

Five factors pleading for priority—Massey Crossing Renewal Project

Jim Wright to City of Richmond and BC Ministry of Transportation and Infrastructure, 2017-11-19

With years of Massey Crossing Renewal knowledge, we* are able to spot possible gaps, especially since the City of Richmond and others have helped the government to get a balanced view. Here, in our final effort to help, we've described five gaps, five factors pleading for attention. Please think about them and act for high impact for the good of all who use the Massey Crossing or care about it. This table is supported by four earlier "Inputs" in response to a City of Richmond request for input.

The plea	The plea details
<p>A. It is up to Massey Crossing Renewal Project to protect the Fraser River Estuary from the much deeper ship channel dredging—still blocked by the tunnel—that the Vancouver Fraser Port Authority has long sought for port expansion east of the tunnel.</p>	<p>It will become opportune for the Port Authority to resume pursuing the deeper dredging, which threatens the estuary ecosystem, after the current federal environmental assessment of the proposed Roberts Bank Terminal 2—<i>if tunnel removal permits.</i></p>
<p>B. Since the role of the Supplementary Tube(s) in enabling Legacy Tube renewal is practically essential, it needs to be factored into the plans. See Input 1.</p>	<p>Fast-tracking a new tube so it can take Legacy Tube traffic (a pair of lanes at a time) would make the seismic upgrade and refurbishing fast and safe, providing what tunnel users deserve.</p>
<p>C. The essential paradigm shift is <i>away from</i> increasing highway capacity (bringing more vehicles to congestion points more quickly) <i>toward</i> increasing thruway capacity (bringing more people from place to place in reliable, comfortable and convenient ways).</p>	<p>See Input 2. Although the Amtrak Thruway with a rail core is different from the Massey Thruway with a tunnel core, the commitment to enabling individual translocation with mass translocation effect is a thruway aspect they would share, and it could start here in early ways soon.</p>
<p>D. Once one sets aside all preconceptions about cost, it may be optimal to add a Supplementary Tube on each side of the Legacy Tube. The new tubes could be spaced as shown in Input 4 or, instead, close to the Legacy Tube, with cutoff walls between tubes (as shown by the Massey Project).</p>	<p>The Massey Project has shown the method of using two tubes to equal one larger one, and the benefits stated in Input 4 seem to outweigh an increase in dredging cost. Note: Each Supplementary Tube would include a multi-use path (cycling, walking, wheelchair, responder, etc.) and one or two lanes.</p>
<p>E. <i>A caution:</i> Although having a set of four tunnel lanes in each direction has significant safety benefits (see Input 3), that eight-lane option becomes cause for concern if there is no strong resolve to avoid the "counterflow" temptation that would lead to five lanes in one direction.</p>	<p>Apart from lost advantages, the shortcoming is an inevitable single-occupancy-vehicle (SOV) increase, working against the paradigm shift. The Massey Renewal will help all users (not forcing drivers out of SOVs), but more-deprived kinds need more help than less-deprived kinds.</p>

* **We** are the Garden City Conservation Society, led on this issue by Jim Wright, Past President, who has written numerous newspaper columns and blog articles on the issue since 2012. Jim even has a personal interest, as his father was a partner in Crippen Wright Engineering Ltd., which did the extensive initial study, *Fraser River Highway Crossing at Deas Island*, 1955, and he has often referred to it, along with Fraser Voices research, among other sources.

1. Massey Crossing rationale, from Garden City Conservation Society (GCCS), 2017-07-14

First in a series of requested inputs to Victor Wei, P.Eng., Director, Transportation, City of Richmond.

Aim: The Massey Crossing, with related transportation systems, will enable efficient, safe, user-friendly transportation of people and goods between its served areas while conserving in a range of ways.

What's known: The bridge options have, in effect, been self-eliminated by their proponents' failure to make a credible case in years of trying. Also, from a conservation standpoint, leaders of all three of the broad conservation groups in Delta/Richmond have determined that the tunnel options are better.

Basic best: From the GMTR Project's five scenarios ([Phase 2 Guide, 2013](#)), the simple tunnel option in [Scenario 4 \(p. 12\)](#) could meet the needs with

- 1) completion of the seismic upgrades for the tunnel and its approaches,
- 2) refurbishing of the tunnel systems—ventilation, lighting, safety, etc.,
- 3) new **2-lane** tube for transit* + multi-use path, in Massey Corridor,
- 4) retrofit/replacement of related Hwy 99 bridges/interchanges, and
- 5) further Hwy 99 corridor improvements—Bridgeport to USA border.

Our graphic at right shows the spacing of the new tube ("Green Tube" because it is ecologically best) from the current tunnel ("Legacy Tube").

**While the Green Tube would enable two transit lanes, it might do so indirectly (e.g., if Legacy lanes are better positioned for Rapid Bus use).*



Quality: Since this saves a hefty chunk of \$12 billion, doing things well should be feasible. Examples:

- 1) State-of-the-art seismic upgrade for the Legacy Tube and approaches. Methods have improved in the decade of delay, and there must also be new site-specific knowledge from the bridge studies.
- 2) Lining of the tunnel walls/ceiling with reflective, easy-to-clean ceramic tile (early intended, never done).
- 3) Green Tube: Improved ceiling height and lane width. Designed to easily adapt for (possible) light rail.
- 4) At the new Steveston Interchange, faster and safer entry and exit, as planned a quarter century ago.
- 5) Facilities for additional efficient Hwy 99 bus entry/exit ramps, sheltered pullouts, easy transfers, etc.

Buses and trucks: Steps to enable (a) early congestion relief, beginning ASAP, and (b) lessons for the future:

- The early need is for the long-overdue influx of energy-efficient Rapid Buses that are reliable (on time, with passenger space), convenient (with Rapid Bus routes or feeder routes reaching people's start/end points) and comfortable (user-friendly throughout trips). High expectations must be set and exceeded.
- Truck traffic to and from the Delta port terminals will need to be spread over far more hours a day, with large trucks banned from the tunnel during the times when they would cause congestion (e.g., rush hour).

Steps: Ideally, the new government's experts will quickly determine how to implement the scenario in seismically sound and practical ways. Action will depend on their advice. For example, re the Green Tube:

- With its current technology to disrupt destructive seismic waves before they reach it, the Green Tube might protect the Legacy Tube. If that applies, it might be placed on the west side of the Massey Corridor.
- If it turns out to be too risky to place the Green Tube within the Massey Corridor (as shown above and in Scenario 4), it could become a new tunnel further east. In the most promising location, it would connect South Fraser Perimeter Rd (with roughly a 76 St route) to Westminster Hwy and Hwy 91 (via Nelson Rd).
- In any case, fast-tracking the Green Tube will allow it to take traffic from the Legacy Tube (usually a pair of lanes of traffic at a time) to enable efficient seismic upgrading and refurbishing of the Legacy Tube.

2. Massey Thruway Renewal Project, from Garden City Conservation Society, 2017-08-14

Second in a series of requested inputs to Victor Wei, P.Eng., Director, Transportation, City of Richmond

This page of input builds on the previous response from Garden City Conservation Society (GCCS), “1. Massey Crossing Rationale.”

Congestion: By making good use of a recent opportunity, Richmond has dealt with a campaign by another local government to flush traffic congestion north into Richmond, which does not welcome it and aims to *not* dump it on neighbour cities. Now, GCCS hopes that Richmond will share (and even promote!) its big-picture vision, which is driven by higher values.

“Renewal”: An updated project name such as “Massey Thruway Renewal Project” would assert the *renewal aspect* that Richmond has long supported, in harmony with Metro Vancouver and—except in recent years—the BC government. **The GCCS suggests this be done soon.**

With the power of naming, the updated name would remove an impediment to success, the term “*Replacement Project*” that tends to preclude retention and renewal.

“Thruway”: Going far beyond the tunnel, **the renewal would feature a transportation thruway**, like a river (Hwy 99) with its tributaries (and distributaries). With greatly enhanced transit (starting very soon), the thruway will get people (and more) from place to place (such as home to workplace) on both sides of the South Arm of the Fraser in reliable, convenient and comfortable ways.

It is fairly like an [Amtrak Thruway](#). That proven thruway features coach buses, and the choice of bus options for the Massey Freeway will be critical, but **an early step would be a healthy dose of any kind of Rapid Buses** to alleviate congestion.

Determinant of wellbeing: The Massey Thruway can and should be a social determinant of wellbeing as an enabler of access to employment, food, health care, education and social support, with tributaries from/to Hwy 99. (That is already the implicit intent. The label makes it simpler to discuss.)

Value per dollar: An independent analysis will likely find that the Massey Thruway Renewal will provide more value at less cost than the current project plan. Some of the most valuable benefits have been downplayed, so **GCCS suggests bringing those values to attention**. For instance, the *Renewal* can:

- End the immense ecological threat to the Fraser Estuary—and the whole Fraser *River* and Salish Sea—from deeper dredging of the ship channel. (It is a bad time for it, but the intent will persist if it can.)
- Minimize the biggest threat to safety. The incidence of LNG carrier explosion may seem low, but it would leave a swath of devastation—probably worse than the Halifax Explosion of 1917. (For instance, it might only take only one terrorist throwing a well-suited bomb from the bridge.)
- Be a model for the world, with values for the BC economy and the future of life on Earth.

Richmond’s two options: Richmond’s Transportation Department is refining two renewal options that embody the tunnel expansion intent, which goes back to the initial engineering consultants’ thorough report, *Fraser River Highway Crossing at Deas Island, 1955*. The GCCS commends them. The third GCCS response in this series will share suggestions for making the options even better.

3. Safety benefits of the renewed tunnel, from GCCS, 2017-08-21

Third in a series of requested inputs to Victor Wei, P. Eng., Director, Transportation, City of Richmond

Naturally, the principal structure in the Massey Thruway Renewal Project is the South Arm crossing structure—either the upgraded and expanded tunnel or the bridge that the previous BC government preferred. One point of agreement: **everyone wants to use it with due confidence it is safe.**

Best for safety: From that safety perspective, GCCS suggests it is optimal to add four lanes (Richmond’s Option 1) as a pair of 2-lane tunnel tubes—a new tube on each side of the Legacy Tube. (That should also be cost-friendly, user-friendly, timeline-friendly, etc., but the focus here is on assurance of safety.)

Basically, there would be four lanes heading in each direction (two in a new tube, two in the Legacy Tube).

As shown, each new tube is about 50 metres from the Legacy Tube, essentially within the Hwy 99 tunnel corridor. On the northwest side, access is between the Canfisco dock/plant to the east and the BC Ferries maintenance dock/facility. On the southeast side, access is via Deas Island Regional Park.

The BC Ferries cove (shown here with one ferry docked) was the low-lying site of the single-use dry dock where the six segments of the tunnel were fabricated in the late 1950s. It was then flooded so they could be floated (sealed at the ends) into position.



Traffic safety: GCCS is impressed with the Richmond concept of an additional outer lane through the tunnel in each direction—between the closest interchanges. At last, it would enable safe merging/diverging where it has been *unsafe*. For instance, where traffic from Steveston Hwy merges into the tunnel-bound traffic, statistical evidence indicates many crashes there, year after year. As well, anecdotal evidence indicates that the related fear prompts people to avoid driving through the tunnel.

The effect is roughly a one-third boost in tunnel-exiting capacity, so the earthquake warning system will] more certainly get everyone out in time. As well, perhaps, a lower speed limit could be applied to those user-empathic segments of outer lane, among the ways to tailor the feature for a safe and calm experience.

The simplicity of the tunnel is in contrast to the complexity of the proposed bridge. For instance, the tunnel project would include a simple two-level Steveston Interchange, not the proposed bridge’s [famous faux Los Angeles interchange](#), with its many ways for drivers to err and crash.

Seismic safety: With this design, two tubes out of the three would theoretically sustain no damage at all in the worst earthquake in 475 years and only repairable damage in the worst one in 2,450 years.

Furthermore, bringing the new tubes into use before doing the external seismic upgrade of the Legacy Tube would make that upgrade safer, especially since the current level of Legacy Tube traffic could be diverted entirely to the new tubes. (The temporary closure of the Legacy Tube would also enable the extensive *internal* renewal work to take place efficiently in the Legacy Tube.)

Along with the obvious benefits for seismic safety stated so far, there is an intriguing possibility that the new tubes could make the Legacy Tube seismically safer than ever thought possible.

This builds on the fact that studies like the [2002 Seismic Retrofits by Rensselaer Polytechnic](#) simulation show that lateral movement of the tunnel, which the external upgrade must address well, is an effect of seismic waves in the *upper 10 metres* of adjacent soil. Remediation* to that depth can be very effective.

The new tunnel tubes, with nearby state-of-the-art remediation, would normally not be damaged by even a fairly high-magnitude earthquake.

With the new tubes dissipating seismic waves and arresting ground movement, **one would expect the Legacy Tube—between them and only about 50 metres from them—to be further protected as a result.** *Is there an independent expert who could confirm this?*



Extreme-weather safety: The tunnel is well suited to the increasing incidence of extreme weather. Unlike a bridge, the tunnel would not typically be dangerous in storm winds, ice, blizzards, torrential rain or thick fog. It would therefore be one of the most reliable lifeline corridors—for emergency response in calamities when a bridge might sometimes even make the situation worse.

* Note: A [2016 report for the previous government](#) made concerning comments that make the remediation seem risky, but the report made suspect use of sources. For example, when it referred to a [2007 seismic densification value engineering study's](#) examination of ways to limit the *risk of cost overruns* in the external seismic upgrade, the 2016 report treated the financial risks as *safety risks*. Also, [provincial records](#) have revealed that the parent company of the report writers, which makes large donations to the BC Liberals, received a \$24,250,000 contract in 2013 to be the "George Massey Bridge Project Owner's Engineer" (the government's *bridge engineer*). That makes them less credible when critiquing the *competing tunnel* option. There are real seismic safety concerns, but the appearance of skewing by consultants with possible conflict of interest means that independent analysis is needed.

Safety from LNG explosions: When the Tilbury LNG plant (with much increased capacity) exports LNG, the carriers will pass through the Massey Crossing. A bridge there might enable a terrorist to drop a bomb on one. That seems as likely as a major earthquake. To add to the following background from the Fraser Voices’ [Let the Fraser Live](#), read Kevin Washbrook’s thorough [Sailing Into Unknown Waters](#).

The BC Wilderness Committee has created a colour-coded risk map of the area on the basis of a US Coast Guard document that outlines "zones of concern" in the event of an LNG tanker accident:

<p>Zone 1 is where an LNG spill could pose severe public safety and property hazard.</p>	<p>Zone 2 would be "less severe" in a wider hazard zone—up to 1.6 kilometres away.</p>	<p>Zone 3 would spread further into Ladner and Richmond. It is considered the maximum distance a cloud of escaped LNG vapour could drift without dispersing. If ignited, the cloud could burn back to the tanker and result in a "pool fire."</p>
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LNG Hazard Zones—“Zones of Concern”

Zone 1: 500 metres Zone 2: 1.6 kilometres Zone 3: 3.5 kilometres



First responding: In either of the new tubes, responders could reach crashes via a pathway—primarily provided for cyclists in one and pedestrians (and mobility-aid users such as wheelchair users) in the other. However, since the whole renewed tunnel will take every opportunity to provide and encourage safety, the need for first responders will be significantly reduced in the best possible way.

Details to come: Can two new 2-lane tubes provide better value per dollar than a single 4-lane tube? The next response in this series will provide details on such questions that are beyond the safety topic.

4. Why use *two 2-lane tubes* to add four lanes? From *Jim Wright*, 2017-08-28

Fourth in a series of responses to Victor Wei, P. Eng., Director, Transportation, City of Richmond.

The Garden City Conservation Society (GCCS) has suggested that the Massey Thruway Renewal Project consider adding a 2-lane tube on each side of the Legacy Tube *if it the project opts to add four lanes*. This response—from Jim Wright—fills out the values of that:

1. Having tubes just over half as wide as 4-lane ones would make each segment much smaller, making construction in a shipyard or purpose-built drydock more feasible. (The drydock where the Legacy Tube was fabricated is now the BC Ferries cove in the top-left corner of the graphic—not available.)
2. Each of the two 2-lane tubes could have its path for walking, cycling and rolling (and emergency use) on the outer side of the expanded tunnel, with *user movement in the same direction as traffic movement*. That is ideal for path users, who would have their first entry to the path beyond the last vehicle entrance and their last exit before the first vehicle exit. Southbound, for example, the path entry could be beyond (south of) Rice Mill Road, and the path exits could be before (north of) the vehicle exit for Delta's River Road. This approach says a lot: *it treats vehicle-less users as important*.
3. If there is thought of encouraging buses and/or large trucks to use the four added lanes—with their more generous width and height, that can only be done for both directions if there is a new tube on each side of the expanded tunnel.
4. Having two new lanes on each side of the expanded tunnel enables easy continuity with the existing highway lanes leading into/from the tunnel. (Simple is good, and there is no loss to Deas Island Regional Park or the somewhat natural area on the Richmond side.)
5. All these values add to the basic value of improved safety of the Legacy Tube in an earthquake (subject to an expert study confirming that theory). Furthermore, along with the boost to safety, any damage would be more likely to be repairable, saving money and enabling reliable service.



With all those values, a large financial cost might be reasonable, but it might not even occur. After all, when the existing tunnel was built, the meticulously quoted amount for a tunnel with *two 2-lane tubes* seems to have been far lower than its eventual cost as *a single 4-lane tube* with far less included. * For instance, the originally planned ceramic tile (reflective and easily cleaned) and raised walkway beside each pair of lanes would, in effect, have added significant safety benefits.)

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- According to "[British Columbia's Massey Tunnel was a cutting-edge endeavour](#)" in the *Journal of Commerce* (Sep 7, 2009), the 4-lane tube cost \$29 million. So much more was included (as listed in the very thorough 1955 report, *Fraser River Highway Crossing at Deas Island*, by Crippen Wright Engineering Ltd.) that it is hard to be precise about the cost difference, but the actual tunnel seems to have increased the cost by at least a third.
 - The Crippen Wright report is available on short-term loan from the [Garden City Conservation Society](#).