

PUBLIC COMMENTS FOR IBR PROGRAM COMMUNITY ADVISORY GROUP– JULY 1, 2021 MEETING

Received between June 2 – June 29, 2021

Bob Ortblad

6/4/21

CAG Comment

Attachment Included*

** ADA compliant versions of the attachments can be made available upon request*

Bob Ortblad

6/24/21

IBR Program

The I-205 Bridge is the 8th most dangerous bridge in the country.
A new I-5 Bridge could be more dangerous.

Please study the attached CAG Public Comment.

Bob Ortblad MSCE, MBA

Attachment included

** ADA compliant versions of the attachments can be made available upon request*

Bob Ortblad

6/28/21

Greg Johnson

IBR Program Administrator

Community Advisory Group Public Comment

The following was recently posted on the IBR Program website:

Myth: A tunnel can solve the Interstate Bridge transportation problem just as easily as a replacement bridge.

Fact:

A tunnel cannot be feasibly built within the footprint of I-5 without eliminating important connections to Hayden Island, downtown Vancouver, and SR-14. It also comes with significantly more operational, environmental and historical resource impacts, and would cost more than a replacement bridge.

This opinion must be based on the Columbia River Crossing's environmental impact evaluation of a **bored tunnel**.

An **Immersed Tube Tunnel (ITT)** will have better connections to Hayden Island, Vancouver, and SR-14 because it can be a half-mile shorter with less grade than a bridge. An **ITT's** smaller footprint will have no impact on historic sites. An **ITT** will have less noise, water, and air pollution, both during construction and when completed. An **ITT** will be safer for car, truck, and rail traffic, and many times more earthquake resistant. A short shallow dip under the river (-50 feet) vs. a long steep climb over the river (+150 feet) will save billions of energy units over the +120-year life of an **ITT**.

Please remove the incorrect Tunnel Myth & Fact post on the IBR Website.

Attached is a summary of **ITT** advantages that have been submitted as IBR Public Comment.

Respectfully
Bob Ortblad MSCE, MBA

Attachment included

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All three of the IBR Program administrators are bridge engineers and seem to focus through a Columbia River Crossing bridge lens. Please refocus with tunnel vision and study information I have previously sent the CAG on immersed tube tunnels.

The IBR Program Administrator, Greg Johnson, was most recently a Senior Vice President with WSP engineers and worked on Gordie Howe International Bridge. WSP is currently the consulting engineer on the IBR Program. The two Assistant IBR Program Administrators are both bridge engineers. One has 20 years with WSDOT with 8 years on the design of the Columbia River Crossing Bridge. The other assistant has 30 years with ODOT, and was Project Manager on the Columbia River Crossing project.

[Greg Johnson comments at the June 3 CAG meeting:](#)

"We can't design a tunnel in a bottle." ?

"These are ideals that are fun and fantastic..." ?

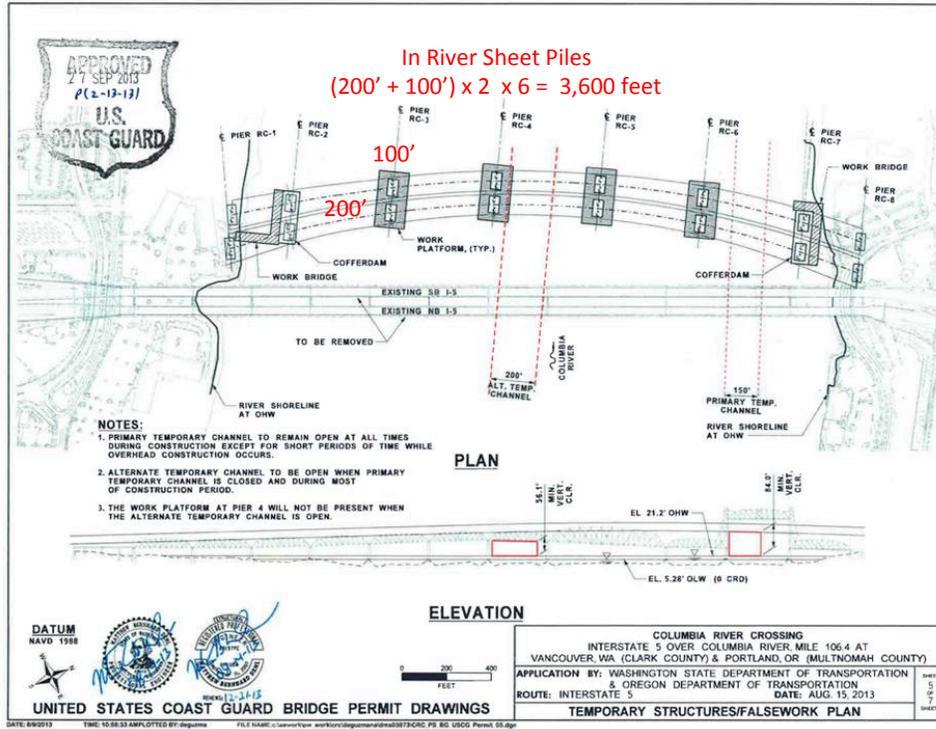
"How would digging a trench 50-foot deep in the Columbia River to place an immersed tube tunnel, what would that due to the environment?"

Answer:

An Immersed tube tunnel needs one-time dredging of less than 1 million cubic yards. An immersed tube tunnel can be fabricated off of the river. Its trench can be dug and the tube sections placed in a few months when no fish are migrating.

A new bridge would require thousands of sheet piles to build half a dozen massive cofferdams and years of dangerous on river construction.

To keep the ports of Portland and Vancouver accessible to oceangoing ships, every year the Corps of Engineers dredges 6 million to 8 million cubic yards of sand from the 107-mile shipping channel between Astoria and Vancouver. About 1 billion cubic yards have been excavated since the Corps began maintaining the shipping channel more than 90 years ago. The Corps plans to dredge 160 million yards of sand over the next 20 years. Corps plans to use the sand to raise levees and habitat construction for salmon and streaked horned larks.



Trelleborg - How to build an immersed tunnel

<https://www.youtube.com/watch?v=2Xkyyc9PIQA>

Trip through Tingstad Tunnel, Gothenburg

<https://www.youtube.com/watch?v=KoEBbmeecd88>

Trip through Marieholm Tunnel before its Dec. 16 opening, Gothenburg

<https://www.youtube.com/watch?v=BT9s2Pf9Wms&feature=youtu.be>

Construction of the Marieholm Tunnel, Gothenburg

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Launch of the Marieholm Tunnel elements, Gothenburg

<https://www.youtube.com/watch?v=JC4mRlgwXU0>

Elizabeth River Tunnel, Norfolk, VA.

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George Massey Crossing Tunnel Concept, Vancouver, Canada

<https://www.youtube.com/watch?v=8At88ti-yFA>

Immersion Tunnel Coatzacoalcos by Volker Construction International, Mexico

<https://www.youtube.com/watch?v=VFWkoZMja0k>

DERSA - Santos Guarujá Immersed Tunnel Project, Brazil

<https://www.youtube.com/watch?v=du8KZob7Pkw>

Busan-Geoje Fixed Link in South Korea

<https://www.youtube.com/watch?v=-aykpUulHJo>



**Immersed Tube Tunnel
better than a
New High Bridge**

The 205 Bridge is the 8th most dangerous bridge in the country. Wind, fog, rain, and black ice combined with bridge grade and curves generated 124 accidents in 2019.

<https://katu.com/news/local/numbers-show-glenn-jackson-bridge-a-hot-spot-for-accidents>

A new I-5 High Bridge will have the same weather, similar curves, and a steeper grade making it **potentially more dangerous** than the 205 bridge.

8th most dangerous bridge*

North
2.5% grade

INTERSTATE
205

SUV hit a patch of ice
plunges into the
Columbia River
Feb. 2021

One accident every three days
124 accidents in 2019

North & South
3.0% grade

INTERSTATE
5

more dangerous bridge

*Go Safe Labs
Review of 2019 Accident Data

BLACK ICE

- VERY HARD TO SEE
- SLICK CONDITIONS
- ESPECIALLY ON BRIDGES/OVERPASSES

Fog

Wind

Rain

Hydroplaning

In February 2021 an ice storm shut down I-84. An SUV hit black and skidded off the 205 Bridge into the Columba River.



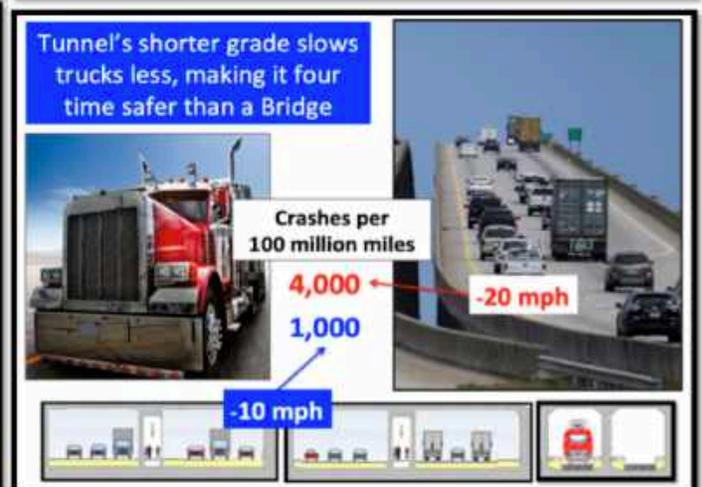
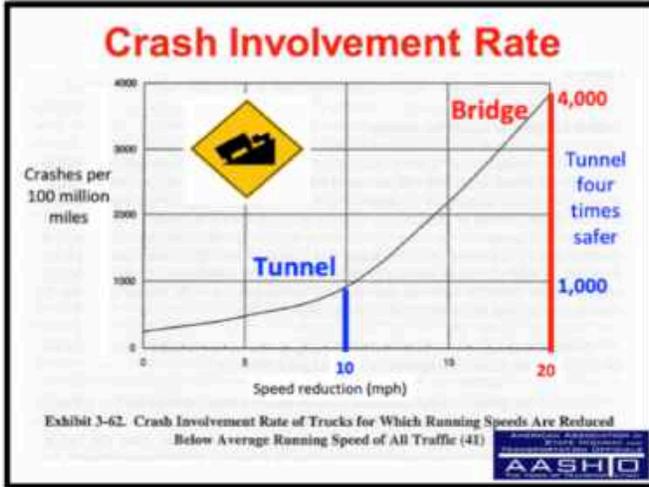
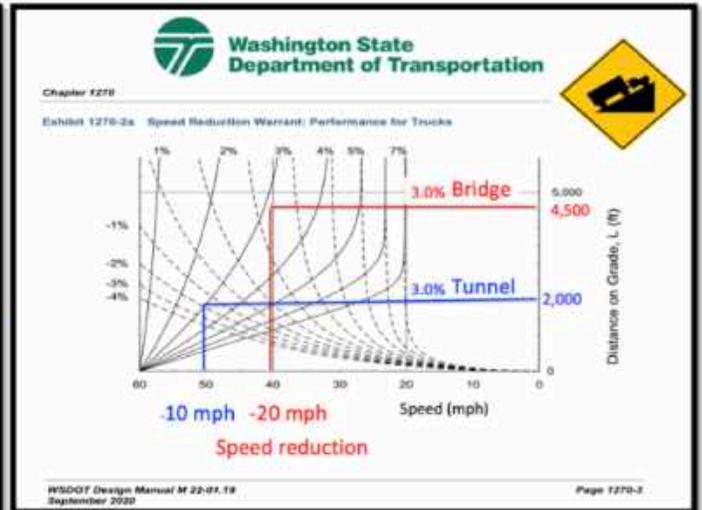
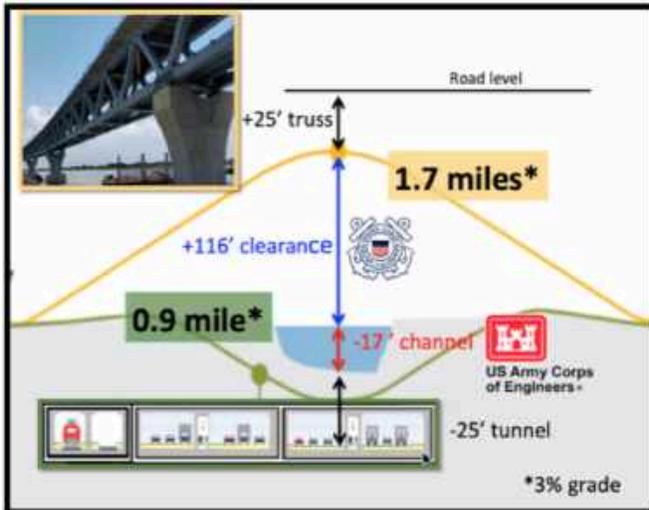
An Immersed Tube Tunnel (ITT) will be protected from the weather, have no curves, and have half as long a grade.



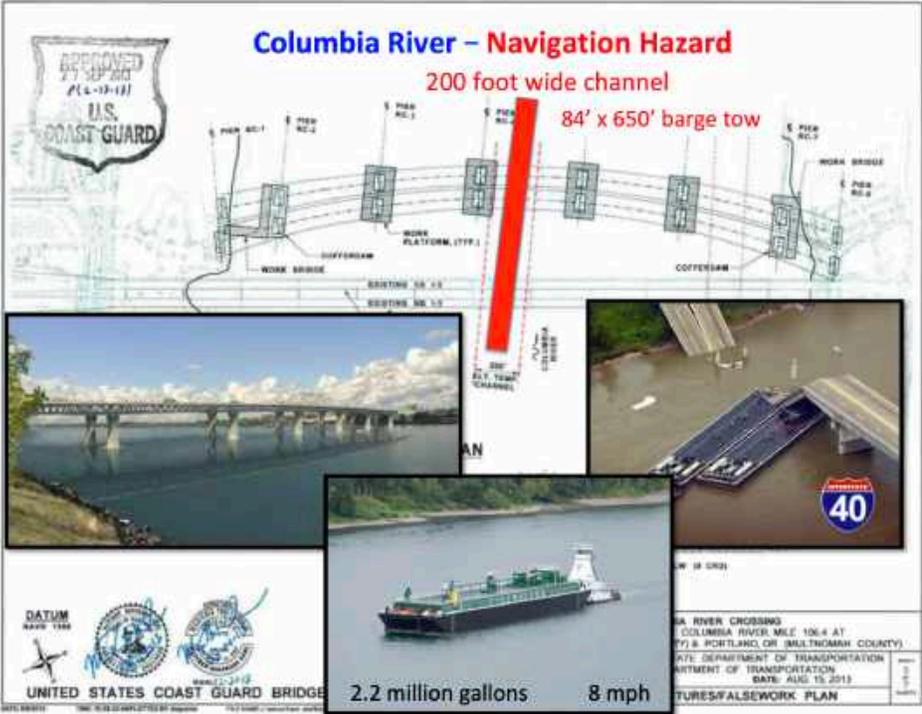
An Immersed Tube Tunnel (ITT) will have **half the grade** of a High Bridge.

A WSDOT graph shows trucks will slow by 20 mph on a High Bridge but only 10 mph in an ITT.

An American Assoc. of State Highways (AASHTO) graph shows an ITT slowing of only 10 mph would be **four times safer** than a bridge.



A during construction a bridge will require massive cofferdams that will narrow the navigation channel to only two hundred feet. Six piers will support a High Bridge and be **permanent navigation hazards**.



Bridge construction is almost twice as dangerous for workers. The workers compensation insurance rate reflects the **risk of injury or death** during construction.

Workers Comp Insurance

Bridge \$4.23 / hour

Tunnel \$2.28 / hour

An ITT is safer during construction. It is also many times safer than a bridge for vehicle and river traffic. **How many injuries and lives could be saved in the next hundred years?**



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Bob Ortblad 6/28/2021

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Respectfully
Bob Ortblad MSCE, MBA

2/16/21

Bob Ortblad 2/16/2021

ESG Public Comment

An Immersed Tube Tunnel would have a much lower environmental impact on Hayden Island, Vancouver, and the Columbia River than a new High-Level Bridge. The Columbia River Crossing bridge design is a 1950's elevated freeway design that would blanket both Hayden Island and Vancouver in concrete. (See attachment #1 & 2)

Gothenburg, Sweden is the largest port in Scandinavia and the World's Most Sustainable City. It is famous for its municipal innovation. Last month the city opened its second immersed tube tunnel. The Marieholm and the Tingstad tunnels can carry a total of 180,000 vehicles/day with little impact on the river and its riverbanks. (See attachment #3)

Attachment #4 has links to YouTube videos about Gothenburg's newest immersed tube tunnel and several similar tunnels.

Respectfully

Bob Ortblad MSCE, MBA



Environmental Impact of CRC Bridge design



1950's Elevated Freeway design



Bob Ortblad 3/5/2021

A long 3,600-foot 3.3% bridge grade will slow trucks by 20 mph.
 A shorter 2,000-foot 3% ITT grade will slow trucks by 10 mph.

This difference in speed makes an ITT four times safer than a bridge.

Crash Involvement Rate

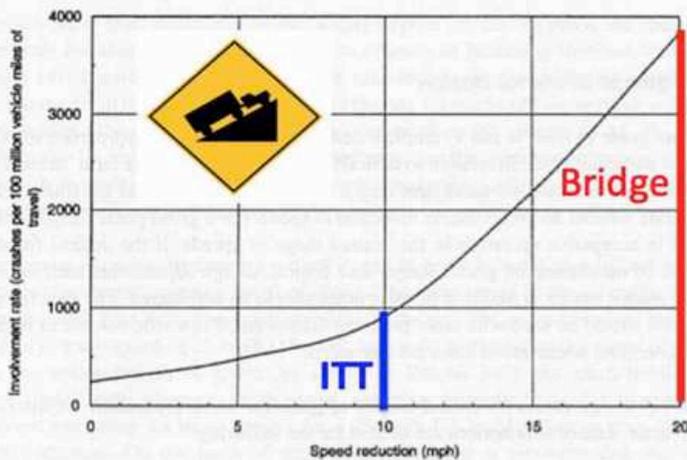
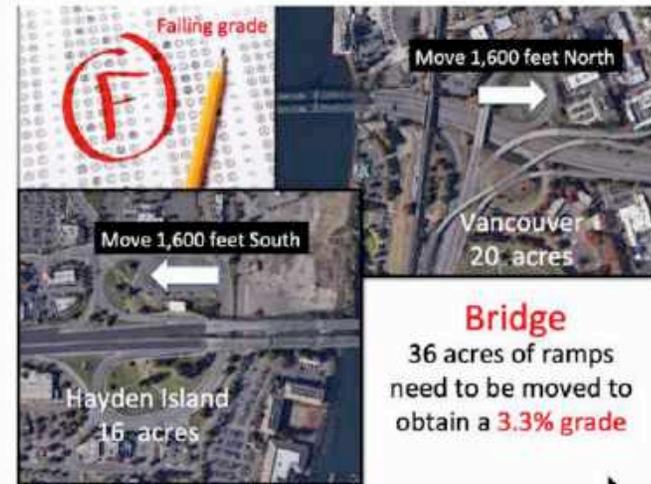
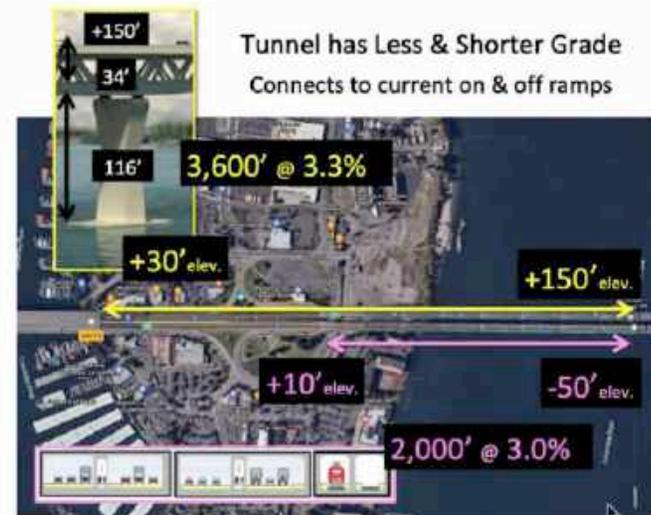


Exhibit 3-62. Crash Involvement Rate of Trucks for Which Running Speeds Are Reduced Below Average Running Speed of All Traffic (41)

Any new I-5 bridge will have a failing grades of "F" and 3.3%. To meet the U.S. Coast Guard's bridge clearance requirement of **116 feet or more**, a bridge will require a 3,600-foot long grade at 3.3% from ground level to the center of the bridge. This will make the 36 acres of current on and off-ramps inaccessible. A new bridge will require the **extremely expensive** movement of these ramps, a quarter-mile north at Vancouver, and quarter-mile south on Hayden Island.



However, an immersed tube tunnel (ITT) requires only a 2,000-foot long grade at 3% from ground level to the center of the river. This allows an ITT to connect to the current on and off-ramps.



An immersed tube tunnel (ITT) will take advantage of local labor, materials, technology, and geography.



Let's Buy Local Labor & Materials

The 2nd Tacoma Narrow Bridge was completed in 2007. Much of it was prefabricated in Korea and transported on a Dutch ship to the Tacoma Narrows. Local ironworkers lost the opportunity for 250 jobs.



Bob Ortblad 3/18/2021

LOCAL LABOR

The construction of concrete tubes for an ITT is almost identical to the construction of the 77 pontoons for the Lake Washington 520 Bridge opened in 2016. The bridge created thousands of jobs across Washington State. Jobs were created at the bridge site, plus Aberdeen, Tacoma, and Kenmore where the pontoons and anchors were fabricated.



LOCAL MATERIAL

The ITT tubes will use famous high-quality NW concrete. The Kingdome had the largest concrete roof in the world. The Seattle office tower Two Union Square achieved a compressive strength of 19,000 psi, one of the highest on record.



LOCAL TECHNOLOGY

Washington State is the world's leader in building concrete pontoons. The first Lake Washington Bridge was opened in 1940. The Hood Canal Bridge opened in 1958, and the 520 Bridge in 2016. Tacoma's Concrete Technology Corporation founded in 1951 was the country's first prestressed concrete fabricator. They have built and shipped floating structures to San Diego, Alaska, and Indonesia.



LOCAL GEOGRAPHY

The Port of Vancouver has an 82-acre site 6 miles downriver of the current I-5 Bridge. This site is ideal for an ITT casting yard similar to the Aberdeen casting yard built for the 520 pontoons.



Bob Ortblad

4/22/21

An Immersed Tube Tunnel UNDER is better than a Bridge OVER the Columbia River.

The United States Coast Guard will require a new vertical and horizontal bridge clearance permit. An immersed tube tunnel (ITT) has no clearance problems.

Sixty-two years ago British Columbia built an ITT under the 38-foot deep ship-channel of the Fraser River. A Columbia River ITT will be less difficult to build with a barge-channel of only 17-foot deep.

British Columbia is planning a new ITT that will include Vancouver's light rail SkyTrain. Light rail will be necessary for any new Columbia River crossing.

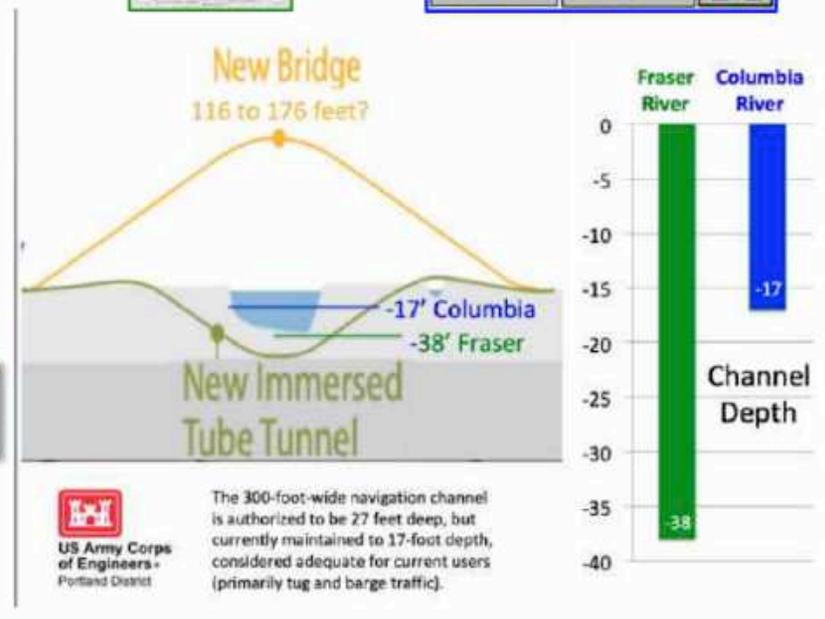
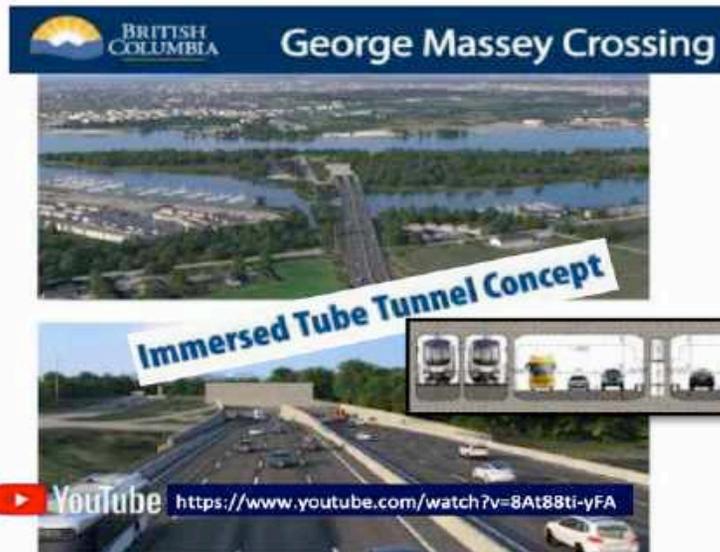
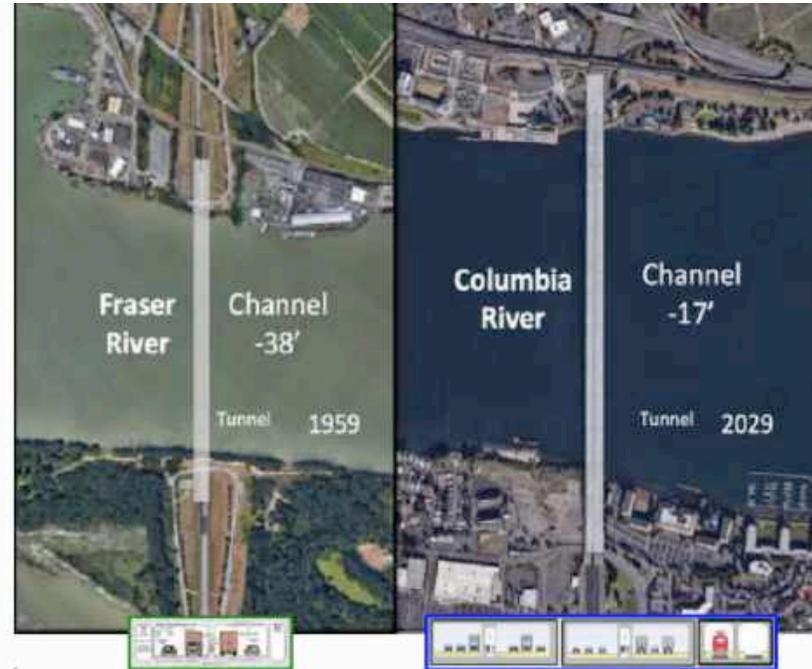
An ITT can be half as long as a bridge. An ITT needs to go downing only 50 feet, a bridge needs to go up over 125 feet. This will allow flatter and shorter ITT grades that are better for light rail, truck traffic, bicycles, and pedestrians.

An ITT will create more "Safe Local Jobs" than a steel truss bridge. The Northwest is famous for casting large concrete pontoons for Lake Washington and Hood Canal.

Bob Ortblad MSCE, MBA

Washington Business Alliance







Safe Local Jobs

on land construction is twice as safe as over water construction

Fraser River - 38 foot channel

George Massey Tunnel - 1958

Community Advisory Group – April 28, 2021

Bob Ortblad Public Comment
4/28/21

Greg Johnson comments on an Immersed Tube Tunnel (ITT):

“But right now what we’re hearing from our tribal partners, one of the large concerns is the archaeological resources that exist on the banks of the Columbia River. As you may know that there were human bones found just in a small section when the CRC was done and now you’re talking about moving millions of cubic yards of earth that could possibly decimate some of these sensitive archaeological areas.

What we’re seeing so far does not bode well for that as a potential outcome. And the second issue is how do you get up to grade to connect SR14, how do you get up to grade to now on Hayden Island to reconnect the surface. Those are some of the technical issues that exist for that type of construction.”

Both of the above statements are factually incorrect, and “does not bode well” is an opinion.

A major advantage of an ITT is its small footprint on the waterfronts of Vancouver and Hayden Island. Excavation on each bank would about one hundred thousand cubic yards, not millions. The following maps from the CRC’s Final EIS locate archaeological areas. On these maps, access to an ITT is overlaid and shows no impacts on sensitive sites.



TABLE 3.1
Summary of Archaeological Investigations by Area on the Washington Shore

Area	Occupation	Site Number	Archaeological Investigations	Significant Archaeology and Effects	Site Warning Preservation in Place	Comments
W11	Pre-Columbian	W11-1	Heritage Archaeology	Yes	Yes	One 100% construction, under review for 2021
W12	Pre-Columbian	W12-1	Heritage Archaeology	Yes	Yes	See notes - 100% City of Vancouver project
W13	Pre-Columbian	W13-1	Heritage Archaeology	Yes	Yes	
W14	Pre-Columbian	W14-1	Heritage Archaeology	Yes	Yes	
W15	Pre-Columbian	W15-1	Heritage Archaeology	Yes	Yes	
W16	Pre-Columbian	W16-1	Heritage Archaeology	Yes	Yes	
W17	Pre-Columbian	W17-1	Heritage Archaeology	Yes	Yes	
W18	Pre-Columbian	W18-1	Heritage Archaeology	Yes	Yes	
W19	Pre-Columbian	W19-1	Heritage Archaeology	Yes	Yes	
W20	Pre-Columbian	W20-1	Heritage Archaeology	Yes	Yes	
W21	Pre-Columbian	W21-1	Heritage Archaeology	Yes	Yes	
W22	Pre-Columbian	W22-1	Heritage Archaeology	Yes	Yes	
W23	Pre-Columbian	W23-1	Heritage Archaeology	Yes	Yes	
W24	Pre-Columbian	W24-1	Heritage Archaeology	Yes	Yes	
W25	Pre-Columbian	W25-1	Heritage Archaeology	Yes	Yes	
W26	Pre-Columbian	W26-1	Heritage Archaeology	Yes	Yes	
W27	Pre-Columbian	W27-1	Heritage Archaeology	Yes	Yes	
W28	Pre-Columbian	W28-1	Heritage Archaeology	Yes	Yes	
W29	Pre-Columbian	W29-1	Heritage Archaeology	Yes	Yes	
W30	Pre-Columbian	W30-1	Heritage Archaeology	Yes	Yes	
W31	Pre-Columbian	W31-1	Heritage Archaeology	Yes	Yes	
W32	Pre-Columbian	W32-1	Heritage Archaeology	Yes	Yes	
W33	Pre-Columbian	W33-1	Heritage Archaeology	Yes	Yes	
W34	Pre-Columbian	W34-1	Heritage Archaeology	Yes	Yes	
W35	Pre-Columbian	W35-1	Heritage Archaeology	Yes	Yes	
W36	Pre-Columbian	W36-1	Heritage Archaeology	Yes	Yes	
W37	Pre-Columbian	W37-1	Heritage Archaeology	Yes	Yes	
W38	Pre-Columbian	W38-1	Heritage Archaeology	Yes	Yes	
W39	Pre-Columbian	W39-1	Heritage Archaeology	Yes	Yes	
W40	Pre-Columbian	W40-1	Heritage Archaeology	Yes	Yes	
W41	Pre-Columbian	W41-1	Heritage Archaeology	Yes	Yes	
W42	Pre-Columbian	W42-1	Heritage Archaeology	Yes	Yes	
W43	Pre-Columbian	W43-1	Heritage Archaeology	Yes	Yes	
W44	Pre-Columbian	W44-1	Heritage Archaeology	Yes	Yes	
W45	Pre-Columbian	W45-1	Heritage Archaeology	Yes	Yes	
W46	Pre-Columbian	W46-1	Heritage Archaeology	Yes	Yes	
W47	Pre-Columbian	W47-1	Heritage Archaeology	Yes	Yes	
W48	Pre-Columbian	W48-1	Heritage Archaeology	Yes	Yes	
W49	Pre-Columbian	W49-1	Heritage Archaeology	Yes	Yes	
W50	Pre-Columbian	W50-1	Heritage Archaeology	Yes	Yes	
W51	Pre-Columbian	W51-1	Heritage Archaeology	Yes	Yes	
W52	Pre-Columbian	W52-1	Heritage Archaeology	Yes	Yes	
W53	Pre-Columbian	W53-1	Heritage Archaeology	Yes	Yes	
W54	Pre-Columbian	W54-1	Heritage Archaeology	Yes	Yes	
W55	Pre-Columbian	W55-1	Heritage Archaeology	Yes	Yes	
W56	Pre-Columbian	W56-1	Heritage Archaeology	Yes	Yes	
W57	Pre-Columbian	W57-1	Heritage Archaeology	Yes	Yes	
W58	Pre-Columbian	W58-1	Heritage Archaeology	Yes	Yes	
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W60	Pre-Columbian	W60-1	Heritage Archaeology	Yes	Yes	
W61	Pre-Columbian	W61-1	Heritage Archaeology	Yes	Yes	
W62	Pre-Columbian	W62-1	Heritage Archaeology	Yes	Yes	
W63	Pre-Columbian	W63-1	Heritage Archaeology	Yes	Yes	
W64	Pre-Columbian	W64-1	Heritage Archaeology	Yes	Yes	
W65	Pre-Columbian	W65-1	Heritage Archaeology	Yes	Yes	
W66	Pre-Columbian	W66-1	Heritage Archaeology	Yes	Yes	
W67	Pre-Columbian	W67-1	Heritage Archaeology	Yes	Yes	
W68	Pre-Columbian	W68-1	Heritage Archaeology	Yes	Yes	
W69	Pre-Columbian	W69-1	Heritage Archaeology	Yes	Yes	
W70	Pre-Columbian	W70-1	Heritage Archaeology	Yes	Yes	
W71	Pre-Columbian	W71-1	Heritage Archaeology	Yes	Yes	
W72	Pre-Columbian	W72-1	Heritage Archaeology	Yes	Yes	
W73	Pre-Columbian	W73-1	Heritage Archaeology	Yes	Yes	
W74	Pre-Columbian	W74-1	Heritage Archaeology	Yes	Yes	
W75	Pre-Columbian	W75-1	Heritage Archaeology	Yes	Yes	
W76	Pre-Columbian	W76-1	Heritage Archaeology	Yes	Yes	
W77	Pre-Columbian	W77-1	Heritage Archaeology	Yes	Yes	
W78	Pre-Columbian	W78-1	Heritage Archaeology	Yes	Yes	
W79	Pre-Columbian	W79-1	Heritage Archaeology	Yes	Yes	
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W82	Pre-Columbian	W82-1	Heritage Archaeology	Yes	Yes	
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W85	Pre-Columbian	W85-1	Heritage Archaeology	Yes	Yes	
W86	Pre-Columbian	W86-1	Heritage Archaeology	Yes	Yes	
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W89	Pre-Columbian	W89-1	Heritage Archaeology	Yes	Yes	
W90	Pre-Columbian	W90-1	Heritage Archaeology	Yes	Yes	
W91	Pre-Columbian	W91-1	Heritage Archaeology	Yes	Yes	
W92	Pre-Columbian	W92-1	Heritage Archaeology	Yes	Yes	
W93	Pre-Columbian	W93-1	Heritage Archaeology	Yes	Yes	
W94	Pre-Columbian	W94-1	Heritage Archaeology	Yes	Yes	
W95	Pre-Columbian	W95-1	Heritage Archaeology	Yes	Yes	
W96	Pre-Columbian	W96-1	Heritage Archaeology	Yes	Yes	
W97	Pre-Columbian	W97-1	Heritage Archaeology	Yes	Yes	
W98	Pre-Columbian	W98-1	Heritage Archaeology	Yes	Yes	
W99	Pre-Columbian	W99-1	Heritage Archaeology	Yes	Yes	
W100	Pre-Columbian	W100-1	Heritage Archaeology	Yes	Yes	



A second major advantage of a shallow ITT is the entrance/exit ramps connect to existing interchanges of SR14 and Hayden Island. Any high bridge coming down from over a 100-foot height will require an impossible +10% grade to connect to the existing SR14 and Hayden Island interchanges.



An ITT can restore the Columbia River to a more pristine state. An ITT will be both invisible and silent for fish, fowl, and humans. For a hundred years a new high bridge will send the roar of 200,000 vehicles up and down the river for miles.



A list of YouTube video links for immersed tube tunnels, with a YouTube logo at the top right. The links are:

- Trollberg - How to build an immersed tunnel <https://www.youtube.com/watch?v=28vev09K3A>
- Trip through Tagstad Tunnel, Gothenburg <https://www.youtube.com/watch?v=6830mex088>
- Trip through Marneholm Tunnel before its Dec. 18 opening, Gothenburg <https://www.youtube.com/watch?v=ETDz772Wm5E&feature=youtu.be>
- Construction of the Marneholm Tunnel, Gothenburg <https://www.youtube.com/watch?v=7Kc54P5u6Wk&feature=youtu.be>
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- Elizabeth River Tunnel, Norfolk, VA <https://www.youtube.com/watch?v=6d3C8t0pWkU>
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Immersed Tube Tunnel better than a New High Bridge

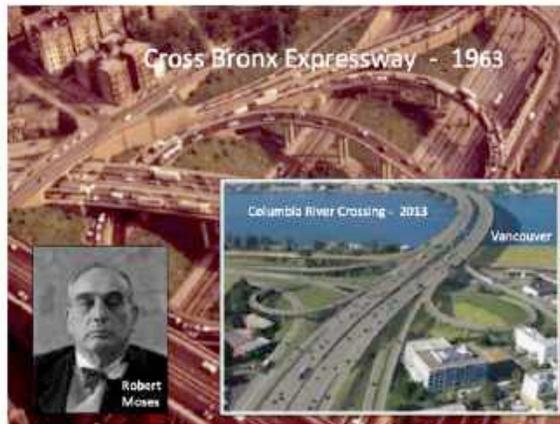
Bob Ortblad 5/16/2021

Interstate Bridge Replacement

The 2013 "Columbia River Crossing" bridge design should be scrapped. It's a Robert Moses design from the 1950s. The following graphics show a disturbing similarity to the Cross Bronx Expressway. This expressway ripped through the heart of the Bronx and lead to extreme urban decay. The expressway split the Bronx into North and South, creating a better side and a worse. Over 40% of the South Bronx was burned or abandoned in the 1970s. I-5 already divides Vancouver, the "Columbia River Crossing" bridge design would make the East and West divide much worst.

A Columbia River "Immersed Tube Tunnel" (ITT) similar to the Gothenburg Sweden's 1968 Tingstad Tunnel and recently completed 2020 Marieholm Tunnel would reduce the environmental impacts of I-5 on Vancouver.

Respectfully
Bob Ortblad MSCE, MBA



Bob Ortblad 6/04/2021

CAG Public Comment - Bob Ortblad MSCE, MBA

All three of the IBR Program administrators are bridge engineers and seem to focus through a Columbia River Crossing bridge lens. Please refocus with tunnel vision and study information I have previously sent the CAG on immersed tube tunnels.

The IBR Program Administrator, Greg Johnson, was most recently a Senior Vice President with WSP engineers and worked on Gordie Howe International Bridge. WSP is currently the consulting engineer on the IBR Program. The two Assistant IBR Program Administrators are both bridge engineers. One has 20 years with WSDOT with 8 years on the design of the Columbia River Crossing Bridge. The other assistant has 30 years with ODOT, and was Project Manager on the Columbia River Crossing project.

[Greg Johnson comments at the June 3 CAG meeting:](#)

"We can't design a tunnel in a bottle." ?

"These are ideals that are fun and fantastic..." ?

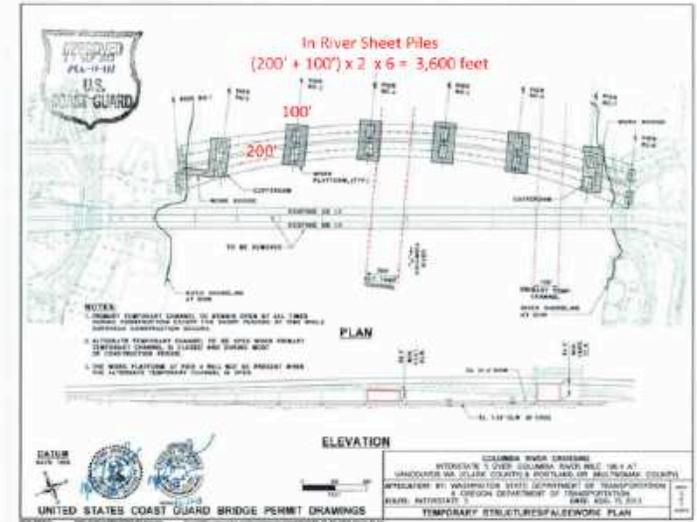
"How would digging a trench 50-foot deep in the Columbia River to place an immersed tube tunnel, what would that due to the environment?"

Answer:

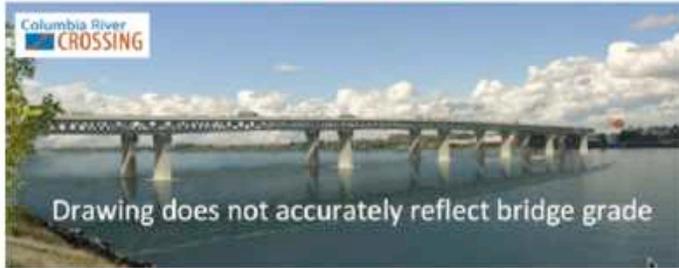
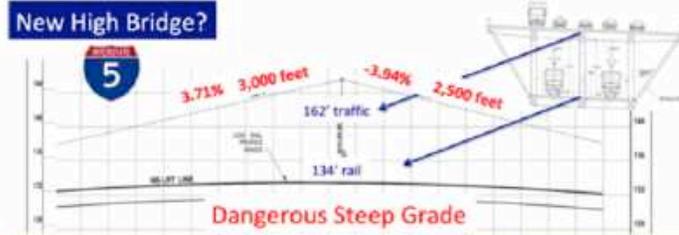
An Immersed tube tunnel needs one-time dredging of less than 1 million cubic yards. An immersed tube tunnel can be fabricated off of the river. Its trench can be dug and the tube sections placed in a few months when no fish are migrating.

A new bridge would require thousands of sheet piles to build half a dozen massive cofferdams and years of dangerous on river construction.

To keep the ports of Portland and Vancouver accessible to oceangoing ships, every year the Corps of Engineers dredges 6 million to 8 million cubic yards of sand from the 107-mile shipping channel between Astoria and Vancouver. About 1 billion cubic yards have been excavated since the Corps began maintaining the shipping channel more than 90 years ago. The Corps plans to dredge 160 million yards of sand over the next 20 years. Corps plans to use the sand to raise levees and habitat construction for salmon and streaked horned larks.



A new I-5 Columbia River High Bridge will be one of the steepest in the US. Its severe grade and local weather will also make it one of the most dangerous.



<https://katu.com/news/local/numbers-show-glenn-jackson-bridge-a-hot-spot-for-accidents>

The 205 Bridge is the 8th most dangerous bridge in the country. Wind, fog, rain, and black ice combined with bridge grade and curves generated 124 accidents in 2019.

<https://katu.com/news/local/numbers-show-glenn-jackson-bridge-a-hot-spot-for-accidents>

A new I-5 High Bridge will have the same weather, similar curves, and a steeper grade making it **potentially more dangerous** than the 205 bridge.

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In February 2021 an ice storm shut down I-84. An SUV hit black ice and skidded off the 205 Bridge into the Columba River.



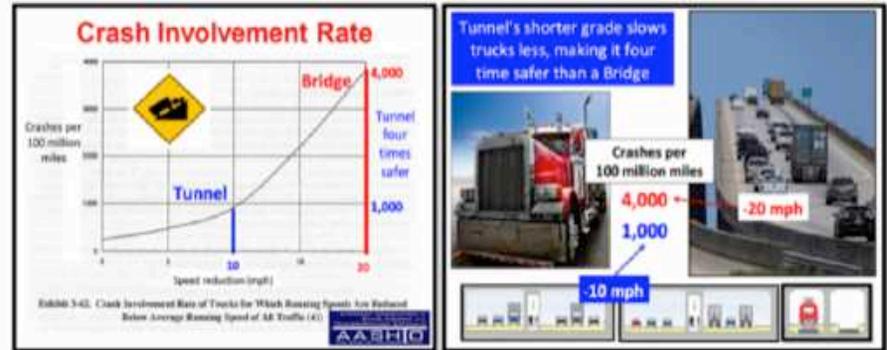
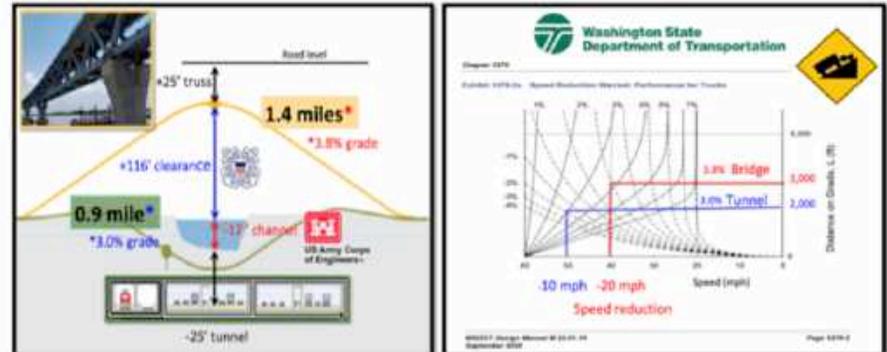
An Immersed Tube Tunnel (ITT) will be protected from the weather, have no curves, and have half as long a grade.



An Immersed Tube Tunnel (ITT) will have **half the effective grade** of a High Bridge.

A WSDOT graph shows trucks will slow by 20 mph on a High Bridge but only 10 mph in an ITT.

An American Assoc. of State Highways (AASHTO) graph shows an ITT slowing of only 10 mph would be **four times safer** than a bridge.



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During construction a bridge will require massive cofferdams that will narrow the navigation channel to only two hundred feet. Six piers will support a High Bridge and be **permanent navigation hazards**.



Bridge construction is almost twice as dangerous for workers. The workers compensation insurance rate reflects the **risk of injury or death** during construction.



An ITT is safer during construction. It is also many times safer than a bridge for vehicle and river traffic. **How many injuries and lives could be saved in the next hundred years?**



Trelleborg - How to build an immersed tunnel
<https://www.youtube.com/watch?v=2Xkyyc9PIQA>

Trip through Tingstad Tunnel, Gothenburg
<https://www.youtube.com/watch?v=KoEBbmeacd88>

Trip through Marieholm Tunnel before its Dec. 16 opening, Gothenburg
<https://www.youtube.com/watch?v=BT9s2Pf9Wms&feature=youtu.be>

Construction of the Marieholm Tunnel, Gothenburg
<https://www.youtube.com/watch?v=2kcAIBFCz8w&feature=youtu.be>

Launch of the Marieholm Tunnel elements, Gothenburg
<https://www.youtube.com/watch?v=JC4mRIgwXU0>

Elizabeth River Tunnel, Norfolk, VA.
<https://www.youtube.com/watch?v=NsnBdPFMuQY>

George Massey Crossing Tunnel Concept, Vancouver, Canada
<https://www.youtube.com/watch?v=8At88ti-yFA>

Immersion Tunnel Coatzacoalcos by Volker Construction International, Mexico
<https://www.youtube.com/watch?v=VFWkoZMja0k>

DERSA - Santos Guarujá Immersed Tunnel Project, Brazil
<https://www.youtube.com/watch?v=du8KZob7Pkw>

Busan-Geoje Fixed Link in South Korea
<https://www.youtube.com/watch?v=-aykpUulHJo>



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Immersed Tube Tunnel
better than a
New High Bridge