



Ministry of
Transportation
and Infrastructure



George Massey Crossing Project

Phase 2: Crossing Options
Richmond General Purposes Committee
October 15, 2019

Schedule 1 to the Minutes of the
Special General Purposes
Committee meeting of Richmond
City Council held on Tuesday,
October 15, 2019.



Agenda

- Planning and engagement to date
- What we heard
- Options analysis
- Request to select preferred option

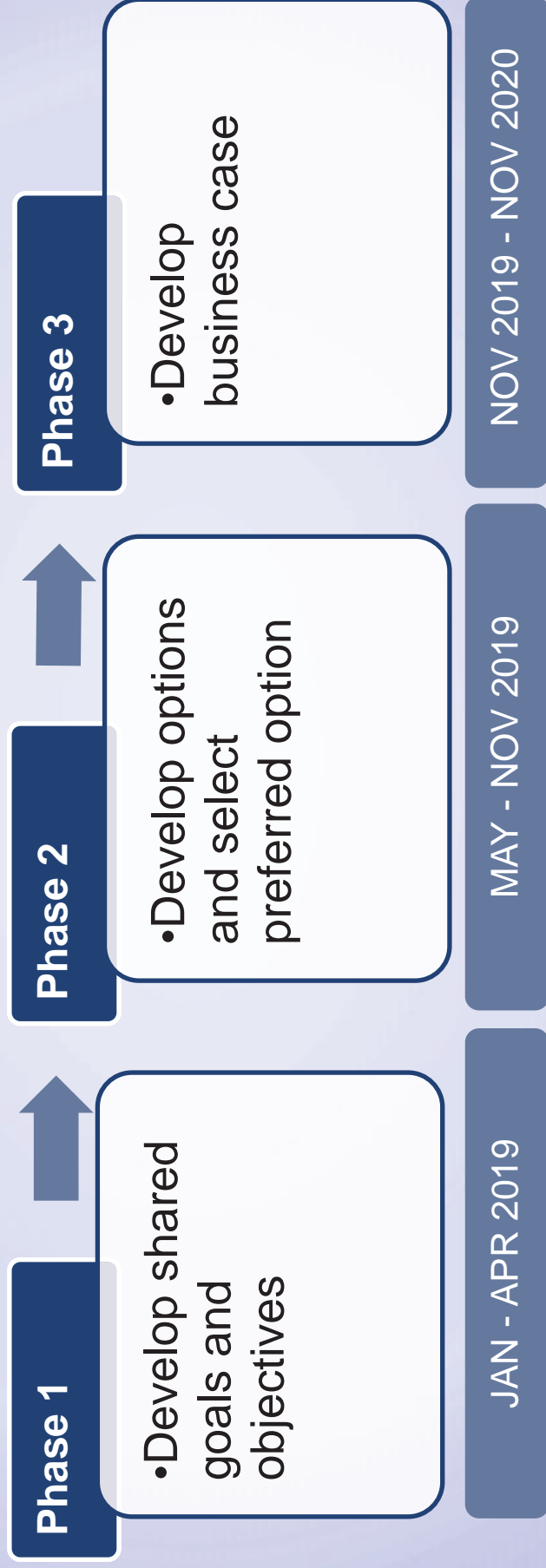


Project Update

- Completed initial meetings with interested councils
- Finalized principles, goals and objectives
- Developed long-list of options
- Developed evaluation framework
- Retained technical consultants
- Worked with Task Force and agency staff
- Concurrent engagements with First Nations
- Stakeholder meetings on request
- Public input ongoing



Process Recap





Project Principles

Align with
regional
plans and
respect
Aboriginal
Interests

Safety

Reliability

Connectivity



Project Goals

Support sustainability
of Fraser River
Communities

Facilitate increased
share of sustainable
modes of transport

Enhance regional
goods movement and
commerce

Support a healthy
environment



Task Force Engagement Process





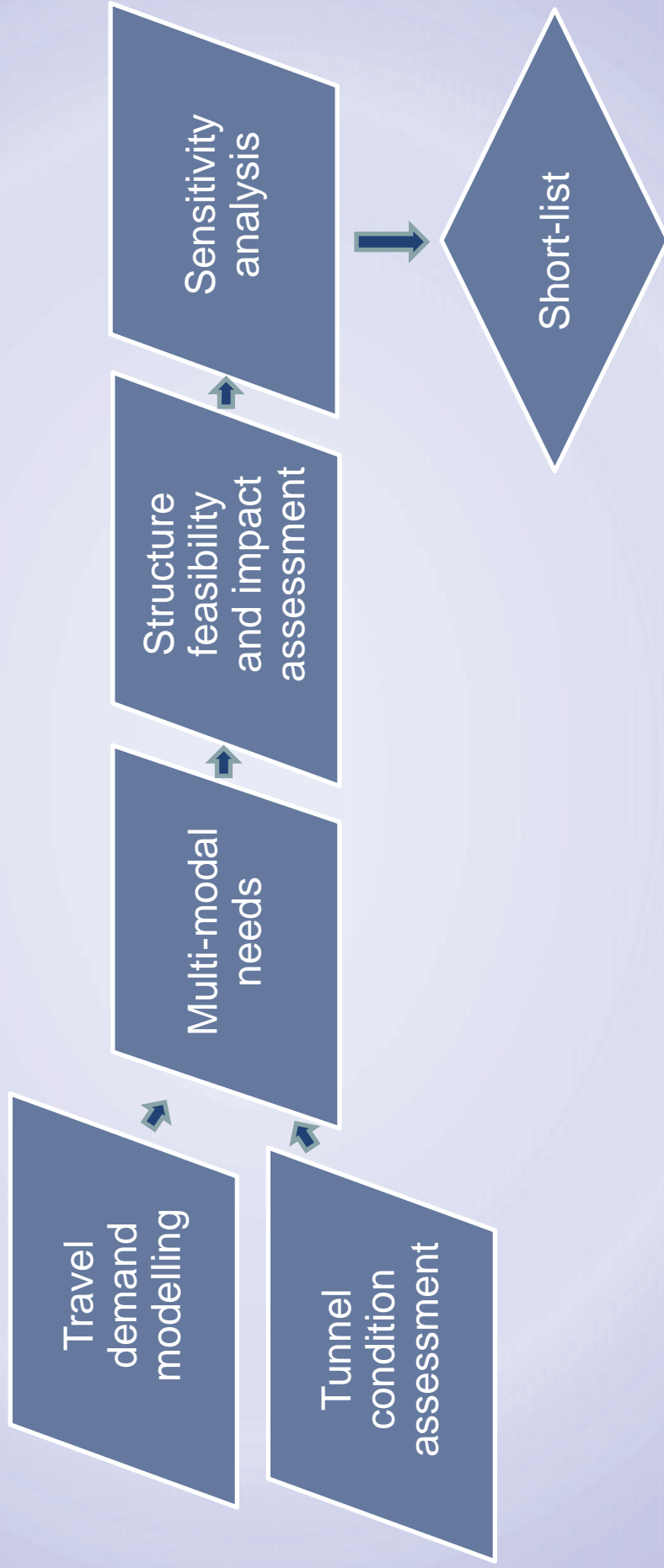
Long-list of Options

18 potential options identified:

- 6-8 lanes
- Consideration of counterflow
- With and without the existing tunnel
- Transit, cycling and pedestrian provisions
- Range of structural options



Long-list Evaluation Process





Short-list Evaluation Framework - Highlights

- Safety
- Travel time
- Agricultural & industrial land
- Communities quality of life
- Project completion timeline
- Transit trip times
- Ease of future expansion to rail transit



Lane Alternatives Analysis Summary

- 6-lane generates significant benefits in the off-peak direction on Hwy 99; some peak direction benefits.
- 8-lane **with** transit dedication incentivizes transit use and provides upside future Hwy 99 resilience benefits.
- 8-lane **without** transit dedication generates overall network benefits but limits transit network benefits.



Endorsed Options Short-list

All options include 2 lanes dedicated for transit and cycling/pedestrian paths

- 8-lane deep bored tunnel (DBT)
- 8-lane immersed tube tunnel (ITT)
- 8-lane bridge
- 6-lane DBT + transit lanes in existing tunnel
- 6-lane ITT + transit lanes in existing tunnel
- 6-lane bridge + transit lanes in existing tunnel



What we've heard from the Task Force

- Urgency to move forward quickly
- Promoting transit use is imperative
- Concern about lifespan of existing tunnel
- Desire to manage risk and cost

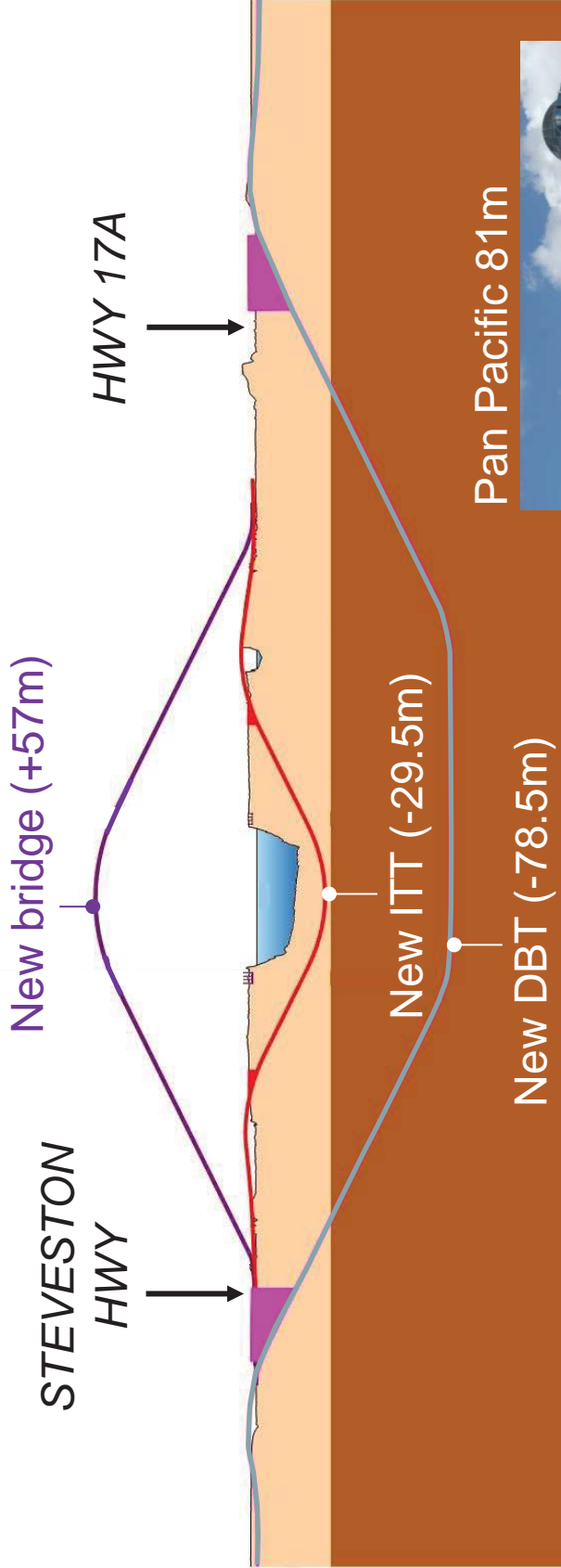


Existing Tunnel

Options using the existing tunnel have greater impacts than all-new options due to:

- In-river ground densification
- Environmental Assessment extended timeline
- Up to 5 minutes longer for transit trips
- Shorter lifespan
- Additional cost (hundreds of millions)

Comparative Height/Depth of Options



Pan Pacific 81m

GLACIAL TILL DEPTH -300m+



Benchmark Comparisons for Costing

Deep Bored Tunnel:

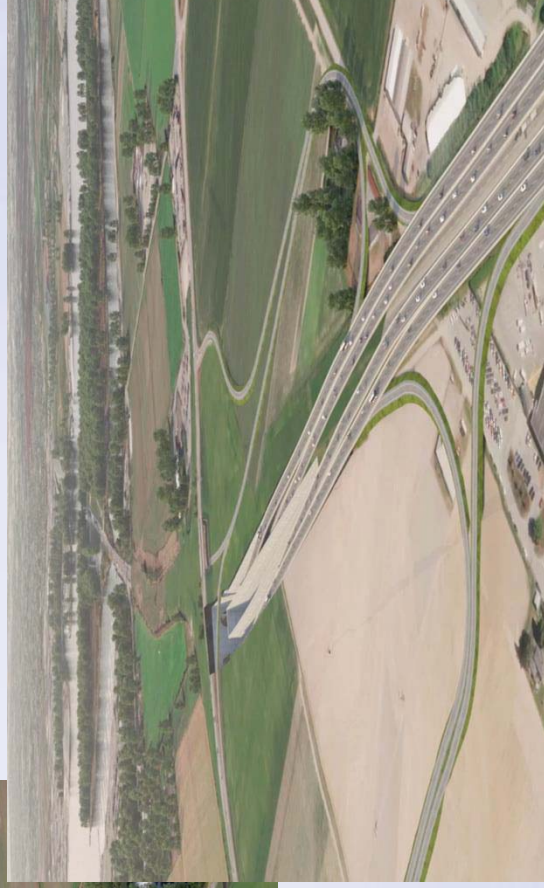
- 8 recent projects in the U.S., Italy, Hong Kong and Australia
- None with our soil or seismic conditions

Immersed Tube Tunnel:

- 7 projects in the U.S. and northern Europe

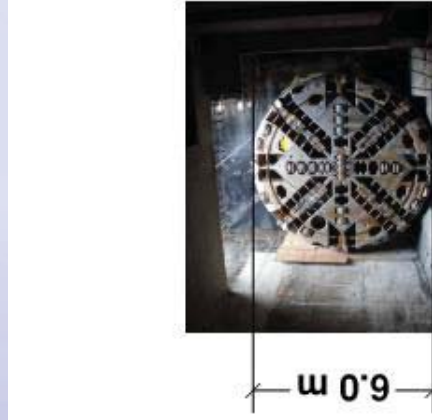


Deep Bored Tunnel Concept Design





Deep Bored Tunnel Size Reference



Canada Line



Evergreen Line



SR99 (Bertha)
Slightly smaller than
would be required



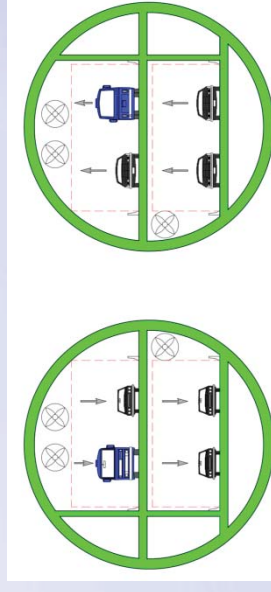
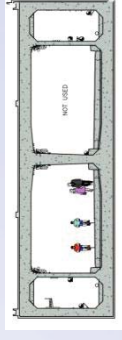
Deep Bored Tunnel Cross Section





Deep Bored Tunnel

- Significant risk of multiple sinkholes
- Longest timeframe to completion
- Extends beyond Steveston and Hwy 17A I/C
- Increased transit trip times
- Existing tunnel must be retained for pedestrians and cyclists
- ALR impacts – up to 200 acres
- Approx. 3 times cost of ITT/bridge





Deep Bored Tunnel Interchange Footprint



Preliminary draft for discussion purposes only





Immersed Tube Tunnel Concept Design





Ministry of
Transportation
and Infrastructure



Immersed Tube Tunnel Concept Planview





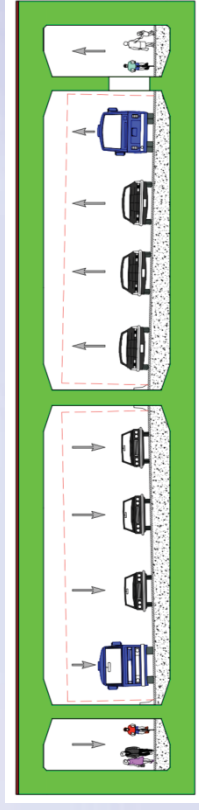
Immersed Tube Tunnel Portal





Immersed Tube Tunnel

- Temporary environmental impact during construction;
- lowest long term impact
- Greatest potential for environmental enhancements
- Medium timeframe to completion
- Low property impact
- Comparable order of magnitude cost to bridge





Ministry of
Transportation
and Infrastructure



Long Span Bridge Concept Planview





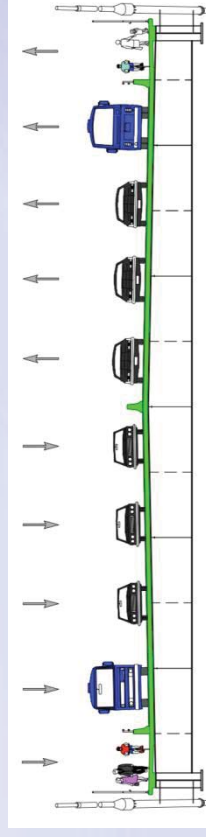
Long Span Bridge Concept Design





Long Span Bridge

- Long term noise, visual and shading impacts
- Land-side property impacts
- No in-river disturbance
- Shortest timeframe to completion
- Comparable order of magnitude cost to ITT
- Local construction expertise





Technology Summary

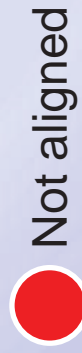
Option	Bore Tunnel	Immersed Tube	Long-span Bridge
Environment Impacts	<ul style="list-style-type: none"> • Sinkhole potential • ALR • Ground densification 	<ul style="list-style-type: none"> • In-river construction 	<ul style="list-style-type: none"> • Noise, visual and shade
Est. Schedule			
<ul style="list-style-type: none"> • EA • Construction 	<ul style="list-style-type: none"> • 3 yr • 7 yr 	<ul style="list-style-type: none"> • 3 yr • 5 yr 	<ul style="list-style-type: none"> • 2 yr • 5 yr
Construction Risk	<ul style="list-style-type: none"> • High 	<ul style="list-style-type: none"> • Medium 	<ul style="list-style-type: none"> • Low
High level cost estimate	<ul style="list-style-type: none"> • Approx. 3 times cost of ITT/bridge 	<ul style="list-style-type: none"> • Comparable cost to bridge 	<ul style="list-style-type: none"> • Comparable cost to ITT



Goals Summary

Key differences by goal area:

- **Goal 1:** ALR impact, timeline
- **Goal 2:** Transit, cycling + pedestrian experience
- **Goal 3:** Goods and service reliability, industrial land impact
- **Goal 4:** In-river impact, community livability



Not aligned



Somewhat aligned



Aligned



Goal Achievement Analysis Summary

Goal	Bored Tunnel	Immersed Tube	Bridge
Goal 1: Support community sustainability	●	●	●
Goal 2: Increase share of sustainable modes	●	●	●
Goal 3: Enhance regional goods movement	●	●	●
Goal 4: Support healthy environment	●	●	●

● Not aligned

● Somewhat aligned

● Aligned



Ministry of
Transportation
and Infrastructure



Thank You