



## North Burnaby Traffic Calming Study Report

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City of Burnaby

REPORT

December 2022



## Corporate Authorization

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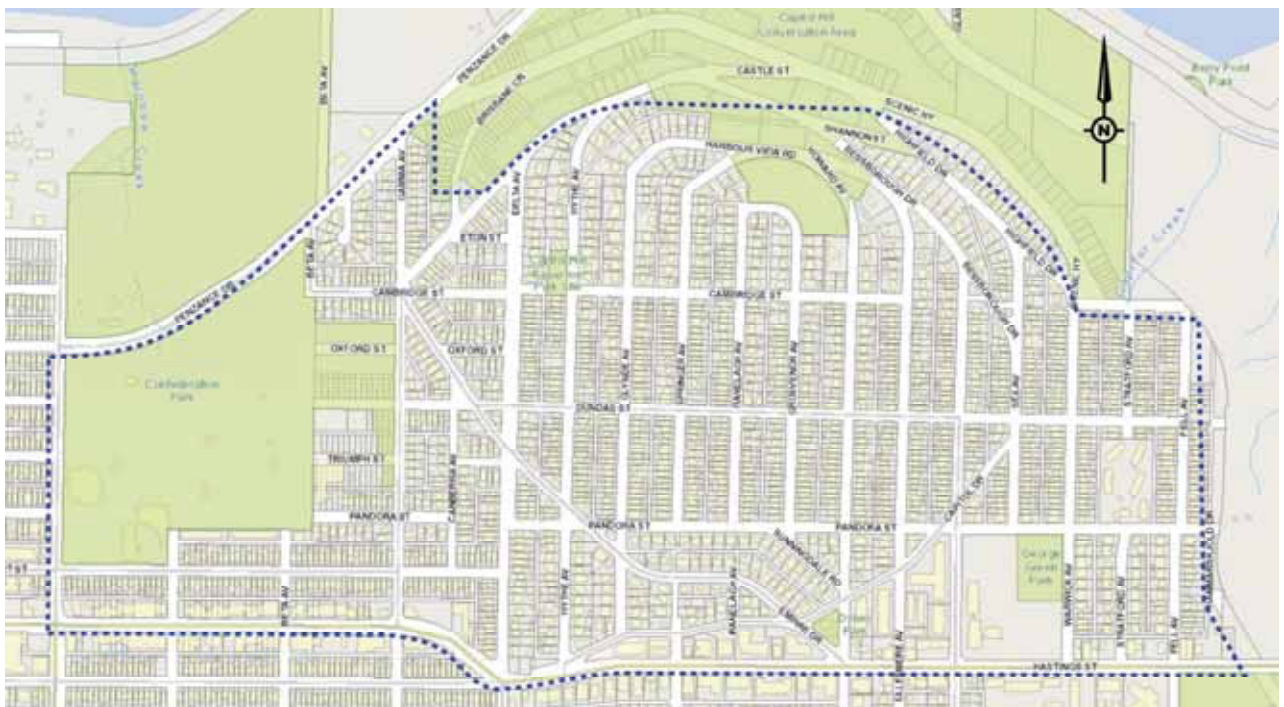
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## Executive Summary

The City of Burnaby retained ISL Engineering (ISL) to conduct a traffic calming study for the North Burnaby area. The study was initiated following public feedback regarding the proposed upgrades to Empire Drive Corridor. During this study, the public voiced concerns regarding vehicular speeding, volume of traffic caused by Parkland refinery, road safety for multimodal transportation modes (pedestrian, cycling etc.) and intersection safety. This study has summarized the available data and identified existing issues and potential traffic calming improvements in the study area. As specified by the City, the study area is located within North Burnaby and is located within the following boundary roads (**Figure ES.1**):

- Willingdon Avenue to the West
- Hastings Street to the South
- Penzance Drive to the North
- Fell Avenue to the East

Hastings Street was not included in this study as it is being reviewed as part of a separate study. However, all other boundary roadways were included, including Willingdon Avenue, Penzance Drive and Fell Avenue.



**Figure ES.1: North Burnaby Traffic Calming Study Area**

This study included the review of the existing conditions and issue identification (summarized in Memorandum #1) and the review of potential traffic calming options (summarized in Memorandum #2). Additionally, two separate public engagement sessions were held, including an online survey at the start of the study (Phase 1) and pop-up engagement events (both weekday and weekend) in Confederation Park and on-line survey to present proposed improvement measures (Phase 2). The descriptions for the public engagement sessions and Technical Memoranda are discussed below:





### **Phase 1 Engagement**

The online survey ran from April 11 to May 1, 2022 and the feedback was utilized to develop recommendations, strategies, and traffic calming improvement options for this technical memorandum. A total of 1,662 entries were started and 1,138 entries were completed while 13,108 questions were answered with a completion rate of 68%. Feedback gathered during Phase 1 of engagement was summarized in the *Public Engagement Summary Phase #1 Report* prepared by ISL (June 2022).

### **Phase 2 Engagement**

ISL organized two pop-up public engagement events held in Confederation Park within the study area on Wednesday June 22, 2022 (4:00PM – 7:00PM) and on Saturday June 25, 2022 (8:00AM – 4:00PM). The feedback will be utilized by the team to further refine recommendations, strategies, and traffic calming improvement options for this memorandum. Similar to Phase 1 results, the Phase 2 of engagement was summarized in the *Public Engagement Phase #2 Summary Report* prepared by ISL (August 2022).

Out of nine preliminary traffic calming options proposed, the improvement options regarding Penzance Drive, Empire Drive, and Dundas Street received the highest number of responses. Most respondents did not support the proposed options to remove the barricades on Penzance Drive/Beta Avenue and Penzance Drive/laneway (between Liberty Place and Gamma Avenue). Also, most respondents supported the permanent installation of barricades on Penzance Drive/Gamma Avenue. Many respondents supported the proposed improvement options for Empire Drive and Dundas Street, particularly the option to provide a new sidewalk to improve connectivity.

### **Memorandum #1 – Existing Conditions Review**

Memorandum #1 was submitted on May 6, 2022, summarizing the existing conditions within the area, and identifying the traffic operations and road safety issues within the study area. Based on the review of the existing conditions along the major corridors within the study area, the identified issues were summarized for each category listed above as well as site specific issues that were identified in the area such as high collision locations and confusing intersection configurations.

### **Memorandum #2 – Traffic Calming Option Review**

Memorandum #2 included a review of potential traffic calming measures and identification of which measures will be appropriate for each study area. The potential traffic calming candidate locations with corridors and site-specific issues were identified within the study area based on the review of the existing conditions (completed in Memorandum #1).

A list of selection guiding principles was developed to improve safety for all travel modes and reduce vehicle travel speeds in order to narrow down the traffic calming measures to be considered. Each of the types of potential traffic calming measure, specific issues identified, and candidate locations were evaluated to identify appropriate traffic calming treatments. The benefits and challenges for each location were identified and discussed. Potential improvement options were identified and discussed for the areas where issues were identified.



### Recommended Improvement Measures

Traffic calming recommendations were determined for the study area based on the potential improvement options identified during the development of Memorandum #2 and the feedback received from the public engagement event. Potential traffic calming improvements were determined and identified for the following locations:

- Dundas Street – *Sidewalk Improvements and Curb Extensions*
- Empire Drive – *Sidewalk Improvements, Curb Extensions, and Intersection Improvements*
- Cambridge Street – *Sidewalk Improvements and Curb Extensions*
- Fell Avenue – *Speed Humps*
- Pandora Street – *Sidewalk Improvements and Curb Extensions*
- Capitol Drive – *Intersection Improvements*
- Gamma Avenue – *Sidewalk Improvements*
- Penzance Drive – *Intersection Improvements*
- Willingdon Avenue – *Curb Extensions and Pedestrian Connectivity Improvements (included as part of the Confederation Park Redevelopment)*
- Albert Street – *Intersection Improvements (included as part of the Confederation Park Redevelopment)*

The review of the existing conditions within the study area and the public feedback indicated that pedestrian connection and the lack of sidewalks along some corridors was an issue, specifically east-west pedestrian connections through the study area. North-south sidewalk connections are provided on both the east and west ends of the study area. Although there is a lack of pedestrian facilities was noted near the centre of the study area, the need for additional sidewalks in the north-south direction could be reviewed in the future. The identified corridors address an identified deficiency in the network by providing facilities along major pedestrian desire lines and existing north-south pedestrian connections.

Complex intersection configuration and safety issues were identified near the Capitol Drive, Holdom Avenue and Pandora Street intersections. In addition, the intersections at Pandora Street, Empire Drive, Hythe Avenue and Glynde Avenue resulting in driver confusion and pedestrian safety concerns due to the proximity of the intersections and long crossing distances. Improvements were proposed for both locations to address the identified issues.

In order to determine the preferred configuration for the intersection at Penzance Drive and Beta Avenue, a comparative assessment of the three improvement options was completed to determine the potential benefits and associated impacts. After considering both engineering and social perspectives, it is recommended that the City proceeds with Option 3 (Partial Closure) as it will provide a balanced outcome. The right-in only movement could reduce the number of vehicles utilizing Beta Avenue while also maintaining some level of vehicular access to Penzance Drive. It will also provide safe operation at the intersection with no direct conflicting traffic movements. It may be prudent to restrict turning movements at Confederation Park northern parking lot (off leash trail), as there is a significant likelihood that motorists from the refinery would complete a U-turn in the parking lot to access Beta Avenue's proposed right-in only intersection.

Details of each improvement have been shown graphically in the **Attachment #1** including the types of traffic calming, where it was recommended and the extent. These recommended improvements are to be confirmed through subsequent technical analyses and refinement through community engagement.

Based on the proposed recommendations provided in the above sections, a summary of all the recommended traffic calming measures is provided in **Table ES.1**.

Table ES.1: Summary of Improvements

Location	Improvement Category	Improvement Description	Estimated Cost
Dundas Street	Sidewalk Improvement	- Upgrade 1200m of Interim road cross section to local collector standard, complete with curb extensions and letdowns throughout the corridor	\$2,250,000
	Curb Extensions	- Provide curb extensions at the intersection of Hythe Ave, Glynde Ave, Springer Ave, Ranelagh Ave and Grosvenor Ave (curb extensions for four corners at all intersections)	\$450,000
Pandora Street	Sidewalk Improvement	- Upgrade 1000m of Interim road cross section to local collector standard, complete with curb extensions and letdowns throughout the corridor	\$1,650,000
	Curb Extensions	- Provide curb extensions at the intersections of Springer Ave, Ranelagh Ave and Grosvenor Ave (Curb extensions on two corners and bump out on south side at all intersections)	\$450,000
Empire Drive	Sidewalk Improvement	- Upgrade 1000m of Interim road cross section to modified local collector standard, complete with curb extensions and letdowns and single sidewalk	\$2,650,000
	Curb Extensions	- Provide curb extensions at the intersection of Oxford Ave and Dundas St (Curb extensions on two corners and bump out at Oxford Ave and two bump outs at Dundas St)	
	Intersection Improvements	- Closures and intersection realignments at Pandora St, Empire Dr, Hythe Ave and Glynde Ave	\$500,000
N Gamma Ave	Sidewalk Improvement	- 225m of sidewalk improvements along the eastern Property line, complete with new curb, boulevard and 1.8m sidewalk	\$112,500
Cambridge Street	Sidewalk Improvement	- Upgrade 800m of Interim road cross section to 8.5m residential section, complete with curb extensions and letdowns	\$1,680,000
	Curb Extensions	- Provide curb extensions at the intersections of Springer Ave, Ranelagh Ave and Grosvenor Ave (Curb extension for four corners at all intersections)	
Willingdon Avenue*	Curb Extensions	- Provide curb extensions at the intersections of Dundas St and Triumph St with curbside parking	\$350,000
	Pedestrian Connectivity Improv	- Provide sidewalk or multi-use path connection from Albert St to Penzance Ave	
Fell Avenue	Cross Section Improvements	- Upgrade 400m of Interim road cross section to 8.5m residential section	\$900,000
	Speed Humps	- Provide speed humps every 75m from Pandora St and Hastings St	
Albert Street*	Willingdon Avenue Intersection	- Implement signalized intersection control	\$250,000
	Alpha Avenue Intersection	- Provide curb extensions and remove angle / perpendicular parking near the intersection to improve sightlines (Curb extension on two west side corners)	\$125,000
Capitol Drive	Intersection Improvements	- Closures and intersection improvements at Holdom Ave, Pandora St and Capitol Dr	\$500,000
Penzance Dr - Gamma Ave	Closure	- Formalize the closure of Gamma Ave complete with cul-de-sac, emergency vehicle access gate and letdown	\$65,000
Penzance Dr - Laneway	Open	- Remove temporary barriers and maintain laneway access for local traffic only	\$1,000
Penzance Dr - Beta Ave	Option 1 - Open	- Existing conditions (remove temporary barriers)	\$1,000
	Option 2 - Closure	- Formalize the closure of Beta Ave complete with cul de sac, emergency vehicle access gate and letdown	\$65,000
	Option 3 - Partial Closure	- Restrict movements at the intersection to right-in only (Penzance Dr Eastbound to Beta Ave)	\$50,000
SUBTOTAL (Including Option 2 - Closure for Penzance Dr - Beta Ave Only - highest cost)			\$ 11,998,500.00
CONTINGENCY @ 30%			\$ 3,599,550.00
<b>TOTAL (exclusive of GST)</b>			<b>\$ 15,598,050.00</b>

\*Improvements to Willingdon Avenue and Albert Street will occur as part of the Confederation Park Redevelopment

Two phases were considered for the implementation of recommended safety improvements which focus on addressing road safety and traffic operations issues at intersections: (short term priority improvements); and improvements to address pedestrian connectivity and vehicle speeding (medium / long-term priority improvements). Improvements along corridors could be completed at the same time; for example, sidewalk, curb extensions and intersection improvements along the Empire Drive corridor could be completed at the same time.

## 1.0 Introduction

### 1.1 Background

As part of the fast-growing Metro Vancouver area, the City of Burnaby (the City) is the third largest municipality in terms of population. The City accounts for approximately 10 percent of the region's population with a population of 249,000 in 2021 (7% increase since 2016). The *Burnaby Transportation Plan 2021* identifies the vision for the transportation system to provide vibrant and prosperous community by connecting people, places, and goods; providing safe, accessible, healthy, and sustainable transportation options and choices for all people; and supporting the ecological integrity of the environment.



The study included the review of the existing conditions and issue identification (summarized in Memorandum #1) and the review of potential traffic calming options (summarized in Memorandum #2). Additionally, two separate public engagement sessions were held, including an online survey at the start of the study (Phase 1) and pop-up engagement events (both weekday and weekend) in Confederation Park and an online survey to present proposed improvement measures (Phase 2).

This report is intended to provide a summary of the previous phases and proposed traffic calming measures including conceptual design drawings, cost estimates and an implementation plan.

### 1.2 Study Objectives

The City of Burnaby retained ISL Engineering (ISL) to conduct a traffic calming study for the North Burnaby area. The study was initiated following public feedback regarding the proposed upgrades to Empire Drive Corridor. During this study, the public voiced concerns regarding speeding, volume of traffic caused by Parkland refinery, multimodal road safety (pedestrian, cycling etc.) and intersection safety. This study has summarized the available data and identifies existing issues and potential traffic calming improvements in the study area.

### 1.3 Study Area

As specified by the City, the study area is located within North Burnaby and is located within the following boundary roads (**Figure 1.1**):

- Willingdon Avenue to the West
- Hastings Street to the South
- Penzance Drive to the North
- Fell Avenue to the East

Hastings Street was not included in this study as it is being reviewed as part of a separate study. However, all other boundary roadways were included, such as Willingdon Avenue, Penzance Drive and Fell Avenue.

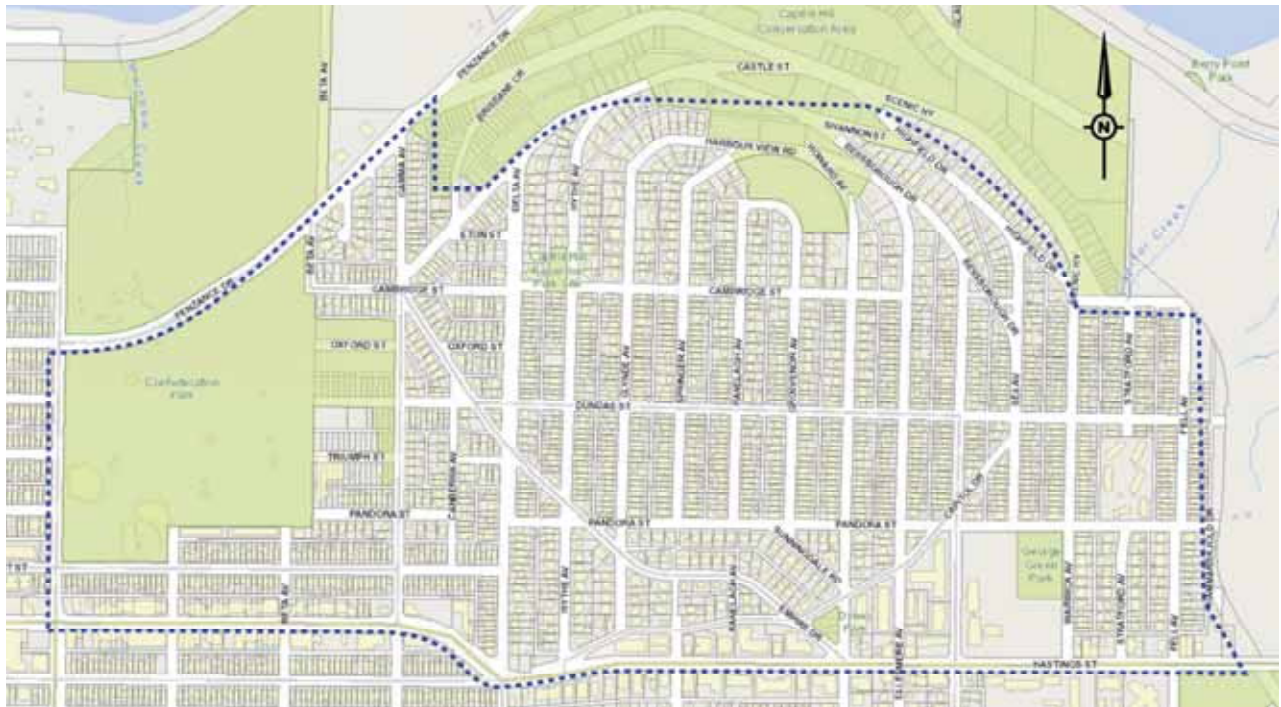


Figure 1.1: North Burnaby Traffic Calming Study Area

In addition, the study area also includes the following internal roads classified as Local / Minor Collector Roadways:

- **Holdom Avenue** – Hastings Street to Dundas Street
- **Dundas Street** – Holdom Avenue to Empire Drive
- **Empire Drive** – Hastings Street to Gamma Avenue
- **Gamma Avenue** – Hastings Street to Cambridge Street
- **Cambridge Street / Beta Avenue** – Gamma Avenue to Penzance Street
- **Willingdon Avenue** – Hastings Street to Penzance Drive
- **Albert Street** – Gamma Avenue to Willingdon Avenue

The intended function of a Minor Collector is to balance mobility and access, providing access to neighborhoods and connect local roads to other collectors and arterial roads. The remaining roads within the study area are classified as local roadways, whose main function is to provide access to local residences including parking and driveways.

## 2.0 Public Engagement Summary

Public engagement took place in two phases during the study. Phase 1 was conducted during the initial project phase through online survey and Phase 2 was conducted through in-person pop-up engagement events in Confederation Park to present potential improvement measures.

### 2.1 Phase 1 Public Engagement

To engage the public and help guide the consulting process, the City conducted an online survey at the start of the study so that residents and business owners/employees could provide their feedback, experiences, and ideas to improve the study area. The online survey (for Phase 1 Public Engagement) ran from April 11 to May 1, 2022 and the feedback was utilized to develop recommendations, strategies, and traffic calming improvement options for this technical memorandum.

A total of 1,662 entries were started and 1,138 entries were completed while 13,108 questions were answered with a completion rate of 68%. Feedback gathered during Phase 1 of engagement was summarized in the *Public Engagement Summary Phase #1 Report* prepared by ISL (June 2022).

### 2.2 Phase 2 Public Engagement

For Public Engagement Phase 2, ISL organized two pop-up public engagement events held in Confederation Park within the study area on Wednesday June 22, 2022 (4:00PM – 7:00PM) and on Saturday June 25, 2022 (8:00AM – 4:00PM). ISL prepared eight display boards for the event which highlighted the previous feedback from the public, identified traffic operations and road safety issues and presented preliminary improvement measures. ISL and City staff were present during these pop-up events to record residents' feedback, answer questions from the public and explain the proposed improvement measures. The feedback will be utilized by the team to further refine recommendations, strategies, and traffic calming improvement options for this memorandum. Similar to Phase 1 results, the Phase 2 of engagement was summarized in the *Public Engagement Phase #2 Summary Report* prepared by ISL (August 2022).

In Phase 2, a total of 319 respondents provided feedback on the preliminary traffic calming options at one of the two pop-up public information sessions or the concurrent online survey. 38 people attended pop-up session #1 and 81 people attended pop-up session #2 while 200 people responded to the online survey. The three most highlighted concerns were the installation or upgrade of sidewalks, addressing speeding issues, and concerns related to the barricades installed at Penzance Drive. In addition, the City also posted the proposed improvement measures on the City's website and asked for the public's feedback.

Out of nine preliminary traffic calming options proposed, the improvement options regarding Penzance Drive, Empire Drive, and Dundas Street received the greatest number of responses. Most respondents did not support the proposed options to remove the barricades on Penzance Drive/Beta Avenue and Penzance Drive/laneway (between Liberty Place and Gamma Avenue). Also, most respondents supported the permanent installation of barricades on Penzance Drive/Gamma Avenue. Many respondents supported the proposed improvement options for Empire Drive and Dundas Street, particularly the option to provide a new sidewalk to improve connectivity.





## 3.0 Memorandum #1 – Existing Condition Review

Memorandum #1 of this study was submitted on May 6, 2022, summarizing the existing conditions within the area, and identifying the traffic operations and road safety issues within the study area. The project team conducted a field review with City staff to identify the road safety and traffic operations issues within the study area. The existing conditions within the study area were reviewed and summarized including the following:

### LAND USE

- Mainly Residential land use was identified within the study area with some other major generators identified such as Confederation Park and Parkland Refinery

### ROAD GRADES

- Steep grades within the study area were identified which could have an impact on pedestrian accessibility and poor sightlines

### INTERSECTION TRAFFIC CONTROL AND SPEED LIMIT

- Some corridors with movement priority (routes with minimal stop controls) through the study corridor were identified as the most likely routes through the neighborhood and had the highest potential for high vehicle speeds.

### EXISTING TRAFFIC CALMING MEASURES

- Several types of traffic calming devices were identified within the study area, such as speed humps, curb bulges and road barricades.

### TRAFFIC VOLUMES

- Peak hour turning movement volumes and 24-hour directional counts collected within the study area were summarized

### ON-STREET PARKING

- On-street parking configurations within the study area were reviewed, including the locations and types of on-street parking

### TRANSIT ROUTES AND STOPS

- Two TransLink bus routes were reviewed within the study area, including routes through the neighbourhood and transit stop locations.

### PEDESTRIAN AND CYCLING FACILITIES

- Existing sidewalks, sidewalk letdowns and cycling facilities were identified within the area and deficiencies or discontinuities were discussed.

### COLLISION ANALYSIS

- Collision history within the study area was reviewed and the top 8 intersections in terms of collision frequency were identified.

Based on the review of the existing conditions along the major corridors within the study area, the identified issues were summarized for each category listed above as well as site specific issues that were identified in the area such as high collision locations and confusing intersection configurations.

## ■ 4.0 Memorandum #2 – Traffic Calming Options Review

Memorandum #2 included a review of potential traffic calming measures and identification of which measures will be appropriate for each study area. The potential traffic calming candidate locations (corridors and site-specific issues) were identified within the study area based on the review of the existing conditions (completed in Memorandum #1). A field review and additional data collection was conducted for all the locations and a summary of the information is provided. Spot speed surveys were conducted for each location to identify where speeding was occurring within the study area.

The potential traffic calming measures that were reviewed for consideration in this study included:

- Speed Humps
- Raised Crosswalk
- Curb Extensions
- Lane Narrowing
- Lateral Shift / Chicanes
- Road Closure
- On-Street Parking
- Raised Median Island
- Textured Crosswalk
- On-Road 'Sign' Pavement Marking

A list of selection guiding principles was developed to improve safety for all travel modes and reduce vehicle travel speeds. The guiding principles for traffic calming measures selection include:

- Safe for implementation on steep grades
- Encourage reduced vehicle speeds
- Discourage cut-through trips
- Improve safety for vulnerable road users
- Does not impede transit and non-motorized modes
- Avoids restricting access and egress
- Preferred self-enforcing measures

Each of the types of potential traffic calming measure, specific issues identified, and candidate locations were evaluated to identify appropriate traffic calming treatments. The benefits and challenges for each location were identified and discussed. Potential improvement options were identified and discussed for the following locations:

- Additional Sidewalk Locations (Various Locations)
- Curb Extensions along Empire Drive, Dundas Street and Cambridge Street
- Willingdon Avenue between Albert Street and Penzance Drive
- Fell Avenue, North of Hastings Street
- Pandora Street, Empire Drive, Hythe Avenue and Glynde Avenue intersection
- Holdom Avenue, Pandora Street and Capitol Drive Intersection
- Penzance Drive at Gamma Avenue and Beta Avenue
- Albert Street at Willingdon Avenue and Alpha Avenue Intersections



## 5.0 Recommended Improvement Measures

Traffic calming recommendations were determined for the study area based on the potential improvement options identified during the development of Memorandum #2 and the feedback received from the public engagement event. Potential traffic calming improvements were determined and identified for the following locations:

- Dundas Street – *Sidewalk Improvements and Curb Extensions*
- Empire Drive – *Sidewalk Improvements, Curb Extensions, and Intersection Improvements*
- Cambridge Street – *Sidewalk Improvements and Curb Extensions*
- Fell Avenue – *Speed Humps*
- Pandora Street – *Sidewalk Improvements and Curb Extensions*
- Capitol Drive – *Intersection Improvements*
- Gamma Avenue – *Sidewalk Improvements*
- Penzance Drive – *Intersection Improvements*
- Willingdon Avenue – *Curb Extensions and Pedestrian Connectivity Improvements*
- Albert Street – *Intersection Improvements*

Details of each improvement have been shown graphically in the **Attachment #1** including the types of traffic calming, where it was recommended and the extent. Detailed descriptions of the improvements have been provided in *Sections 5.1 to 5.10*. These recommended improvements will be confirmed through subsequent technical analyses and refinement through community engagement.

As discussed in detail in Memorandum #2, due to the steep grades found throughout several study corridors, vertical deflection type traffic calming measures (such as speed humps) or more aggressive forms of horizontal deflection (such as chicanes) were deemed inappropriate due to safety concerns. Therefore, for roadways such as Dundas Street, Pandora Street, Cambridge Street and Empire Drive, the provision of curb extensions at cross street intersections were identified as a viable traffic calming measures that could provide road safety and traffic calming benefits through road narrowing at the intersections. On-street parking along the midblock sections also provides lane narrowing effects, with the provision of curb and gutter along the extent of the corridors. Curb extensions also provide reduced crossing distance for pedestrians at the intersection for improved safety, in addition to the slower vehicle speeds.

## 5.1 Dundas Street

Vehicle speed data collected along Dundas Street found that vehicle speeding occurred along the study corridor. Asphalt curbs or gravel shoulders are provided along the sections of the corridor. Wide travel lanes and steep grades along the corridor may have contributed to the high vehicle speeds (85<sup>th</sup> percentile speeds 10 km/hr above the posted speed limit). The proposed traffic calming improvements along the corridor include the following:

- Install curb extensions at Hythe Avenue, Glynde Avenue, Springer Avenue, Ranelagh Avenue and Grosvenor Avenue, as shown in **Figure 5.1**.
- Upgrade the road cross section to include on-street parking, boulevard, and sidewalk on both sides as shown in **Figure 5.2**.
- Formalize on-street parking where driveways are not present with curbs and signage.



Figure 5.1: Dundas Street Corridor Improvements

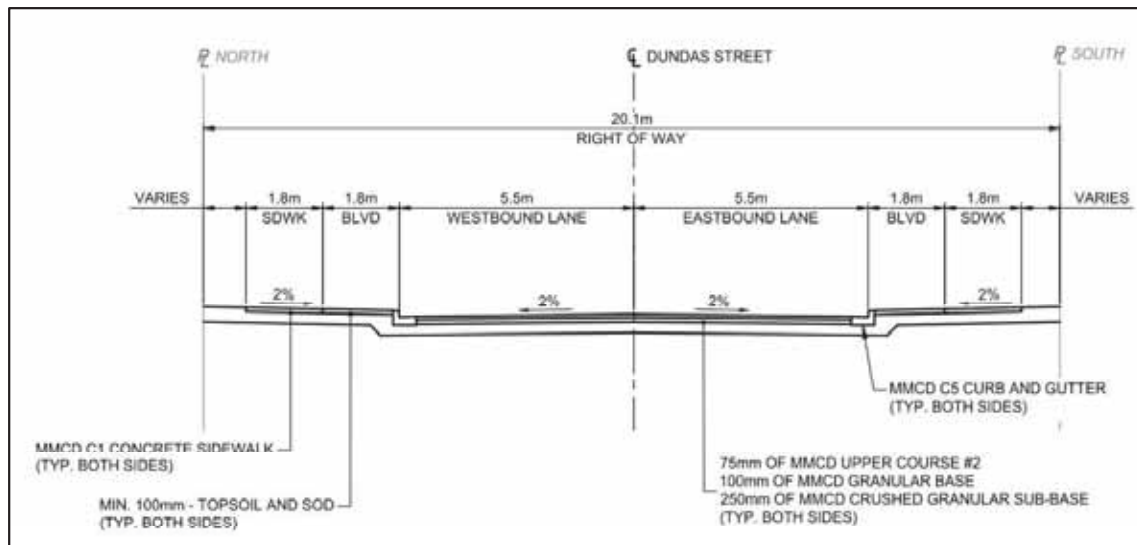


Figure 5.2: Typical Local Collector Section – Dundas Street

Curb extensions are proposed at each intersection to provide speed reduction measures at regular intervals along the corridor, especially for westbound downhill vehicles. Curb extensions are also proposed at Hythe Avenue to provide enhanced pedestrian safety at the intersection with Hythe Avenue sidewalk connections.

## 5.2 Empire Drive

Gravel shoulders or asphalt curbs are provided along the study corridor with shoulder parking on one or both sides and a downhill slope in the northwest direction. As it runs from northwest to southeast through the study area, Empire Drive is identified as a potential main route for vehicle travelling through the neighborhood. Vehicle speed data collected along Empire Drive found that vehicle speeding occurred along the study corridor between Delta Avenue and Oxford Street. Steep grades along the corridor may have contributed to the high vehicle speeds. The proposed traffic calming improvements along the corridor include the following:

- Install curb extensions at Oxford Street and Dundas Street, as shown in **Figure 5.3**.
- Upgrade the road cross section to include on street parking, concrete curb and gutter, and sidewalk on one side as shown in **Figure 5.4**.
- Formalize on-street parking where driveways are not present with curb and signage.



Figure 5.3: Empire Drive Corridor Improvements

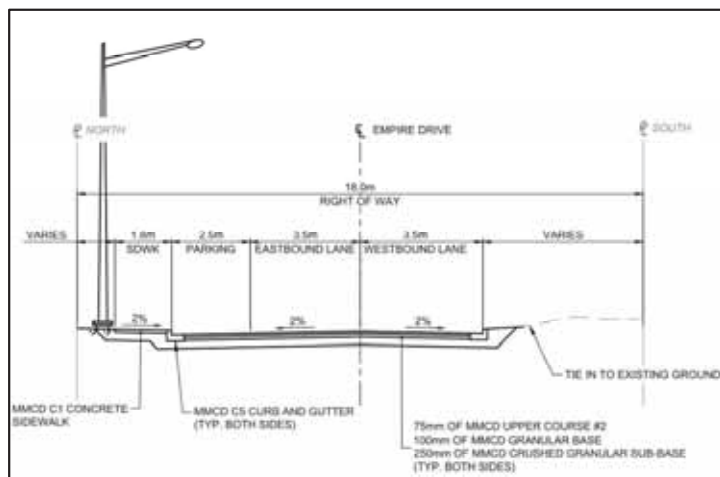


Figure 5.4: Typical Local Collector Section – Empire Drive

### 5.3 Cambridge Street

Cambridge Street is a residential roadway with sufficient on-street parking on both sides. Cambridge Street mainly serves local traffic within the neighbourhood and is unlikely to serve significant cut through traffic. Vehicle speed data collected along Cambridge Street found that vehicle speeding occurred along the study corridor. Wide existing road cross section and steep grades may have contributed to the high speeds. The proposed traffic calming improvements along the corridor include the following:

- Install curb extensions at Springer Avenue, Ranelagh Avenue and Grosvenor Avenue, as shown in **Figure 5.5**.
- Upgrade the road cross section to include on street parking, boulevard, and sidewalk on both sides as shown in **Figure 5.6**.
- Formalize on-street parking where driveways are not present with curb and signage.



Figure 5.5: Cambridge Street Corridor Improvements

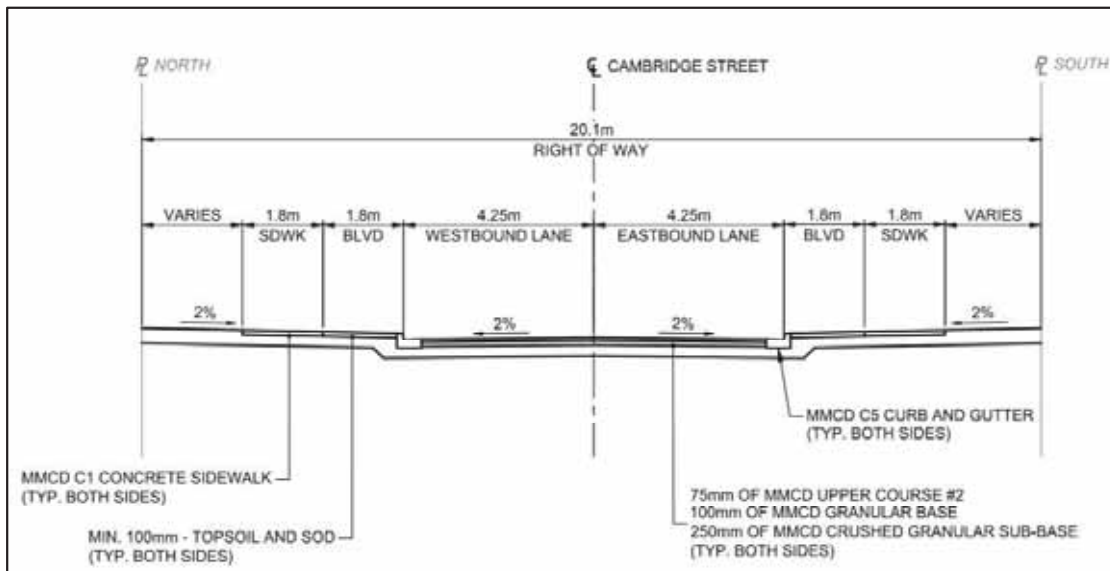


Figure 5.6: Typical Residential Section – Cambridge Street

Curb extensions are proposed at Springer Avenue, Ranelagh Avenue and Grosvenor Avenue to provide speed reduction measures at mid-segment where the relatively high vehicle speeds are occurring.



## 5.4 Fell Avenue

Fell Avenue serves significant cut through traffic and is posted at a 30 kilometers per hour. Speeding (85<sup>th</sup> percentile speeds 10 km/hr over the posted speed) was noted along the corridor. The proposed traffic calming improvements along the corridor includes the following:

- Provide speed humps every 75 metres from Pandora Street to Hastings Street
- Upgrade the road cross section to include on street parking, boulevard, and sidewalk on both sides as shown in **Figure 5.7**.

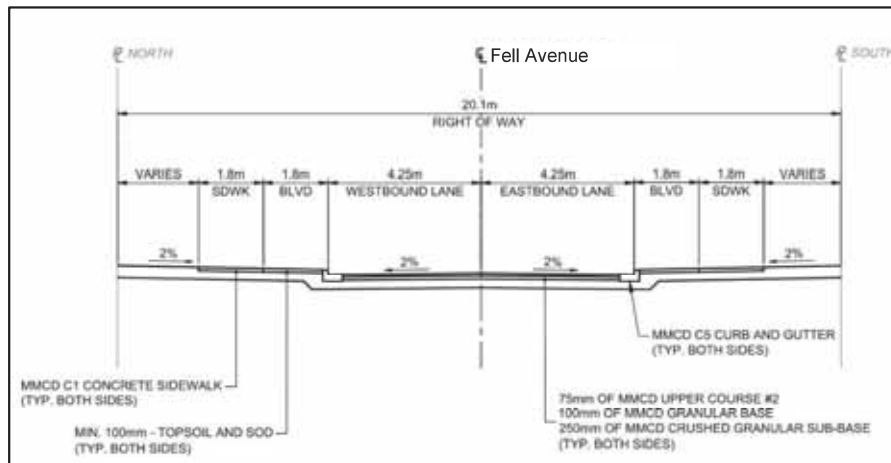


Figure 5.7: Typical Residential Section – Fell Avenue

## 5.5 Pandora Street

Pandora Street is an east-west corridor through the study area parallel to Dundas Street and Cambridge Street. Speeding was not found along the corridor; however, improvements identified at the Empire Drive intersection (discussed in **Section 5.6**) may impact the traffic patterns along Pandora Street. Therefore, the following traffic calming improvements are proposed along the corridor:

- Upgrade the road cross section to include on-street parking, boulevard, and sidewalk on both sides, similar to Dundas Street and shown in **Figure 5.2**.
- Install curb extensions at Springer Avenue, Ranelagh Avenue and Grosvenor Avenue, as shown in **Figure 5.8**.
- Formalize on-street parking where driveways are not present with curb and signage.



Figure 5.8: Pandora Street Corridor Improvements

## 5.6 Pandora Street, Empire Drive, Hythe Avenue and Glynde Avenue Intersections

The complex intersection configuration and safety issues were identified near the Pandora Street, Empire Drive, Hythe Avenue and Glynde Avenue intersections, resulting in driver confusion and stop-control non-compliance. The proposed traffic calming improvements at the study intersections at Pandora Street, Empire Drive, Hythe Avenue and Glynde Avenue are shown in **Figure 5.9** and include the following:

- Split the north and south legs of the Hythe Avenue and Empire Drive intersection and provide 90 degree northbound and southbound intersection approaches.
- Closure of Pandora Street, West of Empire Drive.
- Realign Empire Drive and Pandora Street intersection and implement three-way stop control.
- Closure of Glynde Avenue, South of Pandora Avenue.

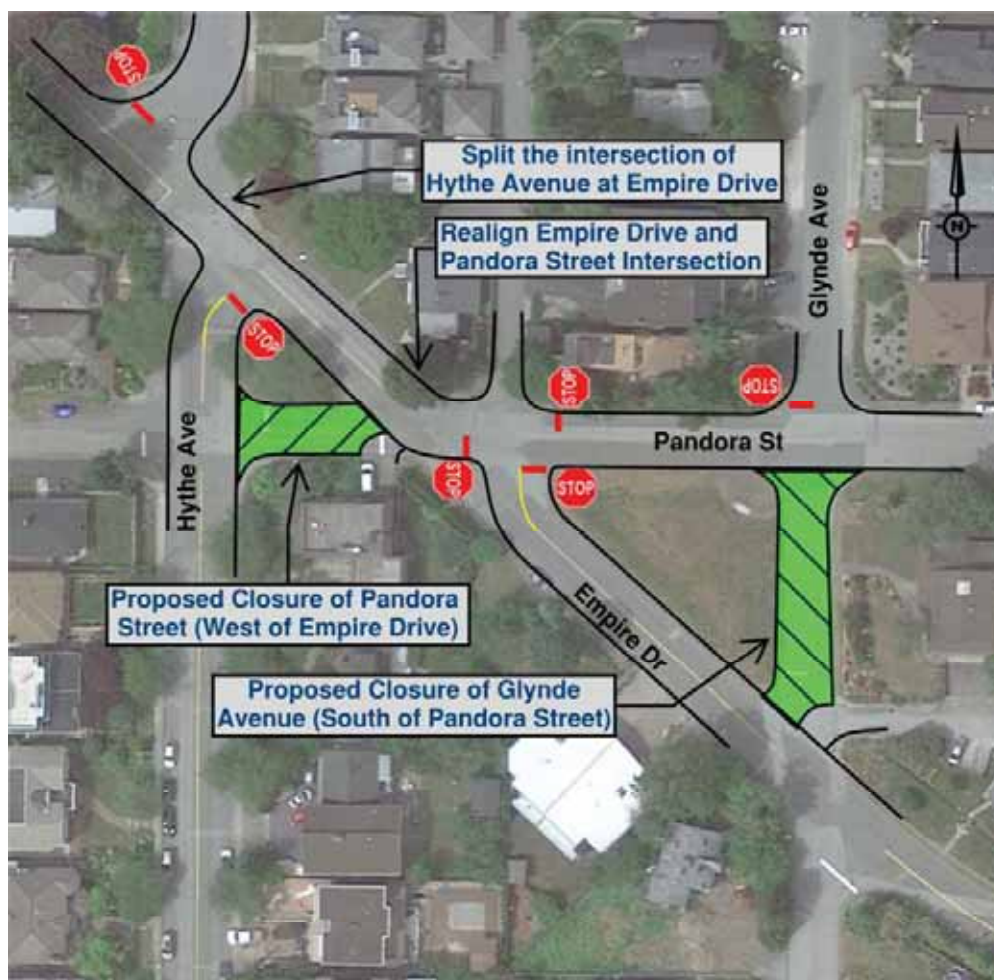


Figure 5.9: Pandora Street, Empire Drive, Glynde Avenue and Hythe Avenue Intersection Improvements

## 5.7 Holdom Avenue, Capitol Drive and Pandora Street Intersections

The complex intersection configuration and safety issues were identified near the Capitol Drive, Holdom Avenue and Pandora Street intersections, resulting in driver confusion and pedestrian safety concerns due to the proximity of the intersections and long crossing distances. The proposed traffic calming improvements at the study intersections at Holdom Avenue, Capitol Drive and Pandora Street are shown in **Figure 5.10** and include the following:

- Align Capitol Drive intersections at 90 degrees and reduce the corner radius.
- Close Capitol Drive between Pandora Street and Hythe Avenue to expand green space.
- Provide vehicle access from Holdom Avenue or remove informal parking stalls to accommodate the full closure.
- At the Holdom Avenue and Pandora Street intersections:
  - Provide south leg curb extensions to align pedestrian crosswalks at 90 degrees.
  - Provide consistent pavement markings in the form of parallel line type pedestrian crosswalks.
- Provide sidewalk on both sides of road where feasible.

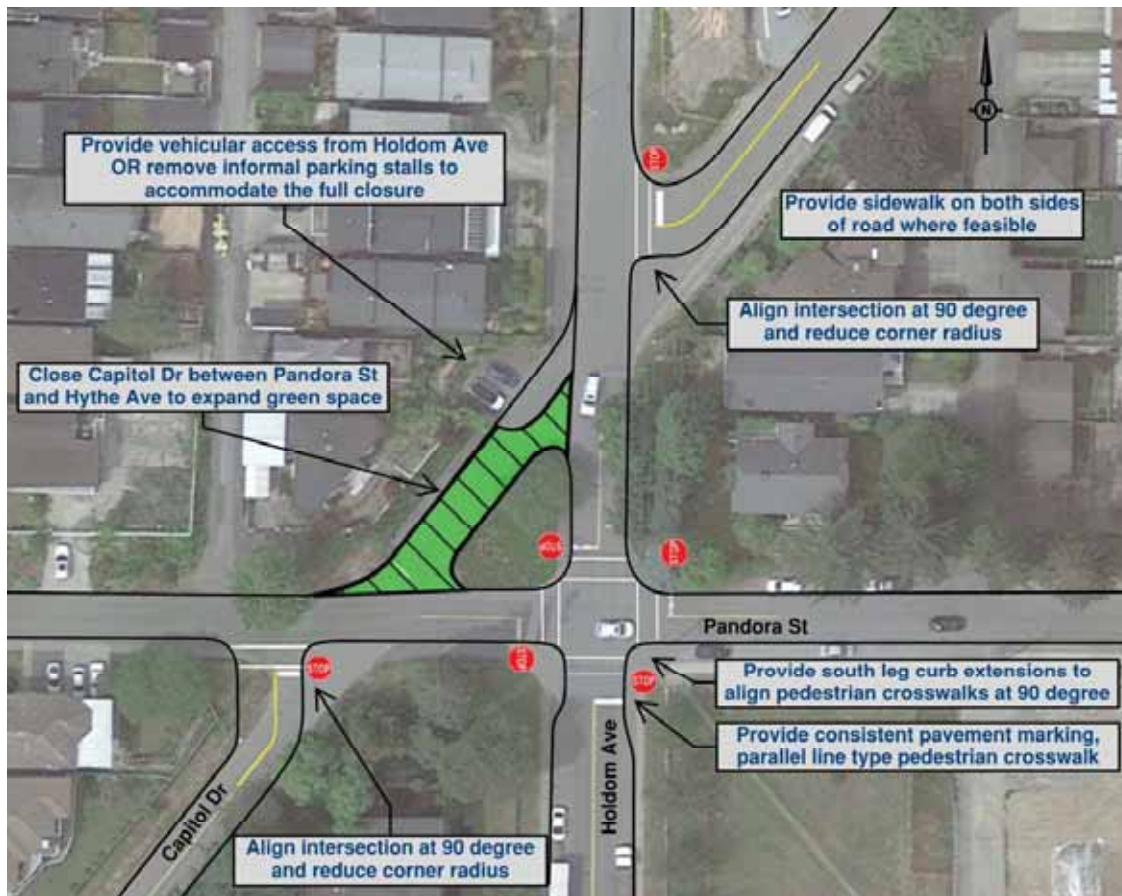


Figure 5.10: Holdom Avenue, Pandora Street and Capitol Drive Intersection Improvements



## 5.8 Penzance Drive at Gamma Avenue and Beta Avenue

Temporary barriers were installed along Penzance Drive at Beta Avenue, the laneway, and Gamma Avenue in October 2021. The barriers were installed by the City as a pilot project to mitigate issues from shortcutting trips to and from the Parkland Refinery. The results of the closures were reviewed along with the public feedback. ISL has developed potential improvements for the area to address the concerns raised during the public engagement process. The proposed improvements for the intersections of Penzance Drive at Gamma Avenue and Beta Avenue are shown in **Figure 5.11** and includes the following:

- Formalize the closure at Gamma Avenue for general purpose traffic while maintaining emergency vehicle access – using locked movable gates with keys held by authorized persons (such as police and fire departments).
- Provide turnaround to accommodate delivery vehicles on Gamma Avenue.
- Allow full movements at the laneway access for local traffic only.
- Three potential options are available at the Penzance Drive and Beta Avenue intersection (preferred option review is discussed on the following page):
  - **Option 1 – Open** – Existing Conditions (remove temporary barriers)
  - **Option 2 – Closure** – Formalize the closure of Beta Avenue
  - **Option 3 – Partial Closure** – Restrict movements at the intersection to right-in only (Penzance Drive Eastbound to Beta Avenue)



Figure 5.11: Penzance Drive at Beta Avenue and Gamma Avenue Improvements

### Comparison of Configurations at Penzance Drive and Beta Avenue

In order to determine the preferred configuration for the intersection at Penzance Drive and Beta Avenue, a comparative assessment of the three options was completed to determine the potential benefits and impacts of each option. The comparison was made based on four accounts, including:

- Impacts to Nearby Residents (Beta Avenue and Cambridge Street)
- Impacts to Capitol Hill Residents
- Traffic Operations and Road Safety along Penzance Drive
- Traffic Operations and Road Safety along Beta Avenue

For each account, it was determined if the option was more desirable, same as existing / minimal change or less desirable. The results from the comparison have been provided in **Table 5.1**.

**Table 5.1: Comparative Assessment for Three Options at Penzance Drive and Beta Avenue**

Comparative Accounts	Impacts to Nearby Residents (Beta Avenue and Cambridge Street)		Impacts to Capitol Hill Residents		Traffic Operations and Road Safety Along Penzance Drive		Traffic Operations and Road Safety along Beta Avenue	
<b>Option 1 - Open</b> <i>Existing Conditions (remove temporary barriers)</i>	✘	- Additional vehicle traffic compared to temporary closure condition	✔	- Improved connectivity to Penzance Dr and Willingdon Ave - Decreased traffic volume on Albert Street	■	- No change in operation or safety from previous operation	■	- No change in operation or safety from previous operation
<b>Option 2 - Closure</b> <i>Formalize the closure of Beta and Gamma Avenue</i>	✔	- Maintained minimal traffic along Beta Ave and Cambridge Street	✘	- Increased travel time and connectivity to Penzance Drive	✔	- Eliminated the turning movements and road safety be improved	✔	- Significantly reduced traffic volumes through neighbourhood
<b>Option 3 - Partial Closure</b> <i>Restrict movements at the intersection to right-in only (Penzance Drive Eastbound to Beta Avenue)</i>	✔	- Reduced the number of vehicles travelling downhill around the Beta-Cambridge curve	✔	- Partial connectivity provided from Penzance Drive and Willingdon Avenue	■	- Reduced conflicted turning movements - Westbound left-turn vehicles may U-turn at parking lot	✔	- Reduced traffic volumes through neighbourhood

**Legend**  
 ✔ = More Desirable  
 ■ = Same as Existing / Minimal Change  
 ✘ = Less Desirable

Prior to deciding on whether to close the roadways at Penzance, it is important to acknowledge the two competing components, Engineering perspective and Social perspective.

From an Engineering perspective, the latest analysis did not find a compelling engineering rationale to close the roadways along Penzance Drive, as the empirical data did not indicate any relevant crash data or significant safety concerns. Also, Gamma Avenue, Empire Drive, Cambridge Street, Penance Drive and Beta Ave are all classified as Local Collector Roads (see **Figure 5.12** for the information extracted from City of Burnaby’s Engineering Design Criteria).

- **Local Collector** - means a highway whose primary function is to carry traffic between local residential streets and Major Roads and to provide direct access to individual properties. Provisions to be made for cyclists and pedestrians as well as vehicular traffic. The Local Collector standard shall be used where a local road serves multi-family, commercial or industrial developments. The design vehicular traffic volume is 1,000 to 5,000 vehicles per day (see Figure 6.8).

Figure 5.12: Extract from City of Burnaby's Engineering Design Criteria

Therefore, by definition, the Capital Hill roadways are meeting the City's design criteria by carrying traffic between local residential streets and major roads, while serving industrial development (Parkland). However, the existing roadways, except for Penzance Drive and Gamma Ave (up to Cambridge), do not have provisions for cyclists or pedestrians and therefore fall short of the required design criteria. Once the proposed upgrades are completed the Local collectors will meet the design standards.

From a Social perspective, the feedback provided through the public engagement process identified that most respondents/residents support the closure of the Penzance Drive access points, as the closure will stop the short-cutting through the Capital Hill neighborhood, which is beneficial to the local residences. It is understood that the public input is an important determining factor in the next steps of the neighborhood. However, the City should consider a balanced approach when deciding upon the final decision.

Therefore, it is recommended that the City proceeds with Option 3 (Partial Closure) as it will provide a balanced outcome. The right-in only movement could reduce the number of vehicles utilizing Beta Avenue while also maintaining some level of access to Penzance Drive. It will also provide safe operation at the intersection with no direct conflicting traffic movements. It may be prudent to restrict turning movements at Confederation Park northern parking lot (off leash trail), as there is a significant likelihood that motorists from the refinery would complete a U-turn in the parking lot to access Beta Avenue's proposed right-in only intersection. Prior to implementing the new intersection configurations along Penzance Drive, it is recommended that Empire Drive be upgraded in order to meet the City's design criteria.



## 5.9 Willingdon Avenue

Volumes and vehicle speed data collected along Willingdon Avenue between Albert Street and Penzance Drive found vehicle speeding along the corridor as well as increased traffic volumes due to the closure of Beta Avenue and Gamma Avenue at Penzance Drive. The proposed improvement measures for the Willingdon Avenue Corridor are shown in **Figure 5.13** and include the following:

- Implementing curb extensions at Dundas Street, Triumph Street and Pandora St.
- Formalizing curbside parking along the east side of Willingdon Avenue.
- Providing new sidewalk or multi-use path along the east side of Willingdon Avenue between Penzance Drive and Albert Street to connect to the existing Willingdon Avenue Multi-Use Path, south of Albert Street.
  - MUP is provided between Hastings Street and Albert Street, therefore, this would provide continuity in the MUP network to Penzance Drive.

All the above safety improvements along Willingdon Avenue will be considered as part of the Confederation Park Redevelopment project.



Figure 5.13: Willingdon Avenue Corridor Improvements

## 5.10 Albert Street

Collision analysis conducted for the study found that eleven and four collisions were recorded in the last 5 years along Albert Street at Willingdon Avenue and Alpha Street, respectively. Most collisions were right-angle configuration. The proposed recommendations for the Albert Street Corridor are shown in **Figure 5.14** and includes:

- Providing a traffic signal to improve traffic and safety operations at the intersection of Albert Street and Willingdon Avenue.
  - Improved safety for pedestrians crossing at the intersection
- Providing improvements to sightlines and parking configuration near the intersection of Albert Street and Alpha Avenue. Curb extensions for the northwest and southwest corners of the intersection.

All the above improvements along Albert Street will be considered as part of the Confederation Park Redevelopment project.



Figure 5.14: Albert Street Corridor Improvements



## 5.11 Pedestrian Connection Improvements

The review of the existing conditions within the study area and the public feedback indicated that pedestrian connection and the lack of sidewalks along some corridors was an issue, specifically east-west pedestrian connections through the study area. North-south sidewalk connections are provided on both the east and west ends of the study area. Although there is a lack of pedestrian facilities was noted near the centre of the study area. The need for additional sidewalks in the north-south direction could be reviewed in the future, however the identified corridors address an identified deficiency in the network by providing facilities along major pedestrian desire lines and existing north-south pedestrian connections. Pedestrian connections proposed for the study area include:

- Empire Drive between Gamma Avenue and Hastings Street
- Dundas Street between Empire Drive and Fell Avenue
- Cambridge Street between Hythe Avenue and Ellesmere Avenue
- Pandora Street between Empire Drive and Fell Avenue
- Gamma Avenue between Cambridge Street and Penzance Drive
- Willingdon Avenue between Pandora Street and Penzance Drive (multi-use pathway connection to the Trans Canada Trail)

The locations of all existing and proposed sidewalk connections have been shown in **Figure 5.15**.



Figure 5.15: Proposed Pedestrian Sidewalk Connections

## 5.12 Summary of Improvements

Based on the proposed recommendations provided in the above sections, a summary of all the recommended traffic calming measures is provided in **Table 5.2**.

**Table 5.2: Summary of Improvements**

Location	Improvement Category	Improvement Description
Dundas Street	Sidewalk Improvement	- Upgrade 1200m of Interim road cross section to local collector standard, complete with curb extensions and letdowns throughout the corridor
	Curb Extensions	- Provide curb extensions at the intersection of Hythe Ave, Glynde Ave, Springer Ave, Ranelagh Ave and Grosvenor Ave (curb extensions for four corners at all intersections)
Pandora Street	Sidewalk Improvement	- Upgrade 1000m of Interim road cross section to local collector standard, complete with curb extensions and letdowns throughout the corridor
	Curb Extensions	- Provide curb extensions at the intersections of Springer Ave, Ranelagh Ave and Grosvenor Ave (Curb extensions on two corners and bump out on south side at all intersections)
Empire Drive	Sidewalk Improvement	- Upgrade 1000m of Interim road cross section to modified local collector standard, complete with curb extensions and letdowns and single sidewalk
	Curb Extensions	- Provide curb extensions at the intersection of Oxford Ave and Dundas St (Curb extensions on two corners and bump out at Oxford Ave and two bump outs at Dundas St)
	Intersection Improvements	- Closures and intersection realignments at Pandora St, Empire Dr, Hythe Ave and Glynde Ave
N Gamma Ave	Sidewalk Improvement	- 225m of sidewalk improvements along the eastern Property line, complete with new curb, boulevard and 1.8m sidewalk
Cambridge Street	Sidewalk Improvement	- Upgrade 800m of Interim road cross section to 8.5m residential section, complete with curb extensions and letdowns
	Curb Extensions	- Provide curb extensions at the intersections of Springer Ave, Ranelagh Ave and Grosvenor Ave (Curb extension for four corners at all intersections)
Willingdon Avenue*	Curb Extensions	- Provide curb extensions at the intersections of Dundas St and Triumph St with curbside parking
	Pedestrian Connectivity Improv	- Provide sidewalk or multi-use path connection from Albert St to Penzance Ave
Fell Avenue	Cross Section Improvements	- Upgrade 400m of Interim road cross section to 8.5m residential section
	Speed Humps	- Provide speed humps every 75m from Pandora St and Hastings St
Albert Street*	Willingdon Avenue Intersection	- Implement signalized intersection control
	Alpha Avenue Intersection	- Provide curb extensions and remove angle / perpendicular parking near the intersection to improve sightlines (Curb extension on two west side corners)
Capitol Drive	Intersection Improvements	- Closures and intersection improvements at Holdom Ave, Pandora St and Capitol Dr
Penzance Dr - Gamma Ave	Closure	- Formalize the closure of Gamma Ave complete with cul-de-sac, emergency vehicle access gate and letdown
Penzance Dr - Laneway	Open	- Remove temporary barriers and maintain laneway access for local traffic only
Penzance Dr - Beta Ave	Option 1 - Open	- Existing conditions (remove temporary barriers)
	Option 2 - Closure	- Formalize the closure of Beta Ave complete with cul de sac, emergency vehicle access gate and letdown
	Option 3 - Partial Closure	- Restrict movements at the intersection to right-in only (Penzance Dr Eastbound to Beta Ave)

\*Improvements to Willingdon Avenue and Albert Street will occur as part of the Confederation Park Redevelopment



## 6.0 Cost Estimate and Implementation Plan

### 6.1 Cost Estimate

ISL prepared a preliminary design for the proposed improvements described in *Section 5*. The preliminary drawings prepared included typical sections for both residential and local collector roadways in the study area. The cost estimate was broken down by location or corridor, as shown in **Table 6.1**. In addition to the cost estimate, a contingency of 30% was also considered on the total cost.

Table 6.1: Preliminary Cost Estimate

Location	Improvement Category	Improvement Description	Estimated Cost
Dundas Street	Sidewalk Improvement	- Upgrade 1200m of Interim road cross section to local collector standard, complete with curb extensions and letdowns throughout the corridor	\$2,250,000
	Curb Extensions	- Provide curb extensions at the intersection of Hythe Ave, Glynde Ave, Springer Ave, Ranelagh Ave and Grosvenor Ave (curb extensions for four corners at all intersections)	\$450,000
Pandora Street	Sidewalk Improvement	- Upgrade 1000m of Interim road cross section to local collector standard, complete with curb extensions and letdowns throughout the corridor	\$1,650,000
	Curb Extensions	- Provide curb extensions at the intersections of Springer Ave, Ranelagh Ave and Grosvenor Ave (Curb extensions on two corners and bump out on south side at all intersections)	\$450,000
Empire Drive	Sidewalk Improvement	- Upgrade 1000m of Interim road cross section to modified local collector standard, complete with curb extensions and letdowns and single sidewalk	\$2,650,000
	Curb Extensions	- Provide curb extensions at the intersection of Oxford Ave and Dundas St (Curb extensions on two corners and bump out at Oxford Ave and two bump outs at Dundas St)	
	Intersection Improvements	- Closures and intersection realignments at Pandora St, Empire Dr, Hythe Ave and Glynde Ave	\$500,000
N Gamma Ave	Sidewalk Improvement	- 225m of sidewalk improvements along the eastern Property line, complete with new curb, boulevard and 1.8m sidewalk	\$112,500
Cambridge Street	Sidewalk Improvement	- Upgrade 800m of Interim road cross section to 8.5m residential section, complete with curb extensions and letdowns	\$1,680,000
	Curb Extensions	- Provide curb extensions at the intersections of Springer Ave, Ranelagh Ave and Grosvenor Ave (Curb extension for four corners at all intersections)	
Willingdon Avenue*	Curb Extensions	- Provide curb extensions at the intersections of Dundas St and Triumph St with curbside parking	\$350,000
	Pedestrian Connectivity Improv	- Provide sidewalk or multi-use path connection from Albert St to Penzance Ave	
Fell Avenue	Cross Section Improvements	- Upgrade 400m of Interim road cross section to 8.5m residential section	\$900,000
	Speed Humps	- Provide speed humps every 75m from Pandora St and Hastings St	
Albert Street*	Willingdon Avenue Intersection	- Implement signalized intersection control	\$250,000
	Alpha Avenue Intersection	- Provide curb extensions and remove angle / perpendicular parking near the intersection to improve sightlines (Curb extension on two west side corners)	\$125,000
Capitol Drive	Intersection Improvements	- Closures and intersection improvements at Holdom Ave, Pandora St and Capitol Dr	\$500,000
Penzance Dr - Gamma Ave	Closure	- Formalize the closure of Gamma Ave complete with cul-de-sac, emergency vehicle access gate and letdown	\$65,000
Penzance Dr - Laneway	Open	- Remove temporary barriers and maintain laneway access for local traffic only	\$1,000
Penzance Dr - Beta Ave	Option 1 - Open	- Existing conditions (remove temporary barriers)	\$1,000
	Option 2 - Closure	- Formalize the closure of Beta Ave complete with cul de sac, emergency vehicle access gate and letdown	\$65,000
	Option 3 - Partial Closure	- Restrict movements at the intersection to right-in only (Penzance Dr Eastbound to Beta Ave)	\$50,000
SUBTOTAL (Including Option 2 - Closure for Penzance Dr - Beta Ave Only - highest cost)			\$ 11,998,500.00
CONTINGENCY @ 30%			\$ 3,599,550.00
<b>TOTAL (exclusive of GST)</b>			<b>\$ 15,598,050.00</b>

\*Improvements to Willingdon Avenue and Albert Street will occur as part of the Confederation Park Redevelopment

## 6.2 Implementation Plan

To support the City in the efficient allocation of resources and funding, an implementation plan to complete the recommended improvement measures was developed. Two phases of the implementation should be considered:

- Short Term Priority – Improvements to address safety and traffic operations concerns at intersections
- Medium / Long Term Priority – Improvements to address pedestrian connectivity and vehicle speeding

### Short Term Priority

- Empire Drive – *Intersection Improvements*
- Capitol Drive – *Intersection Improvements*
- Penzance Drive – *Intersection Improvements (Option 3 – Partial Closure)*

### Medium to Long Term Priority

- Dundas Street – *Sidewalk Improvements and Curb Extensions*
- Empire Drive – *Sidewalk Improvements, Curb Extensions*
- Cambridge Street – *Sidewalk Improvements and Curb Extensions*
- Fell Avenue – *Speed Humps*
- Pandora Street – *Sidewalk Improvements and Curb Extensions*
- Gamma Avenue – *Sidewalk Improvements*

Improvements along corridors could be completed at the same time; for example, sidewalk, curb extensions and intersection improvements along the Empire Drive corridor could be completed at the same time. The implementation plan is shown graphically including the cost for each phase in **Table 6.2**.

### Confederation Park Redevelopment Improvements

Some improvements were recommended that will be completed as part of the Confederation Park Redevelopment.

- Willingdon Avenue – *Curb Extensions and Pedestrian Connectivity Improvements*
- Albert Street – *Willingdon Avenue Intersection Improvements*
- Albert Street – *Alpha Avenue Intersection Improvements*

Table 6.2: Proposed Implementation Plan

Potential Implementation Plan			
Phase	Improvement Location & Category	Cost	Notes
Short Term Priority	<b>Empire Drive</b> <i>Intersection Improvements</i>	\$500,000	At Pandora St, Hythe Ave and Glynde Ave
	<b>Capitol Drive</b> <i>Intersection Improvements</i>	\$500,000	At Holdom Ave and Pandora St
	<b>Penzance Drive - Gamma Avenue</b> <i>Formalize the Closure</i>	\$65,000	Include emergency vehicle access gates
	<b>Penzance Drive - Laneway</b> <i>Remove temporary barriers</i>	\$1,000	
	<b>Penzance Drive - Beta Avenue (Option 3)</b> <i>Restrict movements to Right-in only</i>	\$50,000	Assume Option 3 (partial closure)
		<b>Short Term Total</b>	<b>\$1,116,000</b>
Medium to Long Term Priority	<b>Dundas Street</b> <i>Sidewalk Improvements, and Curb Extensions</i>	\$2,700,000	About 1200m long
	<b>Empire Drive</b> <i>Sidewalk Improvements, Curb Extensions</i>	\$2,650,000	About 1000m long
	<b>Cambridge Street</b> <i>Sidewalk Improvements and Curb Extensions</i>	\$1,680,000	About 800m long
	<b>Fell Avenue</b> <i>Speed Humps and Cross Section Improvements</i>	\$900,000	About 400m long
	<b>Pandora Avenue</b> <i>Sidewalk Improvements and Curb Extensions</i>	\$2,100,000	About 1000m long
	<b>Gamma Avenue</b> <i>Sidewalk Improvements</i>	\$112,500	About 225m long
		<b>Meidium / Long Term Total</b>	<b>\$10,142,500</b>
Included in Confederation Park Redevelopemnt	<b>Willingdon Avenue</b> <i>Curb Extensions and MUP</i>	\$350,000	Covered in the Confederation Park redevelopment
	<b>Albert Street</b> <i>Willingdon Avenue Intersection Improvement</i>	\$250,000	Covered in the Confederation Park redevelopment
	<b>Albert Street</b> <i>Alpha Avenue Intersection Improvement</i>	\$125,000	Covered in the Confederation Park redevelopment





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# Attachment #1 - Summary of Proposed Improvements for the North Burnaby Traffic Calming Study

