resources.

Labor availability

There is also uncertainty regarding the supply and sourcing of construction labor. Because of local project competition the use of construction workers on this project may be limited and could increase labor costs significantly. Lack of housing in the area could be a factor for this situation. Marine experience is another key factor.

Lack of sufficient construction contract competition.
Because of the recently signed Infrastructure Bill (IIJA), there will be a significant increase of construction work across the nation. Competition for this work will draw the best and brightest to the larger more complex projects. Lack of qualified contractors could either drive up the cost of the project or cause a selection of less qualified contractors which easily could lead to quality, cost, and time issues. The marine component and type of construction work does limit the number of contractors that can take on a project of this complexity.

River congestion during construction
The project will require significant resources being on the river for an extended period of time. This will necessitate a public interface with boaters, wind surfers, and other commercial river traffic. If not carefully managed, a safety issue could arise where work may be halted with corresponding cost and schedule ramifications.

Inflation
The country and world are entering a period of increased inflation from about 3% to over 5%. Some economists feel this will be short lived; others not. With the infrastructure bill, many more large projects will be completed in the next few years increasing the workload of these contractors which could easily drive-up costs. See year to construction escalation discussion below.

Class 4 Type Estimate Contingency Spreads:
Low of -15% to -30% to a high of +20% to +50%

Topic Assessment:	Percent Impact Potential (Port Input)
Immaturity of design	+ 30%
Lack of needed permits and local group inputs	+ 20%
Uncertainty of staging areas and approaches	+ 50%
Needed tribal interface agreements	+ 20%
Lack of project funding and timing	+ 50%
Owner's major project experience	+ 50%
Tight in water work windows	+ 40%
Material availability	+ 20%
Labor availability	+ 20%
Lack of sufficient construction contractor competition	+ 30%
River congestion during construction	+ 30%
Inflation uncertainty	+ 20%

Net recommended (Design & Construction) Contingency	+31.6%; PCE update will use 30%

YEAR TO CONSTRUCT ESCALATION

Current economic factors are driving up escalation costs. Some examples include material shortage and increased labor demand. Recent federal economic stimulus packages are creating additional work for the nation, but also increase the strain on materials and labor. Escalation prices have recently increased to 5- or 6-percent, but the Port agreed to carry a 4-Perecent escalation factor to the mid-year of expenditure at this time. This factor may need to be modified in the coming years. A breakout of construction, contingency, and engineering costs from the PCE update are approximated to the mid-year of expenditure and included for reference as back-up for the cost estimate. The summation of all the escalation is included in the PCE update.

PROGRAMMATIC COSTS

The PCE includes programmatic costs for the following work activities, discussed here in more detail with associated assumptions generated by the Port or "others" for the Port.

Right of Way

The Port provide a ROW cost of $2.5 Million for external properties impacted by the project based upon an analysis conducted for NEPA. More information on the details of this cost can be found in the appendix to the Land Use Report. Additional ROW costs to the project are included to account for contractor lease agreement to utilize Port property or other staging areas for construction. An allotment has been made for seven years to use the location where current Port office building and maintenance building reside. Additionally, a 4-year lease is assumed at the Lower Mill site and a site on the Washington side of the river for staging and stockpiling of materials. The rates used are based on current market value for the land in question.

ROW- Port Facility Relocation

The existing Port office building and maintenance building located just west of the proposed bridge approach roadway, north of the boat launch, at the mouth of the Marina Boat Basin are assumed to be demolished to make room for the contractor to lease this property and use it to help facilitate construction. Access to this location and restoration after construction are included in the PCE Update costs.

The consideration still being discussed, but is included in this PCE update has a new office building located at the site of the Marina 1 (M1) building after its demolition. The new building will be constructed with approximately the same size as the current Marina 1 and office building space combined plus a little extra room for ongoing administrative services and/or lease. Due to limited Port property availability, the maintenance building is assumed to be relocated off site though property has yet to be identified. The maintenance yard will be paved and fenced.

Once the current office building is razed, electric power for the existing toll plaza will need to be re-established on the west side of the toll plaza. An existing emergency generator will also need to be relocated to the same west side location. Temporary toll employee parking would be developed using compacted gravel on the east side of the existing toll plaza and accessed off of Button Bridge Rd.

For purposes of this PCE update, the costs for the land, leases, demolition, permitting, new construction, permitting, port personnel and demolition are included in the Port facility relocation costs. Other costs also include lease of Port property during construction at commercial property rates, cost of money, and annual escalators. A list of Port relocation cost are summarized as follows:

- NEW MAINTENANCE YARD – land acquisition for 34,850 sq ft to be developed at an unidentified location; not included currently.
- DEMOLITION OF MARINA ONE – Removal of existing building and preparation for future construction.
- NEW OFFICE BUILDING YARD – Cost to change from commercial use to the Port facility; not included currently.
- NEW MAINTENANCE BUILDING – Costs include development of land, utility hook-ups, new building, permits, parking, fences, etc. to fully develop the property.
- NEW OFFICE BUILDING– Costs include development of land, utility hook-ups, new building, permits, parking, fences, etc. to fully develop the property for both Port use equal to 120% of current space and an area equal to Marina 1 for lease.
- RELOCATION - TOLL PLAZA POWER SUPPLY & EMERGNECY GENERATOR – Added cost to maintain power, parking, and functionality of existing toll facility until new facility can be constructed and functional.
- DEMOLITION OF OFFICE BUILDING – Complete removal of all material and restoration to a gravel parking lot to be used by the contractor as needed during construction and for future use; include removal and proper disposal of any contaminated materials.
- DEMOLITION OF MAINTENANCE BUILDING – Complete removal of all material and restoration to a gravel parking lot to be used by the contractor as needed during construction and for future use; include removal and proper disposal of any contaminated materials.
- SOFT COST/AE/DESIGN/PERMITTING – A&E and construction costs based on 30% of construction and demolition costs for both the Port office and maintenance buildings.
- FURNITURE, FIXTURES, INCIDENTALS – All materials, supplies, furniture, equipment, and other resources to make the office and maintenance facilities fully functional.
- OFFICE / MAINTENANCE BUILDING RELOCATION – Cost to remove, store, and relocate materials, files, etc. that are to transfer to the new facilities.
- RELOCATION FINANCE COST – An assumed financial cost for carrying the burden of relocation costs until the Port can be reimbursed though the construction contract.

The programmatic costs only include a percentage of the total Port relocation costs. This percentage is a placeholder for an actual appraisal for the port properties impacted and relocation costs that will be included in the ROW cost for the project. At this time an allotment of 50-percent of the total Port relocation costs is assumed as a ROW cost.

Tolling System

The new tolling system is assumed to be provided by a third party and is currently kept separate from the construction costs, though it may be incorporated later. The cost used in this estimate is based on assumed cost for an off-site building, computers, and software system, as well as on-site utility hook-ups, toll plaza, readers, and other miscellaneous items. Daily costs to maintain the facility and pay employees while tolls are collected are assumed to come out of actual toll revenue. This assumed cost needs to be verified with a Traffic & Tolls Survey.

Other Port Inputs

A separate evaluation of programmatic costs was developed by Steve Siegel for the Port and the following costs are taken from that effort, modified by Steve for this PCE update:

- TRAFFIC & TOLL SURVEYS
- COSTRUCTION FINANCE PLAN
- GOVERNANCE

The cost estimates are fully-loaded, and expressed in year-of-expenditure (YOE$) dollars, and includes 10-percent contingency. The costs begin at the start of Phase II (does not include NEPA phase costs), and cover costs through the end of Phase III. This includes an estimated $750,000 payment to USDOT to cover its costs for the TIFIA loan, and $180,000 in fees paid to rating agencies. The costs do not include underwriter's fees on the toll bonds, nor the creation of reserves for the bonds and loans, which will be addressed as part of the financial plan.

The cost estimate does not include any post-Phase III work activities or budget, such as continuing disclosure and administrative costs on bonds and loans, which presumably would be operating costs at that point. The cost estimates assume that POHR will be responsible for all administrative costs for the bi-state commission during the Phase II and Phase III period (such as public notices of meetings, keeping minutes of meetings, etc.), and the costs therefore are included in the POHR management and finance budgets.

These cost estimates are slightly larger than those prepared a year ago, primarily due to higher inflation rate and inclusion of contingency. These are preliminary cost estimates, and are subject to change as the work program and schedule and refined.

RBMC Resources

The RBMC activities cover pre-construction design efforts and program management and services during construction hired by the Port and managed by the Port or until another organization like the BSBA can be formed and take the lead on this project. The RBMC costs during pre-construction are supported by a number of staff assumed to support project development in advance of and during engineering. The RBMC would develop procurement processes, make recommendations to the owner on project delivery options, prepare various project plans and schedules, review and make recommendations to the owner on submittals and other project decisions. This effort defines the number of staff assumed to support project early in the project development and estimate includes man hours for the following positions:

- PROJECT MANAGER (1 FTE)
- PROJECT ENGINEER (1 FTE)

- CONTRACTS SPECIALIST (1 FTE)
- ESTIMATOR/RISK ANALYST (1 FTE)
- PLANNING/SCHEDULER (1 FTE)
- COMMUNICATIONS (1 FTE)
- REGULATORY COMPLIANCE (0.4 FTE)
- SUPPORT SPECIALIST (1.25 FTE)
- CONSTRUCTION (0.08 FTE)

The cost from the RBMC Resources during construction by Port or BSBA hired staff are also included in this cost. This effort defines the number of staff assumed to support project during construction and the estimate includes man hours for the following positions:

- PORT MANANGEMENT TIME (2 FTE)
- PROJECT CONTROLS (2 FTE)
- COMMUNICATIONS (1 FTE)
- PORT FINANCE STAFF TIME / SCHEDULE / RAILROAD COORDINATOR (4 FTE)
- REGULATORY AGENT (1 FTE)
- FIELD INSPECTOR (3 FTE)
- SAFETY & HEALTH INSPECTOR (1 FTE)

Note that the Port Management Time and Port Finance staff are already included separately, so no hours are added in the estimate here. The Port finance time also includes schedule maintenance and railroad coordination. Construction support service by the design team is covered in the Post-Design Engineering Costs above. The cost included in this PCE update for RBMC services is intended as a placeholder to be modified as the project scope, deliver method, funding, and project schedule are further defined.

Port/BSBA Finance Staff

The cost estimate assumes that three full-time finance specialist employees will need to be hired prior to and during the 12 years of design and construction. At the start and the end of the project, it will likely be only one staff person working, but in the crux of construction there may need to be 5 or 6 staff to support contracts, invoicing, and other financial services.

Port/BSBA Management

The cost estimate assumes that two members of the Port management team spend approximately as 1.5 staff time to support the project during the 12 years of design and construction.

BNSF Permits and Flagging

The contractor will be responsible for accesses across the railroad BNSF railroad tracks, but the Port will be responsible for the permits needed by the railroad to gain permission for this work. The permit process will be coupled with the BNSF submittals during design. Additionally, the port will directly pay the railroad for flagging expenses during construction. Railroad flagging is currently costing approximate $1,400.00 per day. The duration is assumed daily for 5 years to account for days over the 6-year construction schedule when railroad flagging is not required.

Other Mitigation / Commitments

A placeholder for other mitigation costs has been included by the Port. No budget is included at this time.

Port Insurance

Contractor insurance is included in the PCE; Owner insurance is assumed to be 1.5-percent of construction cost plugged in as baseline, but the actual value will need to be developed.

Attachments

- PCE Update – Scope Assumptions Memo – Draft Final
- Project Cost Estimate Update – Draft Final; includes Programmatic Costs, Escalation & Quantity Backup
- KMC Cost Estimate Update – Draft Final
- POHR PCE Basis Project Doc Review Report – Draft Final
- PCE Cost Risk Register – Draft Final
- PCE Schedule Risk Register – Draft Final
- Schedule Update for Hood River Bridge Replacement Project – Draft Final

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