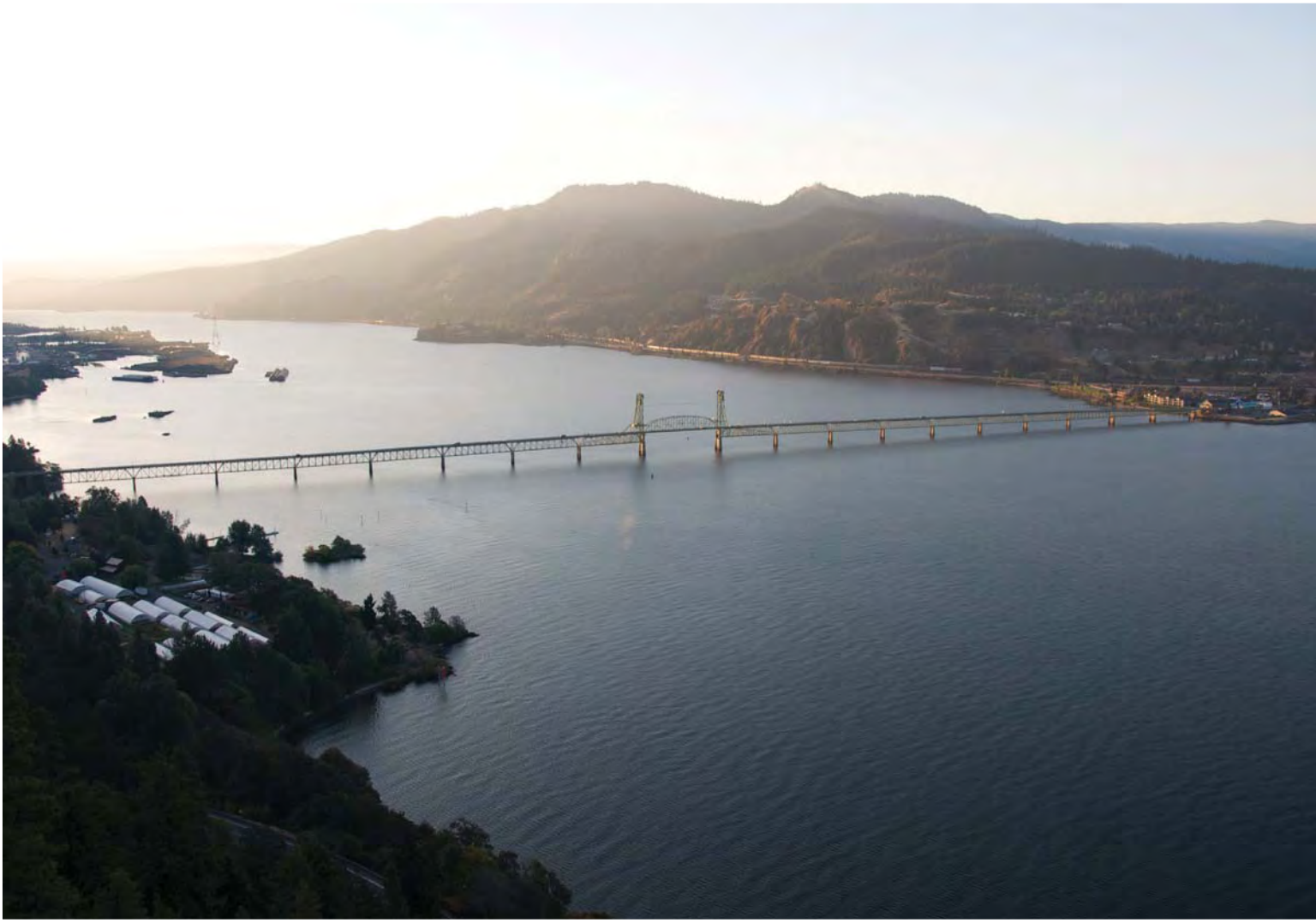

SR-35 Columbia River Crossing Study - TS&L

FINAL REPORT - EXECUTIVE SUMMARY

October 2011

Washington State Department of Transportation

Oregon Department of Transportation

Executive Summary

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Executive Summary

Study Background

The Hood River Bridge was originally built in 1924 and is one of three bridges traversing the Columbia River in the Columbia River Gorge National Scenic Area (CRGNSA). It is one of nine bridges crossing the Columbia River along the Oregon and Washington borders. This bridge connects the communities of White Salmon and Bingen, Washington, with Hood River, Oregon. It serves as an essential link to local communities, the region and interstate travel.

The impetus of this study is the functional obsolescence and structural condition of the existing Hood River Bridge, which limits its ability to serve as an essential link. The existing bridge is functionally obsolete with lane widths of 9 feet-4.75 inches, no shoulders for safety, a vertical clearance height restriction of 14 feet-7 inches, no ability to accommodate pedestrians and bicyclists, and a steel-grated deck. This type of deck is no longer allowed, as it enables storm water to deposit dirt and grime directly into the Columbia River without being treated. Additionally, the bridge's original design is unable to accommodate today's heavier truck loads and a weight limit of 80,000 lbs. per vehicle is required to ensure safety.

The economic well-being of this region is dependent on the Hood River Bridge. Residents, businesses and bridge users on both sides of the Columbia River are concerned about the safety and service life of the existing bridge. If the bridge were closed, the nearest river crossings, to the west and east, are about 20 miles away.

The current SR-35 Columbia River Crossing Study - Type, Size, and Location (TS&L) is built upon the work that was previously completed, including the 2004 SR-35 Columbia River Crossing feasibility study and draft environmental impact statement (EIS) and Section 4(f) evaluation. This previous work identified a preliminary preferred alternative of a fixed-span bridge just west of the existing structure. The preliminary preferred alternative served as the basis for the TS&L study.

Project Purpose and Need

The overall purpose of the SR-35 Columbia River Crossing project is to improve the movement of people and goods across the Columbia River between the White Salmon/Bingen and Hood River communities with the identified need of improving current and future transportation inadequacies and deficiencies associated with the existing Hood River Bridge. Specifically, these needs are to:

- Alleviate current and future congestion
- Provide cross-river linkage
- Accommodate cross-river travel demand, including bicycle and pedestrian travel
- Satisfy cross-river flow of goods and people
- Accommodate river navigation
- Improve safety

Study Process

In 2010, the TS&L phase of the SR-35 Columbia River Crossing project was initiated and included the following elements:

- An economic analysis of the existing bridge and the benefits of a new bridge
- Advancement of the preliminary engineering and the determination of a recommended preferred bridge type
- Estimated cost of the preferred bridge alternative
- Scope of services for the next phase of the project: the final environmental impact statement (FEIS).

Public and Agency Involvement

The SR-35 Columbia River Crossing Study – TS&L used an extensive public and agency involvement process and included several committees and public involvement opportunities.

Bi-State Committee: Comprised of elected officials and agency staff from both Washington and Oregon to guide the overall process.

Focus Groups: Comprised of broad range of interest, from commuters to business and freight operators to recreational and environmental interest. The focus groups were used to gather some of the necessary information for the economic analysis.

Design Workshop: Early in the project, Bi-State Committee members and key stakeholders were brought together to help inform the project team of key project issues and obtain input on design elements.

Columbia River Gorge Commission: Project team met with a staff member of the Columbia River Gorge Commission to gain further understanding of the Columbia River bridge replacement guidelines, found in the Gorge Management Plan.

Barge and Tow Operators: As the pier shapes and sizes were being developed input from the Tug Boat Association was sought.

Other Involvement: In addition to these meetings, information was provided to the general public through a project website, press releases, newspaper articles, study report folio and a public open house.

Bridge Type, Size and Location (TS&L) Analysis

The bridge TS&L analysis included collecting data, developing design criteria, validating the previous River Navigation Survey, ensuring environmental considerations were met, and evaluating the bridge alternatives and recommending the preferred alternative.

Data Collection: In support of the preliminary engineering effort needed to evaluate the three bridge alternatives, data was collected to provide an accurate understanding of the existing conditions at the proposed bridge site. The data collected included ground survey, subsurface exploration and testing, and geophysical and bathymetric surveys.

- **Ground survey** was performed to help establish were the existing features are and the most efficient location for the new bridge.
- **Subsurface exploration and testing** were performed at three locations along the proposed bridge alignment. The three locations yielded a clear understanding of the elevations of rock. This valuable information helped establish properly sized bridge foundations.
- **Geophysical survey** was performed in the vicinity of the proposed bridge alignment. This information helps provide an understanding of the elevation of the rock line, where soil explorations were not performed.
- **Bathymetric survey** establishes the depth of the water or river bottom elevations. This information is used in the flood plain analysis.

Design Criteria: The bridge analysis spans two states and several local jurisdictions. For this analysis, it was not imperative that a comprehensive list of all project design criteria be established by the two state departments of transportation. However, certain design criteria did surface as fundamental or foundational criteria to determining the type, size, and therefore construction cost of the bridge. Agreement was required and achieved by both agencies on these criteria.

Design criteria that affected the footprint of the bridge included the functional classification of the roadway, the number of travel lanes, the width of the shoulders, the number of pedestrian walkways on the bridge and their widths. Additionally, the required navigation clearance of 450 feet high by 80 feet wide was considered foundational criteria.

Environmental: Both the built environment and natural environment needed to be considered. The project lies at a crossroads of transportation modes in the region. The bridge provides connection to I-84 to the south and SR-14 to the north. The

bridge spans the Columbia River and must accommodate river navigation. On the Washington side, the bridge spans the BNSF mainline track.

The natural environment in the project vicinity is dominated by the Columbia River and scenic beauty that it provides. With the project residing within the national scenic area, portions of this project fall under the guidance of the Management Plan for the Columbia River Gorge.

Bridge Aesthetics: Since the site is dominated by natural forms – the water and mountains – a preference was given to sculpting the new bridge structural members to a theme of natural and organic form. Various climatic and light level conditions found in the Columbia River Gorge area were to be considered. The new bridge will have fixed spans, eliminating the need for the lift span by being high enough to clear the navigation channel. This means the new crossing will be further away from the water than the existing structure. This feature provides an opportunity to shape the structure in a manner that makes it look thinner than a low structure. The taller piers also provide an excellent medium to sculpt a natural form in an unexpected way and whose form harmonizes and evolves over time.

Evaluation Process: The draft EIS screened alternative alignments and bridge types to arrive at the preferred alignment and three bridge type alternatives that met the minimum criteria established by the purpose and need. The preferred alignment is directly adjacent to the west side of the existing bridge. The three bridge types under consideration included a steel plate girder, concrete segmental box girder, and a steel tied arch.

Seven primary evaluation criteria emerged through the TS&L analysis. An evaluation matrix was then developed to compare the three bridge types against the evaluation criteria and weighting. The evaluation criteria was used to differentiate and identify trade-offs between the three bridge alternatives. The following primary evaluation criteria were used:

- Design criteria
- Cost
- Construction
- Risk
- Bridge aesthetics
- Impact to recreation users
- Natural environment

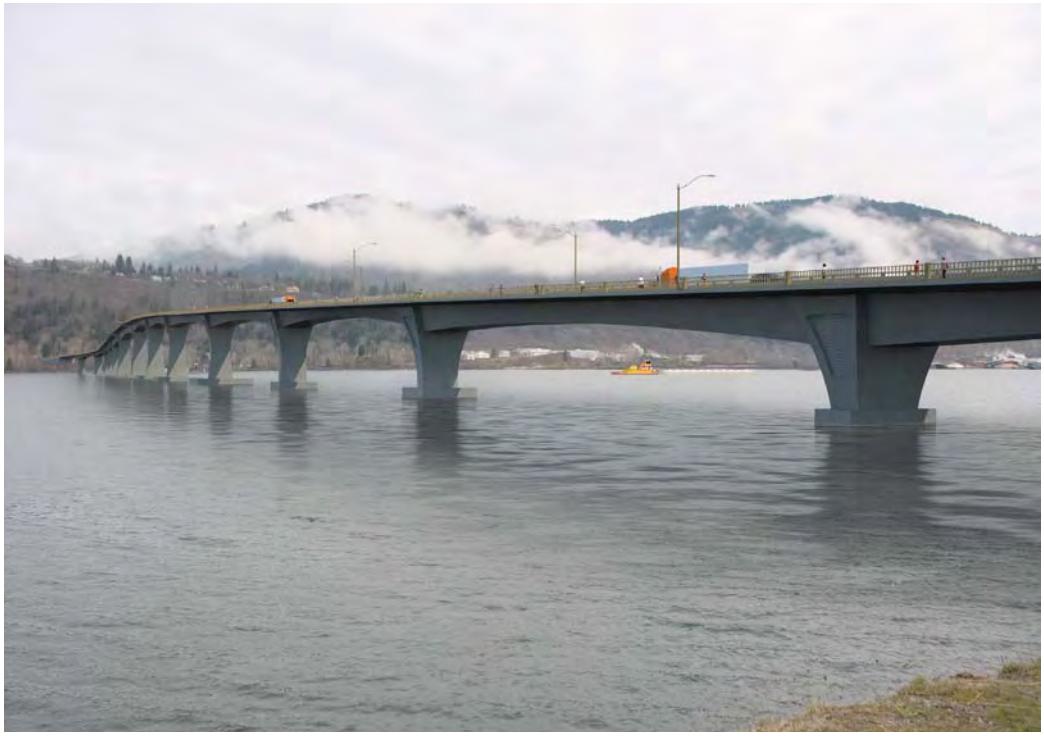
Recommendation: Through the evaluation process the concrete segmental box girder bridge was evaluated as the recommended alternative. This includes two 12-foot travel lanes and 8-foot shoulders, providing for a wider and safer crossing. This option has a main span of 500 feet that will yield 450 feet of horizontal navigation clearance. Segmental box girder approach spans with lengths varying from 100 feet to 400 feet will comprise the remainder of the bridge. The bridge piers that support the concrete box girder will consist of an hourglass shape and will be supported on

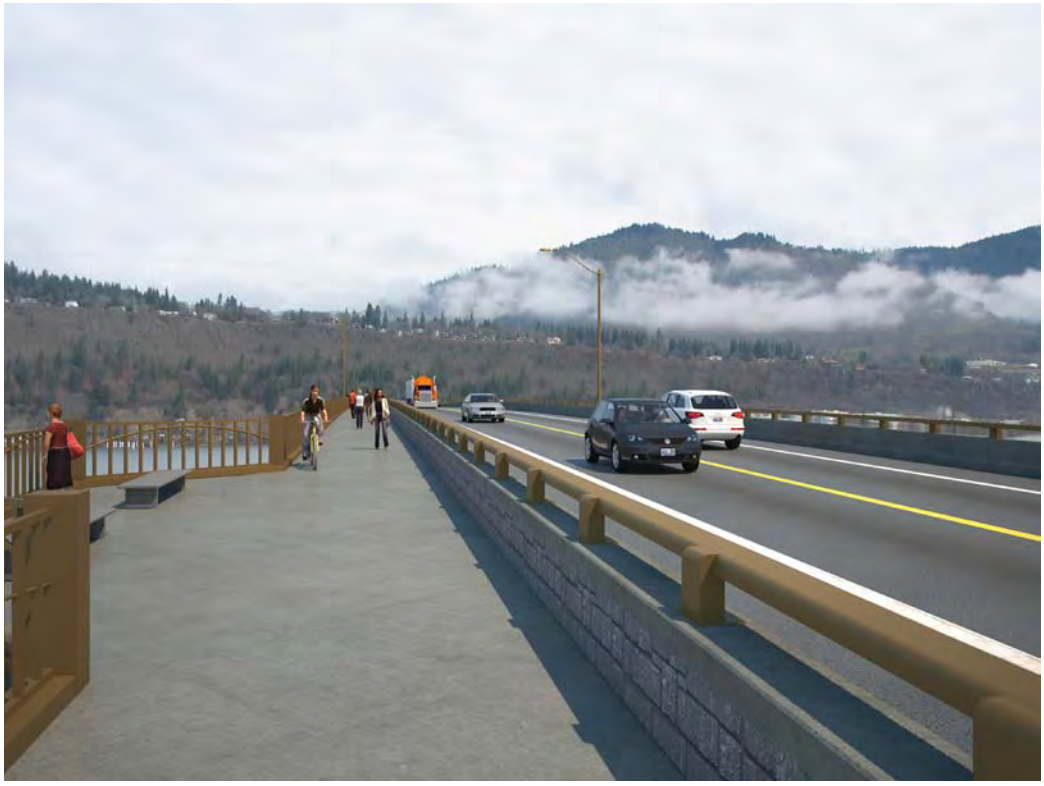
footings that are placed one foot above the two-year recurrence interval elevation of the Columbia River. Two pedestrian overlooks will be placed on the downstream side of the bridge at each of the main span piers. Gateway markers and aesthetic treatments will be placed at each of the entry points of the bridge and will provide a coordinated treatment with the stone formwork used on the pedestrian side of the roadway barrier.

Design Refinement: With the evaluation of the three bridge alternatives concluding with the segmental concrete box girder bridge as the recommended preferred bridge alternative, analysis was continued and refined on the preferred alternative in several areas, such as storm water, bridge hydraulics, right-of-way and construction.

- **Storm water:** With direct discharge into the river no longer acceptable, a preliminary review of storm water collection and treatment was performed to determine feasible options and check for potential obstacles to completion of the storm water design for the bridge. This preliminary analysis concluded that the anticipated storm water volume can be collected in the roadway gutters and down to the Washington and Oregon bridge abutments. The flow would travel through catch basins and on to storm water treatment vaults. Bioswales were considered as an option to vaults, but required a larger physical area than the vaults.
- **Hydraulic modeling and scour analysis:** Since the proposal is to replace an existing bridge with a new bridge, a calculation of the backwater created by the new bridge was compared to the backwater created by the recommended preferred bridge alternative. For a 100-year flood event, calculations indicated that the bridge piers of the recommended preferred bridge alternative raise the water surface approximately ⅛ inch, which is well within acceptable limits.
- **Right-of-way:** It is understood that the north approach to the bridge is on private property. It was indicated at the Bi-State Committee meeting that the property was in condemnation and that it would likely revert to either the City of White Salmon or Klickitat County in the future. The south bridge approach is located on property owned by the Port of Hood River.
- **Construction:** For this bridge analysis, it has been assumed that the superstructure will use cast-in-place segmental construction. This is due primarily to the large weight and size of the segments. The bridge will be constructed adjacent to the existing bridge, which will continue to carry the traffic during construction. There will be short periods of time where traffic staging will be performed to make the approach connections to the bridge, but it is expected that construction activities will not generally affect the traffic conditions in Hood River or White Salmon. It is expected that the bridge construction will take two to three years. Once the foundations and piers are constructed, a contractor may choose to construct the superstructure at multiple locations to decrease the construction duration.

Artist Renderings: To help the reader understand what the preliminary preferred bridge may look like, two artist renderings were developed. These artist renderings provide a view from the Oregon shore and a view from the bicycle and pedestrian path on the bridge.





Project Cost Estimate

With the determination of the concrete segmental box girder as the recommended alternative, the construction cost estimate range and overall project cost estimate range was prepared.

The construction cost estimate was developed by calculating the quantities from the type, size, and location drawings and then using a combination of historical unit prices and unit price analysis to develop the estimated construction cost.

In present day (2011) dollars, the project's overall cost estimate range is $190 million to $205 million. Besides the bridge construction cost, this range includes other items such as the cost for the roadway approaches, existing bridge removal, storm water collection and treatment, right of way, engineering, sales tax, and a contingency allowance. If the bridge construction were to start in year 2020, with an assumed inflation rate of four percent, the project's overall cost estimate range would be $270 million to $290 million.

Economic Analysis

The economic analysis confirmed that the bridge plays a significant role in both the regional transportation network and the regional economy. Businesses depend on access to workers on both sides of the bridge. Commuting to work accounts for about 10–15 percent of daily bridge trips. Hood River is the economic center of the region. Residents of Washington depend on the bridge to shop and conduct business in Hood River. Businesses in Hood River depend on Washington residents as customers.

Most freight goods that cross the bridge are wood products and fruit for processing, use within the region, or for export outside of the region. The weight-restricted bridge limits manufacturing and processing choices for businesses.

Visitors to the region use the bridge to access attractions or recreational opportunities on both sides of the river, as well as the retail and accommodations services available primarily in Hood River.

The bridge also allows local emergency-service providers with the opportunity to combine resources and support each other.

Disruption to bridge service would have a detrimental impact on the regional economy.