

**COLUMBIA RIVER CROSSING
KEY FINDINGS AND RECOMMENDATION RELATED TO BRIDGE TYPE
FEBRUARY 25, 2011**

Three weeks ago Governors Gregoire and Kitzhaber instructed the two state Departments of Transportation to conduct an expedited review of three bridge types for the Columbia River Crossing (CRC) project and report back the week of February 21 with a draft bridge type recommendation. This report contains our work to date, a draft recommendation and next steps.

BACKGROUND:

In November 2010 the Columbia River Crossing Bridge Review Panel was convened to evaluate the bridge type under consideration for the CRC project. The 16-member bridge panel consisted of national and international experts with experience designing, managing and constructing large bridge projects.

On February 3, 2011, the panel of expert bridge designers and engineers released a report that offered three bridge types for consideration. Panel members found these three types to be less risky and potentially less expensive to construct than the proposed CRC bridge type.

The Governors responded immediately by adopting the panel's recommendation to discontinue any further design work on the current CRC bridge type. They also asked their Departments to perform an expedited review of the panel's three recommended bridge types – the tied arch, cable-stayed and deck truss. The Governors' identified specific criteria to be included in the expedited review of the three bridge types:

1. is the most affordable,
2. maintains the project schedule,
3. minimizes environmental impacts,
4. honors commitments that have been made to communities in both states, and
5. provides the least risk.

EXPEDITED REVIEW PROCESS:

Using the governors' criteria, the Departments of Transportation convened a group of bridge engineers, designers, project managers, and environmental managers who met daily to review the independent panel's conclusions and conduct further analysis related to the governors' charge. The Departments met with FHWA, FTA and resource agencies to receive input.

The Departments also simultaneously arranged for the chair of the panel to meet with CRC stakeholders, project partners and the public to present the panel's findings and respond to questions. Meetings were held with members from the bicycle/pedestrian, freight, urban design, and Portland and Vancouver

advisory groups; local elected officials and agency partners; an open meeting with the public; and the Project Sponsors Council.

The work of the independent bridge panel, supplemental review by ODOT/WSDOT's technical team, and the questions and concerns from project partners and the public have informed this report and our draft recommendation on bridge type.

KEY FINDINGS:

The independent panel found that all three bridge type options – tied arch, cable-stayed, deck truss – would be suitable for the crossing over the Columbia River and did not endorse any one over the others.

Our findings are organized specifically to evaluate the three bridge types against the criteria outlined by the governors. The states' technical team built on the panel's work, vetting the panel's observations and conclusions, and conducting further analysis, noting additional questions, concerns or findings.

Is the most affordable

Comparative Costs* (Bridge Panel Report)

CRC design	\$ 440,000,000
Tied Arch	\$ 430,000,000
Cable-stayed	\$ 390,000,000
Deck Truss	\$ 340,000,000
*2011 dollars, no adjustments, estimates only	

The Departments concur with the panel's finding that the deck truss has the lowest comparative cost. It should be noted that the panel focused on the comparative cost of the over-water structure, not the landings on both sides of the river. Once the bridge type is selected, additional work will be needed to determine specific costs associated with the landings. The full project cost estimate will be updated in 2011, after a cost estimate validation process (CEVP) workshop is conducted.

Potential schedule changes and new environmental, design and engineering work are not included in the cost estimates above.

Maintains project schedule

The CRC project schedule includes publication of the Final Environmental Impact Statement and receipt of the federal Record of Decision by the end of 2011. According to the panel's report, the deck truss is the only bridge type that would allow the project to maintain this schedule. The chair of the panel confirmed that the deck truss is also the only bridge type option that can apply much of the work done to date by the CRC. Consequently, the deck truss has the least risk to the project schedule during design and construction phases.

The bridge panel ranked risk factors on a scale of one to four, with one being low risk and four being the highest risk. The Departments of Transportation reviewed and endorsed the following key findings and risk factors related to project schedule.

Project Schedule: Risk ranking	Record of Decision	Design	Construction
Arch	2	2	2
Cable-stayed	2	2	1
Deck Truss	1	1	1

The Departments agree that a Record of Decision in 2011 would be possible with the deck truss. Due to the alignment and footprint changes, in addition to airspace intrusion, the cable-stayed and tied arch bridge types would require additional coordination with resource agencies and the Federal Aviation Administration (FAA).

CRC staff has reviewed the panel’s report with resource agencies, FTA and FHWA. Agency review further supports the panel’s work and provided more detail about schedule changes that would be associated with the cable-stayed or tied arch options. These options would likely require a supplemental draft environmental impact statement.

The cable-stayed or tied arch bridge types would invade Pearson airspace and require further work with FAA. The schedule for a hazard determination from the FAA is still being confirmed and further work would be necessary for an accurate assessment of the impact on the project schedule. The findings from a hazard determination process would result in further work to determine risk, liability and mitigation requirements.

Minimizes environmental impact

The panel did not include environmental specialists, but members worked to develop feasible bridge types that would have similar or improved environmental effects to the open web design. The panel provided preliminary information about the number of piers in the Columbia River and the overall footprint of the piers. The panel’s report notes that the cable-stayed bridge would have the fewest piers in the water and the deck truss would have the smallest in-water footprint.

In- Water Impacts	# of Piers	Footprint
Arch	4	60,000 SF
Cable-stayed	3	52,000 SF
Deck Truss	10	44,000 SF

Long term and temporary construction environmental impacts of the deck truss would be similar to the previous design and supplemental analysis would be minimal. The cable-stayed and arch options would require additional analysis with resource agencies to determine the effects associated with the size of the piers and the piers needed to transition the bridge to the land-side highway. The Departments also

identified questions about the potential for different or more temporary construction impacts for the cable-stayed and tied arch bridges. Resource agencies are interested in the number of piers, size of the piers, overall footprint, the location of the piers (nearshore or in-water), level of shading, and the specific in-water structures necessary during construction.

Honors commitments

The panel provides three bridge types that are technically feasible for the interstate crossing over the Columbia River. The arch and cable-stayed require a tangent (straight) alignment which would require some changes to the areas where the bridge touches down to land on each side of the Columbia River. The deck truss proposed by the panel has a straightened alignment, but the departments note that the bridge type can be modified to include a slight curve to allow landings more consistent with existing commitments. The deck truss alignment and landings would closely match the assumptions and commitments made as the previous bridge design was developed. The tied arch and cable-stayed bridge landing would require revisiting some past commitments.

Separately, the panel also suggests replacing the North Portland Harbor bridges, to the south of the Columbia River. The panel was not asked to evaluate how well these options met prior commitments to communities and stakeholders.

The departments agree that all three of the bridge types could be constructed without replacing the North Portland Harbor Bridge. Built in 1985, this structure does not need to be replaced as part of the CRC project.

Provides the least risk

The panel identified 15 risk factors for consideration. When presenting the report, the panel chair noted that cost growth, procurement and construction claims along with schedule are the key risks to evaluate for delivering a project on time and on budget. The Departments’ analysis supported the panel’s findings that the deck truss was found to have the least risk.

SUMMARY OF RISK	ROD (Record of Decision)	Design	Const.	Procurement	Cost growth	Const. claim
Arch	2	2	2	3	3	3
Cable-stayed	2	2	1	3	2	2
Deck Truss	1	1	1	1	1	1

STAKEHOLDER, ADVISORY GROUPS AND PUBLIC COMMENTS

Comments from the public generally fell into three areas: aesthetics; the importance of moving the project forward; and detailed questions about different aspects like the bike path elevation with the cable-stayed, the covered vs. uncovered pedestrian paths, and access to transit.

Themes expressed by the more than 70 people who attended the public meeting include:

- Support for moving the entire CRC project forward as quickly as possible and selecting a bridge type that will allow that to occur.
- Support for keeping construction and planning costs down.
- The replacement I-5 bridge will stand for at least 100 years and time should be taken to ‘get it right.’
- Appreciation of a process that resulted in new designs that could provide an “iconic” feature for the region.
- Agreements made in summer 2010 related to the design and alignment of the Hayden Island interchange should be maintained. However, some Hayden Island residents expressed a willingness to re-consider previous project designs to accommodate a cable-stayed bridge.
- Support for a cable-stayed bridge based on aesthetics, cost, potential to reduce adverse effects to fish and wildlife and seismic performance.
- Support for a composite deck truss based on similarity to previous open-web box girder design, cost and ability to stay on schedule.
- Questions related to location of bicycle and pedestrian pathway, including grades and pathway widths.
- Questions about the ability of the single-bridge designs (cable-stayed and tied arch) to place light rail track on top and the pedestrian/bicycle pathway under deck to keep people away from traffic.
- Questions related to costs for operations and maintenance for each of the three bridge designs proposed by the bridge review panel.
- Questions about the impacts of different bridge types on traffic operations.

Aesthetics

Aesthetics were a more prominent issue for some advisory committee members and local agency staff than other issues initially.

Local agency staff asked the CRC to recommend to the governors to include aesthetics as a criterion for determining a bridge type. This request reflects comments we heard from different stakeholders and advisory members. It is based in part on a belief by some stakeholders and bridge panel members that the cable-stayed bridge type is a more aesthetically pleasing option than the deck truss. Other supporters of the cable-stayed bridge type also argue that a more aesthetically pleasing design would build greater public acceptance for tolls and/or general support for the bridge. This sentiment is reflected again in a belief by some that although the cable-stayed option may cost more, and take a little longer, it would take less time in the end because the community would be more supportive of the project. Finally, a few stakeholders feel so strongly about the opportunity for making a statement with the bridge that they would prefer that aesthetics be a primary consideration when selecting the bridge type and that schedule, cost and environmental effects should be secondary.

Local agency staff pointed out that the bridge panel included a public support (aesthetics) factor in their risk rating. The deck truss was rated a 4 while the arch and cable-stayed bridge options both received a

1. The chair did not include it in his presentations based on the more subjective nature of the finding and the limited public input.

The bridge panel chair has stressed that much of the aesthetic and design discussion can occur after the bridge type has been decided. His presentations included an example of how a relatively standard bridge type can result in an award winning architectural design.

The Departments agree that aesthetics should be recognized as an important element and evaluated in the context of all of the competing needs. We also agree that a comprehensive public conversation about aesthetics should occur after the bridge type is selected.

DRAFT RECOMMENDATION

After review of the panel's work and report, supplemental technical analysis, conversations with resource agencies, consultation with project partners, and consideration of public comments, the Departments are prepared to recommend the deck truss as the only bridge type that meets the needs of both states and the criteria established by the Governors.

It is the Departments' and the independent Bridge Panel's findings that the deck truss:

- is the most affordable,
- allows the project to stay on schedule,
- adheres to the current environmental commitments,
- builds on the resources spent to date,
- has the least impact in the river,
- is the easiest bridge to build,
- will attract multiple contractors thus giving the public the most competitive prices, and
- is overall the least risky path forward.

NEXT STEPS

The Departments of Transportation and the CRC will meet with the public, stakeholders, project sponsor council staff, and local elected official to discuss, answer questions and gather feedback on the recommended deck truss bridge option. Project advisory committees (CRC Urban Design, Freight, Pedestrian/Bicycle and Portland and Vancouver advisory groups) will continue to be briefed and their feedback and concerns will be delivered to the Governors, along with all public, stakeholders, and local partners' feedback prior to any final recommendation. Additional opportunities for public review and comment on the recommendation will be held in both Portland and Vancouver on March 10, 2011

By mid March, the Departments will provide a final bridge type recommendation to the Governors for their consideration.

**Columbia River Crossing
Bridge Type Review
February 25, 2011**

Criteria	Deck Truss	Cable-Stayed	Tied Arch
Cost* (Most affordable)	\$340,000,000	\$390,000,000	\$430,000,000
Cost Growth (Probability of cost increases during construction)	Least likelihood due to problems arising during construction	Higher likelihood due to problems arising during construction	Highest likelihood due to problems arising during construction
Schedule (Least impact on project schedule)	Allows project to stay on current schedule	Would likely require a Supplemental DEIS due to airspace issues with Pearson Airfield and changes to the Biological Opinion. If required, a SDEIS would add 1-2 years	Would likely require a Supplemental DEIS due to airspace issues with Pearson Airfield and changes to the Biological Opinion. If required, a SDEIS would add 1-2 years and would also lengthen construction duration
Environmental Impacts (in-river area)	44,000 SF footprint in the river with 10 in-water piers	52,500 SF footprint in the river with 3 in-water piers	58,000 SF footprint in the river with 4 in-water piers
Honors Stakeholder Commitments	Commitments are largely unchanged and maintained depending on the alignment	Straighter alignment may impact commitments at touchdown points in Vancouver and on Hayden Island	Straighter alignment may impact commitments at touchdown points in Vancouver and on Hayden Island
Risk (Design, Procurement)	Lowest risk: most straight forward design, attract largest pool of bidders	More risk: Design is common but more complicated, attract good pool of bidders	More risk: Design is common but more complicated, attract good pool of bidders

*Cost estimates shown are comparative costs for the bridge types over the Columbia River only and do not include any costs over land to connect back into the proposed infrastructure. Costs are not inflated for year of expenditure and should not be used to compare to previous estimates for CRC bridge or project costs.



Deck Truss Bridge Type | Looking north to Vancouver