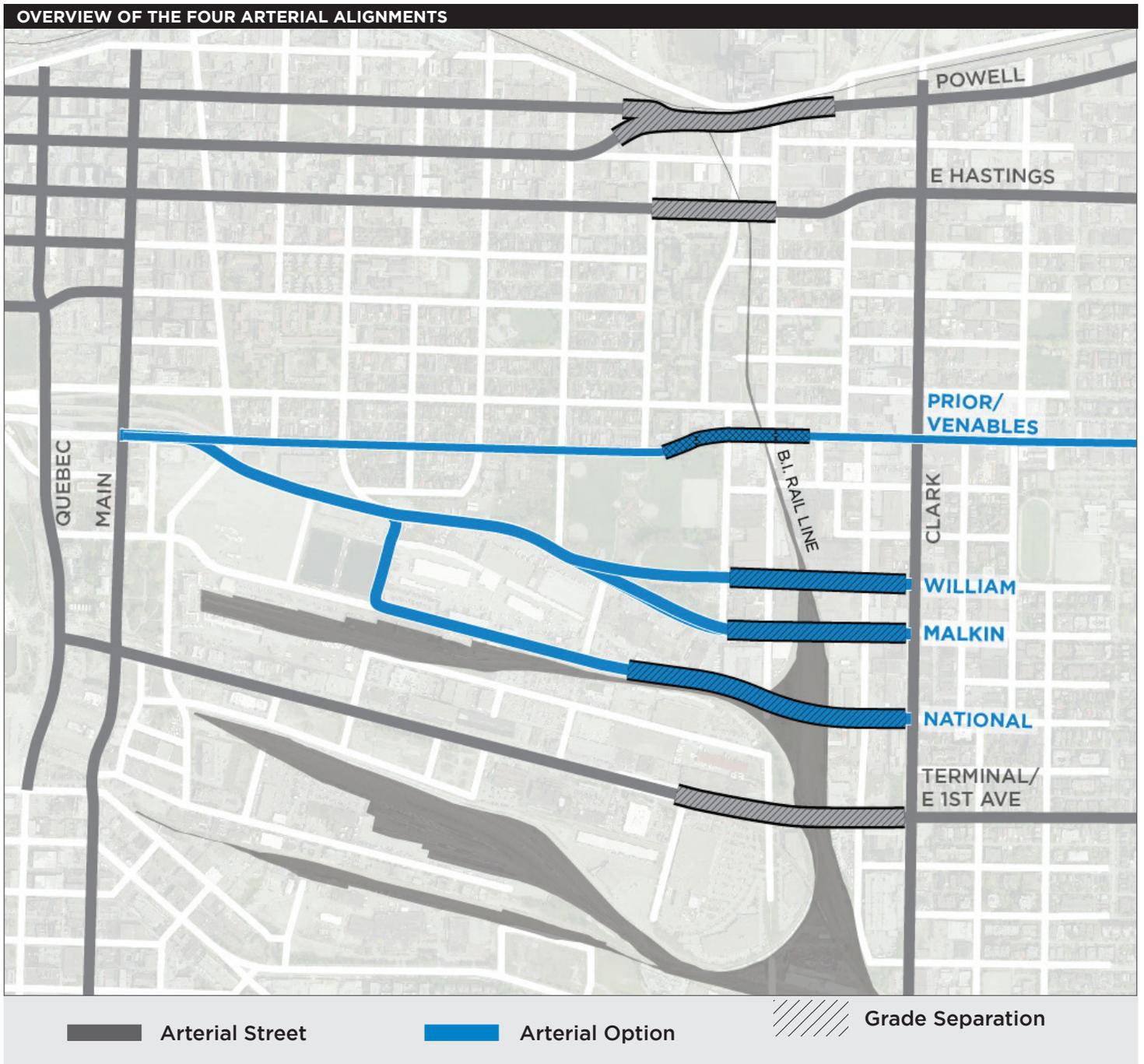


# The Flats Arterial

## COMMUNITY PANEL

### Condensed\* Resource Guide



\*See the full version at  
[bit.ly/FACPRResourceGuide](http://bit.ly/FACPRResourceGuide)

## ABOUT THIS GUIDE

The Flats Arterial Community Panel has been tasked with recommending an east-west arterial route through the False Creek Flats area, grade-separated from the Burrard Inlet train tracks by either an overpass or underpass, that best meets the needs of the neighbourhood, city and region as a whole. The Condensed Resource Guide provides introductory information to the arterial options under consideration. The complete Resource Guide is available at [bit.ly/FACPRResourceGuide](http://bit.ly/FACPRResourceGuide)

## ROUTE OPTIONS

There are four general routes that can provide an arterial connection between Main St and Clark Dr. Each of the routes have variations that can impact the lands adjacent to the street differently, but have the same general characteristics and role as part of the overall street network.

All routes connect either to the viaducts or the replacement street network (Pacific Blvd) at Gore Ave to the west. The routes that are not on Prior Street have the same alignment through the new St. Paul's Hospital site between Main St and a new local street on the west side of Trillium Park, and would 'T' into Clark Dr, meaning that there is no through route to or from Grandview-Woodland.

### PRIOR/ VENABLES

The Prior/Venables route runs along Prior St and Venables St as it does today, connecting at Main St to the west and continuing east past Clark Dr. The route spans a rail line with two tracks. There are two variations for this alignment, either an overpass or underpass.

### WILLIAM

The William route runs along the northern portion of the new St. Paul's Hospital site, along the northern edge of Trillium Park and the existing Malkin Ave between Trillium Park and Hawks Ave. From the intersection of Malkin Ave and Hawks Ave, the route continues east through Strathcona Park and connects with William St east of the rail tracks, and 'T's' into Clark Dr. The route spans a rail yard with four rail tracks.

### MALKIN

The Malkin route runs along the northern portion of the new St. Paul's Hospital site, along the northern edge of Trillium Park and the existing Malkin Ave between Trillium Park and the rail tracks, connecting with Charles St east of the rail tracks, and 'T's' into Clark Dr. The route spans a rail yard with 11 rail tracks. There are three variations for this alignment.

### NATIONAL

The National route runs along the northern portion of the new St. Paul's Hospital site, an S-Curve along the northern edge of Trillium Park and the existing Thornton St and National Ave between Malkin Ave and Chess St. It passes through the Fire Training facilities and over the rail tracks, connecting with Grant St or Charles St east of the rail tracks and 'T's' into Clark Dr. The route spans a rail yard with 14 rail tracks, and a curved track connecting with Pacific Central Station. There are three variations for this alignment.

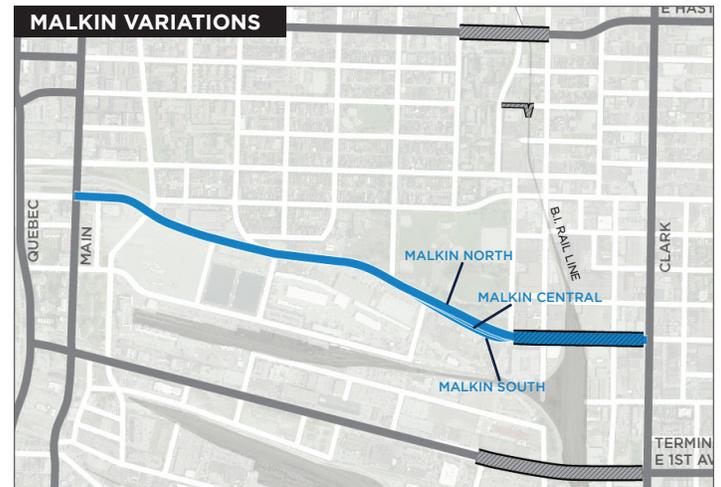
## MALKIN VARIATIONS

There are three distinct variations on Malkin Ave with different impacts between Hawks Ave and Raymur Ave. This segment of the corridor is constrained because of the Cottonwood Community Gardens that are located within the street right-of-way, and Produce Row businesses with shallow forecourts that are improperly utilizing the street for manoeuvring trucks and loading. The distinct variations include:

**Malkin (North) Overpass** - A northerly alignment through this section could preserve Produce Row business operations as they are today by providing a service lane that continues to support truck manoeuvres. However, it would significantly impact the Cottonwood Gardens.

**Malkin (South) Overpass** - A southerly alignment through this section could preserve Cottonwood Community Gardens in their current location but would impact buildings, properties and truck operations significantly.

**Malkin (Central) Overpass** - A central alignment through this section could balance the impacts to both the Cottonwood Community Gardens and Produce Row businesses.

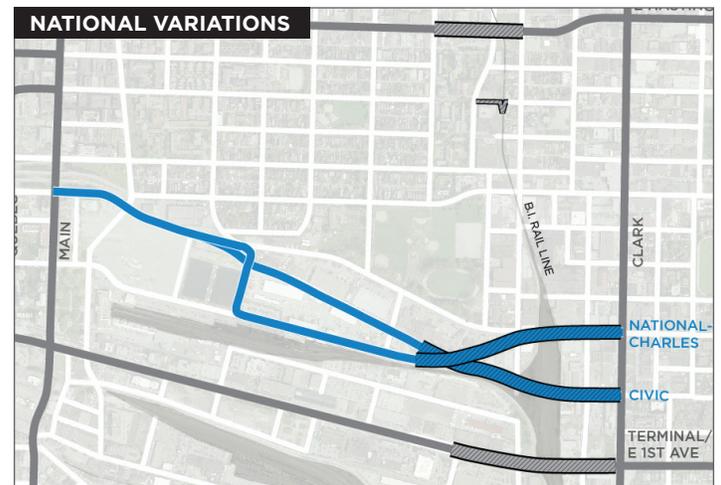


## NATIONAL VARIATIONS

There are two variations of the National route that have been suggested by members of the community, including:

**Civic Facilities Overpass** - A variation of the National route to address the challenges of an S-Curve around Trillium Park and the National Works Yards would include a gentler road curvature by significantly impacting the northern portion of Trillium Park and the National Works Yards. This structure spans the rail yards at Grant St and crosses 14 rail tracks.

**National-Charles Overpass** - A variation of the National route would include an overpass that connects to Charles rather than Grant, to address the challenges of a long structure and proximity to the E 1st Ave intersection at Clark Dr. This structure spans the rail yards at Charles St and crosses 11 rail tracks.



# PRIOR/VENABLES - KEY CONSIDERATIONS

## ARTERIAL DESCRIPTION

The arterial street along Prior and Venables Street would connect at Main St to the west and continue east past Clark Dr, connecting through to Grandview-Woodland on Venables St as it does today.

There are two options for grade separation on Prior/Venables St at the railway tracks – an overpass or an underpass.

An **overpass** would begin ramping up from the intersection with Campbell Ave to the west, pass over Raymur Ave, the railway tracks and Glen Dr, and then intersect with Vernon St at street level and continue to Clark Dr.

An **underpass** would begin ramping down from the intersection with Campbell Ave to the west, connect with the south leg of Raymur Ave, pass under the railway tracks, and then intersect with Vernon St at street level and continue to Clark Dr.

This option maintains the arterial street where it is today and seeks to minimize the overall land impacts.

### **Please Note:**

**This arterial option has two variations: an **overpass** and an **underpass**. The impacts of these two variations are generally similar but where they differ, efforts have been made to highlight these differences.**

## KEY BENEFITS, CHALLENGES AND OPPORTUNITIES

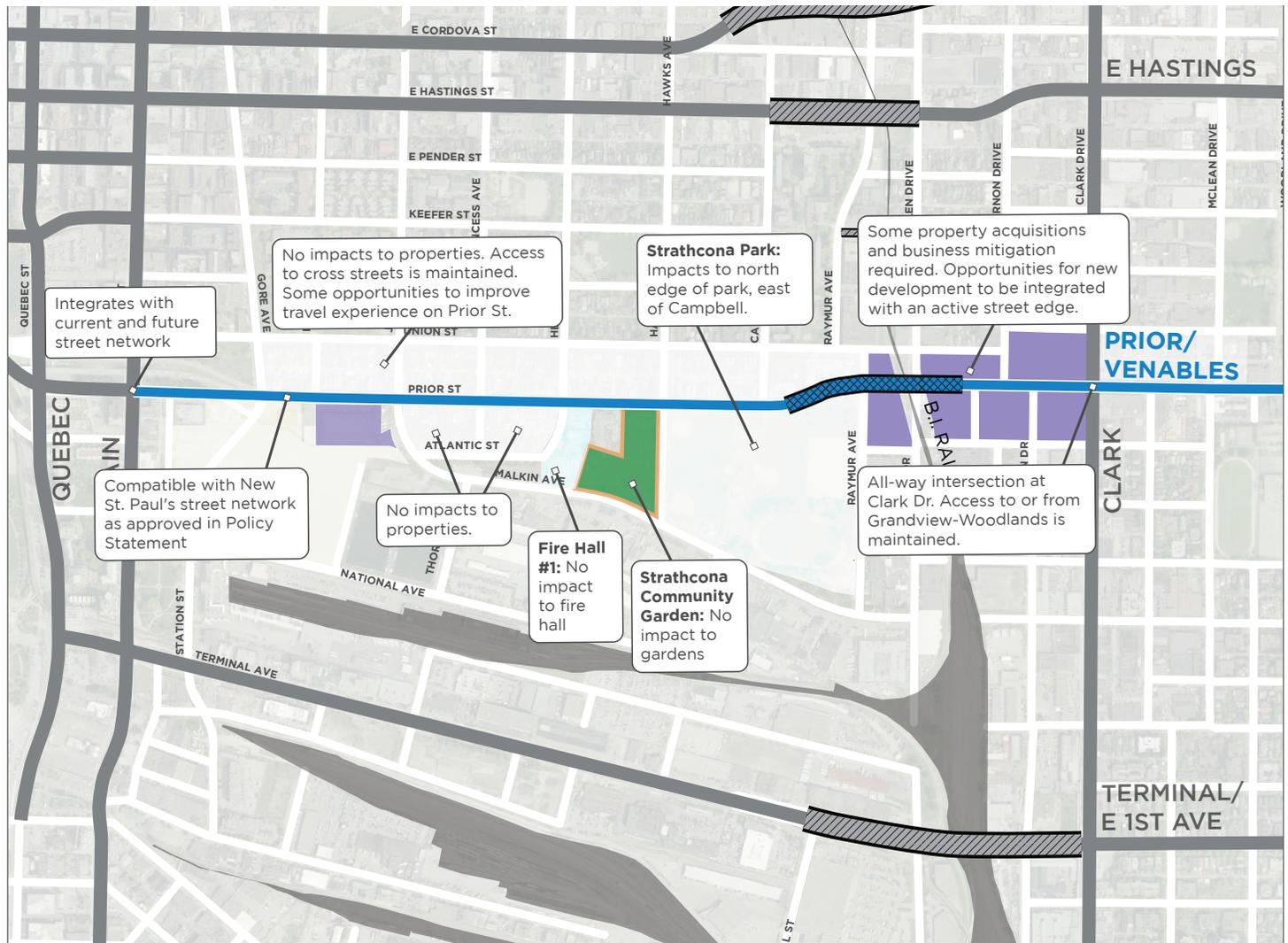
- **Overpass:** Shortest structure with most stable soil conditions, leading to lowest capital and maintenance costs, ease of constructability, and higher resiliency.
- **Underpass:** Creates less visual impact compared to an overpass and less noise from vehicle traffic.
- **Underpass:** Walking and cycling is more accessible due to a gentle grade and decline.
- Structure can also provide a grade-separated crossing for the Adanac Bikeway.
- Provides a reliable and connected street network, with balanced spacing between the other arterial streets (Hastings St and Terminal Ave).
- The arterial street continues to be located between residents in Strathcona and Strathcona Park.
- Transit service can remain on Prior/Venables St and the majority of Grandview-Woodland and Strathcona residents, businesses, and parks are within a 5 min walk to transit.
- Traffic patterns remain the same as today at Clark Dr, allowing all movements including through traffic on Venables St to Grandview-Woodland.
- Avoids direct land impacts to Cottonwood Community Gardens, Strathcona Community Gardens, Trillium Park, Produce Row businesses, National Works Yard, and the Fire Training and Heavy Urban Search and Rescue facility.
- Moderate impacts and loss of park land to the northern edge of Strathcona Park, including impacts to large, mature trees.
- Impacts to businesses on Venables St, between Raymur Ave and Clark Dr would need to be mitigated.

# PRIOR/VENABLES - COMMUNITY IMPACTS

## ADJACENT LAND IMPACTS AND CONSIDERATIONS

This map briefly describes the potential impacts and considerations to the land uses adjacent to this arterial option. Changes to the transportation network impact everyone in the broader community.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



\*The thick blue line outlined in black indicates the location of the overpass/underpass.

## LEGEND

- PARKS
- PRODUCE ROW
- ADJACENT RESIDENTS
- COMMUNITY GARDENS
- CIVIC FACILITIES
- BUSINESSES
- NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE

# WILLIAM - KEY CONSIDERATIONS

## ARTERIAL DESCRIPTION

The William Street option connects the arterial street from Main St to the west to Clark Dr to the east. The arterial would end at Clark Dr, with no through route to or from Grandview-Woodland. The overpass would start at Raymur Ave to the west, pass over top of Glen Dr, the rail yard and Vernon Dr and connect to Clark Dr. People could still travel under the overpass on Glen Dr and Vernon Dr. The existing section of Malkin Ave between Chess St and Glen Dr would become an access road that continues to serve Produce Row businesses.

This option seeks to minimize impacts to Cottonwood Community Gardens, Produce Row and the City's National Works Yard and Fire Training Facility. It would do so by running north of the gardens and through Strathcona Park, connecting the intersection of Malkin Ave and Hawks St to the intersection of William St and Raymur Ave.

## KEY BENEFITS, CHALLENGES AND OPPORTUNITIES

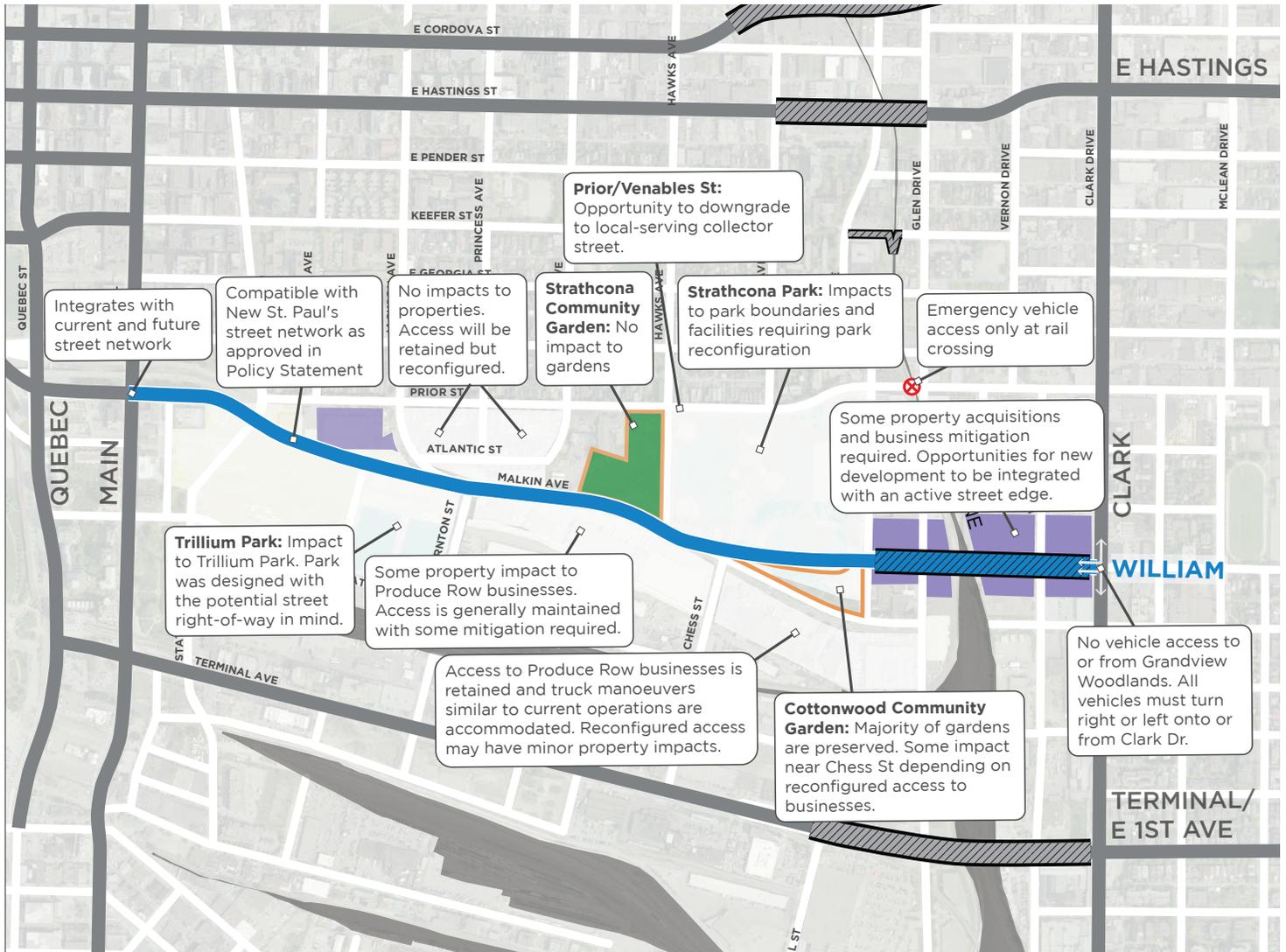
- Provides a reliable and connected street network, with relatively balanced spacing between the other arterial streets (Hastings St and Terminal Ave).
- Transit service would likely be rerouted to William St. Many residents and businesses from Grandview-Woodland and Strathcona are not within a 5 min walk to William St but are within a 5 min walk to services on Hastings St.
- Preserves the majority of Cottonwood Community Gardens and would secure the portion in street right-of-way, but may have some impacts in order to provide access to Produce Row businesses.
- Fragments Strathcona Park by introducing an arterial street between the park and Cottonwood Community Gardens. Significant impacts to Strathcona Park that would require further study, consultation, and a Park Board decision on whether or not the opportunities to replace lost park space and reconfigure facilities is possible.
- High impact to existing tree canopy and habitats of large, mature trees.
- Opportunity to downgrade Prior/Venables St to a more local-serving collector street.
- Avoids direct land impacts to National Works Yard, the Fire Training Facility, the Heavy Urban Search and Rescue Facility, and the Animal Services Facility.
- Generally reduces impact to Produce Row businesses between Chess St and Raymur Ave but there are some impacts in order to provide access.
- Impacts to businesses on William St, between Raymur Ave and Clark Dr would need to be mitigated.

# WILLIAM - COMMUNITY IMPACTS

## ADJACENT LAND IMPACTS AND CONSIDERATIONS

This map briefly describes the potential impacts and considerations to the land uses adjacent to this arterial option. Changes to the transportation network impact everyone in the broader community.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



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### LEGEND

- PARKS
- PRODUCE ROW
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- COMMUNITY GARDENS
- CIVIC FACILITIES
- BUSINESSES
- NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE

# MALKIN - KEY CONSIDERATIONS

## ARTERIAL DESCRIPTION

The Malkin Avenue option connects the arterial street from Main St to the west and Clark Dr to the east. The arterial would end at Clark Dr, with no through route to or from Grandview-Woodland. The overpass would start at Raymur St, pass overtop of Glen Dr, the rail yard and Vernon Dr, and align with Charles St. People could still travel under the overpass Glen Dr and Vernon Dr.

There are three variations to the Malkin Option with different impacts between Hawks Ave and Raymur Ave. This segment of the corridor is constrained because of the Cottonwood Community Gardens are located within the street right-of-way, and Produce Row businesses have shallow areas in front of their businesses and are using the street for manoeuvring trucks and loading.

The variations include:

**Malkin (North) Overpass:** This option seeks to accommodate and minimize impacts to Produce Row businesses by providing a service road to support continued truck movements needed for access, and would hence significantly impact Cottonwood Community Garden plots and the south edge of Strathcona Park.

**Malkin (South) Overpass:** The south option seeks to minimize impacts to the existing Cottonwood Community Gardens in street right-of-way and would hence significantly impact the truck operations, properties, and buildings for Produce Row businesses.

**Malkin (Central) Overpass:** The central option seeks to balance the impacts to both the Cottonwood Community Gardens and Produce Row businesses. It would be generally within the existing street right-of-way and would not impact the Strathcona Park boundary.

### Please Note:

This arterial option has three variations: The **Malkin (North) Overpass**, **Malkin (South) Overpass** and **Malkin (Central) Overpass**. The impacts of these three variations are similar in many ways but where they differ, efforts have been made to highlight these differences.

## KEY BENEFITS, CHALLENGES AND OPPORTUNITIES

- Provides a reliable and connected street network, with relatively balanced spacing between the other arterial streets (Hastings St and Terminal Ave).
- Transit service would likely be rerouted to Malkin. Many residents and businesses from Grandview-Woodland and Strathcona are not within a 5 min walk to Malkin Ave but are within a 5 min walk to services on Hastings St.
- Avoids direct land impacts to National Works Yard, the Fire Training Facility, and Heavy Urban Search and Rescue Facility.
- Impacts to businesses on Malkin Ave and Charles St (between Raymur Ave and Clark Dr) would need to be mitigated.
- Opportunity to downgrade Prior/Venables St to a more local-serving collector street.
- Direct trade-off of impacts between Hawks Ave and Raymur Ave. Impacts range between no-impact to significant-impact for Cottonwood Community Gardens, and Produce Row businesses. Some route variations impact Strathcona Park boundary.
- Degree of impact to Animal Services Facility varies depending on the route variation.



# MALKIN (NORTH) - COMMUNITY IMPACTS

## MALKIN (NORTH) OVERPASS

### ADJACENT LAND IMPACTS AND CONSIDERATIONS

This map briefly describes the potential impacts and considerations to the land uses adjacent to this arterial option. Changes to the transportation network impact everyone in the broader community.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



\*The thick blue line outlined in black indicates the location of the overpass.

### LEGEND

- PARKS
- PRODUCE ROW
- ADJACENT RESIDENTS
- COMMUNITY GARDENS
- CIVIC FACILITIES
- BUSINESSES
- NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE

# MALKIN (SOUTH) - COMMUNITY IMPACTS

## MALKIN (SOUTH) OVERPASS

### ADJACENT LAND IMPACTS AND CONSIDERATIONS

This map briefly describes the potential impacts and considerations to the land uses adjacent to this arterial option. Changes to the transportation network impact everyone in the broader community.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



\*The thick blue line outlined in black indicates the location of the overpass.

### LEGEND

- PARKS
- PRODUCE ROW
- ADJACENT RESIDENTS
- COMMUNITY GARDENS
- CIVIC FACILITIES
- BUSINESSES
- NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE

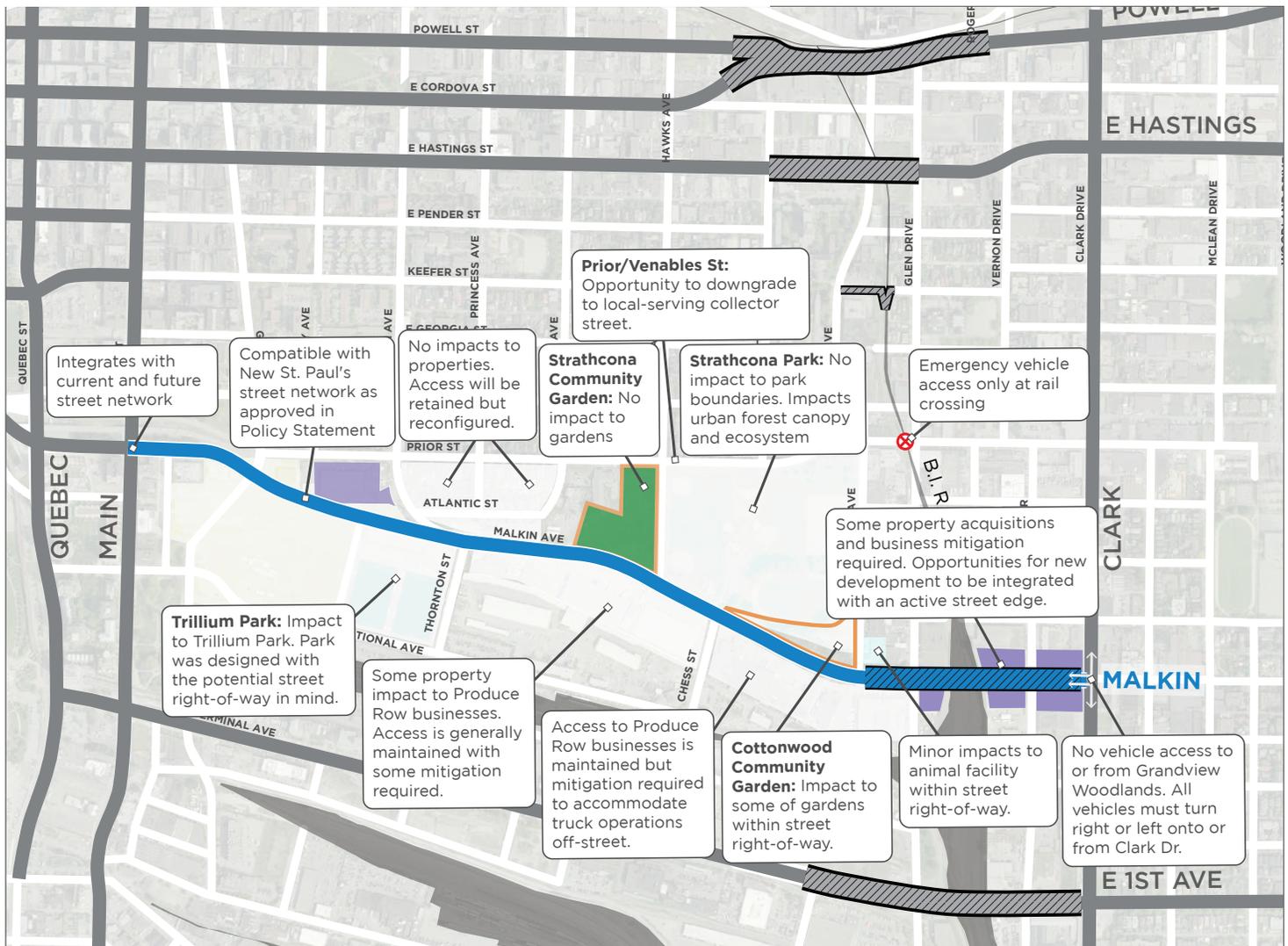
# MALKIN (CENTRAL) - COMMUNITY IMPACTS

## MALKIN (CENTRAL) OVERPASS

### ADJACENT LAND IMPACTS AND CONSIDERATIONS

This map briefly describes the potential impacts and considerations to the land uses adjacent to this arterial option. Changes to the transportation network impact everyone in the broader community.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



\*The thick blue line outlined in black indicates the location of the overpass.

### LEGEND

- PARKS
- PRODUCE ROW
- ADJACENT RESIDENTS
- COMMUNITY GARDENS
- CIVIC FACILITIES
- BUSINESSES
- NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE

# NATIONAL - KEY CONSIDERATIONS

## ARTERIAL DESCRIPTION

The National Avenue option connects the arterial street from Main St to the west and Clark Dr to the east with a S-Curve around Trillium Park and National Works Yard. The arterial would end at Clark Dr, with no through route to or from Grandview-Woodland. The overpass would start east of Chess St, pass through and over the Fire Training Facility and Heavy Urban Search and Rescue Facility, the rail yard, Vernon Dr, and align with Grant St. People could still travel under the overpass at Glen Dr and Vernon Dr

This option would move the arterial from Prior/Venables St and protect existing uses along Malkin Ave east of Thornton St by focusing impacts on City-owned land and facilities along National Ave. It also maintains the same roadway alignment as the Malkin and William options along the north side of the new St. Paul's Hospital site. Other variations through the hospital site were explored but not pursued further because a diagonal with a gentle road curve impacts the viability of the hospital site design, and a grid network does not provide the adequate capacity and travel time reliability for the arterial.

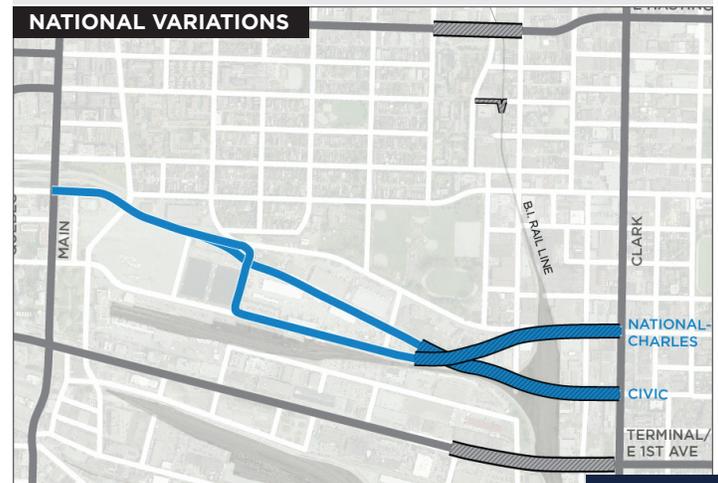
There are two variations of the National route that have been suggested by members of the community, including:

**Civic Facilities Overpass:** A variation of the National route could address the challenges of an S-Curve around Trillium Park and the National Works Yard by a more gentle road curve. However, the gentle curve would still significantly impact the northern part of Trillium Park and the National Works Yard. The intent of this option is to run through City-owned lands and civic facilities, in order to reduce the property impacts to residents and businesses. The variation would have the same overpass structure connecting National Ave and Grant St.

**National-Charles Overpass:** A variation of the National route could address the challenges of intersection proximity to E 1st Ave at Clark Dr and the long structure length by connecting National Ave to Charles St east of the rail tracks, rather than Grant St. The overpass connecting National Ave to Charles St would be shorter than connecting National Ave to Grant St, but longer than connecting Malkin Ave to Charles St. Further design work is needed to review the roadway geometry and structure.

## KEY BENEFITS, CHALLENGES AND OPPORTUNITIES

- Poor spacing between the other arterials on E Hastings St and E 1st Ave. Concerns about the operations at the Clark Dr intersection and impact to north-south travel on Clark Dr.
- Route is indirect and would have higher travel times and be less reliable.
- Concerns with the safety and performance of the road S-Curve around Trillium Park (similar to the current condition at McGill/Nanaimo).
- Transit service would likely be rerouted to National Ave. Majority of residents and businesses from Grandview-Woodland and Strathcona are not within a 5 min walk to National Ave but are within a 5 min walk to services on Hastings St.
- Significant impact to the Fire Training and HUSAR facilities which would require relocation.
- Moderate impacts to National Works Yard, which are a trade-off with impacts to Trillium Park and would need to be mitigated.
- Opportunity to downgrade Prior/Venables St to a more local-serving collector street.
- Avoids direct land impacts to Strathcona Park, Cottonwood Community Gardens, Produce Row businesses, and Animal Services Facility.
- Least impact on urban forest canopy and ecosystem, since large, mature trees are not impacted.
- Significantly higher cost and longer construction schedule than other options, due to longer structure and poor soil conditions.
- Impacts to businesses on Grant St (or Charles St) would need to be mitigated.

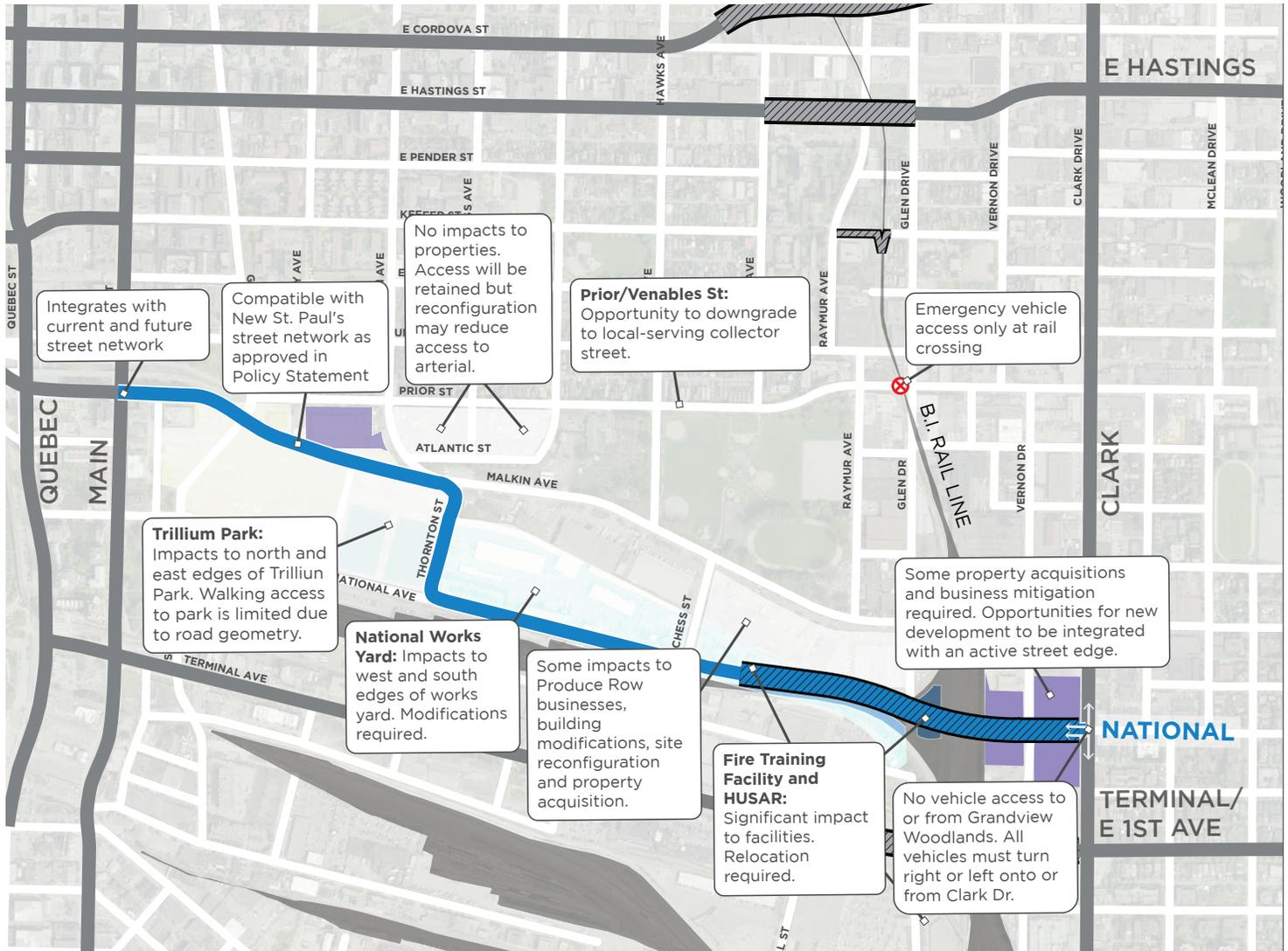


# NATIONAL - COMMUNITY IMPACTS

## ADJACENT LAND IMPACTS AND CONSIDERATIONS

This map briefly describes the potential impacts and considerations to the land uses adjacent to this arterial option. Changes to the transportation network impact everyone in the broader community.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



\*The thick blue line outlined in black indicates the location of the overpass.

## LEGEND

- |   |   |   |                   |
|---|---|---|-------------------|
|  | PARKS                                     |  | PRODUCE ROW       |
|  | ADJACENT RESIDENTS                        |  | COMMUNITY GARDENS |
|  | CIVIC FACILITIES                          |  | BUSINESSES        |
|  | NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE |   |                   |

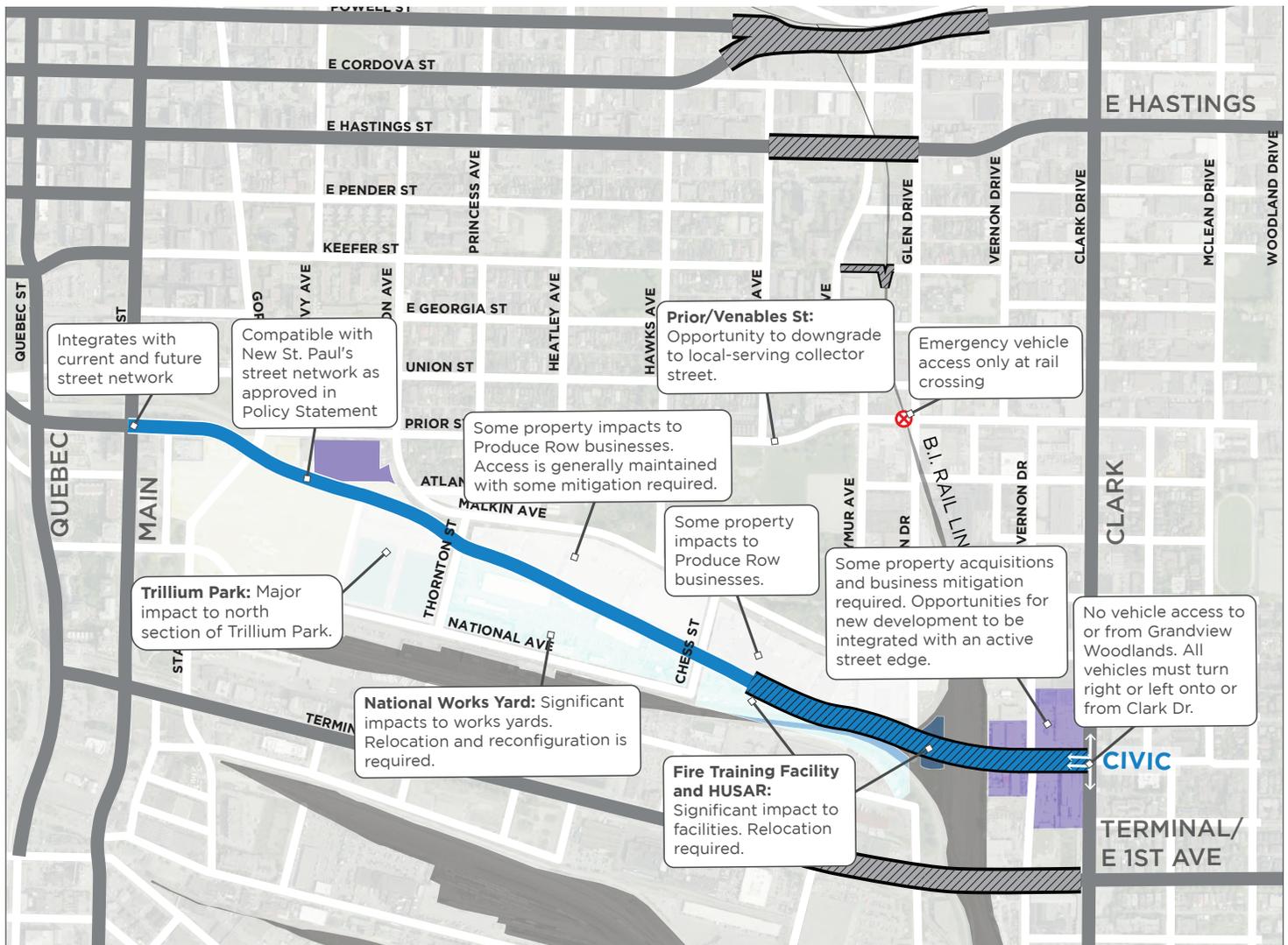
# NATIONAL-CIVIC FACILITIES - COMMUNITY IMPACTS

## CIVIC FACILITIES OVERPASS VARIATION

### KEY BENEFITS, CHALLENGES AND OPPORTUNITIES

- Although the safety and reliability concerns of the road geometry is reduced and is more preferable from a transportation perspective, the significant impact to the National Works Yard, Fire Training and HUSAR facilities, and Trillium Park is highly costly to mitigate.
- Other key aspects of the route are similar to the base National route.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



\*The thick blue line outlined in black indicates the location of the overpass.

### LEGEND

	PARKS		PRODUCE ROW
	ADJACENT RESIDENTS		COMMUNITY GARDENS
	CIVIC FACILITIES		BUSINESSES
	NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE		

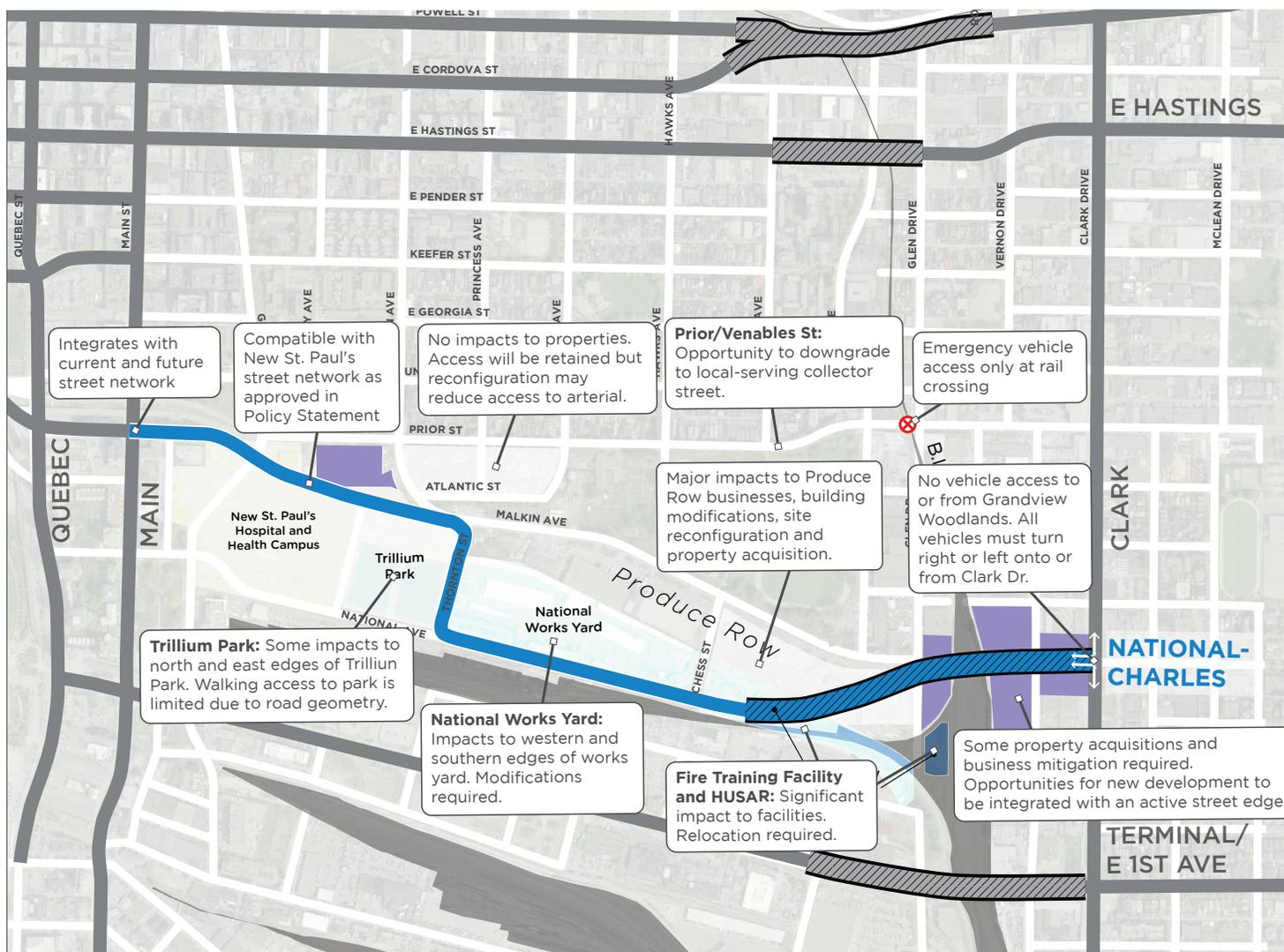
# NATIONAL-CHARLES - COMMUNITY IMPACTS

## NATIONAL-CHARLES OVERPASS VARIATION

### KEY BENEFITS, CHALLENGES AND OPPORTUNITIES

- Although the capacity and reliability concerns related to the intersection with Clark Dr is reduced, the variation is less preferable from a transportation perspective due the indirect routing of the S-curve combined with the curved overpass. As there would still be a significant impact to the Fire Training and HUSAR facilities, it would be highly costly to mitigate.
- Other key aspects of the route are similar to the base National route.

\*More info about the Transportation Considerations (network connectivity, local vehicle access, transit, walking and cycling), Cost and Constructability (structure, soil, schedule, cost), and some Mitigation Strategies are available in the City's Full Resource Guide.



\*The thick blue line outlined in black indicates the location of the overpass.

### LEGEND

- |   |   |   |                   |
|---|---|---|-------------------|
|  | PARKS                                     |  | PRODUCE ROW       |
|  | ADJACENT RESIDENTS                        |  | COMMUNITY GARDENS |
|  | CIVIC FACILITIES                          |  | BUSINESSES        |
|  | NEW ST. PAUL'S HOSPITAL AND HEALTH CENTRE |   |                   |

# PROJECT COSTS

## POTENTIAL COST RANGES

In the planning phase, preliminary estimates provide the approximate order of magnitude of the cost. The cost ranges have been derived from unit rates of other similar projects, the probable conditions of the site based on limited information, and professional experience.

The major components of the project cost are:

- **Construction costs** include the design and construction of the arterial roadway, the overpass structure, and the Adanac Bikeway structure.
- **Land Acquisition and Property Impact Mitigation costs** include purchasing land for the roadway and overpass, and to mitigate the direct property impacts on private properties, businesses and city facilities.
- **Park Mitigation** include mitigating impacts to Trillium Park and Strathcona Park.

### Please Note:

Cost estimates are only indicative of the current market conditions and are subject to change. The planning-level cost ranges provide an order of magnitude of cost and the relative cost difference between the arterial route options.

The potential cost ranges for the arterial routes are provided in the table below.

	PRIOR		WILLIAM	MALKIN	NATIONAL
	Overpass	Underpass		All Variations	Base Route with Grant overpass*
<b>Construction Cost</b>	\$45-70 M	\$60-85 M	\$130-180 M	\$130-180 M	\$150-200 M
<b>Land Acquisition and Property Mitigation Cost</b>	\$20-30 M	\$20-30 M	\$40-65 M	\$40-85 M	\$195-285 M
<b>Total Project Cost</b> (park mitigation costs provided separately)	<b>\$65-100 M</b>	<b>\$80-115 M</b>	<b>\$170-245 M</b>	<b>\$170-265 M</b>	<b>\$345-485 M</b>

Note: Cost estimates are only indicative of the current market conditions and available information, and are subject to change. The planning-level cost ranges provide an order of magnitude of cost that indicates the relative cost difference between the arterial route options.

\*Cost ranges for variations of the National route are not available. The Civic Facilities Overpass variation would be an order of magnitude higher due to significant impact to the National Works Yard. The National-Charles Overpass variation would be a similar cost range as the National base route. Both variations require relocation of the Fire Training and Heavy Urban Search and Rescue facilities.

# PROJECT COSTS

## KEY COST CATEGORIES

### Roadway

The roadway includes the pavement surface, sidewalks and cycling facilities, traffic signals, bus stops, street lights, above- and underground utilities, street furniture, and landscaping in the public realm.

For arterial routes on William St, Malkin Ave, and National Ave, a new arterial street of about 1.7-2.0 km would need to be constructed. On Prior/Venables St, the existing arterial would be upgraded.

### Overpass Structure

The arterial overpass structure includes the approach ramps and retaining walls, bridge deck, bridge structure, piers, and foundations. The structure cost varies significantly between options because of the following key features:

**Length** – The length of the longest span and the entire length of the structure is primarily defined by the number of rail tracks it needs to span and the height clearance.

- Prior/Venables – overpass spans the rail line with 2 tracks. The underpass can be thought of as a railway overpass that would span the roadway.
- William – spans the railyard with 4 tracks.
- Malkin – spans the railyard with 11 tracks.
- National – spans the railyard with 14 tracks, along with a curved track connecting with Pacific Central Station.

**Piers and Foundation** – The soil conditions define the amount of remediation and the size and depth of foundations required.

- Prior – soil is stable at a shallow depth.
- William – stable soils are approx. 5-6m below the surface.
- Malkin – stable soils are approx. 5-7m below the surface.
- National – stable soils are approx. 9-12m below the surface.

**Underpass Considerations** – A road underpass requires building a railway overpass, but has additional costs for excavation and mechanical systems to address groundwater and rainwater.

### Adanac Bikeway Structure

The project includes a pedestrian and bike structure for the Adanac Bikeway, which may be an underpass or overpass, and either on Union St or Prior St.

For the Prior/Venables route, the Adanac Bikeway could be routed onto the arterial street, to cross the rail tracks at the same location. The cost ranges represent one structure for all transportation modes on Prior/Venables, but a separate structure could also be constructed on Union St. For the William, Malkin, and National routes, a separated walking and cycling structure would be provided.

### Land Acquisition

The street right-of way would need to be expanded in some areas to accommodate the width of the arterial and overpass. The cost for each route differs based on the width of the existing street right-of-way and was estimated using current market value. The land acquisition cost shown only includes private properties and does not include City-owned land. If land is needed to relocate a property, the cost for new land is included in the property impact mitigation category.

### Property Impact Mitigation

The arterial roadway and structure would have direct property impacts to private properties, businesses, and civic facilities. The City takes care and effort to support businesses continuity and mitigate property impacts. When mitigation measures cannot be address in place and buildings need to be entirely relocated, the cost includes land acquisition for a new location.

The major costs to mitigate the impacts to businesses and city facilities would include:

- Prior/Venables – mitigating impacts to businesses.
- William – mitigating impacts to Produce Row and other businesses.
- Malkin – mitigating impacts to Produce Row and other businesses.
- National – relocating and reconstructing the Fire Training and Heavy Urban Search and Rescue facilities, and the National Work Yards.

# PROJECT COSTS

The breakdown of key cost factors is as follows:

	PRIOR		WILLIAM	MALKIN	NATIONAL
	Overpass	Underpass		(includes all variations)	Base Route with Grant overpass
Roadway	\$5-15 M	\$5-15 M	\$20-25 M	\$20-25 M	\$20-25 M
Overpass Structure	\$40-55 M	\$55-70 M	\$85-120 M	\$85-120 M	\$105-140 M
Adanac Bikeway Structure	(included in overpass cost)	(included in underpass cost)	\$25-35 M	\$25-35 M	\$25-35 M
Land Acquisition	\$10-15 M	\$10-15 M	\$35-45 M	\$25-60 M	\$35-45 M
Property Impact Mitigation	\$10-15 M	\$10-15 M	\$15-20 M	\$15-25 M	\$160-240 M
<b>Total Project Cost</b> (park mitigation costs provided separately)	<b>\$65-100 M</b>	<b>\$80-115 M</b>	<b>\$170-245 M</b>	<b>\$170-265 M</b>	<b>\$345-485 M</b>

Note: Cost estimates are only indicative of the current market conditions and available information, and are subject to change. The planning-level cost ranges provide an order of magnitude of cost that indicates the relative cost difference between the arterial route options.

\*Cost ranges for variations of the National route are not available. The Civic Facilities Overpass variation would be an order of magnitude higher due to significant impact to the National Works Yard. The National-Charles Overpass variation would be a similar cost range as the National base route. Both variations require relocation of the Fire Training and Heavy Urban Search and Rescue facilities.

## PARK MITIGATION COSTS

Costs to mitigate potential impacts to Strathcona Park and Trillium Park include replacement costs for amenities impacted, replacement and

compensation fee for trees, planning and design costs, construction costs for affected park space outside of alignment boundaries.

	PRIOR		WILLIAM	MALKIN	NATIONAL
	Overpass	Underpass		All Variations	Base Route with Grant overpass
Parkland Acquisition	\$8-13M	\$10-16M	\$40-66M	\$5-47M	\$4-8M
Park Mitigation	\$1-2M	\$1-2M	\$11-18M	\$1-16M	\$0.5-1M
<b>Total Park Cost</b>	<b>\$9-15M</b>	<b>\$11-19M</b>	<b>\$50-82M</b>	<b>\$6-63M</b>	<b>\$4.5-9M</b>

\*Costs are preliminary, order of magnitude only.