DRAFT Engineering Report

An Assessment of the Decision To Reject a Tunnel as a Viable Option to Replace the I-5 Bridge Over the Columbia River

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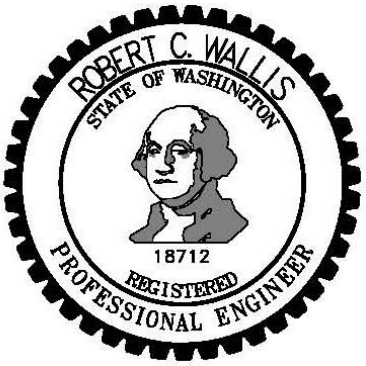

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Introduction

WSDOT and ODOT (the DOTs) are now proceeding with the design and environmental permitting for the Interstate Bridge Replacement (IBR) project. This is the second try at replacing the existing I-5 bridge across the Columbia with a new one, 200 feet wide and 100 feet high above Downtown Vancouver. The impacts of the giant bridge and its elevated ramps are considered by many to be nothing short of a blight upon that downtown and its waterfront.

To avoid those impacts, Downtown Vancouver business and property owners have been advocating for a tunnel instead of bridge. Local bike/ped advocates have joined them knowing that the tunnel offers huge advantages for those who bike and walk.

During the initial phases of the project, the DOTs rejected the tunnel as a viable option. This was based upon a flawed conceptual engineering design effort that erroneously concluded that the tunnel was too deep to allow freeway connections to Downtown Vancouver. That conceptual engineering design and the process by which it was used as a basis of decision-making has been criticized as being more about selling DOT's vision for a bridge replacement project than engineering a bridge replacement project whose vision is shaped by community needs. Project critics are referring to the process of implementing the bridge project as the "bridge scam".

This report summarizes the findings of a municipal engineering evaluation of the aforementioned criticism as well as related issues.

Conclusion

The conclusions from this evaluation are:

1. The tunnel was rejected as a viable option on the basis of a comparison of the conceptual design concepts for both bridge and tunnel options. That comparison was not credible.
2. The tunnel-bridge comparison evaluation was not credible because of an engineering error in the conceptual design of the tunnel option. That error led to the conclusion that the tunnel would be about "50 to 100 feet deep" at the portals at each end of the bridge (portals are the tunnel entrance points). The report does not mention which end (Vancouver or Hayden Island) of the tunnel was the deepest, but conceptual drawings included in the report suggest a 100-foot deep portal at the Vancouver end. That depth is extremely over-stated. At both ends, the portal depth would be less than 35 feet. By exaggerating the depth, the freeway connections to Downtown Vancouver become impossible. In short, an engineering error caused the tunnel option to be rejected. Without the error, the tunnel may have been selected as the preferred option.
3. It is impossible to say whether the over-exaggeration of tunnel depth was intentional or an honest mistake. The fact that the conceptual engineering report was not stamped by a professional engineer as it should have been suggests the former.

Background

WSDOT and ODOT (the DOTs) together are making another try at gaining public acceptance of a proposed $7.5 billion bridge replacement project on I-5 across the Columbia River. This is a continuation

of the CRC (Columbia River Crossing) program begun 20 years ago and abandoned 10 years later due to a "bridge too high" error in the conceptual design of the bridge.

The CRC began with an initial screening of bridge replacement options. During that screening, they evaluated a type of tunnel called a "bored tunnel". That option was determined not to be feasible for a variety of reasons.

The "bridge too high" error resulted in the Washington State Legislature choosing not to fund further efforts, which effectively ended WSDOT's involvement. ODOT made an attempt to move the project forward for several months, but eventually they too put the project on hold. At the time of abandonment, the preliminary engineering and EIS were largely completed at a cost in excess of $170 million.

The current effort, renamed as the IBR (Interstate Bridge Replacement) program, picked up where the CRC left off. An initial assumption was that the CRC tunnel screening effort was still valid. That assumption, when presented to the public, was questioned. One individual in particular, a Seattle engineer named Bob Ortblad, raised the question – why was a type of tunnel called "immersed tube tunnel" (ITT) not considered? An immersed tube tunnel is in fact much more suited to this project than the "bored tunnel" technology that was originally evaluated.

Mr. Ortblad contacted WSDOT and was initially ignored. That led to a social media effort to make the public aware of his concern that it was a mistake rejecting the tunnel option without a credible engineering evaluation. That led the DOTs to complete an engineering report to justify their decision to reject the tunnel. This report, entitled Tunnel Concept Assessment, was utilized in a conceptual alternative evaluation that addressed both the "bored" and "immersed tube tunnel" options as well as two bridge options. The Tunnel Concept Assessment was the basis for a comparative evaluation, which concluded that the tunnel option was not feasible because its excessive depth made it much more costly, and also prevented connecting the freeway expansion to Downtown Vancouver. Project critics believe that the DOT's greatly exaggerated the tunnel depth for purposes of deceiving the public into approving their proposed mega-bridge.

Despite the criticisms, the DOTs managed to gain public approval to proceed with a more detailed engineering evaluation of their "mega-bridge" options. At that point, those alternatives were all variations of the bridge project that was embedded in the CRC EIS.

Eventually a preferred alternative was selected (called the Modified Local Preferred Alternative, or LPA for short). The LPA was approved by a variety of local advisory groups and both state governments. With that approval, the DOT's proceeded with preliminary design and EIS finalization for a bridge project (again, building upon the failed CRC EIS).

The "Tunnel too Low" Error

In the Tunnel Concept Assessment referred to above, design assumed a vertical alignment that is significantly deeper than it need be. This was a result of the failure to assume that the main navigation channel would be relocated from its existing location near the north bank of the Columbia to the center of the river. To understand this allegation, please note:

1. As shown on the attached Figure 3 from the Tunnel Concept Assessment, there are currently three navigation channels crossing the potential alignments of the tunnel, with the Primary Channel being located within close proximity to the north bank of the Columbia River under the lift-span

of the bridge. In addition, there are two barge channels located under the two highest spans of the existing bridge to the south.

2. As shown on the attached Figure 4 from the Tunnel Concept Assessment, the low point of the tunnel was assumed to be below the Primary Channel near the north bank of the Columbia. Assuming that the Primary Channel would not be relocated, the low point of the tunnel is approximately 100 feet below the north bank of the river.

3. If a tunnel were to be constructed, regardless of its depth, it is logical to assume that the three channels would be combined into a single 600-wide channel in the middle of the river. That 600-wide navigation channel is currently maintained through the entire length of the Columbia from its mouth to Vancouver, except at bridges, where several smaller channels are needed to avoid bridge piers. A credible conceptual tunnel design would have assumed that the channel would be relocated to the center of the river. Doing so would have put the low point of the tunnel near the center of the river instead of near the north bank. By sloping the tunnel up from the center of the river to the river banks, the tunnel would be much higher in elevation at its bank and inland. Instead of the tunnel being 90 feet deep at the bank as was assumed in the flawed DOT conceptual design, it would be about 45-feet deep.

In short, by failing to make the logical assumption that the Primary Channel would be relocated to the center of the river, the tunnel was conceptually designed to be much deeper than necessary where it touches upon land on both sides of the river. In essence, this was a "tunnel too low" error.

The Impact of the Conceptual Design Error Upon the Feasibility of the Tunnel

A mentioned above, the error in regards to the channel location assumption significantly exaggerated the depth of the tunnel. If that error had not been made, the tunnel would be much higher in elevation, which would have the following impacts upon its feasibility as compared to a bridge:

1. The tunnel would be significantly less costly than assumed. In the flawed tunnel versus bridge comparison, the DOTs have given the high cost of the tunnel as a major reason for rejecting it.

2. The tunnel would allow on/off ramp connections to downtown. In the flawed tunnel versus bridge comparison, the DOTs have assumed that connections to downtown would not be feasible.

The City of Vancouver is the single local government that is most negatively impacted by the "tunnel too low" error. The proposed bridge and its elevated ramps would have a very negative impact upon Vancouver's downtown and its waterfront. It would require a 70-foot high elevator for the waterfront transit stop, which would likely limit its use. None of these impacts were considered by the City when they approved the Local Preferred Alternative, because city officials were under the false impression that the tunnel could not provide connections to downtown. This, as stated previously, would not be the case if a tunnel was selected as the preferred option.

Was The Tunnel Elevation an Honest Mistake or Intentional Deceit?

Some project critics have contended that the "tunnel too low" mistake was not really a mistake, but a sleight-of-hand to deceive the public into believing the tunnel option was not feasible. These project critics have asked two questions:

1. Was the engineering error that led to the decision to reject the tunnel option from further consideration done on purpose to deceive the public?
2. Did the "project packaging" cross the ethical line separating public service from public fraud?

The Failure To Provide An Engineering Stamp

The fact that the Tunnel Concept Assessment was not stamped by a professional engineer suggests that the error may have been intentional, yet WSDOT has alleged that it was not required to be. The Washington State Board of Registration for Professional Engineers and Land Surveyors has made an initial determination that a stamp was not required, however that decision is currently being disputed.

Washington State has well-written laws that govern the practice of engineering and the requirements for stamping engineering documents. There are good reasons for those laws, further discussed below. Washington Administrative Code (WAC) WAC 196-23-020 states:

> *"Seal/stamp usage.*
>
> *The use of the seal/stamp must be in accordance with chapter **18.43** RCW or as otherwise described herein:*
>
> *(1) Final documents are those documents that are prepared and distributed for filing with public officials, use for construction, final agency approvals or use by clients. Any final document must contain the seal/stamp, signature and date of signature of the licensee who prepared or directly supervised the work. For the purpose of this section "document" is defined as plans, specifications, plats, surveys, land descriptions as defined in WAC **332-130-020**, reports, and as-built documents prepared by the licensee.*
>
> *(2) Preliminary documents are those documents not considered final as defined herein, but are released or distributed by the licensee. Preliminary documents must be clearly identified as "preliminary" or contain such wording so it may be differentiated from a final document."*

The fact is that the Tunnel Concept Assessment was *"distributed for filing with public officials"* for *"final agency approvals"*. Because the report was a used for *"final agency approvals"*, it appears as though the Tunnel Concept Assessment should have been stamped by a professional engineer. It is not totally clear why the IBR project team failed to put a professional stamp on a technical document that was the basis for one of the more, if not the most, important decisions being made in the IBR process. Some project critics contend that the document was not stamped because none of those involved wanted to take responsibility for the error.

State laws regarding the use of an engineering stamp exist for good reasons. Elected officials and their citizenry frequently rely upon engineers to provide expert advice in making policy and project decisions. By placing a professional stamp upon any document that supports that expert advice, an engineer is taking responsibility for the accuracy of that advice. This is particularly important with public works projects

simply because of the long history of corruption involved in such projects. In essence, state laws regarding professional licensing exist to maintain integrity in the process of building public infrastructure.

It Was "Packaging"

Over the past few decades, it has become increasingly common for public agencies who are responsible for mega-transportation projects to deceive the public in the interest of overcoming project opposition.

According to an expert on mega infrastructure projects – Bent Flyvbjerg, the Danish professor of Urban Economics at Oxford University – public deceit is not uncommon in the implementation of mega-transportation projects like the IBR project. Although many other prominent engineers, including Bob Ortblad, have drawn attention to the problem of deceit in public projects, none have illuminated this mega-project deceit as well as San Francisco Mayor Willie Brown, who wrote in a 2013 newspaper column:

> *"In the world of civic projects, the first budget is really just a down payment. If people knew the real cost from the start, nothing would ever be approved. The idea is to get going. Start digging a hole and make it so big there's no alternative to coming up with the money to fill it in."*

Project critics should keep in mind that the firm leading the project is WSP-USA, an international infrastructure consulting firm headquartered in Canada and having over 50,000 employees. The DOTs selected that firm to lead the project because they did not want to repeat their first try at a bridge replacement., which failed partly because of inadequate project packaging. WSP is superb at packaging projects. Here is how Lou Cornell, current CEO of WSP-USA, views packaging. He is on record as saying:

> *"Clients are now coming to us looking for solutions rather than purely design or construction services as they are facing greater challenges with their ultimate clients or recipients, and the work is therefore being packaged differently."*

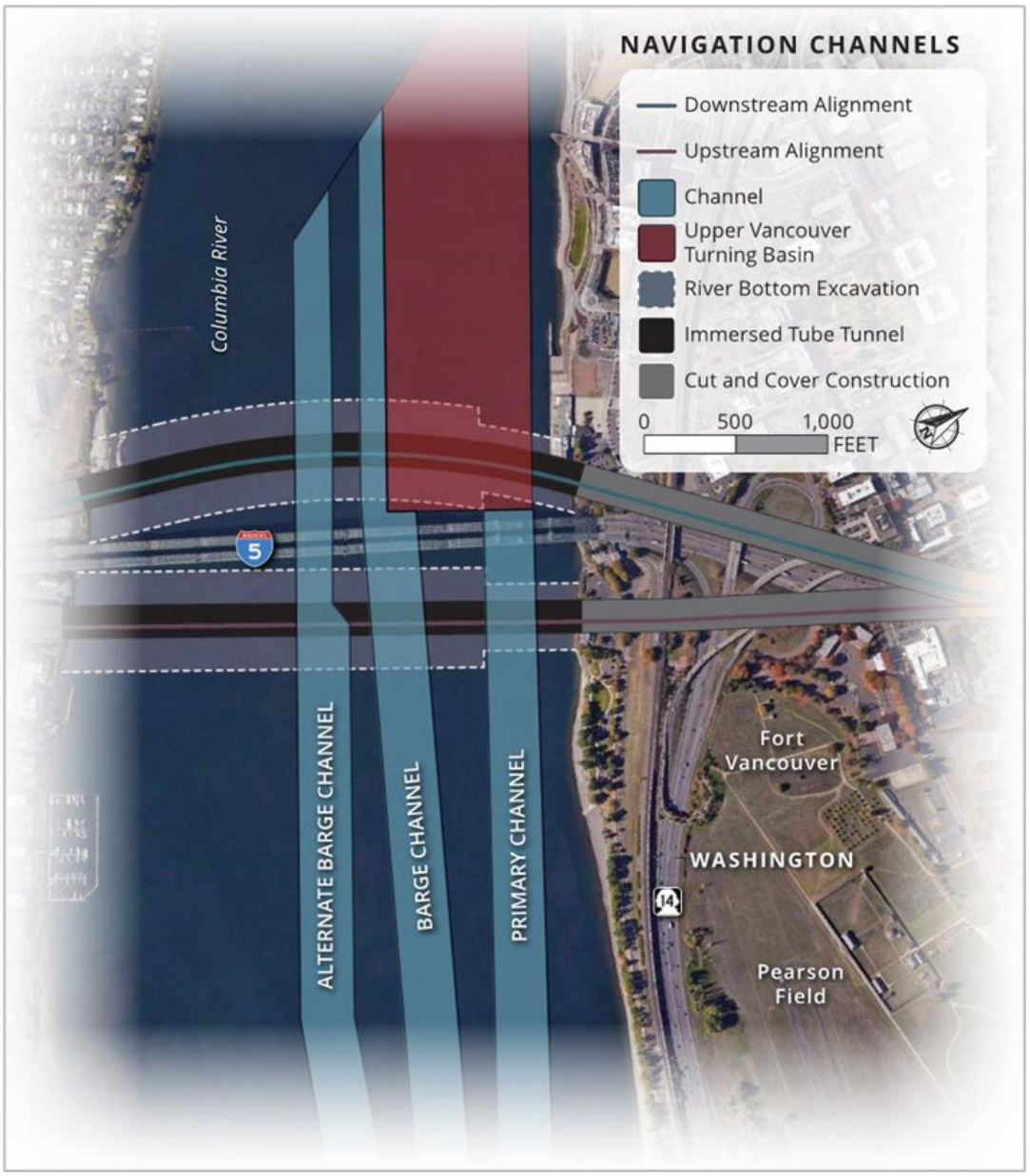
There is no question that the IBR project is being "packaged". Nor that the DOT's viewed such packaging as both necessary and in the public's best interest. It appears that with the IBR project, the DOTs view the end to justify the means. Unfortunately, there is a very low "ethical bar" in regards to the means. The IBR project suggests that the bar may need to be raised.

Attachments

Figure 3 from Tunnel Concept Assessment

Figure 4 from Tunnel Concept Assessment

Figure 3. Columbia River Navigation Channels



The Upper Vancouver Turning Basin, downstream of the existing Interstate Bridges, has an authorized depth of 35 feet (see Figure 4).

Upstream of the existing Interstate Bridge are three navigation channels: the primary channel, barge channel, and alternate barge channel. All three channels have an authorized depth of 27 feet (see Figure 5). USACE maintains the navigation channels through continuous dredging operations. Currently, USACE maintains the channels to a depth of 17 feet below zero Columbia River Datum

(CRD); however, any project must comply with the authorized depth of the channel. The authorized channel depth of 27 feet extends approximately 90 miles upriver to The Dalles, Oregon.

Figure 4. Navigation Channel for the Downstream Alignment

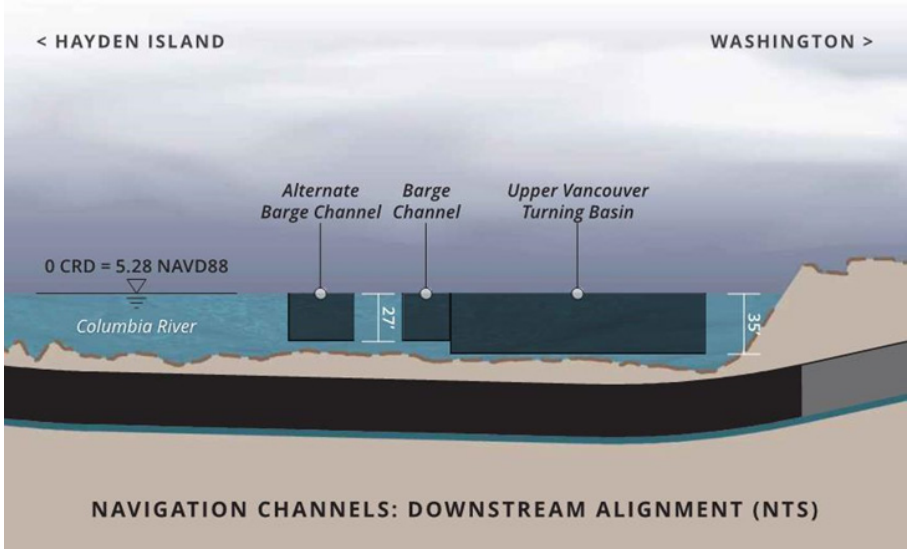
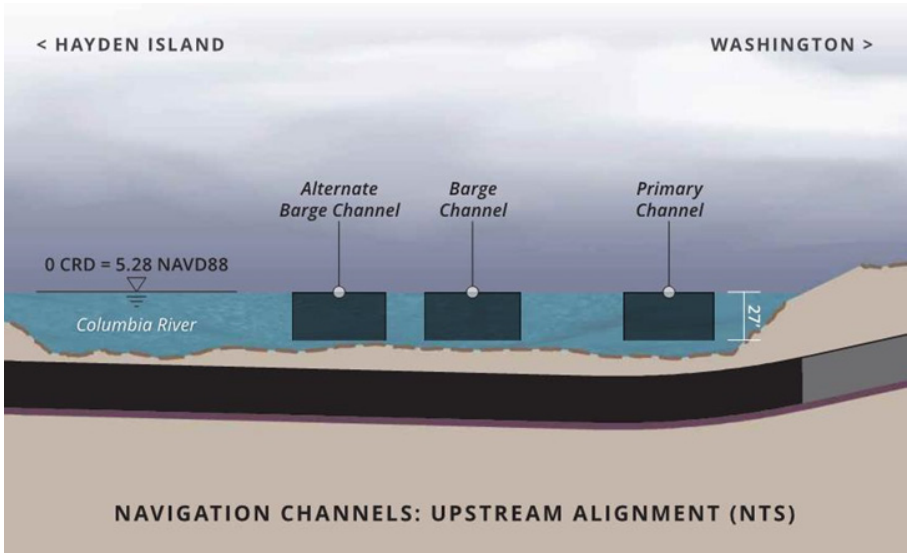


Figure 5. Navigation Channel for the Upstream Alignment



USACE requires that any civil works below the turning basin or navigation channels must be placed below the authorized depths and include an additional 5 feet of depth for advanced maintenance dredging. This is to allow for excess over-dredging required to maintain the authorized channel depth.