

PUBLIC COMMENTS FOR IBR PROGRAM COMMUNITY ADVISORY GROUP– JUNE 3, 2021 MEETING

Received between April 26 – June 1, 2021

David Rowe

4/28/21

I hope the IBR considers an alternative to the CRC which I am submitting in this Email. The 2012 CRC design was a tall bridge that would prevent Thompson Metal Fab manufacturing tall structures that had to be shipped downstream on the Columbia River. The CRC initially said draw bridges were not allowed on the I-5 Highway system.

Dave Rowe

Attachment Included*

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

Bob Ortblad

4/29/21

Attachment included

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

Robert Liberty

5/13/21

David Bragdon was President of the Metro Council, while I served on the Council, during the time I vigorously opposed the CRC (the only one on the Council to be outspoken in my opposition.)

Although David supported my motions directing ODOT to provide information and justifications for its project (over the opposition of the Councilor liaison) when it came time for the crucial votes on amendments to the project approval, David voted with the majority (5-2) to support the project.

This commentary in City Observatory shows just how much he has changed his mind.

HARD EARNED LESSONS: DON'T REPEAT THE MISTAKES OF THE FAILED CRC

By David Bragdon Former Portland Metro Council President

<https://cityobservatory.org/hard-earned-lessons-dont-repeat-the-mistakes-of-the-failed-crc/>

10.5.2021

The Oregon and Washington highway departments are at it again, reviving the same half-truths and propaganda that doomed their first Columbia River Crossing fiasco a decade ago

Instead of fixing the real problems in the corridor, they'll make the problems worse

A warning from one of Portland's past leaders about the deceptive high pressure sales tactics used to sell a bloated freeway boondoggle

Editor's Note: David Bragdon was the President of the Metro Council, Portland's regional government, from 2003 to 2010. He led the agency at the time the Columbia River Crossing was developed and was part of the local Project Sponsors Council. Since 2013, Bragdon has been Executive Director of TransitCenter, a New York based foundation that works with leading transportation advocates and agencies in major cities across the nation.

Legend has it that the Columbia River Crossing project died in 2013 only because a handful of right-wing politicians in Washington State killed it. This inaccurate re-writing of history was spun retrospectively by the project's formidable public relations machine to obscure the real reason their project failed: the incompetence and mendacity of the project leadership at the Oregon and Washington State Highway Departments, ODOT and WSDOT, who made a series of errors that doomed the project long before those Washington State legislators administered the last rites.

The first gentle pull on the plug occurred in 2010, when a "blue ribbon panel" of highway and bridge experts in engineering, finance, planning and design – handpicked by ODOT and WSDOT, with the assumption they'd be told what they wanted to hear with a great big rubber stamp of support – issued a damning report: the peers from agencies and firms from around the country found that ODOT/WSDOT had selected an untested bridge type, had conjured a finance and tolling plan that did not add up, had ignored or misled other agencies like the Coast Guard, and had made countless errors, large and small.

Among those fatal mistakes, the two state agencies had poisoned their relationships with local agencies and the community with a pattern of half-truths, untruths, and broken promises. It was this pattern of deceit that weakened the CRC proposal to the point that the right-wingers in Olympia could ultimately provide the death blow.

I know. I was an up-close witness to ODOT/WSDOT management's bad faith for several years. Leadership at ODOT frequently told me things that were not true, bluffed about things they did not know, made all sorts of misleading claims, and routinely broke promises. They continually substituted PR and lobbying gambits in place of sound engineering, planning and financial acumen, treating absolutely everything as merely a challenge of spin rather than matters of dollars or physical reality.

That history is important, because if you're not honest about the patterns of the past, you are doomed to repeat them. Unfortunately, I understand that's exactly what's going on with the rebranded CRC: the same agencies, and even some of the same personalities who failed so spectacularly less than a decade ago – wasting nearly \$200 million and building absolutely nothing – have inexplicably been rewarded for their failure by being given license to try the very same task, using the very same techniques of bamboozlement. It's the definition of insanity.

I ask the community members and elected leaders of the Portland-Vancouver area in 2021 to take it from me, who learned it the hard way 2007-10: do not fall for ODOT management's chronic misrepresentations, or its outdated technical methods rooted in the 1950s. You are being misled in the short-term, and your constituents' descendants will be stuck with a terrible project and debt for decades. The I-5 / I-205 corridor between Oregon and Washington State has serious challenges – too much congestion at peak hours and peak directions, old and out-moded infrastructure, poor air quality in adjacent communities – but the two State Highway Departments' approach won't fix any of those problems and will make some, like traffic and emissions, worse than today.

I can take you through ODOT's old playbook, and you can tell me whether they are running it again now:

The bum's rush

I understand ODOT management has revived one of its favorite old falsehoods by claiming they are facing an "imminent federal deadline," and that if local leaders don't knuckle under to ODOT's plan—and soon—the region will lose millions or tens of millions of dollars forever.

Creating fictional "federal deadlines" and other federal processes as an excuse for false urgency is a familiar ODOT tactic. From 2007 through 2013, ODOT staff frequently but vaguely claimed that quick action was needed on certain approval steps, and there "there is no more time to consider x or y" because of "impending federal deadlines." When asked to cite specifically what deadlines they meant, ODOT officials would refuse to answer or parry with generalities. When Congressional staff would inquire with the Federal Highway Administration (FHWA) or other federal agencies about what

deadlines ODOT could possibly be referring to, nobody could say. ODOT public relations staff had made it up.

In short, ODOT leadership's claims that "federal deadlines" are urgently impending are usually fabrications, created by ODOT PR staff (who dominate the agency) to force other parties like local governments to go along with whatever ODOT staff is proposing without scrutiny. (Ironically, ODOT itself rarely meets any real deadlines, and has a terrible track record of doing anything on time. Yet ODOT management insists that everybody else adhere to deadlines that don't exist.)

One specific example: in the summer of 2010, ODOT public relations specialist Travis Brouwer solemnly intoned that Congress was on the verge of passing a reauthorization bill, and that it was essential that certain approval steps be taken for the CRC for it to be included in this (supposedly) impending bill. Actually, as all Congressional staff knew, and as Brouwer and State Highway Department Director Matt Garrett also must have known, it was an election year and there was little likelihood of a bill passing in that time frame. (Brouwer and Garrett, like much of ODOT management, are better versed in politicking than engineering, being former Congressional staff experienced in lobbying and propaganda. Like much of CRC's senior team, they had little or no understanding of modern engineering, planning or finance, beyond a 1956-era grasp.)

Some of the other ODOT falsehoods which were debunked during CRC v.1, and which you can be on the lookout for again were:

We can't consider less costly alternatives. When asked about projected costs, ODOT staff claimed that federal law or regulation prevented them from considering cost and budget when developing their plan. There could be no value engineering, they said, vaguely handwaving at "federal regulations." ODOT staff made this statement partly as an evasion so they couldn't provide a realistic tolling and revenue plan, claiming they were "not allowed" to take realistic revenue availability or costs into account (the way transit projects must, by the way). When US Representative Peter DeFazio, who knows a thing or two about federal transportation law, scoffed at the claim, senior ODOT staff were privately dismissive of him. But ODOT's claim sounded absurd, and indeed it was: through independent channels we learned that Obama Administration FHWA Director Victor Mendez publicly stated the opposite of ODOT's statement, and declared that in practice FHWA was *encouraging* state governments to become more cost-conscious at *all* stages of project development, not barring them from doing so. In short, ODOT claimed the federal government prevented them from realistic budgeting, while in fact the top highway official in the nation countered that he strongly encouraged it. (This is one of those lies that cleverly twists a kernel of truth: agencies are barred from excluding options from consideration based solely on cost, but that doesn't mean they can't use cost as a criterion in choosing their ultimate action).

We can't change anything in our plan without violating federal rules. ODOT also claimed that design parameters such as ramps, grades, turning radii etc. could not be changed because doing so would require FHWA to approve waivers, which ODOT said FHWA was highly unlikely to do. They were adamant that an enormous interchange had to be inflicted on Hayden Island, eroding property values and discouraging redevelopment, because federal regulations required it. This excuse was debunked by ODOT/WSDOT's own hand-picked "blue ribbon" panel, when Chair Tom Warne (a veteran Utah state highway official) observed that FHWA can be expected to routinely approve hundreds of waivers like that on a project of this size. The problem was that ODOT staff, who have not successfully built anything more complicated than a simple overpass for the past thirty years, did not have the training or sophistication to deal with complex engineering challenges, and just didn't have the skills to be bothered. In the absence of technical knowledge, ODOT leadership defaults to the one skill they do possess, word-spinning. (To be fair, WSDOT has superior technical skills to ODOT, though most of its talent is deployed in the Puget Sound region, not Southwest Washington.)

This is special money that can only be used for this project. Another ODOT staff whopper was the repeated claim that federal money for the CRC was somehow special, could not be used for other projects, and therefore lavish spending on CRC would not deprive other priorities of funding. This claim was exposed as untrue when the project was cancelled, and the money was quickly reprogrammed to other highway projects. (Keep in mind, this claim that billions must – must! – be spent on overbuilding I-5 comes from an agency that can't seem to find a few nickels to fund passenger trains between Portland or Eugene, or paint crosswalks or install signals to prevent pedestrians from being killed on 82nd Avenue.)

OK, we'll go along with what you want (Not really: fingers crossed). When under more intense pressure, ODOT management will grudgingly make vague promises to "consider" things, which over and over it proved it had no intent to do. (Or, as in the case of I-5 Rose Quarter, create an advisory committee that it completely controls – or else.) ODOT leadership routinely used its control of the technical process to renege on its commitments. For example, to win support from the Metro Council, Mr Garrett pledged to commission an independent review of the project staff's highly questionable estimates about greenhouse gas emissions. (This same Mr Garrett had a bad habit of recycling untruths: he was later caught providing falsified GHG estimates to a legislative panel, with the fantastical notion that more traffic leads to less GHG.) Within weeks of the Metro Council accepting his pledge and voting to endorse the project, ODOT leadership reneged on the promise of an independent review, with Garrett privately telling a Metro official, "we just need to greenwash" this project. (Current ODOT management used a similar technique recently, by bringing in an expert panel ostensibly to audit traffic forecasts for their monstrous I-5 Rose Quarter proposal, but then forbidding the panel from considering induced demand, the primary factor at issue. It's like saying,

“OK, OK, OK, we’ll bring in independent experts to evaluate our claim that pigs can fly” but then directing the experts to ignore the existence of gravity.)

In another fingers-crossed promise, under pressure from the community due to the very real probability of induced demand and an understandable community desire that Hayden Island not be further obliterated beyond the existing highway blight, ODOT leadership pretended to reduce the size of the Columbia River Crossing from a proposed 12 lanes to 10 lanes. It cleverly changed all the project’s promotional materials to describe the road as a 10 lane facility. But it actually [made no changes to the physical width of the roadway](#) and structures it planned to build. What it cheekily did do was to delete from the project’s Final Environmental Impact Statement every single reference to the actual width of the massive bridges it was proposing to build. A public records request forced WSDOT to divulge plans showing that the supposed ten-lane bridge they had agreed to build was 180 feet wide—exactly the same width as it had been when ODOT described it as carrying 12 lanes.

ODOT and WSDOT’s manipulative tactics became more and more apparent as local officials compared notes with each other in the first decade of the century. State officials probably banked on local leaders from the two sides of the river never talking to each other, but the more we did talk, the more we realized how we were being played off against each other by the self-styled amateur Svengalis in Olympia and Salem. ODOT would whisper to Oregonians, “don’t worry, the tolls are going to pay for it all, and light rail is a must,” while at the very same moment WSDOT would whisper to Washingtonians, “aw, don’t worry, the tolls are going to be low, and we’re going to get rid of this light rail component, just go along for now.” (WSDOT was far more savvy than their ODOT cousins too, by larding up the project with interchanges far to the north that functionally had very little utility for true interstate traffic but were designed for intra-Clark County short trips. WSDOT winked at their constituents and confided, “We got those rubes down in Salem to fall for Oregon paying for 50 percent of our sprawling suburban interchanges!”)

The revived CRC, aka “Interstate Bridge Replacement,” is more of the same

In the past year, WSDOT and ODOT have been attempting to [breathe new life into the corpse of the expired Columbia River Crossing project](#). They’ve started by rebranding it as the “Interstate Bridge Replacement.” The revived “IBR” project may have changed its name, but hasn’t changed its bad faith efforts to peddle this multi-billion dollar project as if it were the only possible solution to the very real challenges in this corridor. When faced with a challenge, ODOT simply rebrands, without really changing anything. It’s the same old soup in a new bowl, brewed by cynical chefs who, cigarettes dangling from their lips, also cook the books on traffic forecasts, [budgets](#) and GHG modeling.

The new name itself is a [distortion](#). It implies that they're merely "replacing" the existing bridge, when in fact that's no more than 20 percent of this giant boondoggle, which is in reality a 5 mile long, \$5 billion 12 lane freeway that just happens to cross a river. The reality looks like this:



Animated GIF courtesy of Bike Portland.

[Robert Liberty comment: It is about the same width at the Evergreen Boulevard overpass in Vancouver.]

This illustration shows not the new bridge, but the planned widening of I-5 south of the bridge on Hayden Island. This is no "replacement." It is as Congressman Peter DeFazio – whose cautions ODOT routinely ignored during the first chapter of this saga, despite the power and knowledge he has – aptly described it “[a gold-plated project](#),” with most of the project’s cost being driven by highway department plans to widen long stretches of freeway on either side of the bridge itself.

As City Observatory noted, the revived CRC project kicked off with an enormous lie and yet another fictitious deadline. Project Manager Gregg Johnson told Oregon and Washington Legislators that [they'd have to repay the Federal Highway Administration \\$140 million](#) if they didn't move ahead with the project by 2024. That, of course, isn't true, if Oregon and Washington choose a "no-build" alternative, FHWA regulations say there's [zero repayment liability](#).

The Columbia River Crossing failed because state highway officials were simply dishonest every step of the way in their efforts to sell this project. Their coverup was essential to them, because as agencies whose main activity is rural, single-purpose highways, they lacked the skills to plan and build a complex, urban, multimodal project in a community that rightfully demands authentic engagement. In the face of that need, they obscured real likely costs, either bungled or intentionally exaggerated tolling forecasts, refused to release accurate renderings, and invariably substituted branding, bullying and propaganda for problem-solving.

I'm saddened to see that almost a decade later the Governors of Oregon and Washington have unleashed the same agencies again to use the same techniques and simply continue this stupefying track record of incompetence and dishonesty. Those of us who were leading the region 10-15 years ago learned a difficult and expensive lesson about the perils of trusting ODOT and WSDOT management and their methods. We can only hope that today's leaders profit from our experience and not repeat our mistake of trusting the phony sales pitches used to push this project, which is the wrong solution to a set of very real problems.

While the two state highway departments are fixated on their 1950s style non-solution, the I-5 corridor is beset by major challenges: high demand in certain directions at certain hours, freight being delayed by an abundance of single-occupancy cars, one structure that is now over a hundred years old, inadequate transit and biking and walking options, and a legacy of harm inflicted on North Portland, Hayden Island and downtown Vancouver. Those are very real challenges which can be addressed only with truth, creativity, first-class planning and engineering and design, credibility with the public, and post-1950s concepts like demand management. The two State Highway Departments have already proven they have none of those attributes. Their proposal will not solve the real problems and will actually exacerbate them, and their methods and lack of credibility will lead to more wasted years and wasted money. Rather than being trusted and empowered, ODOT and WSDOT should be removed from their role as project managers – which they've amply proved they're not qualified for – and replaced with an interagency team rooted in the region that can get this important job done.

ODOT and WSDOT take one truth, and then extrapolate many untruths from it. ‘We need to do something to fix the problems in this corridor,’ is true, but ‘Therefore we need to do the most expensive, stupid something’ is not true.

Robert Liberty

5/28/21

Can Removing Highways Fix America’s Cities?

By [Nadja Popovich](#), [Josh Williams](#) and [Denise Lu](#) May 27, 2021

https://www.nytimes.com/interactive/2021/05/27/climate/us-cities-highway-removal.html?action=click&block=more_in_recirc&impression_id=686de8d0-bfc8-11eb-9cba-650fc7686a59&index=1&pgtype=Article®ion=footer

Excerpt:

In a wide-reaching infrastructure plan [released at the end of March](#), President Biden proposed spending \$20 billion to help reconnect neighborhoods divided by highways. Congressional Democrats have translated the proposal [into legislation](#) that would provide funding over the next five years. And the Department of Transportation opened up separate grants that could help some cities get started.

Pete Buttigieg, who heads the department, has [expressed support](#) for removing barriers that divided Black and minority communities, saying that “[there is racism physically built into some of our highways](#).” Midcentury highway projects often targeted Black neighborhoods, destroying cultural and economic centers and bringing decades of environmental harm.

Bob Ortblad

5/28/21

Community Advisory Group

Please accept the attached CAG Public Comment.

Bob Ortblad

Vancouver IBR

Attachment included

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

As SLIDE	Narrative	Notes
1	<p>We have a traffic bottleneck on the Interstate 5 highway corridor, as it crosses the Columbia River between Oregon and Washington, and it must be addressed.</p> <p>Common Sense Alternative, Version II, is a cost-effective environmentally friendly solution for this bottleneck.</p> <p>This presentation is brought to you by AORTA, the Association of Oregon Rail and Transit Advocates. The proposal was primarily developed by Jim Howell, AORTA Director and Strategic Planner. Note that all of the maps in this presentation include an arrow indicating which direction is north.</p> <p>The “locally preferred alternative” for the Columbia River Crossing proposed in 2012 was not only destructive to the local environment, but also failed to address serious problems with the existing infrastructure.</p> <p>AORTA’s Common Sense Alternative, or CSA, does address these problems, offering far more effective and environmentally friendly solutions.</p> <p>First, the CSA repurposes the existing I-5 bridge for local traffic between Hayden Island and Vancouver Washington, using the upstream span for autos and trucks and the downstream span for transit and bicycles. Both spans could also accommodate pedestrians. Retaining this existing bridge would avoid a costly demolition, as proposed in the 2012 “locally preferred alternative”.</p>	Music intro
2	<p>This slide shows an overhead view of the proposed bridge configuration, including both the repurposed existing bridge and two new bridges.</p> <p>Yes, the CSA does call for a new I-5 freeway bridge, <i>in addition to</i> the existing bridge. This new bridge would be just upstream from the current bridge, and it would have 8 lanes for auto and truck traffic, a 72-foot river clearance and a bascule lift span.</p> <p>The CSA II also includes a new, relatively short bridge over the South Channel, to accommodate MAX light rail and local traffic between Hayden Island and Expo Road in North Portland. MAX trains would cross this new bridge and connect with C-Tran buses from Vancouver at a new Hayden Island Transit Center.</p> <p>Finally, the CSA envisions changes to the BNSF railway bridge, farther downstream (near the center top of this photo). The 100-plus year-old swing span on this bridge would be replaced with a lift span that would be aligned with the high point of the current and new I-5 highway bridges. This alignment would eliminate 95% of the lift events on the current bridge, as explained later in this presentation.</p>	
3	<p>This slide shows a ground-level view of the bridges shown in the previous slide. Note that the new freeway bridge would diverge northbound from the current south channel bridge at it crosses Hayden Island. This new bridge is designed to carry primarily long-distance interstate traffic between Oregon and Washington, including most of the freight traffic.</p>	
4	<p>This is an aerial view of the proposed CSA solution for the full river crossing.</p> <p>The wide gold line depicts the new 8-lane bridge that would carry interstate traffic between Portland and Vancouver. The alignment here is</p>	

	<p>actually straighter than the existing I-5 alignment.</p> <p>The white line depicts the route for local traffic, including pedestrians and bicyclists, that would be traveling between Portland and Hayden Island, over the new South Channel Bridge, and between Hayden Island and Vancouver, over the existing bridge. Note that the new South Channel Bridge provides two lanes for emergency vehicles to travel between Portland and Hayden Island.</p> <p>The short yellow line on the left, between Portland and Hayden Island, denotes the extension of the MAX light-rail line. This also runs over the new South Channel Bridge. The blue line connects to this line at the new Hayden Island Transit Center. It carries C-Tran buses to and from Vancouver, over the existing I-5 bridge.</p>	
5	<p>This a more detailed aerial view of the new South Channel Bridge, showing its connections both on the Portland side of the channel and on Hayden Island. The yellow line is the new extension of the MAX line, the short blue line on the far right is the C-Tran bus route, and the curved pale gray lines denote the routes for auto, truck and bicycle traffic that would be traveling to and from Hayden Island.</p>	
6	<p>This diagram shows the new South Channel Bridge in even more detail. The yellow line shows the MAX route, the gray line shows the auto and truck route and the green line shows a bike path, including access to the Marine Drive bicycle path.</p>	
7	<p>This illustrates the CSA interchange in Vancouver. Compared to the “Locally Preferred Alternative”, the CSA has a much lower elevation and a modest footprint.</p> <p>The gold lines here depict the landing for the new CSA eight-lane I-5 bridge, which would carry only interstate traffic. The curving pale gray line on the left indicates the on and off ramps for the upstream span of the existing bridge, which would carry local auto and truck traffic, with provision for bicycles and pedestrians as well.</p> <p>The blue line depicts the on and off ramps for the downstream span of the existing bridge, which would carry transit vehicles—C-Tran buses for now, but with an option to add light rail later. Bicycles and pedestrians could also use this section of the bridge.</p> <p>Note that the CSA utilizes much of the existing infrastructure, with moderate, safe grades. The wider radius of the curve of the on ramp from West Fifth Street and SR-14 provides easy, safe merges with interstate traffic.</p> <p>Local traffic moving between Hayden Island and Vancouver does not intermix with interstate traffic, avoiding many of the lane and speed changes required for merging and exiting, allowing interstate traffic to flow more freely.</p> <p>And C-Tran buses, as represented by the blue line, also reach Hayden Island without steep grades or intermixing with interstate traffic.</p> <p>Also, if the interstate freeway is temporarily out of service for any reason, emergency vehicles and other traffic can still reach Hayden Island from Vancouver, utilizing the existing bridge.</p> <p>And what is it that caused the “Locally Preferred Alternative” to propose massive, high-elevation, unsafe, noisy interchanges on the Vancouver side of the river? The BNSF railway line, adjacent to the north bank of the Columbia, shown here as a dark gray line sloping from left to right.</p> <p>In order to go <i>over</i> the railway, as the “Locally Preferred Alternative”</p>	

	<p>proposed, I-5 would have to clear the rail line by a minimum of 23 and a half feet. But going <i>over</i> the railway is <i>not</i> necessary! The current freeway alignment goes <i>under</i> the railway. Keeping the I-5 alignment under the railway avoids the high costs as well as many of the problems with the proposed new Vancouver interchanges.</p>	
8	<p>The blue line here shows a new Hayden Island shuttle bus route. This shuttle could connect residents, employees and businesses with transit to and from Oregon and Washington, and also help revitalize businesses on the island. The shuttle would connect with Portland's MAX light rail and Vancouver's Vine bus service at the Hayden Island Transit Center.</p> <p>The "Locally Preferred Alternative," by contrast, would seriously degrade island livability.</p>	
9	<p>This side profile contrasts the relative height of the CSA (in red) with the previously adopted "Locally Preferred Alternative" depicted by the blue line.</p> <p>Note that the high point of the CSA is near the river's center channel, whereas the "Locally Preferred Alternative" shifted the high point north, closer to the location of the existing lift span.</p> <p>Let's take a look at the bridge height targets proposed in the 2012 plan.</p> <p>The first draft proposal in 2006 was 116 feet at the highest point of the bridge. But the final "Locally Preferred Alternative" was only 95 feet high, eliminating the ability of upriver businesses to continue navigating the river, and essentially forcing expensive taxpayer payouts for compensation of damages to those businesses.</p> <p>While the CSA has only a 72-foot highest point, it compensates for this lower height with its bascule draw span, which imposes no new restriction on the height of river traffic, greatly reducing these problems as well as the cost of the project. And since the CSA's bascule drawspan is lined up with the existing lift spans, with their 178-foot clearance, that will be height limitation as long as the existing bridge remains in place.</p> <p>Finally, since the CSA has a lower height than the proposed "Locally Preferred Alternative", it does not interfere with aviation from Pearson Field, and does not require distortion of the I-5 pathway. The "Locally Preferred Alternative," in a convoluted attempt to avoid conflict with Pearson Airfield, required <i>increased</i> curvature and increased project expense.</p>	
10	<p>This ODOT slide illustrates a cross section of the "Locally Preferred Alternative" new 10-lane I-5 bridge far above the river, mixing local traffic with interstate traffic. There is no alternative route available here, should there be a serious traffic issue on the interstate.</p> <p>Imagine the noisy, dark environment for pedestrians and bicyclists, after they have struggled up a long corkscrew ramp to attain the height of an 8-to-10-story building in order to reach the bridge deck. Light rail has also had to negotiate steep grades and a forward-view-blocking curve, increasing operational costs and transit time, <i>and</i> decreasing ridership because of those longer transit times.</p> <p><i>All</i> these problems are avoided with the Common Sense Alternative.</p>	
11	<p>This side profile of the new CSA 8-lane bridge shows the location of the new drawspan, which will be aligned with the lift spans on the current bridges. It also shows that the 72-foot high point of the new bridge is close</p>	

	to the center of the river channel, at its deepest point.	
12	<p>This is a cross section of the existing and new I-5 bridges proposed by the CSA.</p> <p>The green span on the left is for buses or light rail.</p> <p>The other green span has one lane in each direction for local traffic.</p> <p>These bridges also provide space for bicycles and pedestrians.</p> <p>The CSA avoids the excessively long, steep inclines, and the unnecessary curvature, envisioned in the 2012 “locally preferred alternative.”</p> <p>Note that the new freeway bridge, shown here on the right, has eight lanes—four in each direction.</p>	
13	<p>Early in the CRC planning process there was some testimony that lift spans were no longer allowed in the interstate system. In fact there are multiple bridges with movable spans on that system.</p> <p>This is a photograph of the Woodrow Wilson double-leaf bascule drawspan completed in 2006 and 2008. This bridge has a high point of 70 feet.</p> <p>This relatively new bridge carries traffic on I-95, the North-South interstate on the East Coast. It also carries Capitol Beltway traffic which circles Washington D.C.</p> <p>The traffic on this bridge, and on the river, far exceeds the demands we encounter on our Columbia River crossing.</p>	
14	<p>Let’s turn our attention now to the BNSF railroad bridge, downriver from I-5, completed in 1908.</p> <p>Early in the original CRC process ODOT carefully and purposefully identified the scope of the process by drawing arbitrary borders to exclude the railway. But ... are a railway line and river traffic corridor components of a transportation system? Absolutely, and these modes of transport have significant relevance to the I-5 freeway river crossing. A department of <i>transportation</i> should most certainly give consideration to all modes of transport.</p> <p>Viewed from downriver with the railway bridge in the foreground, this photo illustrates the difficult right-turn maneuver heavy barge traffic would have to negotiate in order to go under the high point of the existing I-5 bridge. Note that passage through the narrow opening in the swing span of the railway bridge includes negotiating a long concrete barrier on one side, complicating the maneuver even further. It is particularly difficult when water levels are high.</p> <p>The straight brown line shown on the left here provides a safe, relatively easy path between the railroad bridge and the I-5 bridge. BUT it requires a bridge lift on the existing I-5 bridge, and this is the reason tugboat operators must frequently request bridge lifts on I-5, during all hours of the day. Swinging over to the 72-foot high point of the existing I-5 bridge is too difficult a maneuver for these large ships.</p> <p>This configuration, in other words, forces river traffic to request I-5 bridge lifts, even though over 90% of the river traffic could easily fit under the high point of the existing I-5 bridge, if it were not for the sharp turn required to do so.</p>	
15	<p>This picture shows a barge being pushed downriver after passing under the I-5 lift span. Traffic is no doubt still backing up in Oregon and Washington, waiting for the lift span to lower into place and for the gates to be raised. Maneuvering a heavy barge downriver is no easy task. Guiding it through the long narrow swing-span opening in the railway bridge, with concrete</p>	

	<p>piers on the left, is difficult and dangerous.</p> <p><i>AORTA's</i> proposed new lift span, south of the swing span and located near the central channel of the river, would provide a much safer course for tugboat operators.</p>	
16	This chart identifies I-5 bridge lifts in 2004. It shows how vessels between 51 and 60 feet above water level resulted in 525 bridge lifts in 2004.	

17	This chart shows the number of I-5 bridge lifts that could be eliminated with the replacement of the swing span on the railroad bridge with a better-placed lift span: 54 lifts versus 604 lifts, in 2004—a 91% reduction.	
18	<p>This diagram shows how a new swing span on the BNSF Bridge would provide a much easier-to-negotiate path for barges and other large ships, allowing them to pass under the 72-foot high points of both the existing bridge and the new CSA bridge. Note that the new opening on the railroad bridge is much wider and closer to the center of the river channel, and no longer has the long concrete wall on one side of the opening.</p> <p>This new lift span on the railroad bridge would eliminate about 90% of the bridge lifts that tie up I-5 traffic today. It would benefit interstate road traffic, river traffic and railway traffic. It is truly a <i>transportation</i> project.</p> <p>This project could be completed in a relatively short time. The cost could possibly be covered in part, or in whole, by funds allocated through the 1940 Truman-Hobbs Act. Oregon is powerfully positioned to leverage federal funds for such a project.</p> <p>Keep in mind that the BNSF railroad bridges over both the Willamette and the Columbia are a decade older than the oldest Columbia River I-5 freeway bridge, yet these railroad bridges continue to safely carry heavier loads than the two I-5 bridges, every day.</p>	
19	<p>This photo shows another BNSF railroad bridge on the same rail corridor, crossing the Willamette River just upstream from St. Johns.</p> <p>This 1908 bridge originally had a swing span similar to that on the rail bridge over the Columbia. That old swing span was replaced with a lift span in 1989. When this lift span was installed, rail traffic was disrupted for a mere 72 hours.</p> <p>The 1989 cost was about \$40M (\$87M in 2021 dollars), less than half (in 2021 dollars) of what has already been wasted on the 2006-2012 CRC design.</p>	
20	<p>When ODOT initiated this project, six statements of purpose and needs were identified:</p> <ul style="list-style-type: none"> • Growing travel demand and congestion • Impaired freight movement • Limited public transportation operation, connectivity and reliability • Safety and vulnerability to incidents • Substandard bicycle and pedestrian facilities, ... and • Seismic vulnerability. <p>We have updated this list to add 'equity' to the third bullet point and a seventh statement: addressing GHG emissions and climate change, which are finally receiving enough public attention to be included.</p> <p>The Common Sense Alternative, or CSA, meets <i>all seven of these purpose statements</i>.</p>	
21	The Common Sense Alternative II is a workable crossing of the Columbia River between Portland and Vancouver. It would eliminate the need for a full	

	<p>interchange on Hayden Island and be over a billion dollars less expensive than the formally approved “locally preferred alternative”.</p> <p>The CSA II proposes the following steps:</p> <ol style="list-style-type: none"> 1. Install a lift span in the railroad bridge downriver from the existing interstate bridges. This would allow barge traffic to navigate under the high spans of the existing interstate bridges and reduce the number of lifts by 90 percent. 2. Construct a new eight-lane freeway bridge with a bascule opening that aligns with the lift span of the existing bridges. This bridge would accommodate river traffic of any height and align exceptionally well with the existing Interstate-5 bridge approaches. I-5 can continue to cross <i>beneath</i> the BNSF railroad along the Vancouver side of the river, and its low profile solves many of the engineering challenges of 2012’s “locally preferred alternative”. The proposed bascule lift span is not unprecedented on a major interstate highway (note the I-95 bridge recently built near Washington, D.C.) 3. Repurpose the existing interstate bridges for local auto and truck traffic, public transit, bikes and pedestrians. Seismic retrofitting would be an option, not a requirement. 4. Build a new bridge over the South Channel for local traffic, light rail, bikes and pedestrians, that allows non-freeway access to and from Hayden Island. 	
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22	<p>This concludes Part I of the Common Sense Alternative presentation: the proposed solution. The following slides present a more detailed comparison of the CSA to the “locally preferred alternative” proposed in 2012.</p>	
23	<p>This illustration shows Hayden Island, looking southeast toward the Portland side of the river, as it exists today.</p> <p>The I-5 freeway does not cast an enormous, towering and noisy shadow over Hayden Island, as it would in the “Locally Preferred Alternative”. There is no concrete cloud blocking the sun here.</p>	
24	<p>This ODOT illustration shows the “Locally Preferred Alternative” towering over Hayden Island. The opportunity for transit-oriented development on the island would be destroyed by these towering, multiple, massive overhead concrete structures.</p> <p>Imagine the view from below as this enormous dark, noisy shadow towers high above the island.</p> <p>The view is gone.</p>	
25	<p>This illustration depicts the CSA II on Hayden Island, with the North Portland landing at the far right. Note there is <i>no</i> need for an expensive, high-level concrete platform towering above the Island, as seen in the previous slide.</p> <p>The gold lines here represent the new 8-lane I-5 bridge, that would carry interstate traffic between Hayden Island and Vancouver.</p> <p>The yellow line depicts the extended MAX light rail line on the new South Channel Bridge. The broad yellow band shows the location of the new Hayden Island Transit Center, where MAX would connect with C-Tran buses serving Vancouver, shown by the blue line representing the downstream span of the existing bridge.</p> <p>The white L-shaped lines are the existing bridges, ramps and overpasses</p>	

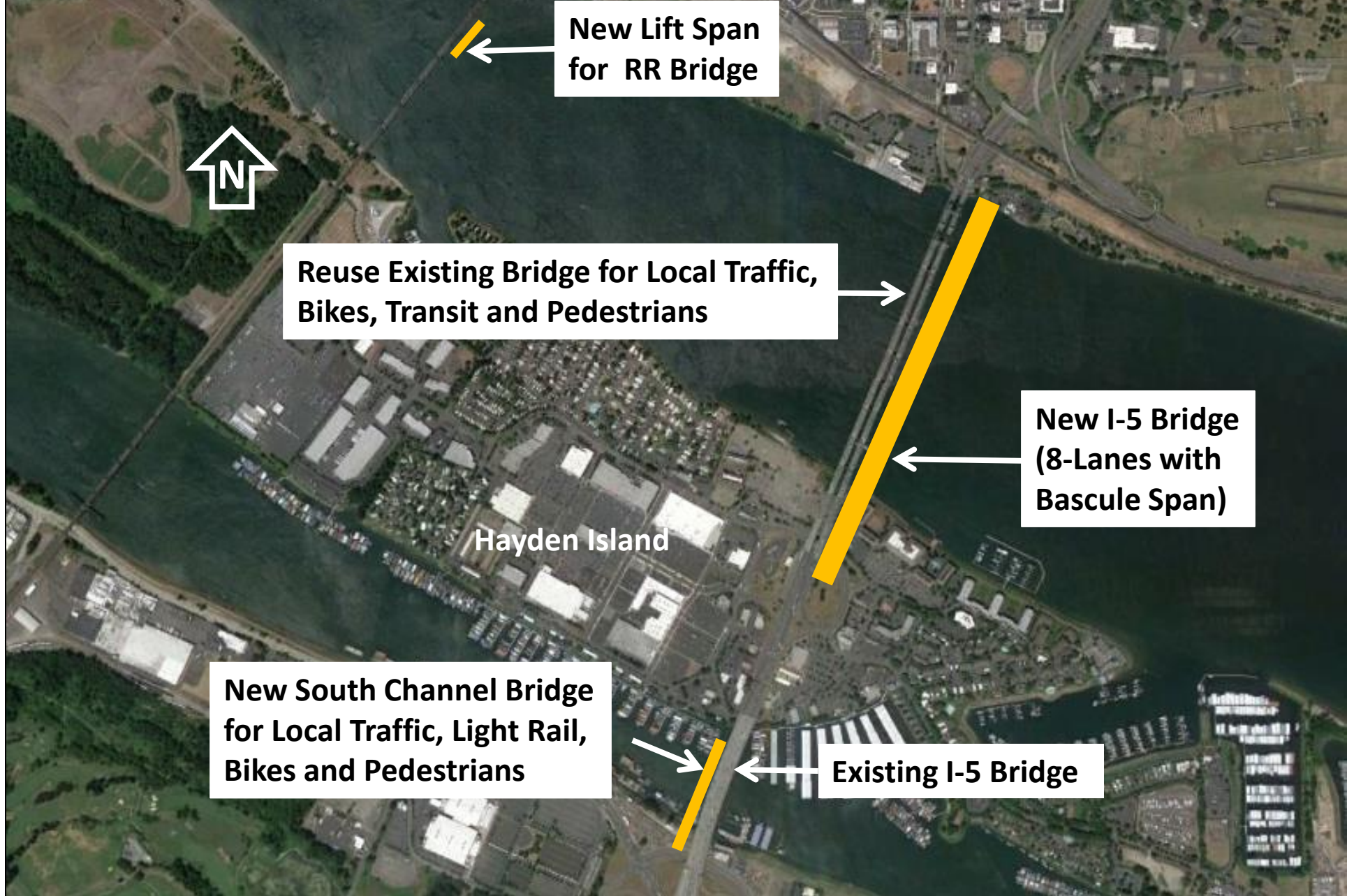
	<p>that would carry local auto and truck traffic between North Portland and Hayden Island, and between Hayden Island and Vancouver.</p> <p>Extending MAX from the current Expo Center station, connecting to businesses and residential areas on Hayden Island, will dramatically increase ridership on the MAX Yellow Line seven days a week.</p> <p>Note also that local traffic no longer intermixes with interstate traffic, avoiding the traffic turbulence and safety issues that such mixing would entail. That violation of fundamental traffic planning was essentially ignored by highway department planners in 2012.</p>	
26	<p>This is a view of the bridges as they exist today, looking south from Vancouver. It shows the investment taxpayers have already paid for. Demolishing these bridges is a wasteful, unnecessary, and completely avoidable expense.</p> <p>Should we claim that the existing bridges, completed in 1917 and 1958, need to be demolished simply because they are older and not seismically sound? If we were to apply that standard to all bridges in Oregon, we would find very few bridges remaining. In fact, applying that standard would leave very few bridges remaining anywhere in the world. We cannot afford to employ that standard, nor is there any need to.</p>	

27	<p>This is ODOT’s illustration of the “Locally Preferred Alternative” looking south from Vancouver, showing the high-level approach to the bridge from Vancouver, and steep, high-level on-ramps and off-ramps, towering above local buildings.</p> <p>Imagine the heavy shadows, the sounds of traffic and heavy trucks struggling to ascend and descend the steep grades as you sit in the nearby office buildings or walk along the riverfront or even on a more distant sidewalk.</p> <p>Imagine the carbon footprint left behind as these steep grades are negotiated.</p> <p>Furthermore, this interchange, along with the one on Hayden Island, adds over a billion dollars to the cost of the project—a totally unnecessary expense.</p>	
28	<p>Here we view the CSA from the Washington side.</p> <p>Note the new, straight freeway bridge on the left, completely free of local traffic. (Local traffic would travel over the new South Channel Bridge and the existing I-5 bridge.) Problems associated with traffic turbulence, speed variance, capacity constraints and safety are gone. These problems were not resolved with the far more expensive “locally preferred alternative.”</p> <p>Also note that the CSA does not tower high above the Vancouver office buildings shown here. It does not cast dark shadows over the buildings and living space in the foreground.</p> <p>The CSA does not interfere with aircraft using nearby Pearson Field.</p> <p>Costs for demolition of old ramps, and construction of new ramps, are dramatically reduced. The long, steep grades envisioned by the rejected 2012 proposal are avoided.</p> <p>It is clear from these comparisons that the CSA offers a far better solution to the Oregon-Washington I-5 river crossing, than the “Locally Preferred Alternative” proposed in 2012. It is safer, more esthetically pleasing and better for the environment, while still fulfilling all the purposes and needs identified for the project.</p>	

	<p>Thank you for viewing this presentation. AORTA appreciates your attention, and we hope you will support and advocate for this sensible option for the interstate highway crossing of the Columbia River.</p>	
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Common Sense Alternative II (CSA) Includes Reusing the Existing Bridge for Local Traffic, Buses & Bikes





Common Sense Alternative II



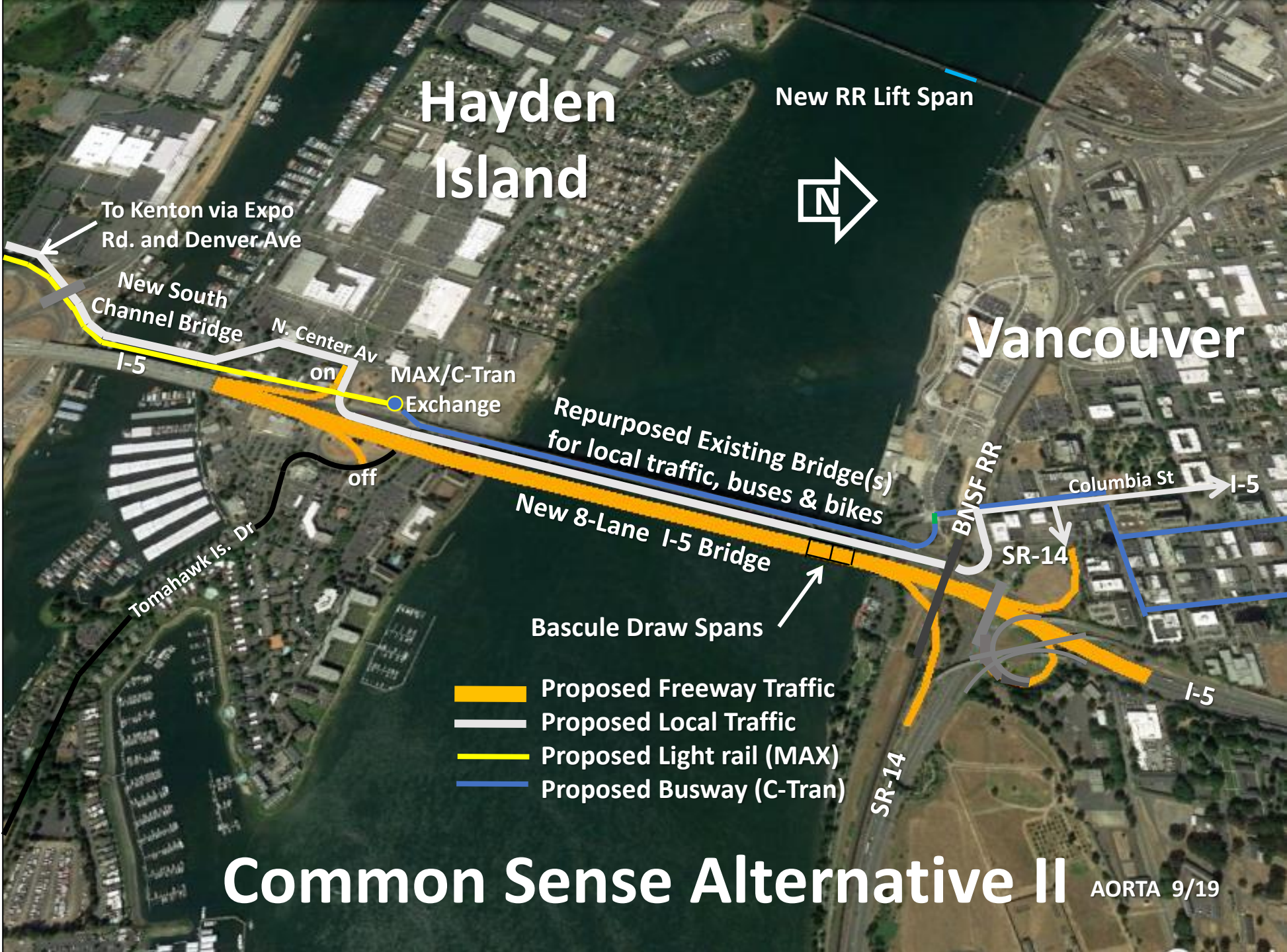
Reuse Existing Bridge for Local Traffic, Bikes, Transit and Pedestrians

New earthquake resistant I-5 Bridge (8-Lanes with Bascule Span)

New earthquake resistant South Channel Bridge for Local Traffic, Light Rail, Bikes and Pedestrians

Reuse existing 8-lane I-5 Bridge

CSA II Bridges



Hayden Island

New RR Lift Span



Vancouver

To Kenton via Expo Rd. and Denver Ave

New South Channel Bridge

N. Center Av

MAX/C-Tran Exchange

Repurposed Existing Bridge(s) for local traffic, buses & bikes

New 8-Lane I-5 Bridge

Bascule Draw Spans

- Proposed Freeway Traffic
- Proposed Local Traffic
- Proposed Light rail (MAX)
- Proposed Busway (C-Tran)

Tomahawk Is. Dr

BNSF RR

Columbia St

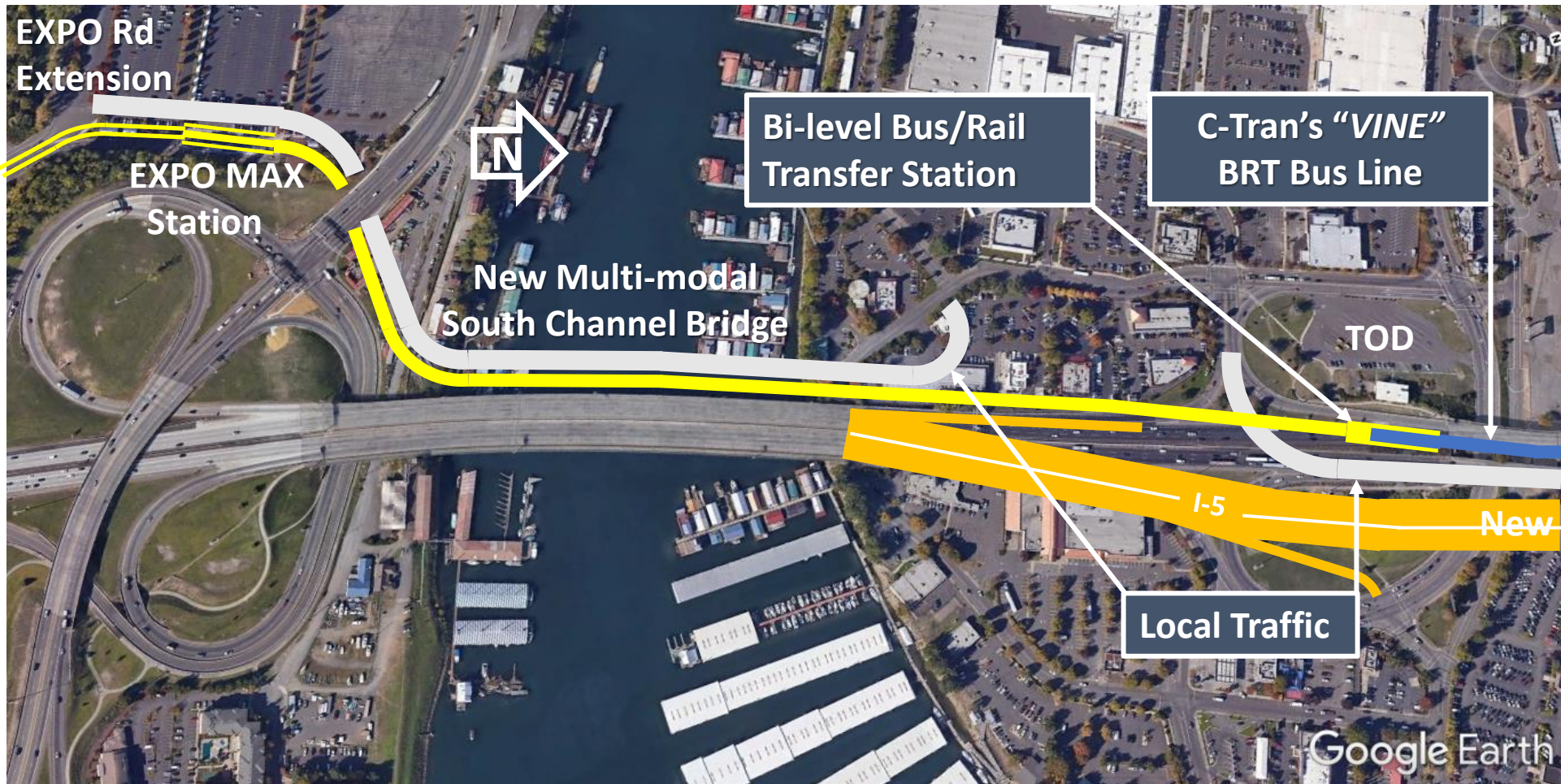
SR-14

SR-14

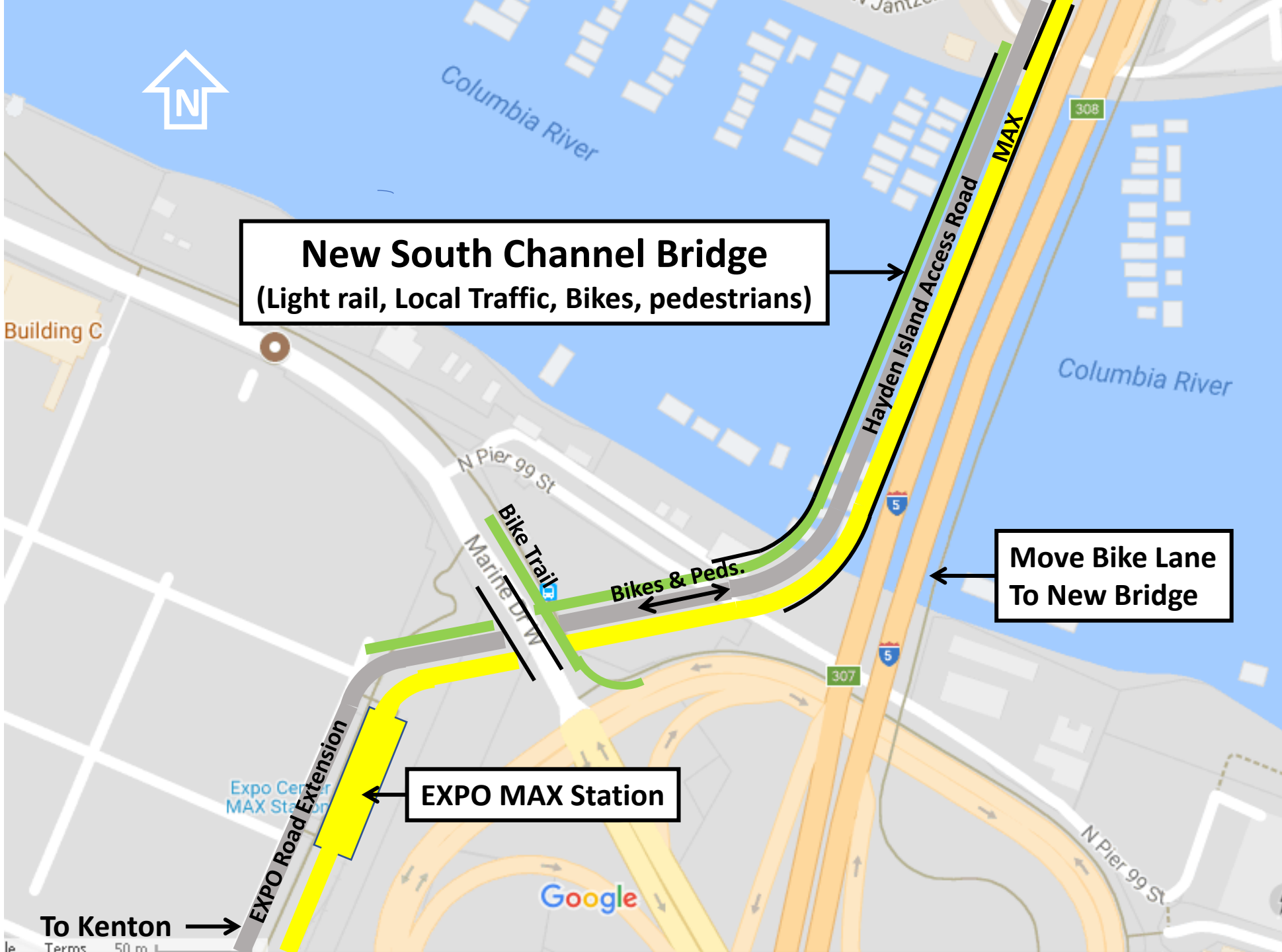
I-5

Common Sense Alternative I

AORTA 9/19



Existing I-5/Marine Drive Interchange with no I-5/Hayden Island Interchange

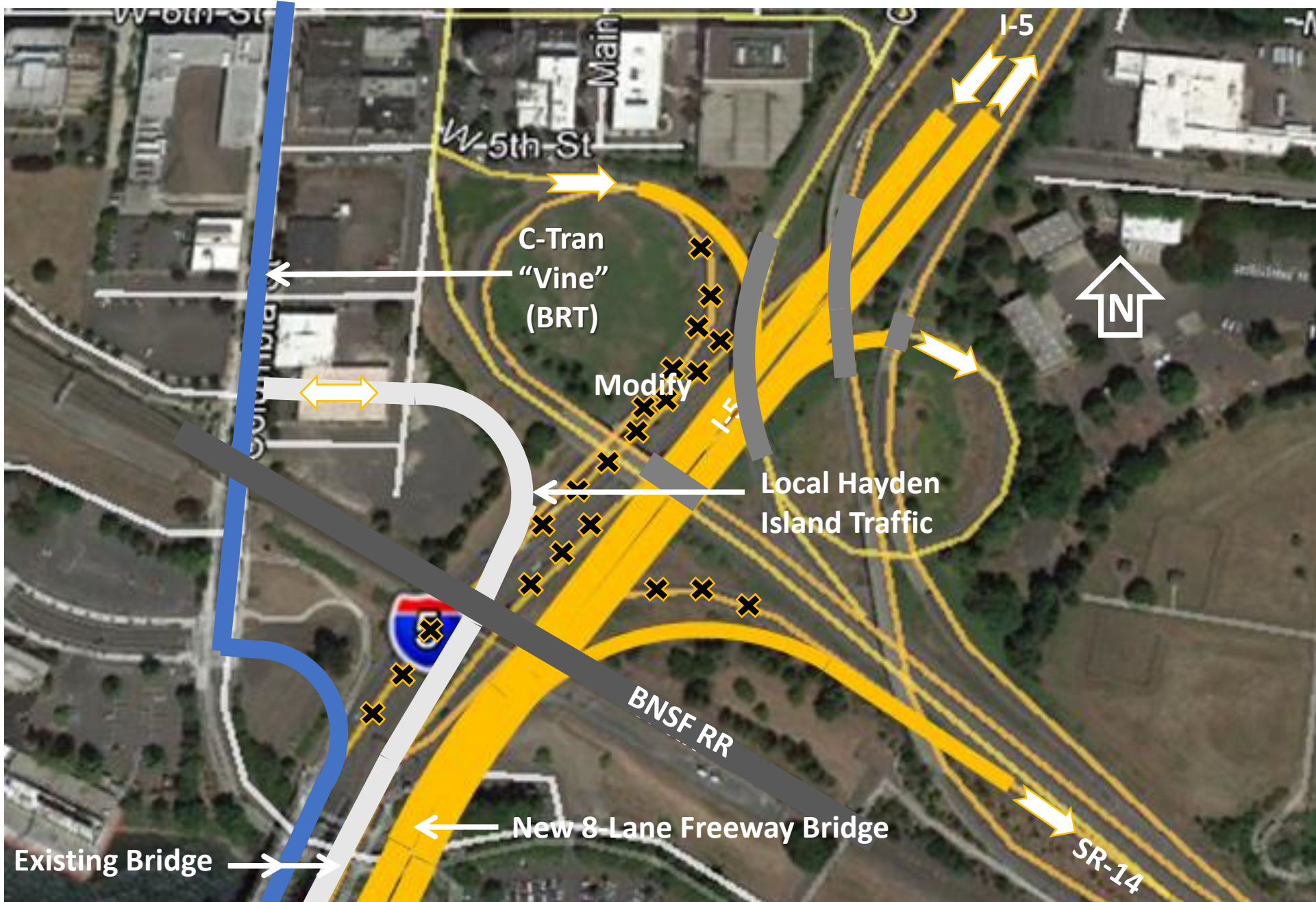


New South Channel Bridge
(Light rail, Local Traffic, Bikes, pedestrians)

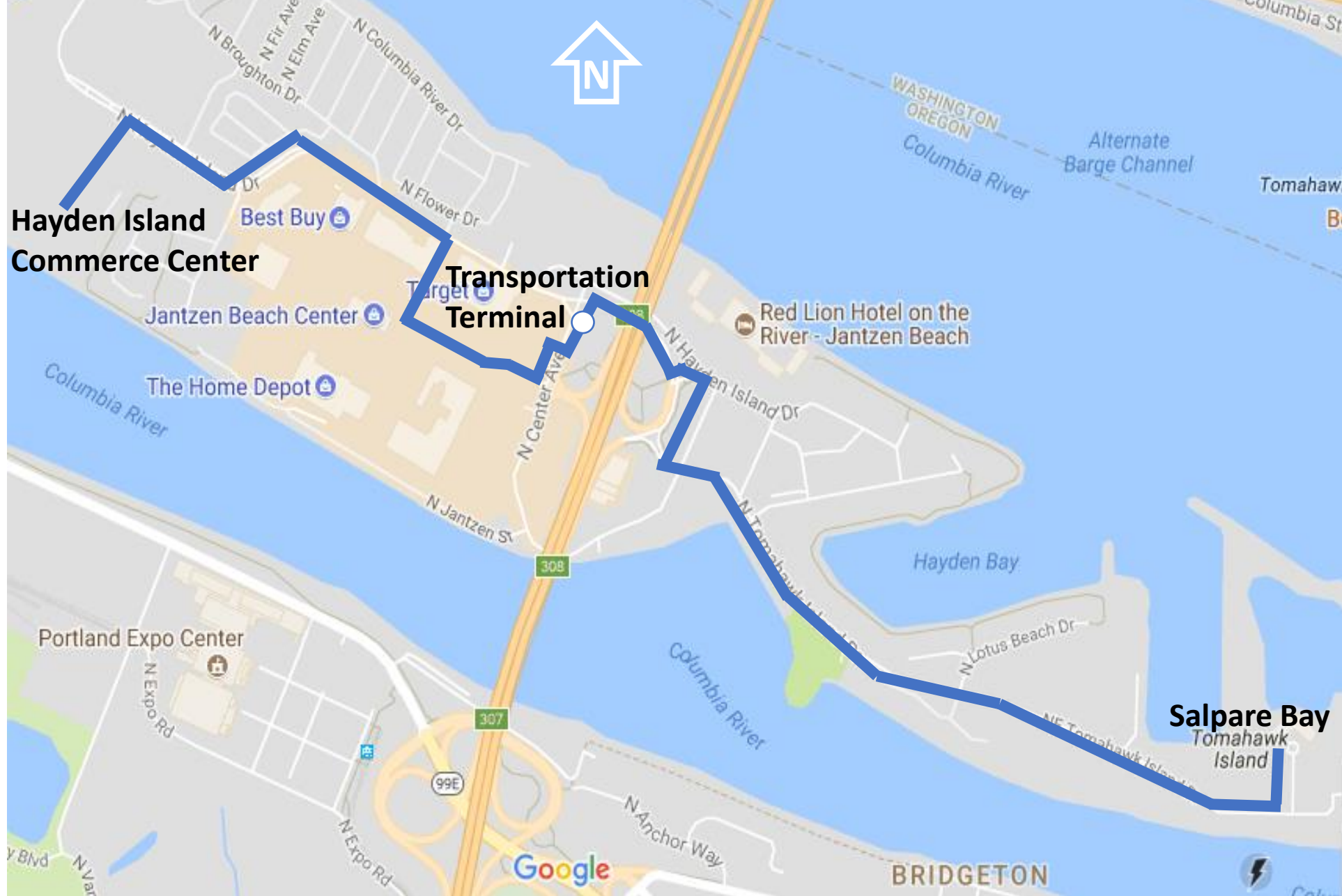
Move Bike Lane To New Bridge

EXPO MAX Station

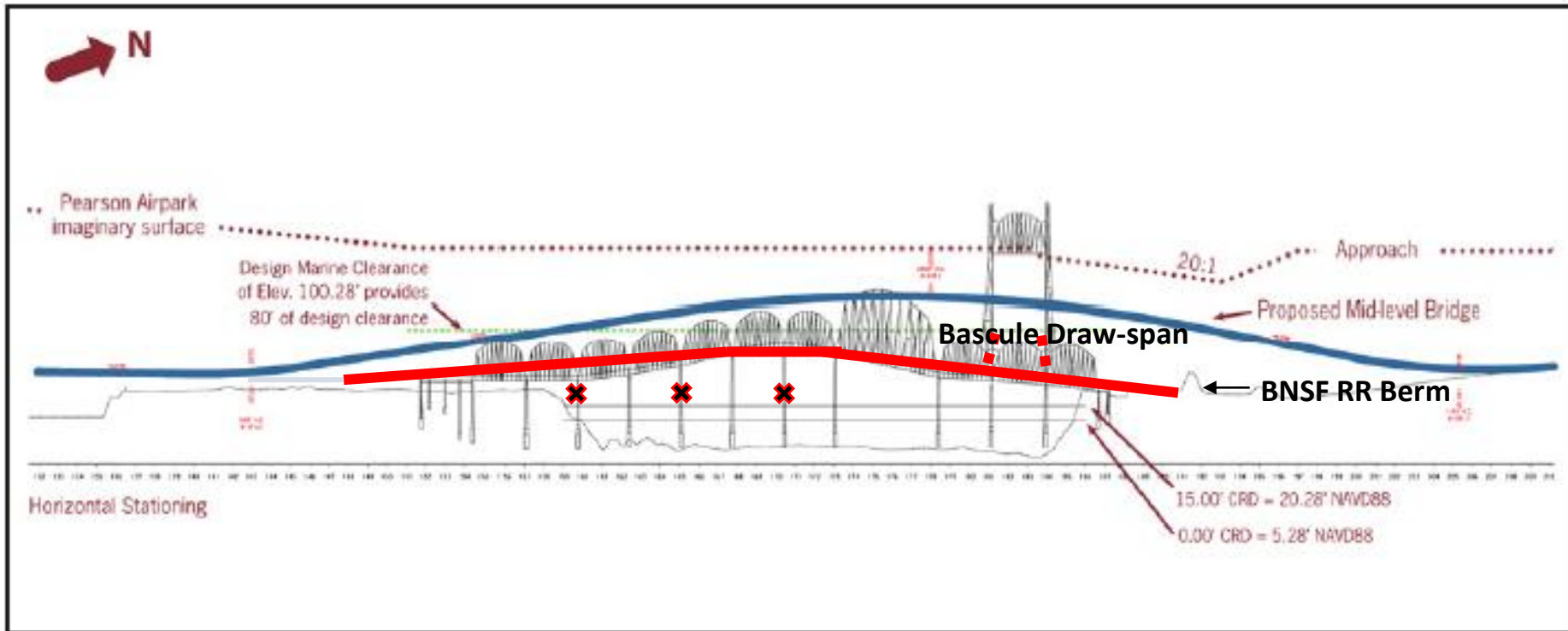
To Kenton →



At-Grade Vancouver Interchange

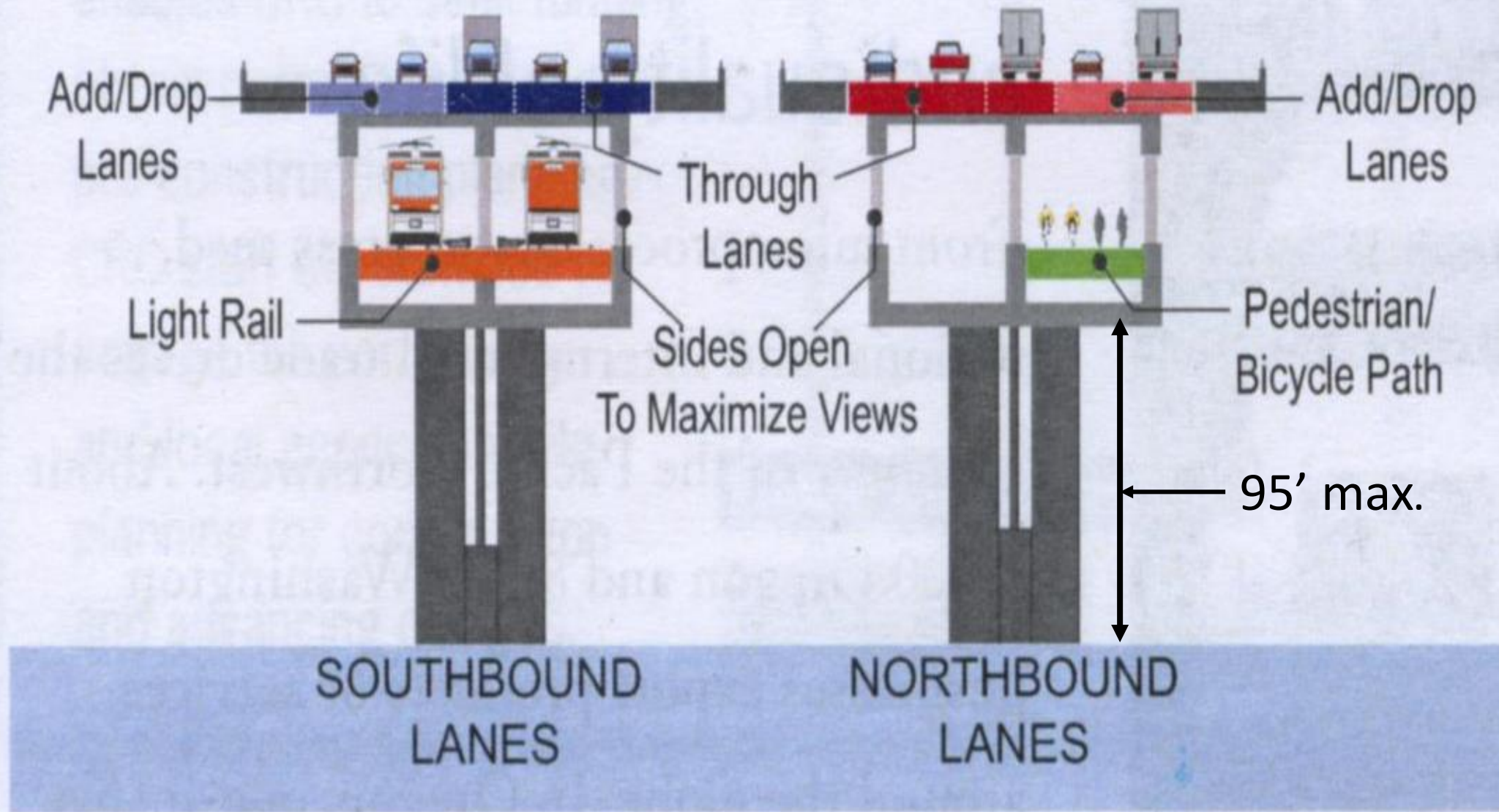


Hayden Island Shuttle Bus



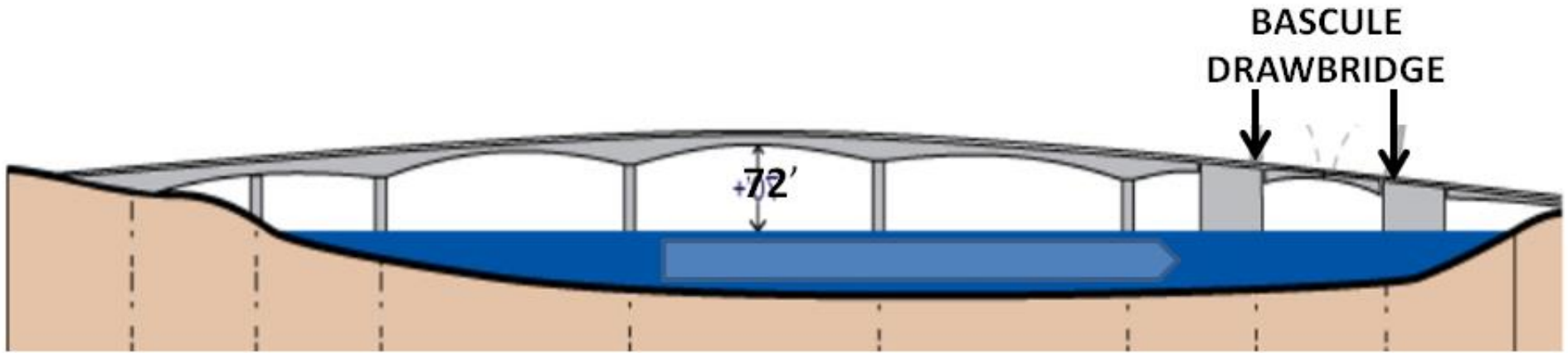
- ODOT's Preferred Alternative (95')**
- Common Sense Alternative II (72')**

Profiles

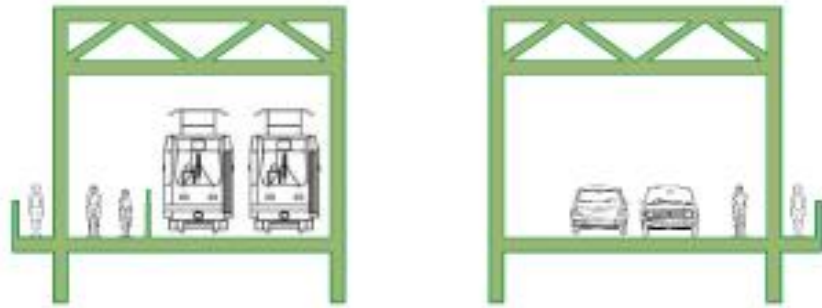


Design calls for two structures with a total of 10 lanes and full safety shoulders.

(ODOT's Proposal)



CSA II Bridge Looking West



Transit (Buses/LRT)
Cycle-Track & Ped.

Local traffic
& Pedestrians

Existing I-5 Lift Span Bridges



Freeway – 3 through lanes
+ add/drop lane each way

New I-5 Bascule Bridge

72' River
Clearance

(Cross-Section looking North toward Vancouver)

Common Sense Alternative II



CSA PROPOSAL - Bascule draw span similar to this new Woodrow Wilson I-95 Bridge near Washington DC

550 Annual
I-5 Lifts for Vessels
Under 60' Height

72' Clearance
Under I-5



BRIDGE LIFT PATH ▶
High river flow or
vessels that require
more than 68 ft.

Lift
Span

Primary
Channel

Barge Channel

Alternate
Barge Channel

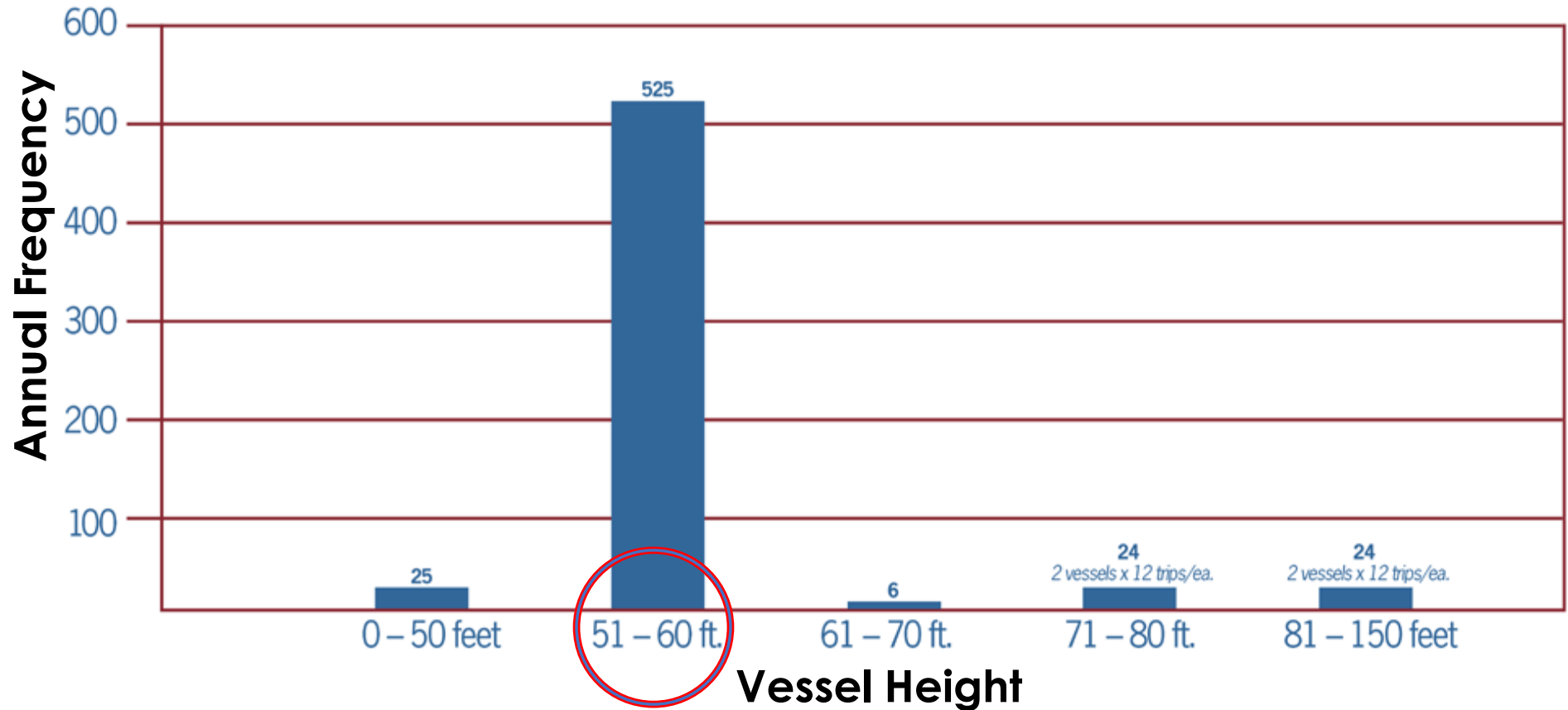
Rotating
Span

Existing Barge Traffic



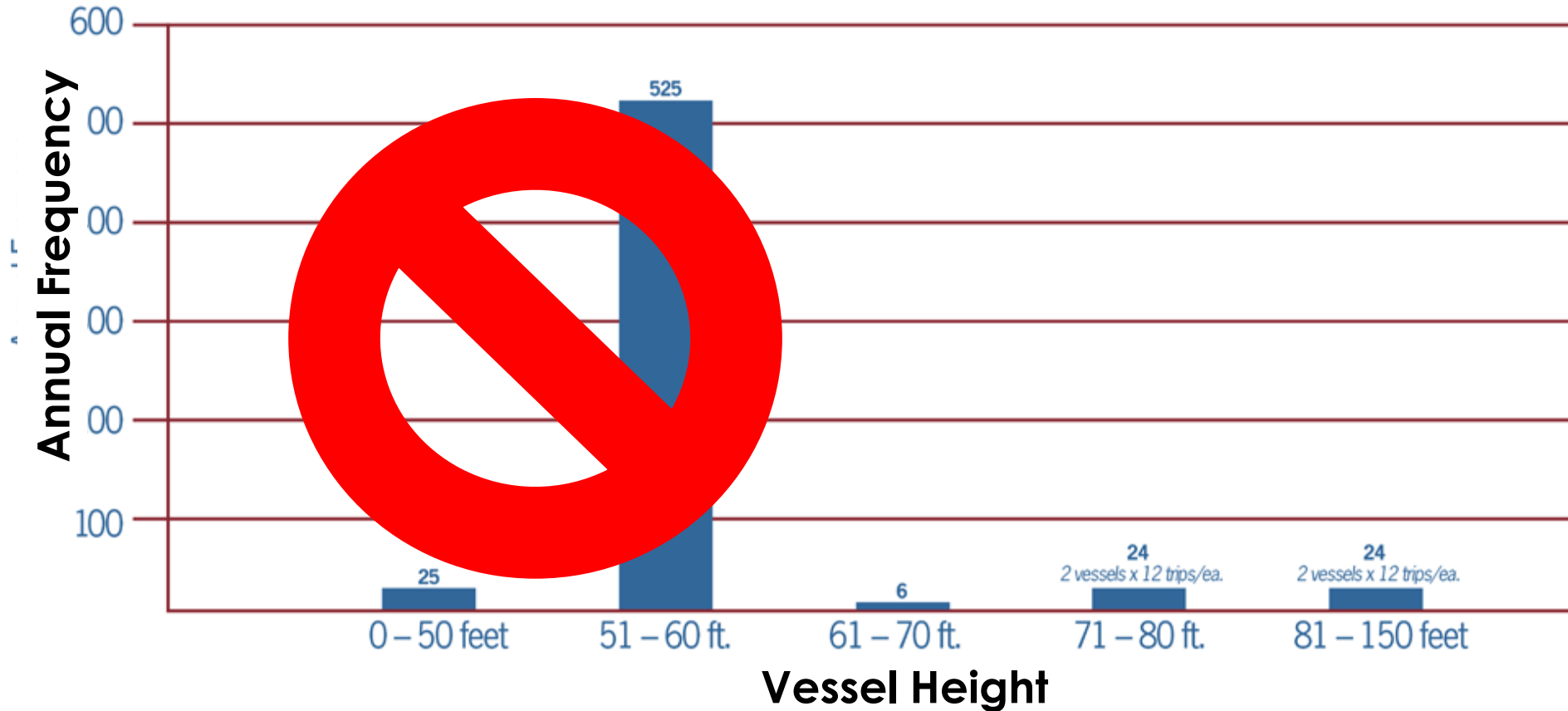
BNSF Railroad New Lift Span

604 Total I-5 Lifts

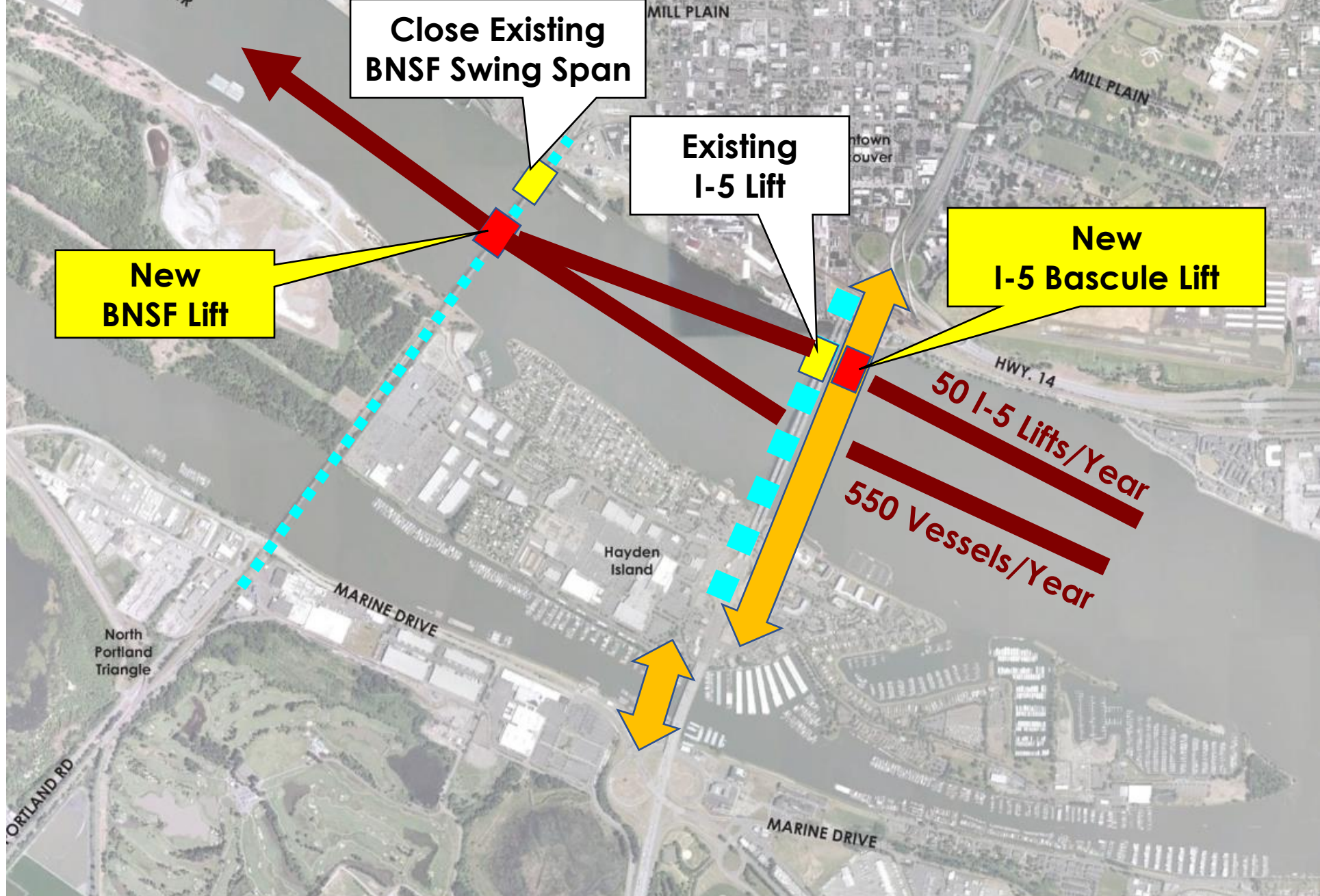


I-5 Bridge Lift Frequency (2004 Averages)

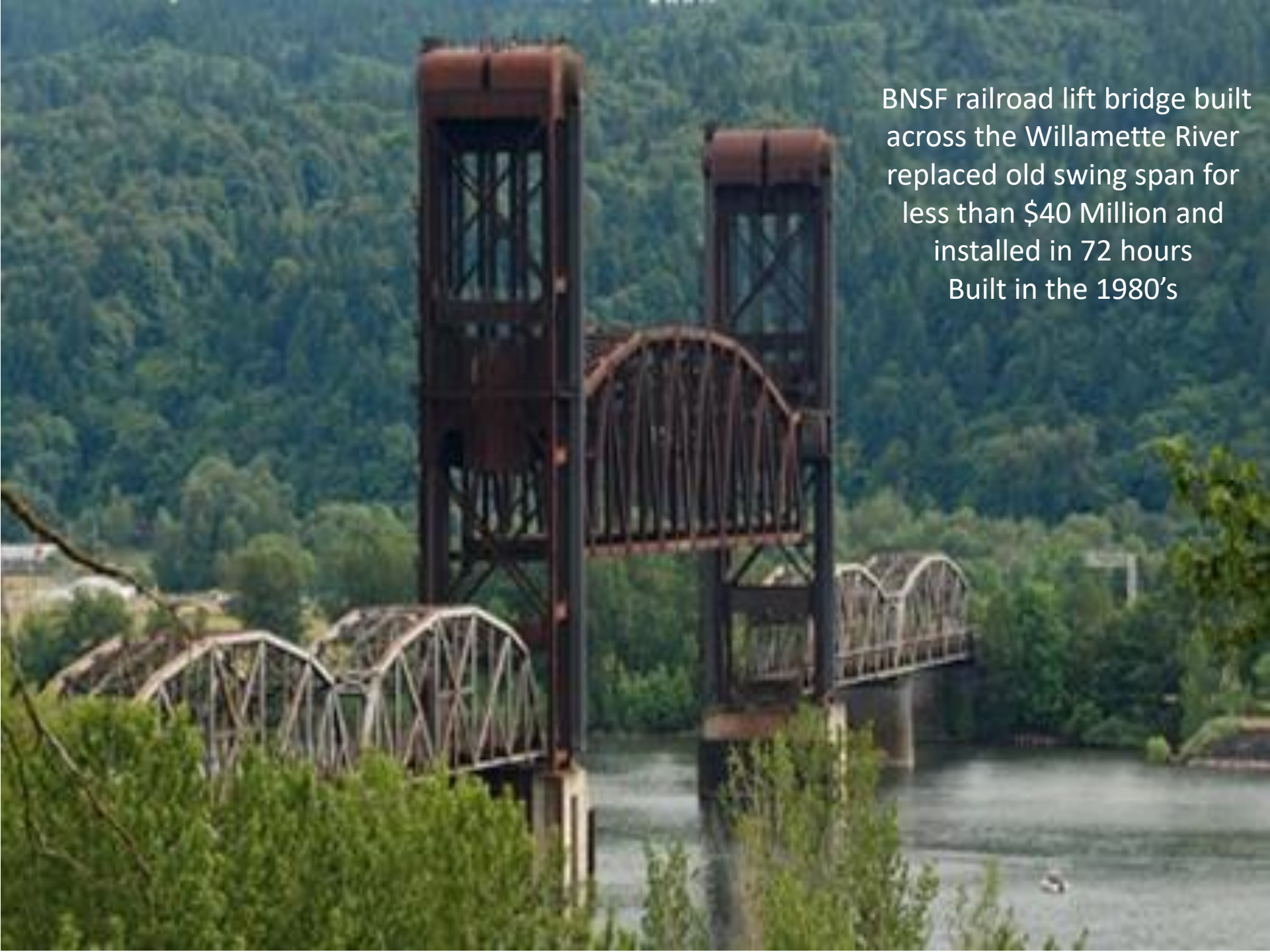
550 Lifts Eliminated



I-5 Bridge Lift Frequency (2004 Averages)



Barge Traffic With New Bridge



BNSF railroad lift bridge built
across the Willamette River
replaced old swing span for
less than \$40 Million and
installed in 72 hours
Built in the 1980's

Purpose and Needs

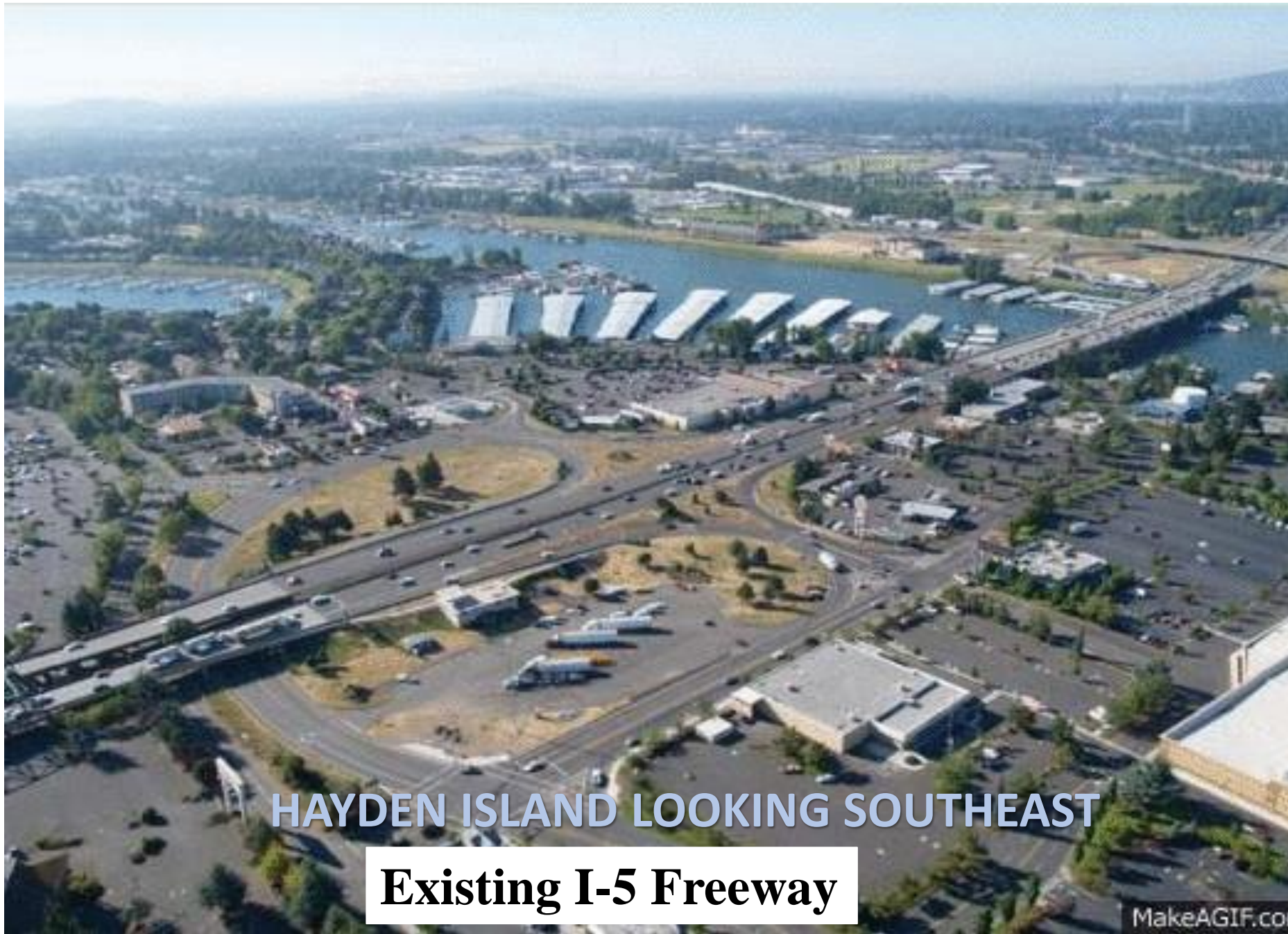
1. Growing travel demand and congestion
2. Impaired freight movement
3. Limited public transportation operation, connectivity, reliability **and equity**
4. Safety and vulnerability to incidents
5. Substandard bicycle and pedestrian facilities
6. Seismic vulnerability
7. **Addresses GHG emissions and climate change**

Common Sense Alternative II

The Common Sense Alternative II is a workable crossing of the Columbia between Portland and Vancouver. It would **eliminate the need for a full interchange on Hayden island.**

- **Install a lift span in the railroad bridge** downriver from the existing Interstate Bridges. This would allow all commodity barge traffic to navigate under the high spans of the existing Interstate Bridges and reduce the number of lifts by 90 percent.
- **Construct a new eight-lane freeway bridge with a bascule opening** that aligns with the lift span of the existing bridges. This bridge would accommodate river traffic of any height and align exceptionally well with existing Interstate-5 approaches. I-5 can continue to cross beneath the BNSF railroad. Its low profile solves many of the engineering challenges of the CRC. This opening span is not unprecedented on a major Interstate Highway. (I-95 Bridge recently built near Washington, DC.)
- **Repurpose the existing Interstate Bridge** for local traffic, public transit, bikes and pedestrians. Seismic retrofitting would be an option, not a requirement.
- **Build a new bridge over the South Channel** for local traffic, light rail, bikes and pedestrians that allows non-freeway vehicle access between North Portland and Hayden Island.

**The Next Slides Compare the
Common Sense Alternative II
To the CRC Preferred Alternative**



HAYDEN ISLAND LOOKING SOUTHEAST

Existing I-5 Freeway

MakeAGIF.com



ODOT's Columbia River Crossing Concept

Columbia River Crossing conceptual drawing, looking south, showing the new bridge with light rail access along the west (lower right in drawing) side.



HAYDEN ISLAND LOOKING SOUTHEAST

Common Sense Alternative II



Looking South from Vancouver



ODOT's Preferred Alternative

Rendering is for discussion purposes only and is subject to change. Transit alignment could be used for bus rapid transit or light rail. -11/27/07



Common Sense Alternative II

Movable Bridges on the Interstate Highway System

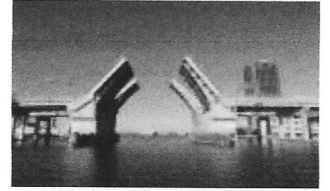
[View Exhibit map](#)

[Berkley Bridge](#) (Norfolk, Virginia)

Built 1952; rehabilitated 1991

Bascule bridge over East Branch Elizabeth River on Westbound I-264 in Norfolk

Open to traffic

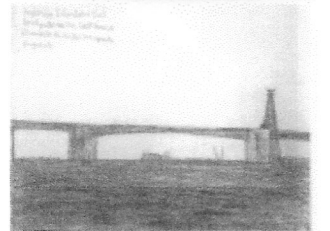


[High Rise Bridge](#) (Chesapeake, Virginia)

Built 1969

Bridge over South Branch Elizabeth River & VA-166 on Interstate 64/US 17

Open to traffic

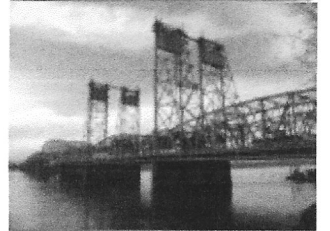


[I-5 - Interstate Bridge \(Northbound\)](#) (Multnomah County, Oregon)

Built 1917; Main span modification 1958

Vertical lift Parker through truss bridge over the Columbia River on northbound I-5 between Vancouver and Portland

Open to traffic

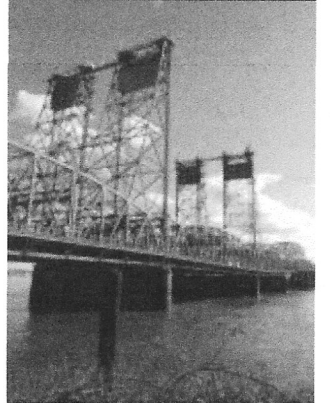


[I-5 - Interstate Bridge \(Southbound\)](#) (Multnomah County, Oregon)

Built 1958

Vertical lift Parker through truss bridge over Columbia River on Southbound I-5

Open to traffic



[William A. Stickel Memorial Bridge](#) (Essex County, New Jersey)

Built 1948; rehabilitated 1973

Vertical lift bridge over Passiac River on I-280 in Newark

Open to traffic

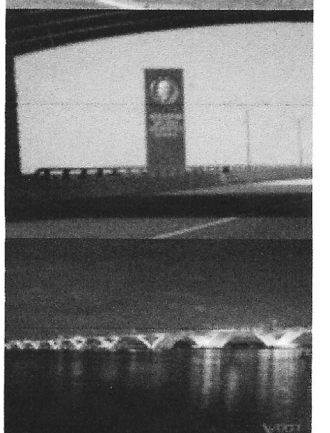


[Woodrow Wilson Memorial Bridge \(1961\)](#) (Prince George's County, Maryland)

Built 1961; rehabilitated 1984, Replaced 2008

Lost bascule bridge over Potomac River on the Capital Beltway (I-95/I-495) in Fort Washington

Replaced by the 2008 Woodrow Wilson Memorial Bridge



[Woodrow Wilson Memorial Bridge \(2008\)](#) (Prince George's County, Maryland)

Built 2006-2008

Bascule bridge over Potomac River on the Capital Beltway (I-95/I-495) in Fort Washington

Dan McFarling

dan@parkerpup.com

Community Advisory Group – April 28, 2021

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.

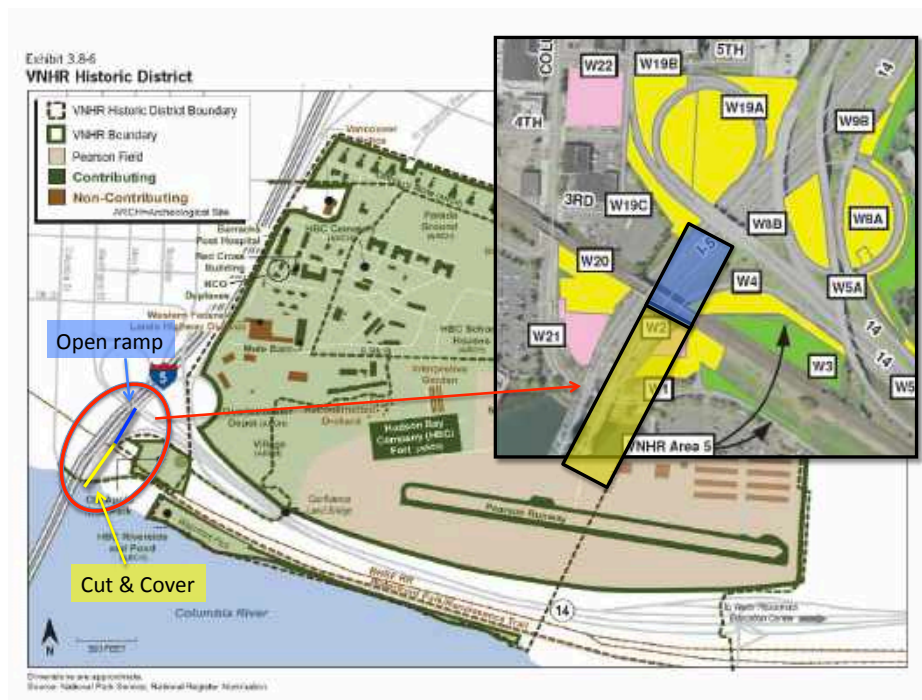


Exhibit 3.8-39

Summary of Archaeological Investigations by Area on the Washington Shore

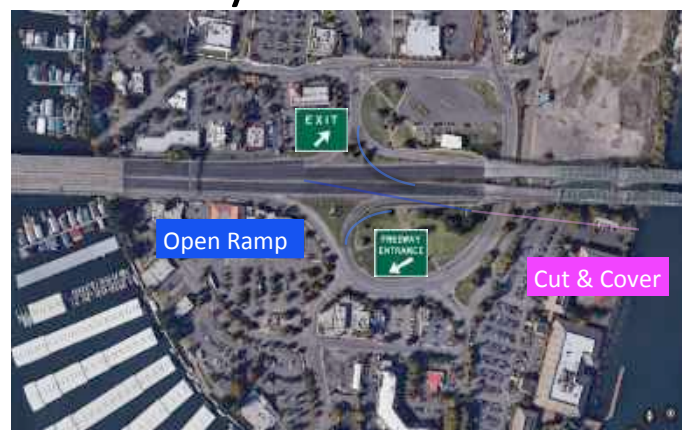
Area Designation	Site Number	Archaeological Investigations	Significant Archaeology and Criteria	Site Warrants Preservation in Place	Comments
W1	48CLB18	HERITAGE Appendix 1-C	Yes (a,d)	No	Only eastern portion tested; western portion not accessible
W2		None	Undetermined	No	No access - BND/City of Vancouver property
	1956 US Army Building	NPS Appendix 1-C3	Yes (d)	No	
VNHR 2	1825 Vancouver House (Hotel)	NPS Appendix 1-D	Yes (a,d)	No	
	1826 Old Apple Tree	NPS Appendix 1-D	Yes (a,d)	No	
W4	48CLB11	HERITAGE Appendix 1-C	Yes (a,d)	No	



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.



Hayden Island



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.

I-5 Ship Canal Bridge
Noise Reduction Failure
\$1,560,000 2010

Tacoma Narrows
Noise Reduction Failure
\$878,000 2008

SR 520
Noise Reduction Study
\$181,000 2019
unresolved

NOISE
0.4 mile
Refracts & Amplifies over water

Tunnel Invisible Silent

YouTube

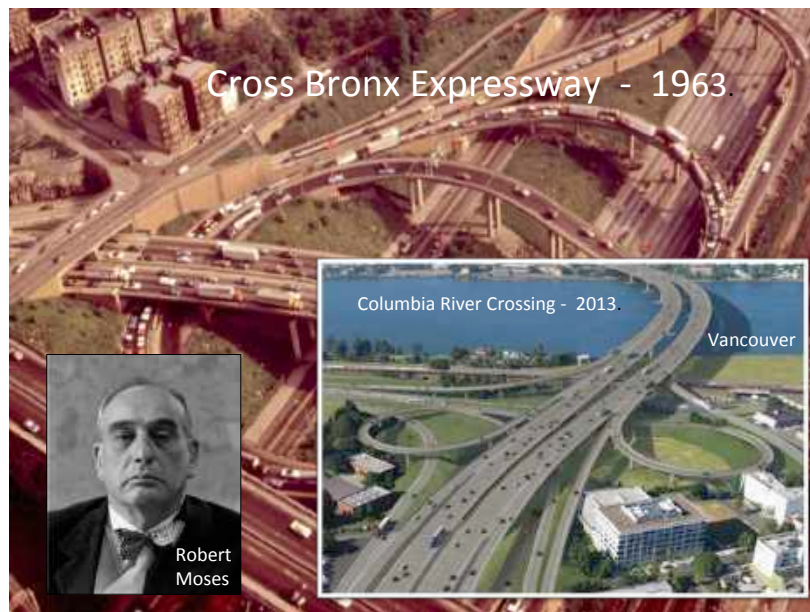
- Trelleborg - How to build an immersed tunnel
<https://www.youtube.com/watch?v=2Xkyvc9PIQA>
- Trip through Tingstad Tunnel, Gothenburg
<https://www.youtube.com/watch?v=koE8Bmecd88>
- Trip through Marieholm Tunnel before its Dec. 16 opening, Gothenburg
<https://www.youtube.com/watch?v=RT9x2P99Wms&feature=youtu.be>
- Construction of the Marieholm Tunnel, Gothenburg
<https://www.youtube.com/watch?v=2k-A8FCr8w&feature=youtu.be>
- Launch of the Marieholm Tunnel elements, Gothenburg
<https://www.youtube.com/watch?v=IC4mBtpwXU0>
- Elizabeth River Tunnel, Norfolk, VA
<https://www.youtube.com/watch?v=NsN8dPFMuQY>
- George Massey Crossing Tunnel Concept, Vancouver, Canada
<https://www.youtube.com/watch?v=8A98H-vFA>
- Immersion Tunnel Coatzacoalcas by Volker Construction International, Mexico
<https://www.youtube.com/watch?v=VF7WkoZMja0k>
- DERSA - Santos Guarujá Immersed Tunnel Project, Brazil
<https://www.youtube.com/watch?v=du8KZob7Pkxw>
- Busan-Geoje Fixed Link in South Korea
<https://www.youtube.com/watch?v=aykpUulHj0>

Immersed Tube Tunnel better than a New High Bridge

Bob Ortblad MSCE, MBA

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



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=KoEBbmeCd88>

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=JC4mRlgwXU0>

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>



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