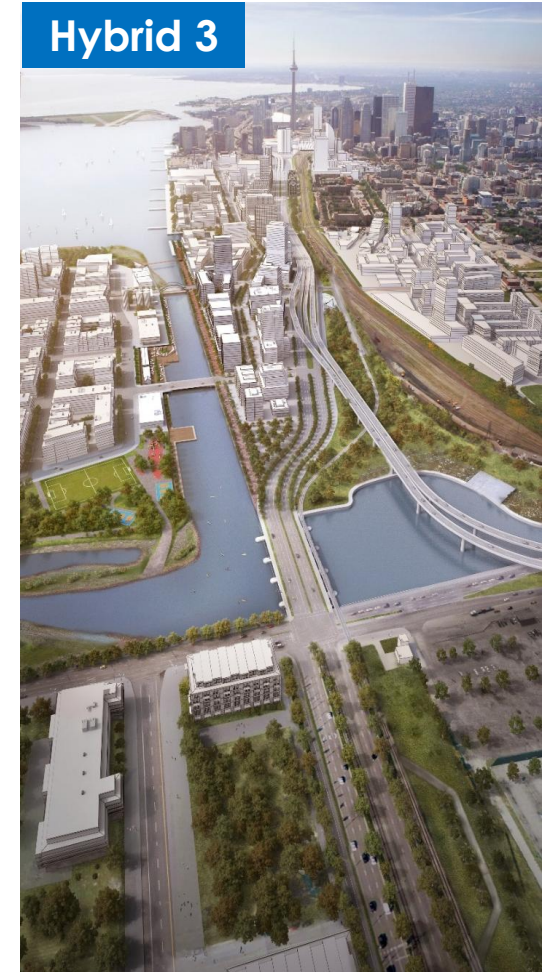


Gardiner East EA

Hybrid Alternative Designs



Public Works & Infrastructure Committee – March 1, 2016

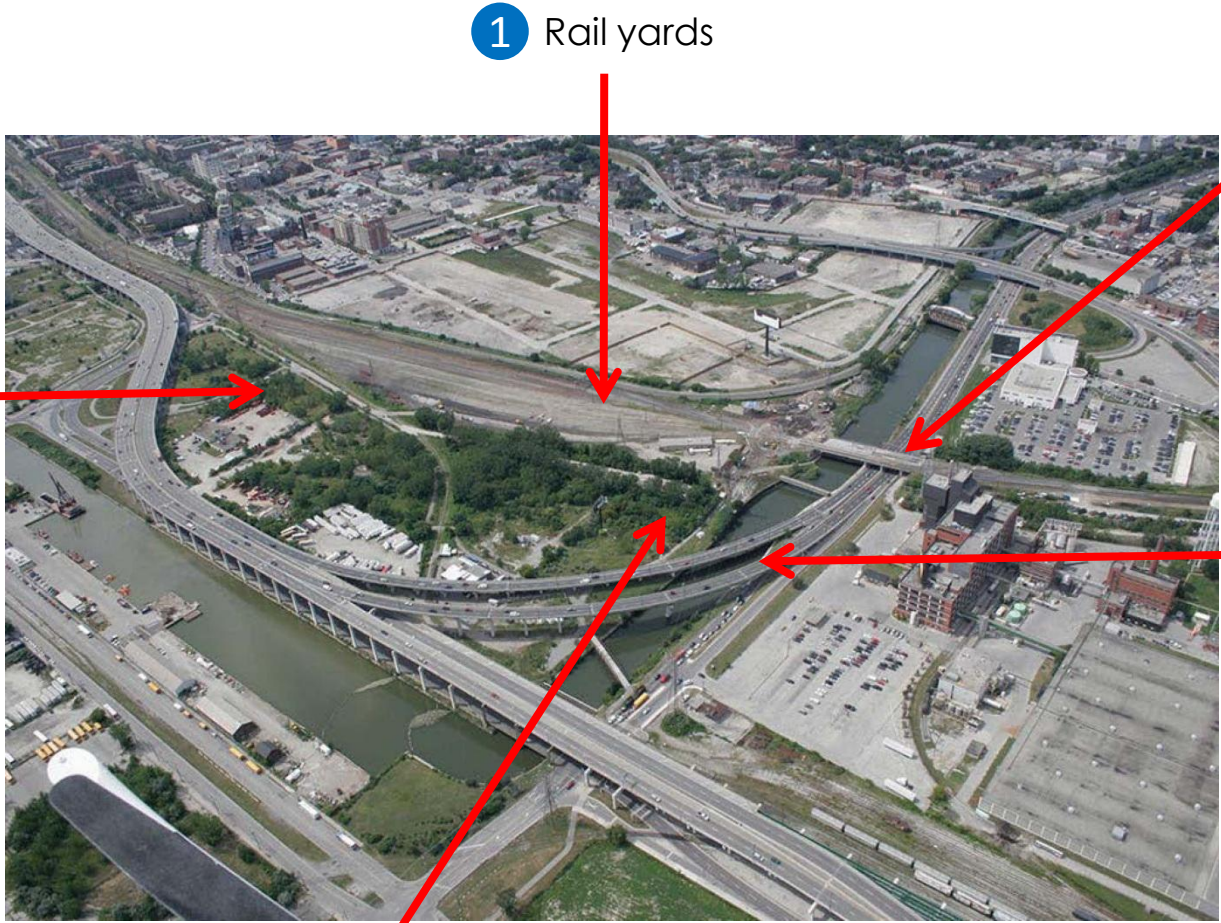
Council Direction

- In June 2015, City Council endorsed the Hybrid as the preferred solution for the Gardiner East EA
- Council directed staff to develop and evaluate alternative designs for the Hybrid
- Council also directed staff to incorporate the EA preferred alternative for the Gardiner into the Strategic Plan for the Rehabilitation of the Gardiner Expressway
- In September 2015, the City's Public Works and Infrastructure Committee endorsed three Hybrid alternative design concepts for further assessment:
 - Hybrid 1: Revised Hybrid with tighter ramps in Keating
 - Hybrid 2: New Hybrid with alignment further north
 - Hybrid 3: New Hybrid with alignment further north and rail bridge underpass widening

A Decision is Needed

- A decision on the Gardiner East is critical
- The elevated concrete deck is in poor condition and approaching the end of its useful service life
- The Gardiner East requires significant public investment, regardless of the preferred design
- Interim repairs were started in 2013 and are expected to be completed by the end of 2016
- An aggressive schedule has been developed that could see implementation of the Gardiner Strategic Plan, including the Gardiner East, commencing as early as 2018

Hybrid Design Constraints and Considerations



1 Rail yards

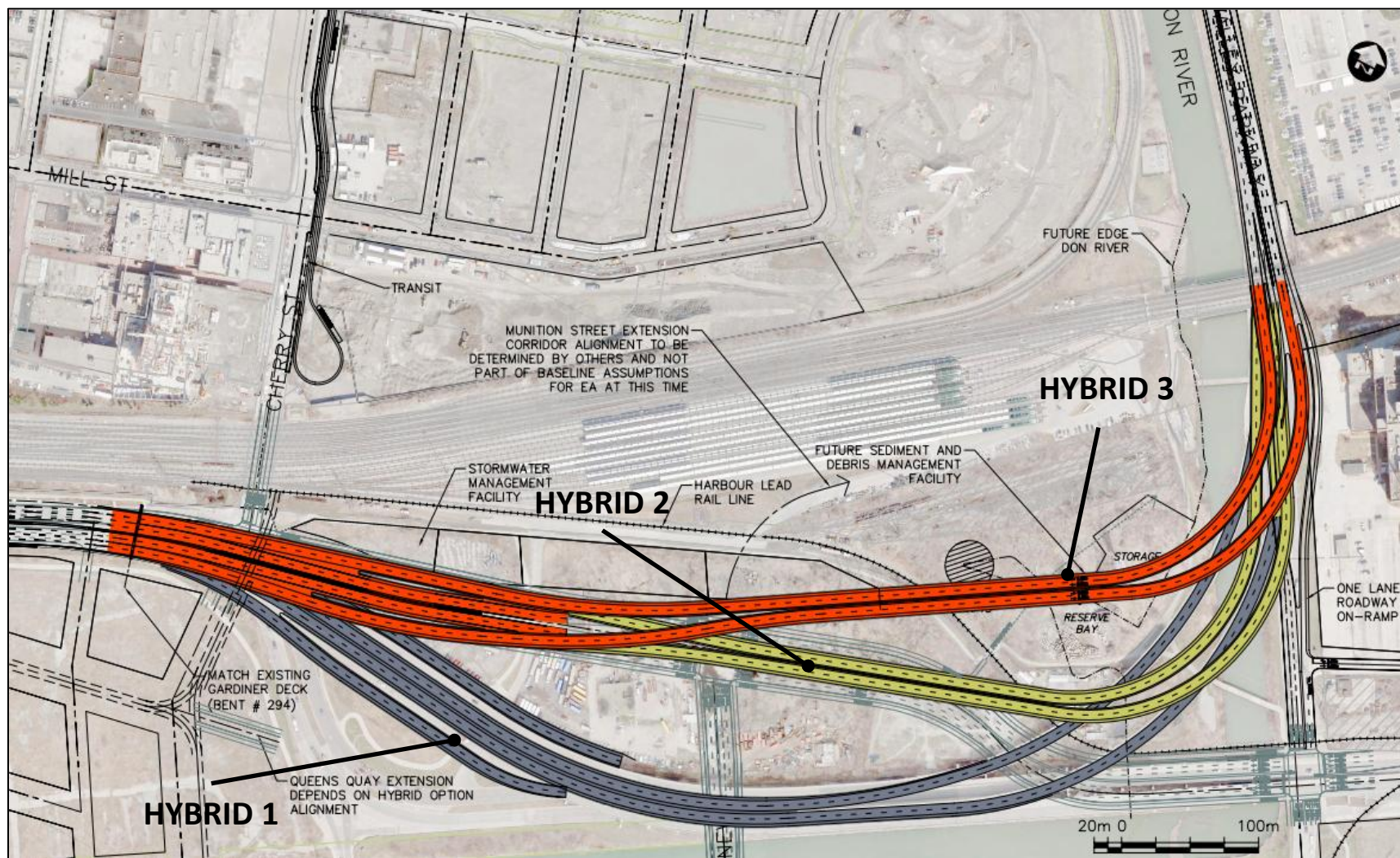
2 Rail corridor bridge

5 City Stormwater Quality Management Facility

3 Gardiner-DVP link

4 Planned Don River Sediment Control Basin

Overlay of Hybrid Alternative Designs

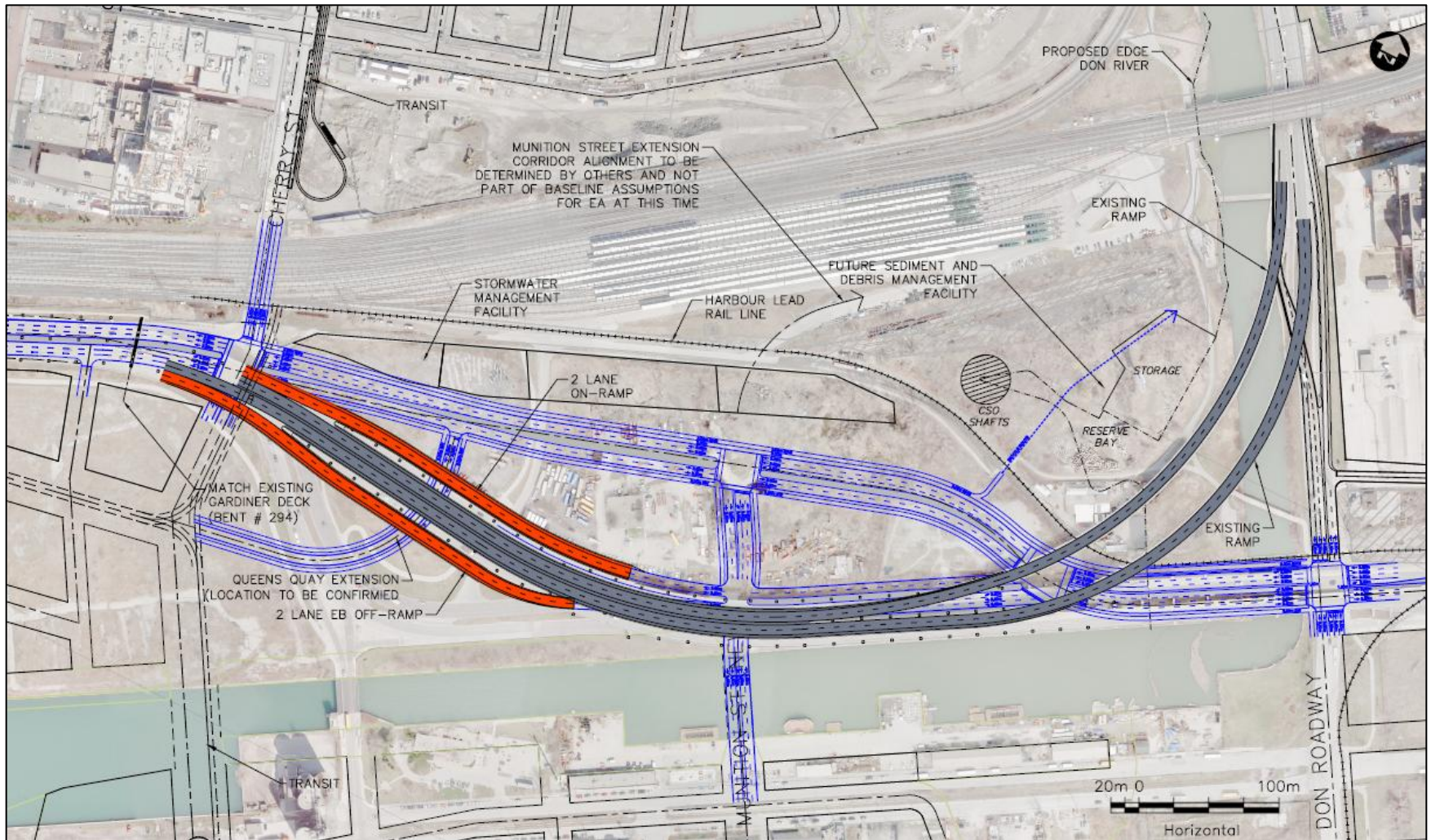


Common Elements - Hybrid Alternative Designs

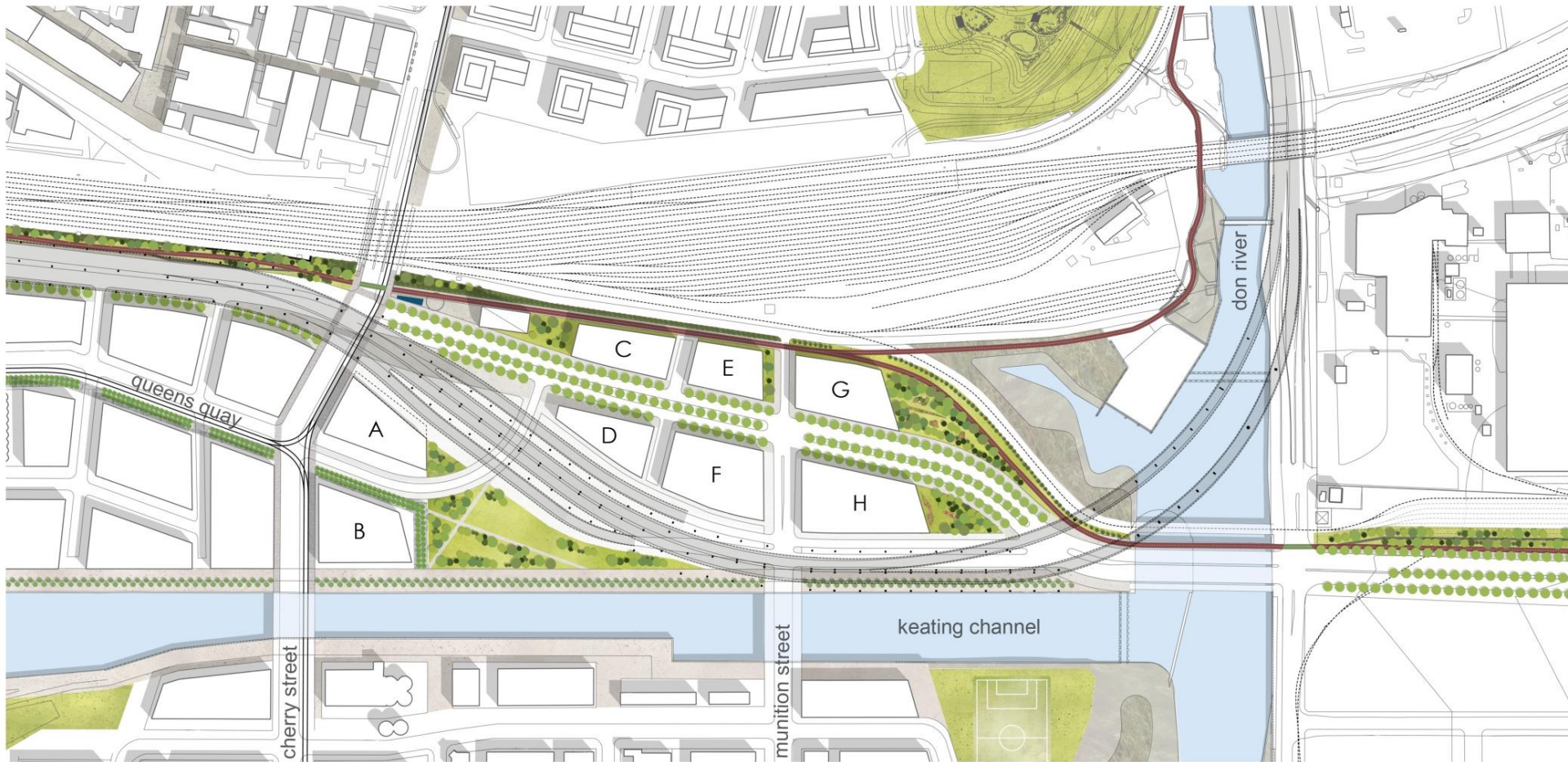
All design concepts:

- Preserve continuous Gardiner-DVP freeway connection
- Remove Logan on/off ramps
- Provide new on/off ramps at Cherry Street
- Realign Lake Shore Boulevard through Keating Precinct
- Accommodate future surface street connections (e.g. Queens Quay and Munition Street)
- Support the Gardiner Strategic Plan

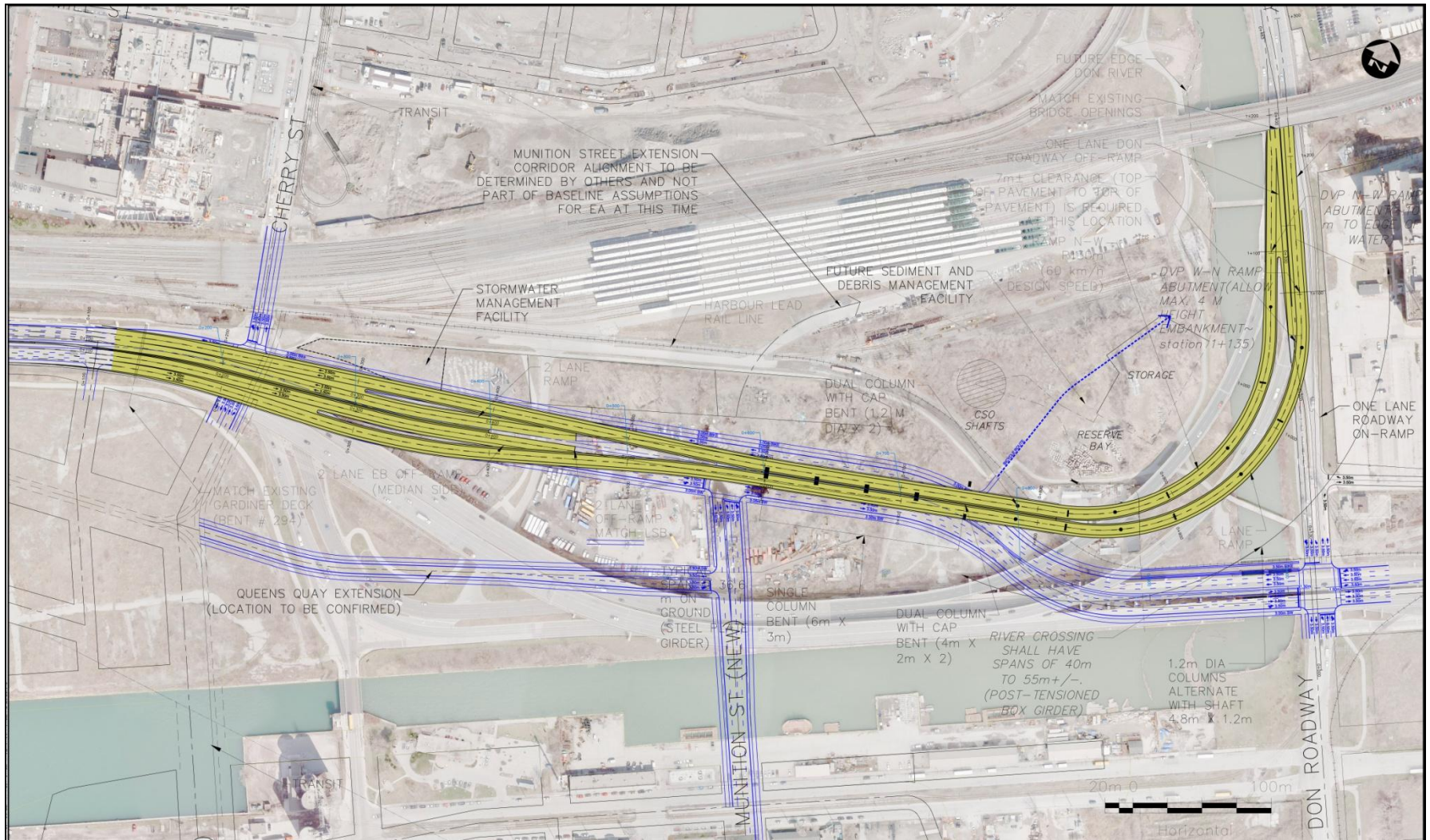
Hybrid 1: Road Design



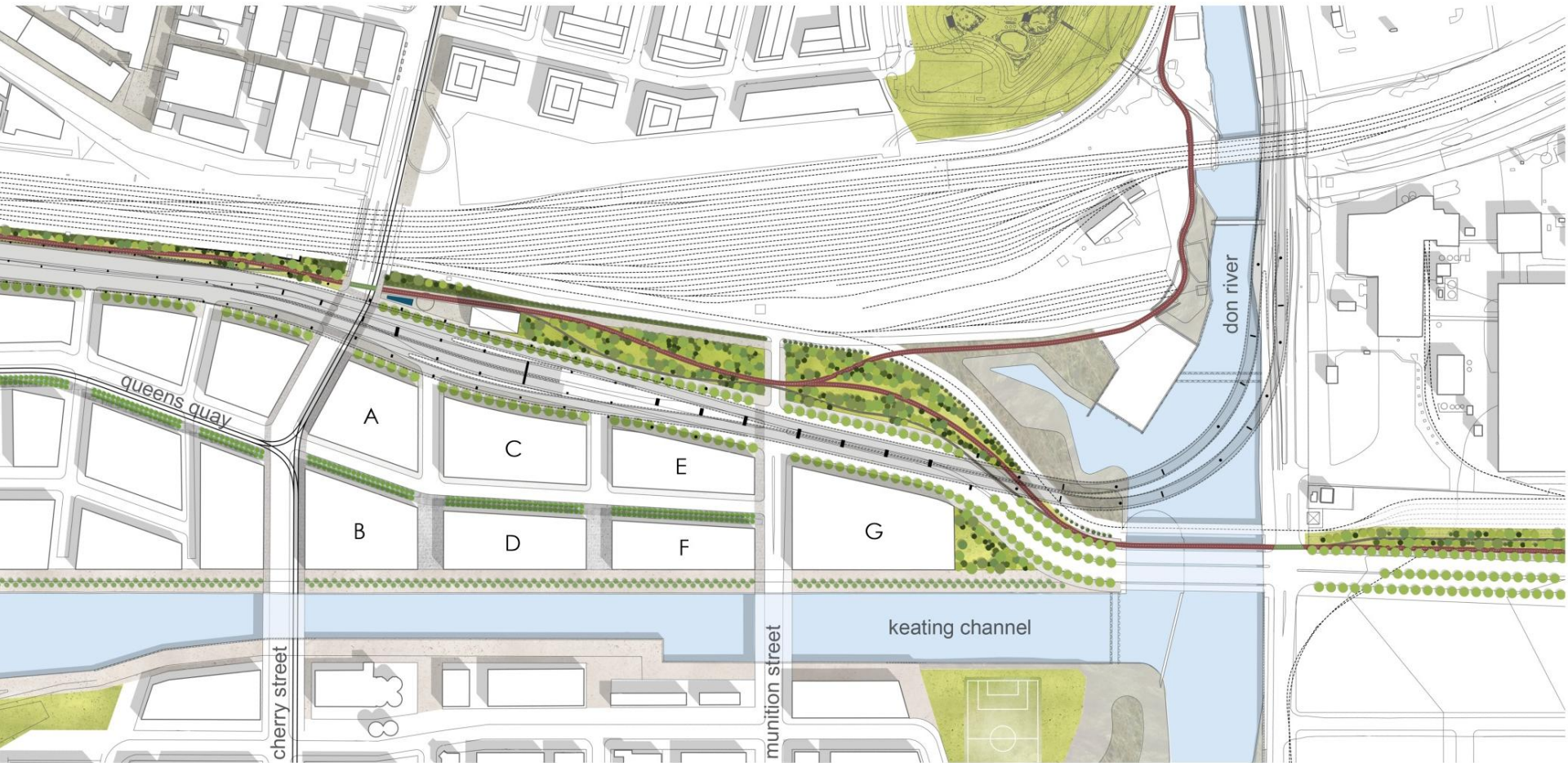
Hybrid 1: Urban Design Concept



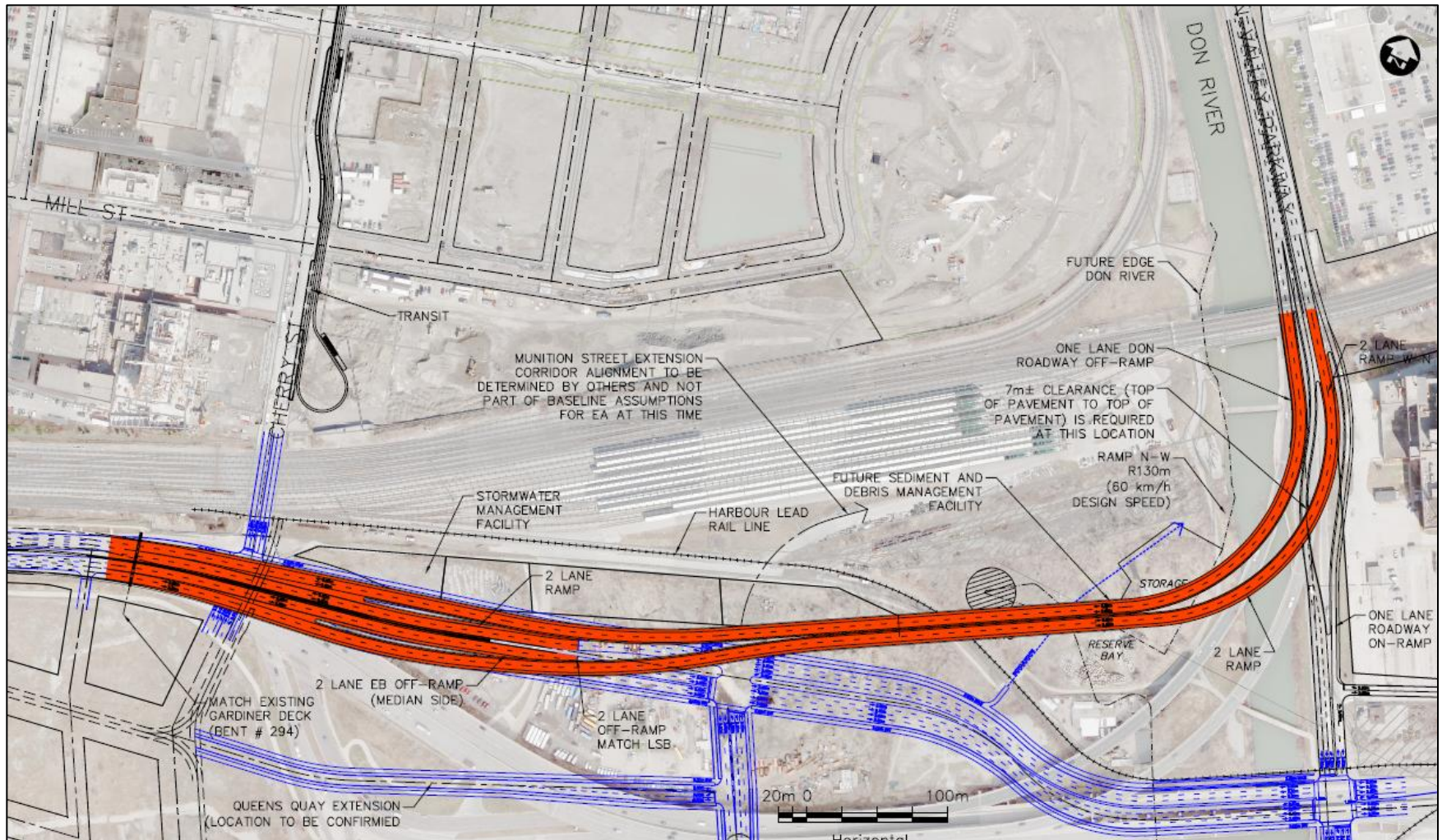
Hybrid 2: Road Design



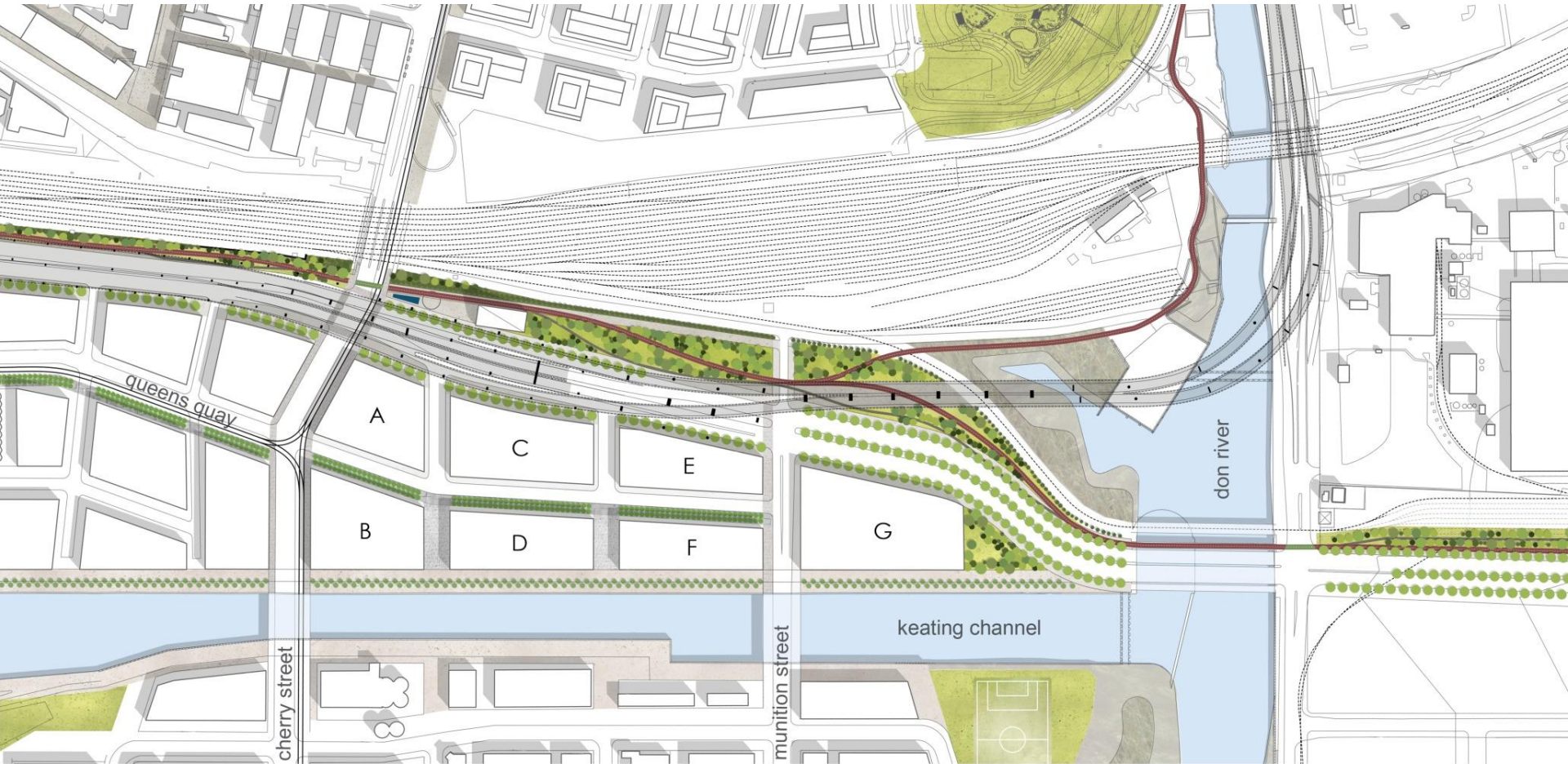
Hybrid 2: Urban Design Concept



Hybrid 3: Road Design



Hybrid 3: Urban Design Concept



Summary

Hybrid 1



Hybrid 2

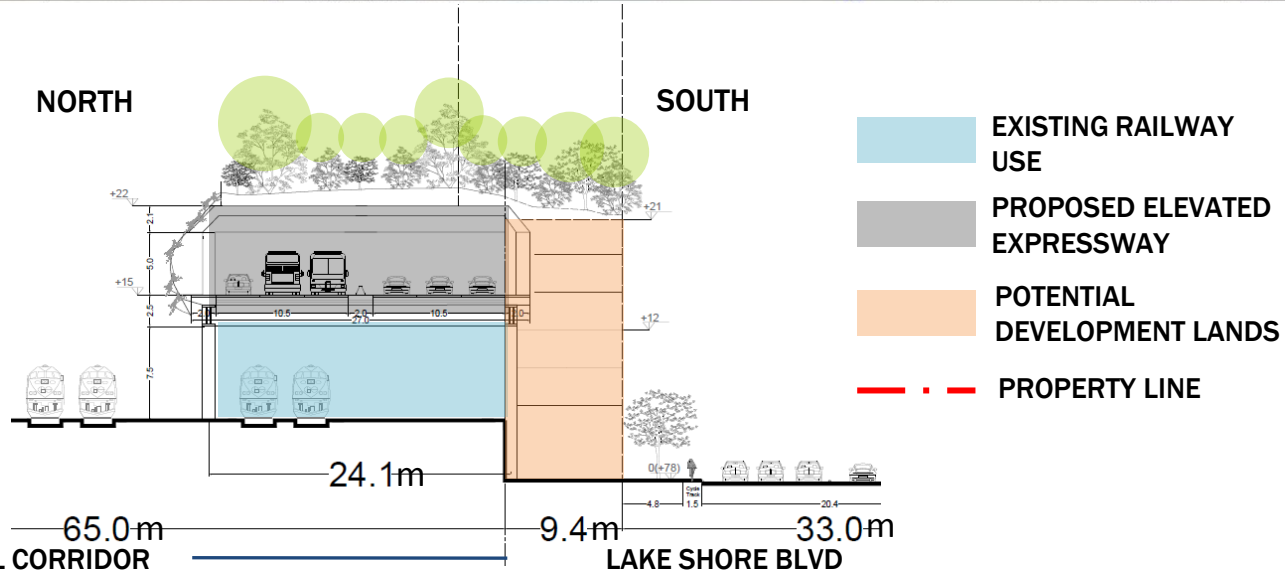
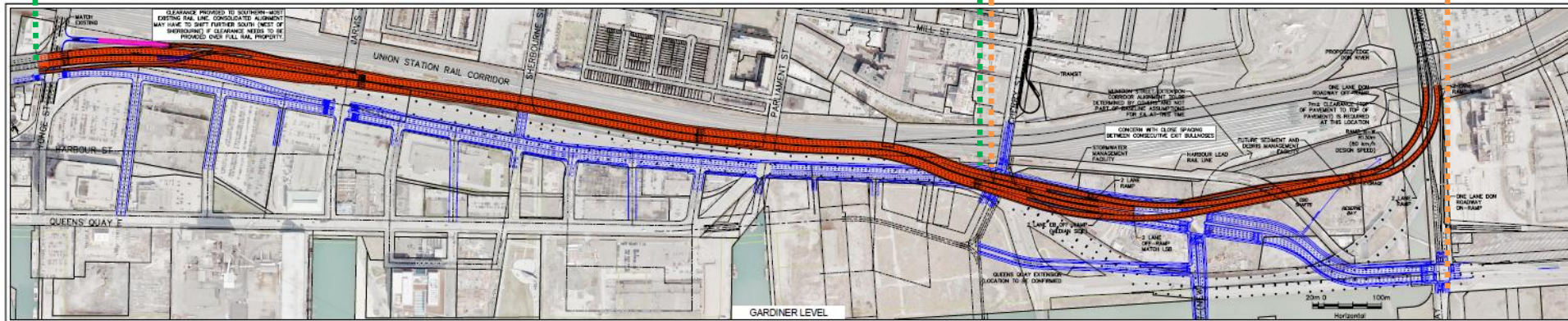


Hybrid 3



The Green Gardiner

Hybrid 1, 2 or 3



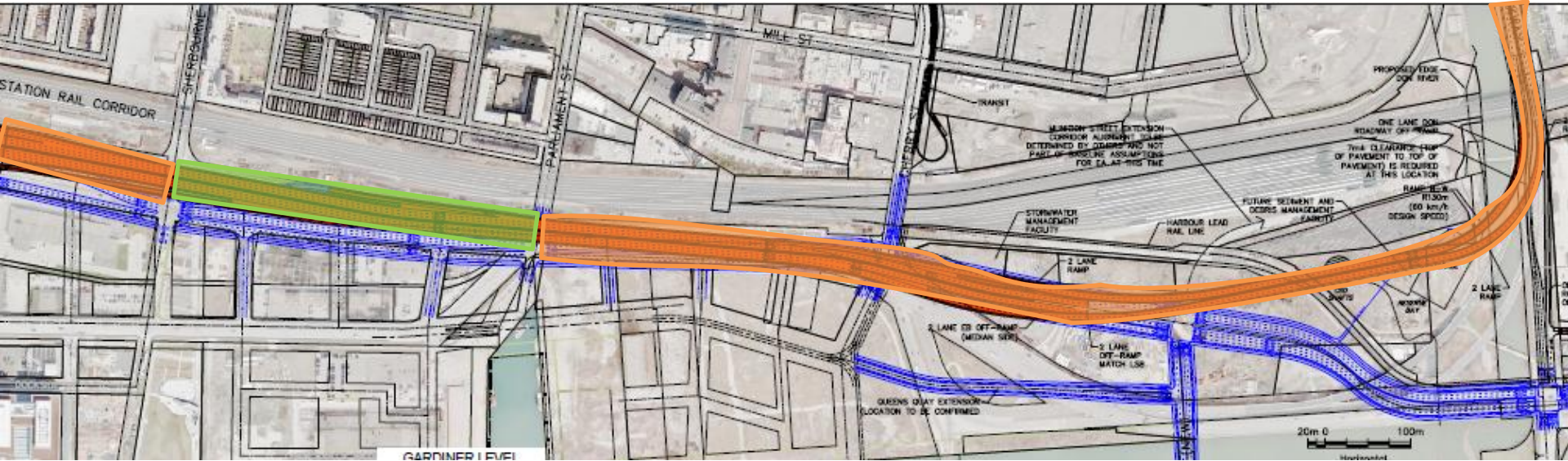
Pros

- 1.1 km of open-air Lake Shore Blvd with two-sided development
- Additional three hectares of public land released for development (\$130M - \$145M)
- New open space over expressway deck

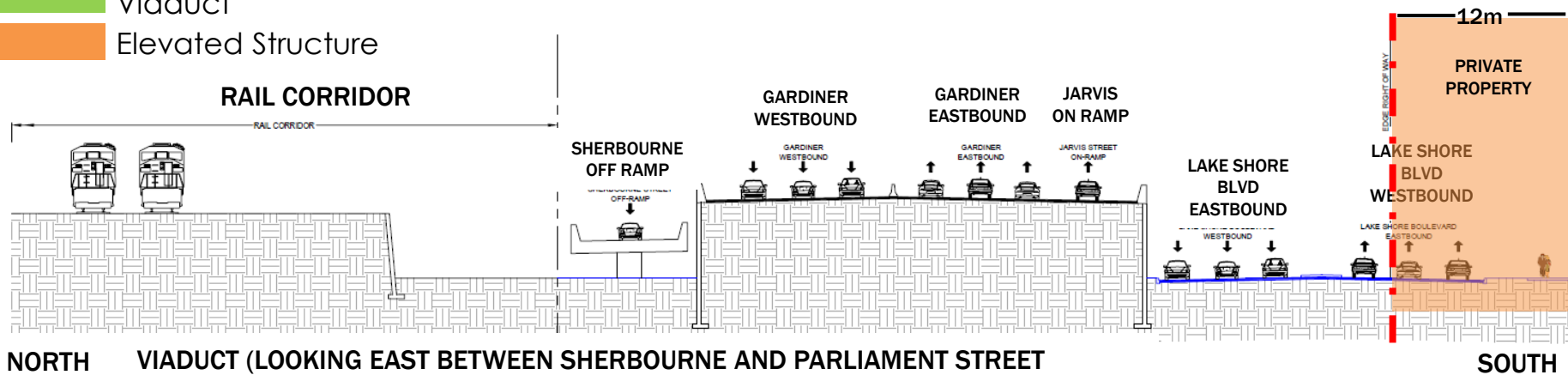
Cons

- Lengthy and uncertain Metrolinx approvals process
- Design and approvals unachievable within lifespan of current Gardiner East
- Results in throwaway Gardiner rehabilitation costs
- Extra \$735M (2013\$) over Hybrid costs
- Local neighbourhood noise, air quality and view impacts
- New WB off-ramp at Munition reduces open space and impacts Keating Precinct

The Viaduct



- Viaduct
- Elevated Structure



Pros

- Creates a section of bermed expressway / open-air Lake Shore Blvd from Sherbourne to Parliament with two-sided development
- Lower highway profile in bermed section improves corridor views
- Reduced lifecycle costs for bermed section

Cons

- Only 425m of viaduct possible in 1700m corridor
- Design and approvals unachievable within lifespan of current Gardiner East
- Costly and lengthy landowner negotiations
- Results in throwaway Gardiner rehabilitation costs
- Extra \$485M (2013\$) over Hybrid costs
- Plus costs for property acquisition for 12 sites (\$45M - \$50M)
- Lengthens pedestrian crossing distances at some north-south streets

- Detailed analysis of proposals completed, discussed with Metrolinx, proponents and other stakeholders
- Third-party teams helped inform designs for the Hybrid east of Cherry
- Design and approvals unachievable within lifespan of current Gardiner East
- Costly, including throwaway rehabilitation costs
- Long-term potential to examine Green Gardiner after Metrolinx plans are implemented
- Viaduct benefits limited to a short section
- These proposals are not being carried forward for additional study in the Gardiner East EA

Hybrid Evaluation Criteria

A. Transportation and Infrastructure

- Automobile
- Transit
- Pedestrian
- Cycling
- Movement of Goods
- Safety
- Construction Impacts

B. Urban Design

- Planning
- Public Realm
- Built Form

C. Environment

- Social & Health
- Natural Environment
- Cultural Resources

D. Economics

- Global & Regional Economics
- Local Economics
- Fiscal Net Benefits

DVP-Gardiner Ramp



- Design speed determines ramp radius
- Existing DVP- Gardiner Ramp has a 190m radius ramp and a 70km/h design speed

70 km/h design speed:

- Would be posted at 60km/h
- Would retain freeway connection and functionality
- Requires a 190m radius ramp
- Would satisfy minimum accepted freeway design standards
- May require additional safety measures

60 km/h design speed:

- Would be posted at 50km/h
- Would retain connection but at a reduced speed
- Would enable tighter radius (130m) ramp
- Would require additional safety measures (e.g.):
 - Signage
 - Warning Lights
 - Deceleration zones

- All three Hybrid designs have similar auto travel time and capacity
- Lower speed ramps for Hybrid designs 2 and 3 have nominal to zero impact on projected auto travel times
- Traffic modeling confirms need for new access ramps at Cherry Street to replace Logan ramps
- Similar demand/volume on Lake Shore Blvd anticipated under all scenarios
- Hybrid designs 2 and 3 allow for better development of local street network

The results reflect Dillon Consulting's Road Safety review, peer reviewed by AECOM

Hybrid 1	Hybrid 2	Hybrid 3
<ul style="list-style-type: none"> While existing DVP Gardiner Ramps have a higher design speed, they do not meet current standards due to lack of roadway shoulders and limited sightlines. Potential traffic weaving issues for EB traffic between Jarvis on-ramp and Cherry off-ramp. Potential sightline issues with new EB off-ramp due to expressway columns. Potential new WB on-ramp weaving issues with Sherbourne exit. 	<ul style="list-style-type: none"> New DVP-Gardiner ramps Include wider shoulders to improve sightlines. Drivers will likely exceed the design speed on the curved portion of DVP-Gardiner ramps - signage and speed deceleration zones will be required (90 km/hr to 50 km/hr). With appropriate mitigation, ramps can be designed to an acceptable level of safety. 	<ul style="list-style-type: none"> New DVP-Gardiner ramps Include wider shoulders to improve sightlines. Drivers will likely exceed the design speed on the curved portion of DVP-Gardiner ramps - signage and speed deceleration zones will be required (90 km/hr to 50 km/hr). With appropriate mitigation, ramps can be designed to an acceptable level of safety.

Hybrid 1

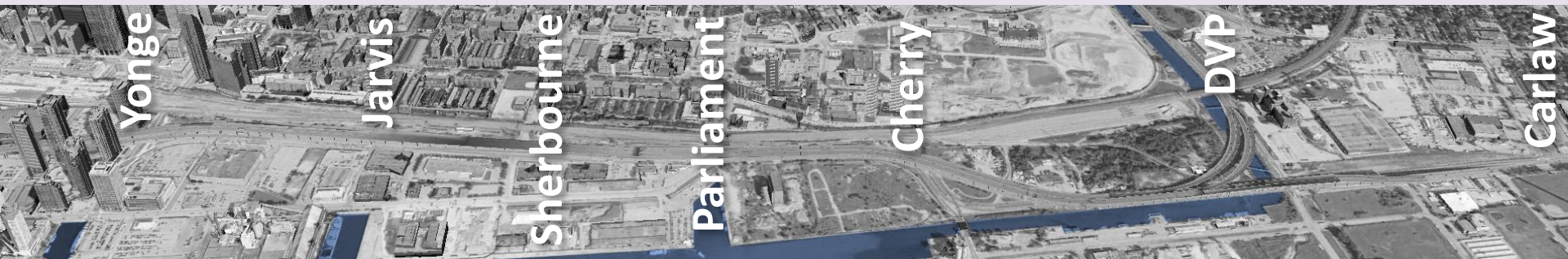
- Approx. **4 years incl. 1 year advance work** – Overall shorter period than Hybrid 2 & 3.
- Majority of the realigned LSB **can be constructed while maintaining current LSB.**
- **Traffic detours required** utilizing Villiers Street and temporary widening of Don Roadway, for work at Logan Ramp, Don River Bridge, new Gardiner Ramps and DVP column relocation, incl. other restrictions.
- Potential **least period of traffic detours** (approx. 2 -3 years).

Hybrid 2

- Approx. **5 years incl. 1 year advance work** – Overall longer than Hybrid 1.
- Majority of the realigned LSB **can be constructed while maintaining current LSB.**
- Traffic detours required utilizing Villiers Street and temporary widening of Don Roadway, for work at Logan Ramp, Don River Bridge, and New DVP-Gardiner Ramps, incl. other restrictions.
- Potential **longest period of traffic detours** for DVP-FGE ramp construction (approx. 3-4 years).

Hybrid 3

- Approx. **5 years incl. 1 year advance work** – Overall longer than Hybrid 1.
- Majority of the realigned **LSB can be constructed while maintaining current LSB.**
- Traffic detour requirement same as Hybrid 2.
- Potential for **shorter period of traffic detours than Hybrid 2** as existing ramps may remain open longer.
- Pre-stage highly challenging for the schedule as rail underpass widening is subject to Metrolinx requirements.
- Widening of **rail underpass may provide roadway detour opportunities.**



	Hybrid 1	Hybrid 2	Hybrid 3
Planning	<ul style="list-style-type: none"> Partially consistent with existing and approved plans, impacts Keating Channel Promenade due to ramps and roadways required east of Cherry Street. 	<ul style="list-style-type: none"> Improves opportunities for Keating Precinct development and Queens Quay extension. Improves Keating Channel Promenade. 	<ul style="list-style-type: none"> Improves opportunities for Keating Precinct development and Queens Quay extension. Improves Keating Channel Promenade.
Built Form	<ul style="list-style-type: none"> Opportunity for two-sided Lake Shore Blvd with active space at-grade. Greatest proportion of above-grade development compromised by proximity to elevated Gardiner Expressway. 	<ul style="list-style-type: none"> Provides double-sided Queens Quay with improved pedestrian scale for walkable vibrant streetscape. Relocated Gardiner has less amount of above-grade development impacted by expressway proximity. 	<ul style="list-style-type: none"> Provides double-sided Queens Quay with improved pedestrian scale for walkable vibrant streetscape. Least amount of above-grade development impacted by expressway proximity.
Public Realm	<ul style="list-style-type: none"> Streetscaping and public realm improvements along Lake Shore Blvd. View corridors and Keating Channel access compromised by ramps east of Cherry. Keating Channel water's edge impacted by expressway supports. Greatest impact on public streets and open spaces. 	<ul style="list-style-type: none"> Streetscape, view corridors, public realm improvements along Queens Quay extension, Keating Channel and Munition Street. Unencumbered water's edge along Keating Channel for pedestrian promenade. 	<ul style="list-style-type: none"> Streetscape, view corridors, public realm improvements along Queens Quay extension, Keating Channel and Munition Street. Unencumbered water's edge along Keating Channel for pedestrian promenade. Better Lakeshore Blvd. streetscape and visual connection with less overhead expressway. Visual connection over Don River Mouth improved.

Hybrid 1



Hybrid 2



Hybrid 3



Hybrid 1

- Ramp location assumed in design of sediment management facility.
- Assumed in flood risk modeling.
- **Ramps are located over Don River mouth** area and thus are less preferred.

Hybrid 2

- Alignment location is less preferred than Hybrid 3 as **potential to disrupt sediment management operation** activities.
- Can be accommodated with minor change to flood mitigation works.
- More northern alignment **allows for Don mouth to be opened up** and pulled away from the Keating Channel – **beneficial to water quality**.

Hybrid 3

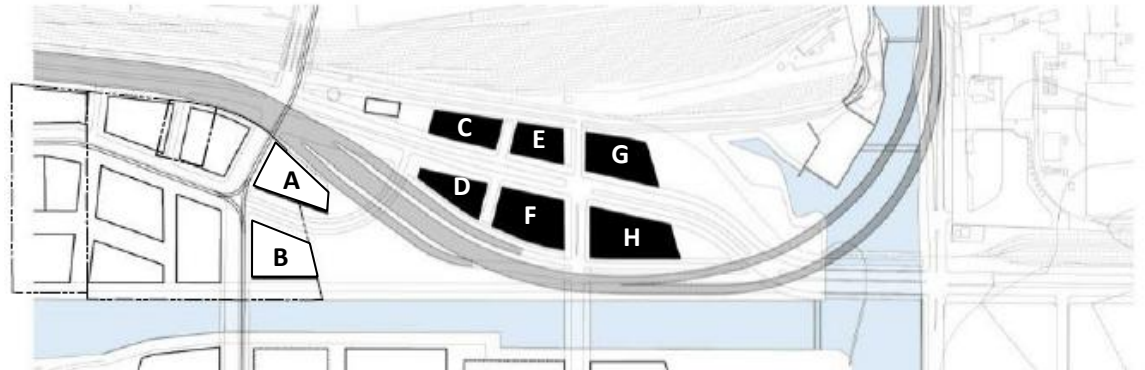
- Alignment location is preferred as **least potential for impact on sediment management operation** activities.
- Can be accommodated with minor change to flood mitigation works.
- Most northern alignment **best for Don mouth to be opened up** and pulled away from the Keating Channel – **beneficial to water quality**.

Public Land Value Creation

HYBRID ALTERNATIVE 1

 GROSS DEVELOPMENT AREA=
2 hectares/5 acres

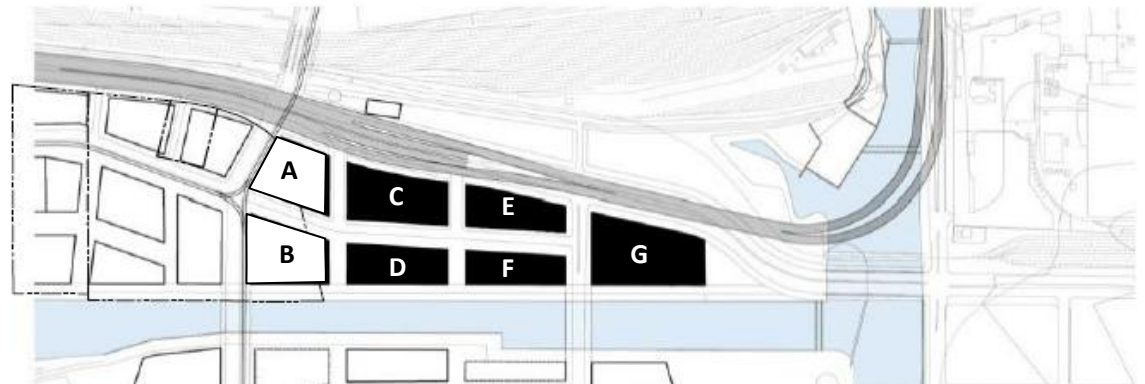
TOTAL LAND VALUE =
\$40M - \$50M



HYBRID ALTERNATIVE 2

 GROSS DEVELOPMENT AREA =
3 hectares/7.5 acres



TOTAL LAND VALUE =
\$70M - \$80M

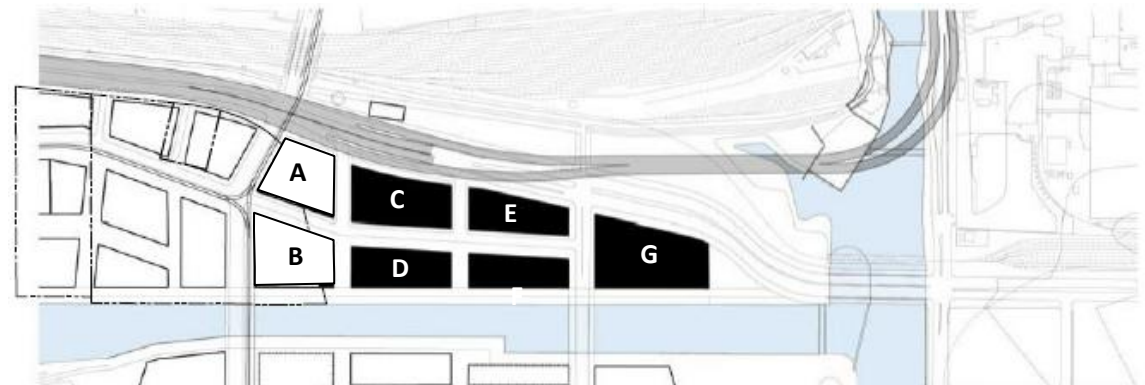


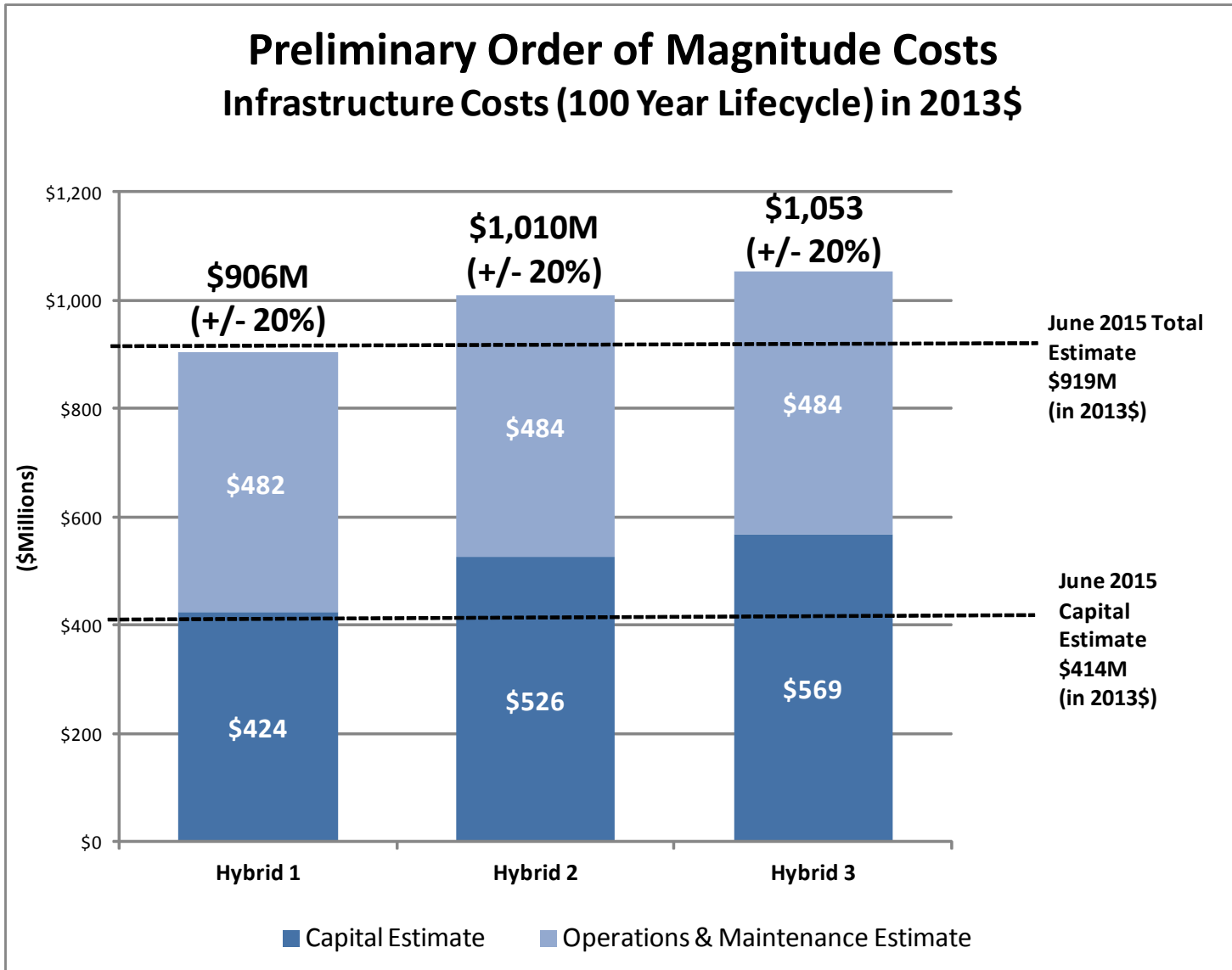
HYBRID ALTERNATIVE 3

 GROSS DEVELOPMENT AREA=
3 hectares/7.5 acres

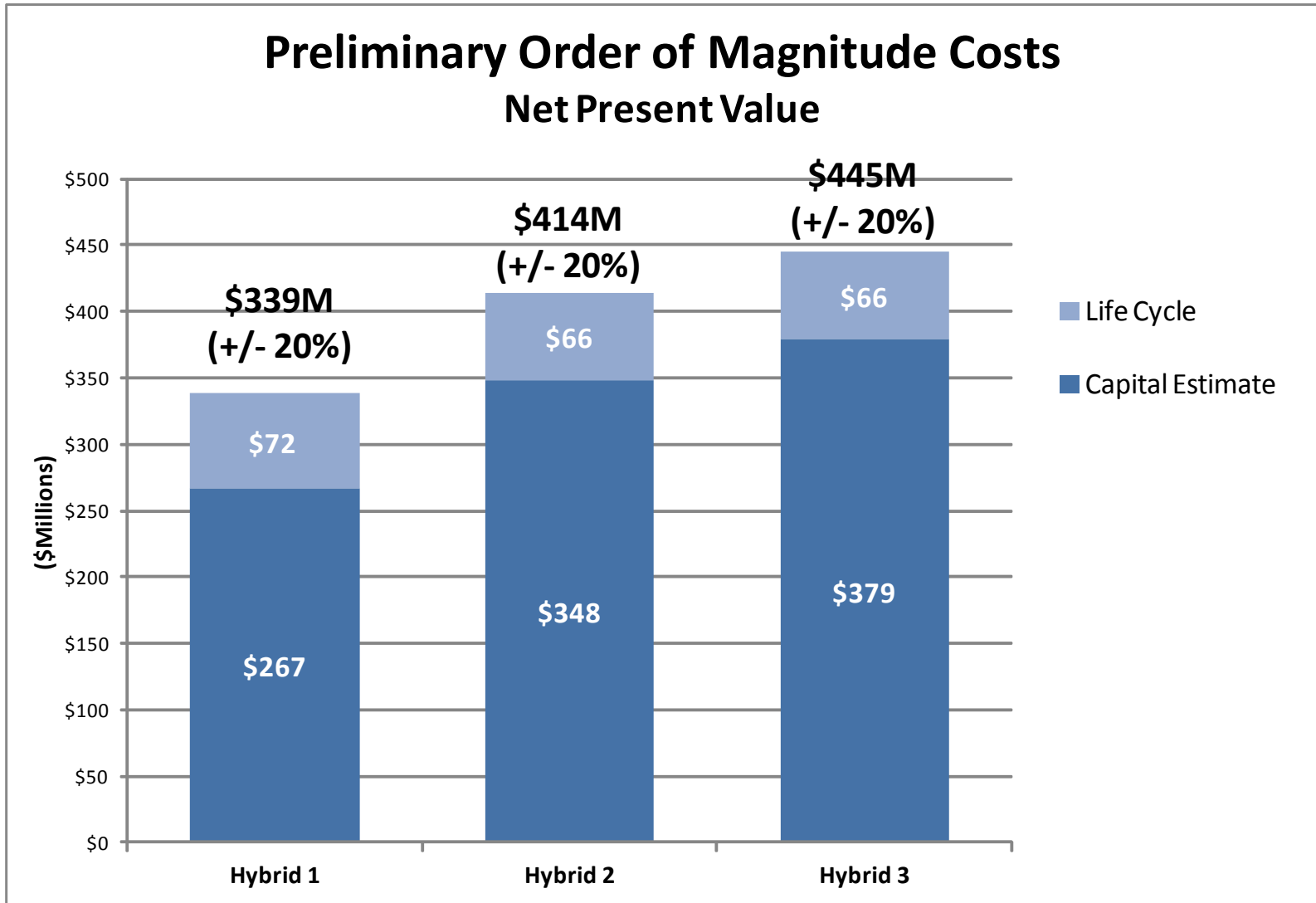
TOTAL LAND VALUE =
\$72M - \$83M

 Public land  Private land

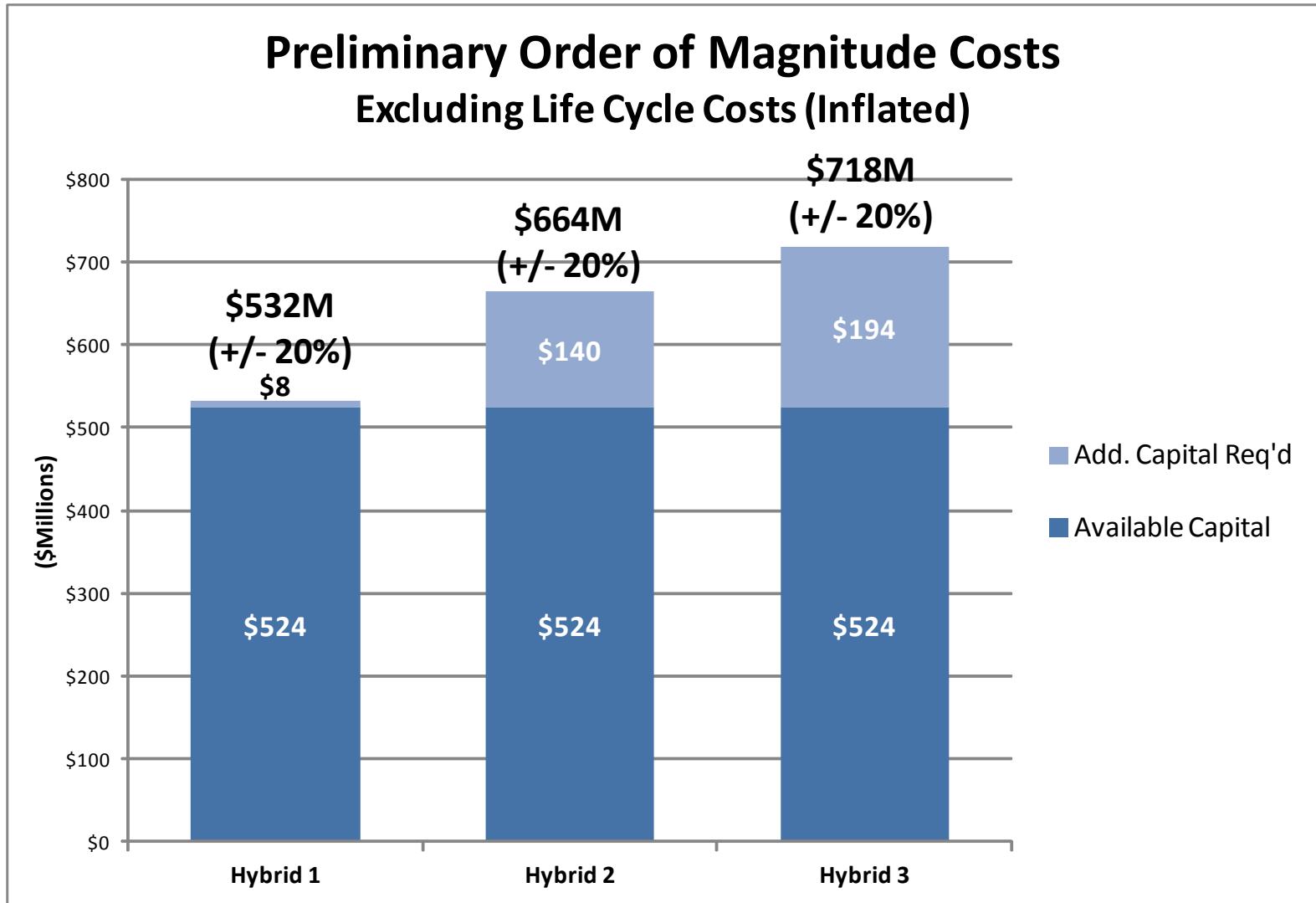




¹ All costs are high level order of magnitude prepared for comparative purposes only.



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Gardiner East EA Funding Strategy

- The current \$2.6 billion total project cost estimate for the Gardiner Strategic Plan includes \$524 million in costs for the "base case" design of the Hybrid EA preferred alternative.
- Within all Hybrid alternatives, additional capital funding is necessary. Additional capital construction funding (inflated to year of construction) is estimated at:
 - \$8 million more for Hybrid 1, for a total anticipated cost of \$532 million;
 - \$140 million more for Hybrid 2, for a total anticipated cost of \$664 million; and
 - \$194 million more for Hybrid 3, for a total anticipated cost of \$718 million.
- Cost estimates provided by the Gardiner East EA consultant are order-of-magnitude costs for comparative purposes with a potential variance of up to +/- 20%.

Gardiner East EA Funding Strategy

- Staff will report back on required budget adjustments and a detailed financing strategy following approval of the preferred Hybrid alternative design and the resulting refined Class C capital cost estimates.
- This report will consider the City's conventional method for financing capital projects by way of issuance of debenture debt, funded primarily through the tax base.
- Other sources of funding will be explored to minimize the tax impact of servicing the required debt including, but limited to:
 - Proceeds from future land sales;
 - Potential for increased Federal and/or Provincial funding based on the increased construction costs;
 - Proceeds from eligible development charges that may be applied to certain aspects of the project, such as the Lake Shore Boulevard Realignment and Don Bridge that are included in the City-Wide DC By-law; and
 - Potential of utilizing new revenue tools, including road tolls.

Preferred

Moderately Preferred

Least Preferred

Criteria Group		Hybrid 1	Hybrid 2	Hybrid 3	Notes
Transportation & Infrastructure	Automobile				<p>Automobiles – Hybrid 2 and Hybrid 3 preferred, allow for a better at-grade street network with extension of Queens Quay to Munition St.</p> <p>Transit – Hybrid 2 and Hybrid 3 preferred, allow for possible extension of transit into Keating Precinct with Queens Quay extension</p> <p>Pedestrian – Hybrid 1 is less preferred as new Cherry St. ramps and access road inhibit pedestrian access to/from Keating Channel Promenade</p> <p>Cycling - All allow for a new east-west off-road cycling track</p> <p>Movement of Goods - Preference for Hybrid 2 & Hybrid 3 as a result of less impact during traffic incidents</p> <p>Safety – Hybrid 1 is less preferred due to greater potential for cyclist/pedestrian conflict. While all alternatives have some less than standard road elements, they can be designed to an acceptable level of safety</p> <p>Construction - Preference for Hybrid1 due to shorter construction period and less traffic detours/delays</p>
	Transit				
	Pedestrian				
	Cycling				
	Movement of Goods				
	Safety				
Construction Impacts					
Urban Design	Planning				<p>Planning - Preference for Hybrid 2 and Hybrid 3 because of improved development opportunity in Keating Precinct</p> <p>Public Realm – Hybrid 1 is less preferred as access to the Keating Channel is compromised from ramps or access roads</p> <p>Built Form – Hybrid 3 has least amount of above-grade development next to expressway</p>
	Public Realm				
	Built Form				
Environment	Social & Health				<p>Social & Health - Less potential for noise effects to future noise receptors under Hybrid 2 & Hybrid 3</p> <p>Natural Environment – Hybrid 3 preferred as would have least impact on planned Don Mouth Rehabilitation</p> <p>Cultural Environment - All alternatives have similar impact</p>
	Natural Environment				
	Cultural Resources				
Economics	Global Regional Economics				<p>Global Regional Economics - Slight preference for Hybrid 1 as less impact on trucks during construction. No long-term effects</p> <p>Local Economics - All options support new economic growth or downtown economy</p> <p>Fiscal Net Benefits – Hybrid 1 preferred because of least overall cost</p>
	Local Economics				
	Fiscal Net Benefits				

Alternatives Trade-offs

- Hybrid 1 has a lower cost and is easier to construct
- Hybrids 2 and 3 are more desirable for Transportation, Urban Design and Environment
- Key differences between Hybrids 2 and 3 are as follows:
 - Hybrid 3 is preferred from an Urban Design perspective because the realignment of the expressway is furthest away from the Keating Channel and Don Mouth area
 - Hybrid 3 is preferred from an Environmental perspective as the expressway alignment has less potential to impact Don Mouth sediment management activities
 - Hybrid 3 is more expensive than Hybrid 2 (additional capital cost of about \$43M in 2013\$)

Conceptual Open Space System

System of New Interconnected Linear Greenway

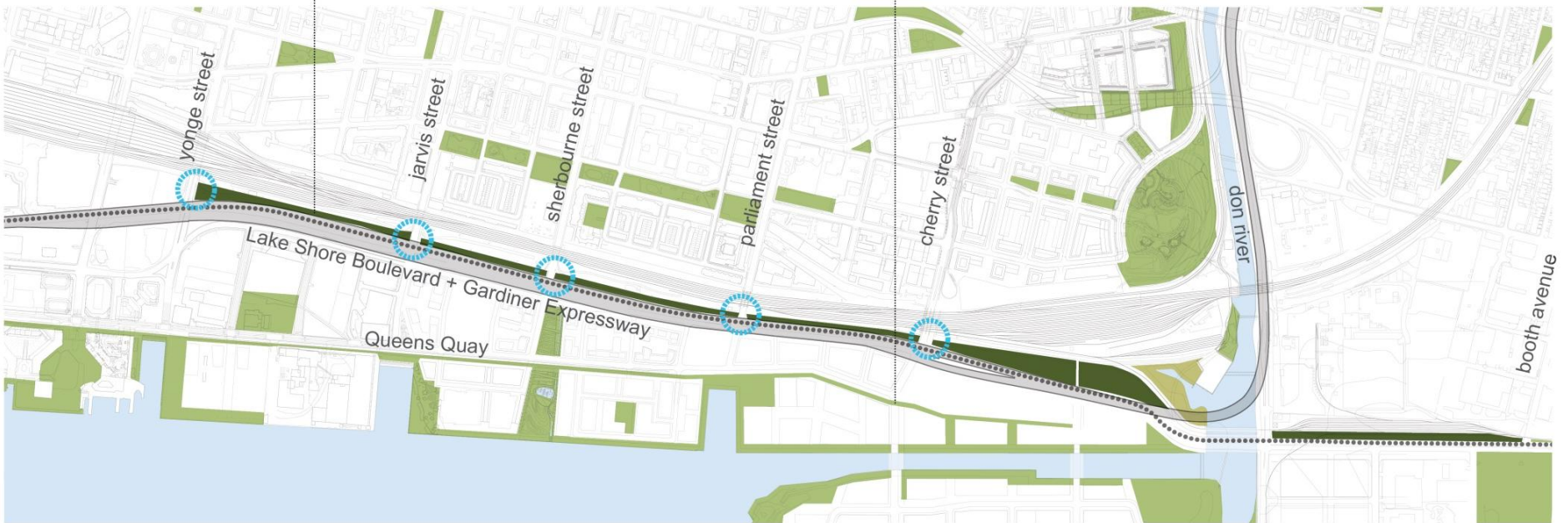
Facilitate Connections with Existing and Future Greenspace

OPENSOURCE 

LAKESHORE BOULEVARD 

TRAIL / GREENWAY 

KEY CONNECTIONS 







Looking East

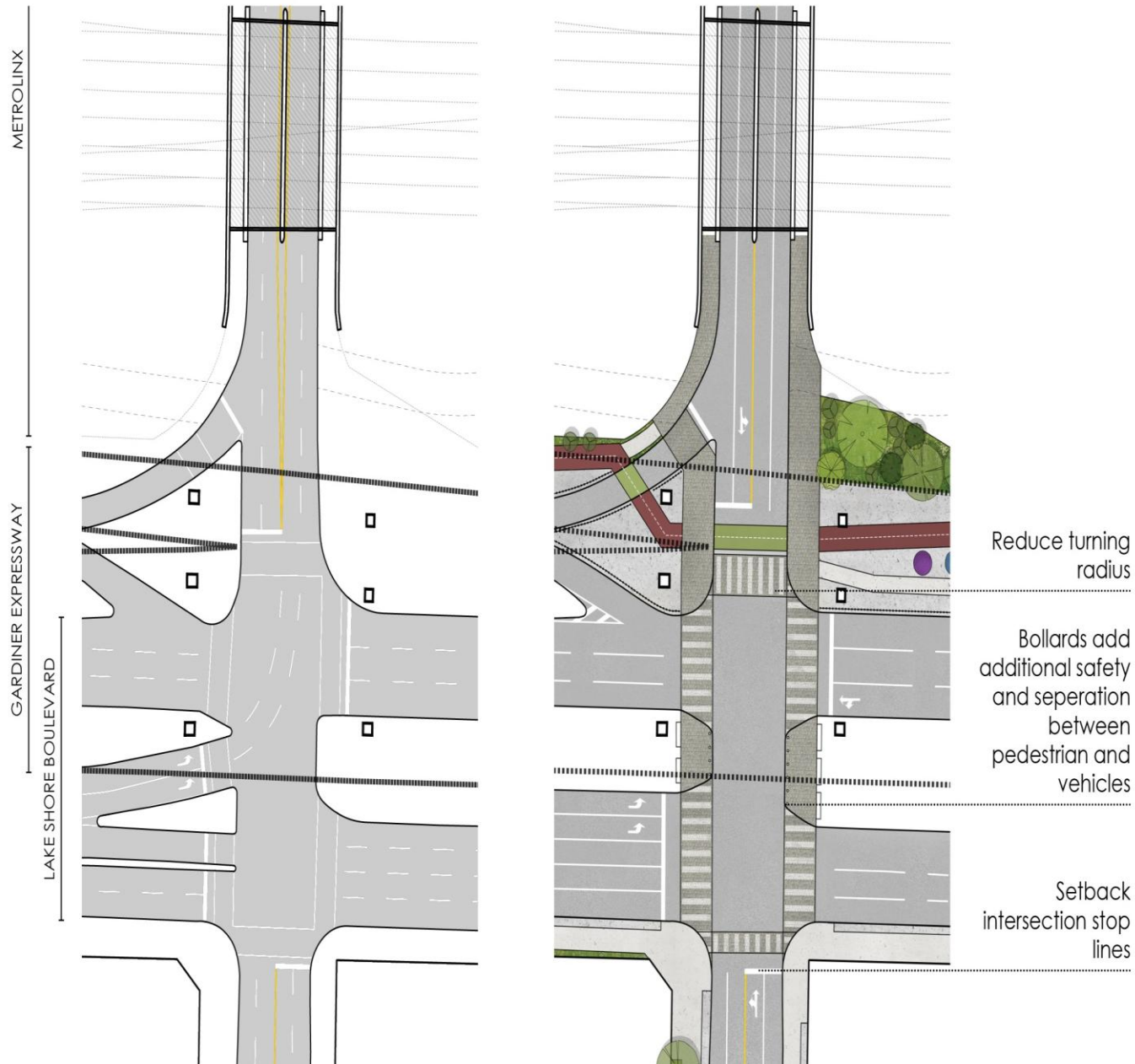


Hybrids 2 and 3





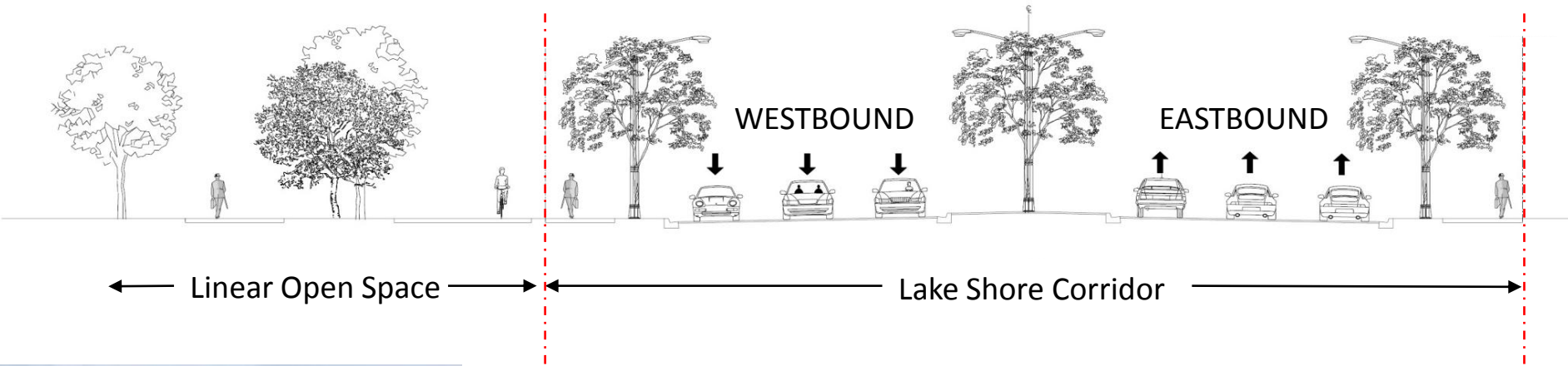
Lower Jarvis Intersection Concept

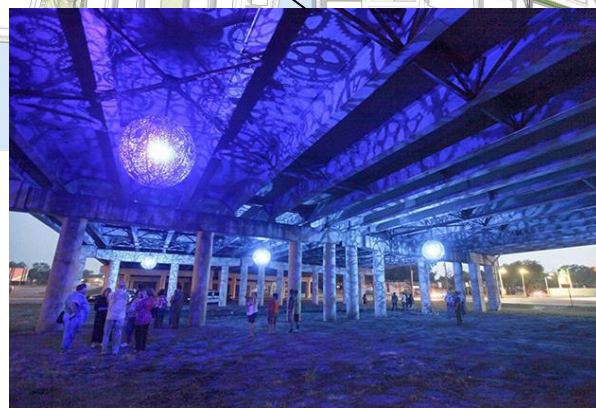
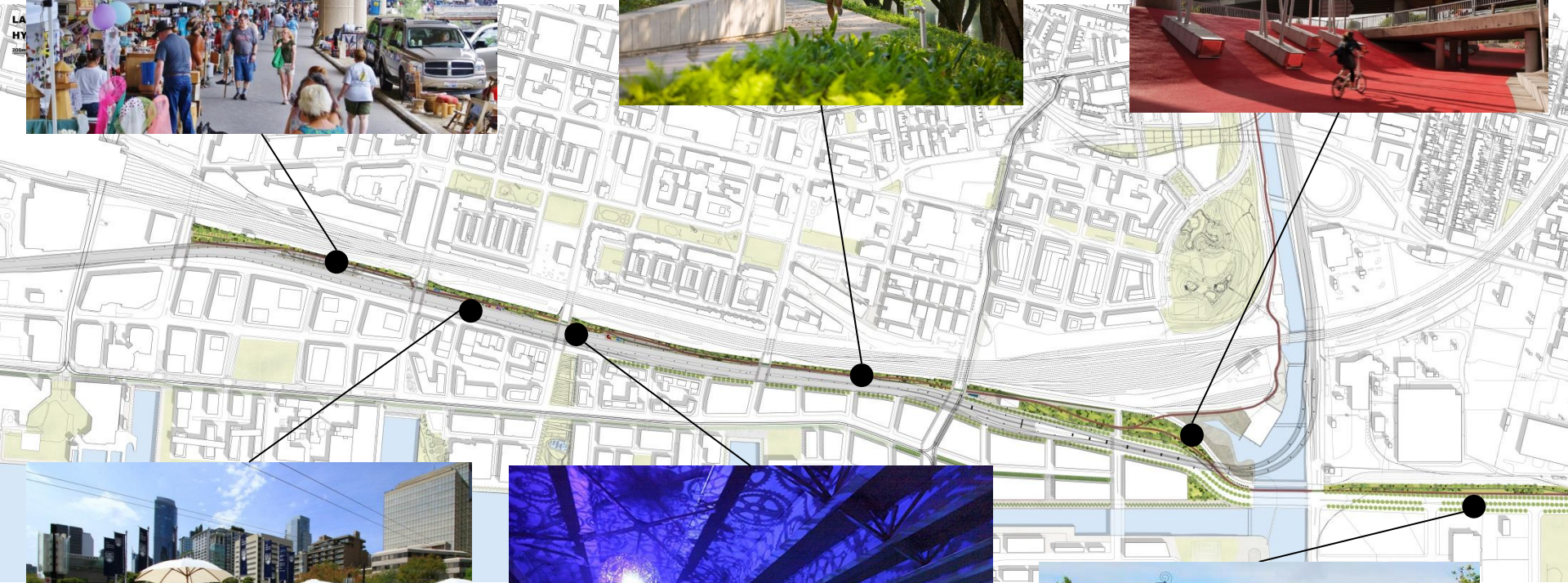
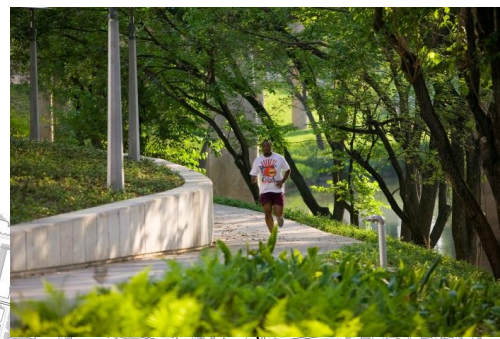


Lake Shore East of the Don River

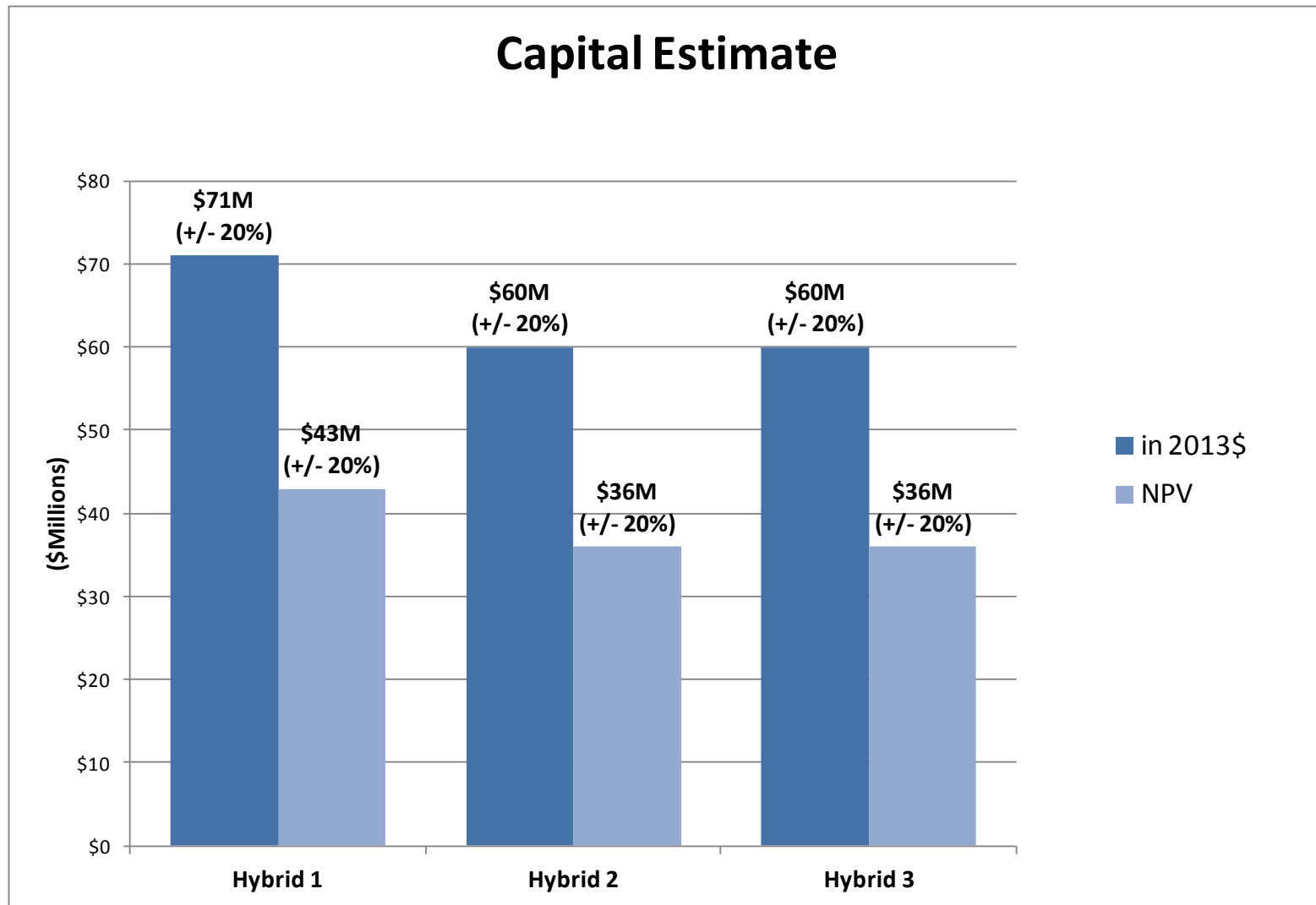
NORTH

SOUTH





Public Realm Costs¹ – East of Jarvis



¹ All costs are high level order of magnitude prepared for comparative purposes only.

Public Realm Implementation Strategy

- Gardiner East project overlaps with numerous other waterfront revitalization projects
- Public realm implementation strategy needed to identify how improvements can be coordinated and phased
- Funding options might include:
 - Gardiner Strategic Plan
 - Other waterfront revitalization projects
 - Private land owners/developers
 - Provincial and Federal governments
 - Philanthropists
 - City programs related to traffic safety, cycling and pedestrian infrastructure

Public Feedback

- Public forum held in January 2016 to obtain feedback on Hybrid alternative designs
- Over 300 participants, and 60 webcast viewers
- Most participants expressed support for either Hybrid 2 or 3, though Hybrid 3 received the most positive feedback
- Benefits of Hybrid 3 communicated by meeting participants: moving expressway north from the Keating Channel, improving public access to the waterfront, and improving open space and development opportunities
- Very little support expressed for Hybrid 1

Conclusion and Next Steps

- Hybrid 3 recommended as preferred design based on:
 - Urban design and waterfront revitalization benefits
 - Transportation and environmental benefits
 - Stakeholder and public feedback
- A decision on the Gardiner East is needed now
- EA report will be finalized and submitted to MOECC for decision
- EA result will be incorporated into the Gardiner Strategic Plan
- Further reporting on implementation funding and public realm implementation strategy through Budget Committee

Questions?

Hybrid 1



Hybrid 2



Hybrid 3



Reference Materials

Hybrid 1: Features

This Hybrid design is closely based on the Hybrid endorsed by Council last June:

- Re-decks existing Gardiner structure and retains existing DVP ramps
- Removes about 750 m (EB lanes) and 850 m (WB lanes) of the existing Logan on/off ramps
- Adds 2 new on/off ramps (2 lanes each) in the Keating precinct:
 - about 313 m new WB on-ramp and
 - about 341 m new EB off-ramp
- Realigns Lake Shore Blvd as per Keating Precinct Plan
- Limited opportunities for improvements to public space
- Includes new multi-use pathway and some intersection improvements



Hybrid 2: Features

This Hybrid design reduces the radius of the DVP-Gardiner ramp and realigns the Gardiner east of Cherry north:

- Removes existing Gardiner-DVP ramps and realigns further north
- Realigns the Gardiner east of Cherry Street and re-decks it west of Cherry Street
- Removes 750 m (EB lanes) and 850 m (WB lanes) of the existing Logan on/off ramps
- Adds 2 new on/off ramps (2 lanes each) in the Keating precinct:
 - about 355 m new WB on-ramp and
 - about 333 m new EB off-ramp
- Realigns Lake Shore Blvd as per Keating Precinct Plan
- Opportunities for enhanced public realm include two-sided Queens Quay extension and unencumbered water's edge along Keating Channel
- Includes new multi-use pathway and some intersection improvements



Hybrid 3: Features

This Hybrid design reduces the radius of the DVP-Gardiner ramp and realigns the Gardiner east of Cherry to the most northern alignment by widening the underpass beneath the CN Rail bridge:

- Removes existing Gardiner-DVP ramps and realigns to the most northern location
- Realigns the Gardiner east of Cherry Street and re-decks west of Cherry Street
- Removes about 750 m (EB lanes) and 850 m (WB lanes) of the existing Logan on/off ramps
- Adds 2 new on/off ramps (2 lanes each) in the Keating precinct:
 - about 355 m new WB on-ramp and
 - about 333 m new EB off-ramp
- Realigns Lake Shore Blvd as per Keating Precinct Plan
- Opportunities for enhanced public realm include two-sided Queens Quay extension and unencumbered water's edge along Keating Channel
- Includes new multi-use pathway and some intersection improvements



Hybrid 1



Hybrid 2



Hybrid 3

