A Civil Engineering Assessment of the Decision To Reject A Tunnel as an Option To Replace The I-5 Bridge Over the Columbia River

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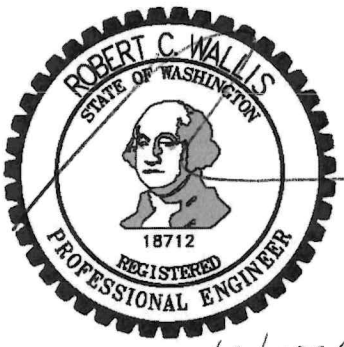

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1. Introduction

The States of Oregon and Washington recently released a draft EIS for the proposed $7.5 billion project to replace the I-5 bridge across the Columbia River. That project, called the IBR (Interstate Bridge Replacement Program) is being implemented by a group of Oregon and Washington DOT staff and their consultants, herein called the IBR team.

An initial step in the EIS process was the evaluation of technical options to identify a preferred option for further refinement and environmental evaluation. A fixed bridge option was identified as the preferred option and the others were rejected, including the immersed tube tunnel (ITT) option.

Project critics have alleged that the IBR team deceived the public and elected officials when they provided false information regarding the deficiencies of the ITT design option which led to the rejection of that option. This report evaluates the validity of those allegations and their implications.

2. Conclusions

In evaluating the public record, it is concluded that:

1. During the process of screening design options to replace the existing I-5 bridge over the Columbia River, the public and their elected officials were deceived by the IBR team.

2. That deception was related to false and exaggerated claims regarding the deficiencies of the ITT option during the process of screening design options. One of the more significant false claims – that the ITT option would not enable connections to critical streets without significant out-of-direction travel – was in fact contradicted by IBR consulting engineers. That screening process completely lacks credibility.

3. By undermining the credibility of the process of screening design options, the credibility of the recently released draft EIS was also undermined. The process of screening alternatives should be repeated prior to finalizing the EIS.

4. The IBR team's leadership was negligent. They should be held accountable. If the screening process for the technical alternatives is repeated, which it should be, those involved in the previous screening process should not participate.

3. Background

The process of selecting a replacement of the I-5 bridge over the Columbia River began in the mid-1990's - with internal efforts by the ODOT staff to explore options. ODOT staff assumed that the replacement bridge would be a fixed bridge similar to the I-205 bridge except that it would include light rail.

Officially, that process began in 2005 when the Oregon and Washington DOTs were authorized to proceed with what became known as the Columbia River Crossing (CRC) project. Through that CRC process a fixed-bridge design option was selected and advanced through preliminary design and environmental assessment, leading to a final EIS prepared to meet the requirements of the National Environmental Policy Act (NEPA).

The CRC project was officially terminated 2014. The DOTs of both states continued efforts to implement a bridge replacement project. That effort, now named the Interstate Bridge Replacement Program (IBR) began in earnest in 2019. That project has moved forward through five basic decision making steps – all as mandated by NEPA due to the fact that the project was federally funded.

Step 1 – Establish the Project Team

The I-5 bridge is jointly owned by the states of Oregon and Washington, which means the state legislatures are responsible for making key decisions regarding what bridge replacement project gets built and how it is funded. A Bi-state Legislative Committee from both states was established to guide the process and provide oversight. A wide variety of advisory groups including those from local, state, and federal agencies were established to provide input and recommendations. These are collectively referred to as "the public".

Step 2 – Identify Project Goal.

The Bi-state Legislative Committee agreed to a project goal. In this case - the replacement of the existing bridge.

Step 3 – Identify Options that Meet that Goal.

State DOT staff and their consultants (the IBR team), provided the public with technical options that met the project goal of replacing the bridge. Initially, they did not present the public with the option of an ITT . That option was added as a direct result of public input into the Step 3 process.

Step 4 – Evaluate Options and Select A Preferred Option.

IBR leadership gathered technical information to help inform the public decision-making process. Most of that information came from previous studies completed as part of the CRC. Because the ITT design option was not evaluated in the CRC process, an engineering evaluation of the ITT design option was completed by IBR consultants, and summarized in an engineering report made available to the public. That report was entitled Tunnel Concept Assessment.

Project advisory groups, using a consistent set of parameters to apply to each technical option, compared each option to the others through a screening process to select a locally preferred alternative (LPA). It is important to note that the LPA became a foundational decision to serve as a basis for Step 5 efforts.

That process of evaluating and comparing the technical options was summarized in a

memorandum called the River Crossing Option Comparison. That memorandum reflected what the IBR advised the public and their elected officials during the public meetings and workshops where the technical options were discussed. The most significant category of that advice was technical, based upon the engineering expertise of the IBR team.

Step 5 –Advance Design Efforts and Address Environmental Impacts.

The evaluation of project impacts for the LPA was completed and summarized in a draft EIS which met the requirements of the National Environmental Policy Act.

The first four of these steps are taken for every complex public infrastructure project regardless of whether it is implemented by federal, state, or local government. The intent of this process is to assure that agency staff deliver a project which meets public needs as opposed to their own institutional needs, or the needs of special interest groups having influence over them. The process enables citizens, who pay for public projects, to dictate through their elected officials, what "public" project, if any, gets built.

4. How the Public Was Deceived

The public was deceived by false and misleading technical information regarding the deficiencies of the ITT design option. That information was represented to the public as being the professional opinion of engineers, when it was not.

During the Step 3 process of reviewing and assessing the technical options, there was considerable interest by the public in the ITT design option and strong advocacy for that option. That interest largely disappeared when the IBR team falsely claimed that the ITT design option had a fatal flaw.

The alleged fatal flaw in the ITT option was that it could not enable connections to streets in Downtown Vancouver and Hayden Island or SR-14 without significant out-of-direction travel. That claim was totally untrue, and in fact was explicitly contradicted by the engineering report prepared by IBR team consultants that summarized the engineering evaluation of the ITT design option – the Tunnel Concept Assessment.

In addition to making the false claim regarding connections, the IBR team appears to have exaggerated other ITT tunnel deficiencies.

The IBR team's false and exaggerated claims regarding ITT option deficiencies were made in numerous public meetings and workshops. They were discussed in the report which summarized the process of screening design options – the River Crossing Option Comparison. Those deficiencies were listed in a "fact sheet" that was distributed to the public and made available on their website. That fact sheet - "Why Not A Tunnel" is quoted as follows:

"The tunnel design concepts have already been analyzed as river crossing options. Tunnel options do not best address the transportation issues identified in the I-5 bridge corridor, and would result in multiple challenges in the program area. Because of these challenges, tunnel options were removed from consideration.

Analysis of the tunnel options identified the following challenges:

- *Significant out-of-direction travel for drivers, freight, emergency response vehicles, transit users, bicyclists and pedestrians*
- *The inability to tie into existing connections such as SR 14, Vancouver City Center and Hayden Island*
- *Potential safety concerns for bicyclists and pedestrians*
- *The potential for significant archaeological, cultural and environmental impacts*
- *Cost estimates for a tunnel are estimated to be approximately two times higher than cost estimates for a replacement bridge and approaches. This estimate does not include other highway, interchange or high-capacity transit improvements that would be necessary."*

The first two of these deficiencies are one and the same (the inability to connect means significant out-of-direction travel). If true, *which was not the case*, the ITT design option would not be practical.

The Alleged Deficiencies Regarding Out-of-Direction Travel and Inability to Make Critical Street Connections.

The first two claims regarding ITT deficiencies were that the ITT option would:

1. Present "*Significant out-of-direction travel for drivers, freight, emergency response vehicles, transit users, bicyclists and pedestrians?*
2. Result in "*The inability to tie into existing connections such as SR 14, Vancouver City Center and Hayden Island"?*

Again, they are one and the same. The essential assumption that supports the claim that connections to critical streets cannot be made is that the ITT design option could not include interchange ramps. The IBR design team deceived the public when they told them told that those ramps were impractical. Please note what the IBR team stated in the River Crossing Option Comparison document. They stated that the ITT design option:

> "Requires **unconventional and complex** below-grade construction to accommodate interchange connections consisting of cut and cover tunnels with large temporary excavations. This would make **construction impractical".**

The bold sentences are from the IBR report.

The River Crossing Option Comparison also stated:

> *"The Tunnel Concept Assessment concluded that an ITT is technically feasible; however, there are numerous challenges, as identified in Table 5. These challenges include significant out-of-direction travel for drivers, freight, transit users, bicyclists and pedestrians; the inability to tie into existing connections, such as SR 14, Vancouver City Center, and Hayden Island."*

Compare that comment with the only mention of that issue in the engineering report – Tunnel Concept Assessment and it will become clear that the IBR team's intent was deceit.

> "The ITT would be connected to the above-ground roadway network via cut-and-cover and retained cut connections at either end. Excavation support for these end connections could differ between Vancouver and Hayden Island, as excavations in Vancouver are anticipated to be primarily in gravel alluvium, whereas excavations on Hayden Island are anticipated to be primarily in silt/sand alluvium. The deepest excavations could require ground support systems consisting of braced or restrained secant pile or slurry walls, while shallower excavations may require less robust ground support systems. Ground improvement measures could be incorporated to decrease the potential for seepage through the base of the excavation and to provide long-term support for the constructed cut-and- cover and retained cut sections."

The comment "would be connected to the above grade roadway network" is a total contradiction to what the IBR told the public during the alternative screening process as quoted previously.

In the engineering report prepared by IBR consultants, there is no mention whatsoever of those connections being "impractical". The Tunnel Concept Assessment clearly contradicted the claim about connections. Connections are in fact practical and with those connections, there are no out-of-direction travel deficiencies.

In public meetings and workshops, the IBR team leadership told the public repeatedly that, because there could be no connections from the tunnel to surface streets, frontage roads would be required from the ends of the tunnel where it daylighted at each end over 1,000 feet from the river banks. To get to any point near the river (streets in downtown Vancouver, SR-14, and Hayden Island, would require exiting the tunnel where it surfaced, and back-tracking to where I-5 crossed the streets through those frontage roads, thus the "out-of-direction travel". Here is a quote from the Option Comparison document:

> "As shown, an ITT would likely daylight on the southern end of Hayden Island in Portland and near Evergreen Boulevard in Vancouver. This would eliminate connections to I-5 at SR-14 and Hayden Island."

Those alleged frontage roads would have had drastic impacts upon Downtown Vancouver and Hayden Island. Those business and property owners who had shown initial interest in the ITT design due to the fact that it avoided what they perceived to be "bridge blight" completely lost interest upon being deceived into believing that their properties and businesses would have been devastated by frontage roads. If the IBR team was correct about the inability of the ITT design option to connect to downtown Vancouver streets, it would have effectively destroyed that downtown.

The Alleged Deficiency Regarding Potential Safety Concerns for Bicyclists and Pedestrians

Although there are no meaningful safety concerns for a well-designed tunnel, the fact is that if not designed well or policed, there could be a safety concern. The exact holds true for the fixed bridge options massive above-ground vehicle and pedestrian ramps as well, however that

potential deficiency was not identified for the fixed bridge option. Nor was it noted that the fixed bridge option could "potentially" present additional safety concerns related to the fact that, unlike the ITT design option, pedestrians and bicyclists will be exposed to weather conditions that would result in in slippery surfaces and that associated fall hazards would be increased by high winds.

The Alleged Deficiency Regarding Archaeological, Cultural and Environmental Impacts

The fact that more ground would be excavated with the ITT design option than with the fixed bridge option does mean that there are potentially more archeological impacts. It should be noted that there is no mention of the fact that just downriver from the proposed tunnel, Vancouver's Waterfront Development was constructed with significantly more excavation and site disturbance than would occur with the ITT design option construction. That vast amount of excavation did not have any archeological impacts or cultural impacts.

Nor does the IBR team mention the opportunities that the ITT option would provide for enhancement of cultural resource in the vast amount of open space created above the tunnel.

The IBR team members have emphasized the environmental impacts of dredging, without mentioning the fact that those impacts can be easily managed. The dredging required to install the ITT design option is in fact a small percentage of the dredging that occurs every year to maintain the Columbia River shipping channel.

The Alleged Deficiencies Regarding Cost Estimates

The IBR team stated that the ITT design option would cost twice as much as the fixed bridge option. That statement is very questionable.

The fact that when the IBR team initially provided a cost estimate, it appears to have been based upon three engineering errors that exaggerated costs. One was the assumption that the existing navigation channel would not be relocated for the ITT option. The second was the error made in assuming frontage roads would be required to access critical street connections. The third was an error in the estimated excavation quantities which significantly increased the cost estimate for the ITT design option. Both errors were brought to the attention of the IBR team. They failed to acknowledge the first two errors. They corrected the second but continued to claim that the ITT option was "twice the cost".

The error regarding the ITT option's inability to connect to critical streets is discussed in the previous section. The error in excavation quantities was acknowledged by the IBR team, and thus does not require addressing. The error regarding the navigation channel relocation is discussed in the following subsection.

The Error Regarding The Navigation Channel Location Assumption

The IBR team assumed that the main navigation channel would be relocated for the fixed-bridge option, but not the ITT option. In doing so, the depth, cost, and construction challenges of the ITT option were all exaggerated.

The Tunnel Concept Assessment report included a vertical alignment that was significantly deeper than need be as the result of the failure to assume 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 make that assumption suggests negligence. To understand this please note:

1. As shown on Figure 3 from the Tunnel Concept Assessment (available for review on the IBR project website under "Technical Documents"), 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 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. With the assumption that the Primary Channel will not be relocated, the low point of the tunnel is at approximate 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 channel in the middle of the river. That 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.

4. A credible conceptual tunnel conceptual 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 50 feet deep.

In short, by failing to assume the Primary Channel would be relocated to the center of the river, which would be a logical assumption, the tunnel was conceptually designed to be much deeper than necessary where it touches upon land on both sides of the river.

5. The Impact of the Deception Upon the Draft EIS

The draft EIS was prepared assuming the initial screening process was credible, which it was not. That EIS addresses only the fixed bridge option. Without a credible alternative screening process, the draft EIS is not credible.

The process of screening design options resulted in the selection of a locally preferred alternative (LPA). The selection of the LPA was a foundational decision that established the design option upon which the EIS was based. In essence, the draft EIS was prepared based upon a decision that was the end result of deception by the IBR team.

The screening process needs to be repeated without the deception that dominated the process that

resulted in the draft EIS. Those on the IBR team involved in that screening process should not be involved in a repeat of that process. They completely lack credibility.

6. Why IBR Leadership Should Be Held Accountable for Negligence

Negligence is the failure to behave with the level of care that a reasonable person would have exercised under the same circumstances.

It is clear that the process of screening design options and selected a locally preferred alternative was not managed by the IBR team to an acceptable standard of care. They were clearly negligent because they:

1. Claimed ITT deficiencies that did not exist, and exaggerated others.
2. Provided a single engineering evaluation which contained significant errors and not only confused the public, but IBR leadership as well.
3. Violated state professional licensing laws.
4. Skirted those professional licensing laws to avoid accountability for deceiving the public with false engineering information

These acts of negligence are discussed in the following paragraphs.

Exaggeration of Deficiencies

The IBR leadership was negligent in claiming deficiencies when they did not exist, and exaggerating others. That matter is discussed in Section 5 above.

The Deficiencies in the Tunnel Concept Assessment

As mentioned above, of the Tunnel Concept Assessment contradicted what the public was told by the IBR team leadership. Apparently, IBR team leadership were unable to understand the Tunnel Concept Assessment. That suggests that the report was seriously flawed. The IBR team leadership was negligent in not providing the public with an engineering evaluation and report which provided the engineering information that was critical to the success of the public's decision-making process.

The Tunnel Assessment Report Violated Washington State Licensing Laws

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 the TCA was "distributed for filing with public officials" for "final agency approvals".

When released to the public, the Tunnel Concept Assessment did not have a professional stamp. Whether that was for purposes of avoiding accountability, or an oversight, that action clearly violated Washington's licensing law and suggests negligence on the part of the IBR team.

The IBR Team Skirted Professional Licensing Laws.

It is the job of public agency staff and their consultants to inform the public and their elected officials. The IBR team has focused on influencing them, not informing them. In doing so, they have not only violated state licensing laws, but skirted those laws.

The success of the IBR project, like all complex public infrastructure projects depends upon the expertise and ethics of the professional engineers who the public relies upon for advice and opinions on technical matters. State licensing laws exist to provide a mechanism to ensure high professional standards. The public and their elected officials need to trust engineers. Those laws ensure the engineers do not betray that trust.

A key requirement of engineering licensing laws is that engineering reports be stamped by a professional engineer. If that report does have errors that do not reflect an acceptable standard of professional care, the engineer who stamped the report can be held accountable.

The value of these professional licensing laws is made very clear by the fact that IBR leadership falsely claimed that the ITT design option had a fatal flaw, when it did not. Unlike most of the false and misleading claims by the IBR team, this particular claim was addressed in an engineering report which had to be stamped by a professional engineer who could be held accountable. For that reason, the engineering report stated the truth about the fatal flaw false claim made by the IBR team, which totally contradicted the statements by IBR team members interfacing with the public.

The state licensing laws in Washington differ from those in Oregon in that preliminary documents containing engineering information are required to be stamped in Washington and not in Oregon. In Oregon, only final documents need be stamped. That is a flaw in Oregon licensing law because the preliminary documents are used in decision making for those complex projects that require the evaluation of design alternatives. That was exactly what occurred in the decision making process that led to the LPA – preliminary technical information led to the selection of the LPA.

The single technical document prepared to date that was stamped by a professional engineer is the Tunnel Concept Assessment. That document was only stamped after an informal complaint was made to the Washington State Board of Professional Engineers, whose efforts ultimately led

the IBR team to stamp the report.

The IBR team has released other technical documents to the public as can be seen on their website. Because they are technical documents, they should be stamped by a professional engineer, whether they are deemed preliminary or final. None are. The IBR team is negligent in not having them stamped.

Initially, the IBR team members resisted providing an engineering stamp to the Tunnel Concept Assessment. They will likely resist doing so for the other reports. Although Oregon does not have a requirement for providing a professional stamp to preliminary engineering documents, they do for final engineering documents. ODOT also has specific guidelines that address what technical documents need to be stamped by an engineering – TSP11-02d found at https://www.oregon.gov/odot/Engineering/Doc_TechnicalGuidance/TSB11-02d.pdf

That ODOT guidance document makes it clear what technical documents require an engineering stamp. WSDOT does not appear to have specific guidance but does clearly require that preliminary documents be stamped: "Project Delivery Memo #21-02 – Applying Professional Stamps" accessible at https://wsdot.wa.gov/publications/fulltext/ProjectDev/ProjectDeliveryMemos/Memo21-02.pdf

Considering the fact that the IBR project is required to meet the laws in both Oregon and Washington, it is clear that all of the technical documents listed on the IBR website should be stamped. Given the fact that other aspects of the project besides the decision to reject the ITT design option are dependent upon technical documents to support those decisions, it is clear that they also should be listed as Technical Documents and stamped by a professional engineer. For instance, there are technical documents listed as "Program Fact Sheets" and "Financial Reports" that are clearly based upon engineering, and should be stamped by a professional engineer. None are, with the end result that the professional licensing laws are being skirted.

As mentioned above, professional engineers are held to professional standards that limit their ability to deceive without being held accountable. The IBR team has repeatedly made engineering claims which were alleged to reflect engineering opinions without providing any documentation that would support such opinions. In doing so, they skirted the professional licensing laws and avoided accountability for failure to comply with an acceptable standard of professional care.