
*Municipal Class Environmental Assessment for
Road Improvements near Derry Road East and Alstep Drive:
Environmental Study Report*

Appendix L: Alternative Designs Report



Evaluation of Alternative Designs

Bombardier Aerospace – Pearson

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for Road Improvements near
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November 16, 2021

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1. Introduction

EXP has been retained by Bombardier Aerospace to assist with its industrial development on a parcel of land situated just north of the Toronto Pearson International Airport at 1890 Alstep Drive, Mississauga, Ontario. The land is owned by the Government of Canada and administered by the Greater Toronto Airports Authority (GTAA).

The study area for this Class EA, selected based on discussions with the Region of Peel and the City of Mississauga, is primarily along Derry Road East (865 m west and 450 m east of Bramalea Road) and Bramalea Road (485 m south of Derry Road East and 410 m north of Derry Road East). It also includes four local roads: Menkes Drive, Alstep Drive, Menway Court and Telford Way. The study area is depicted in **Figure 1**.

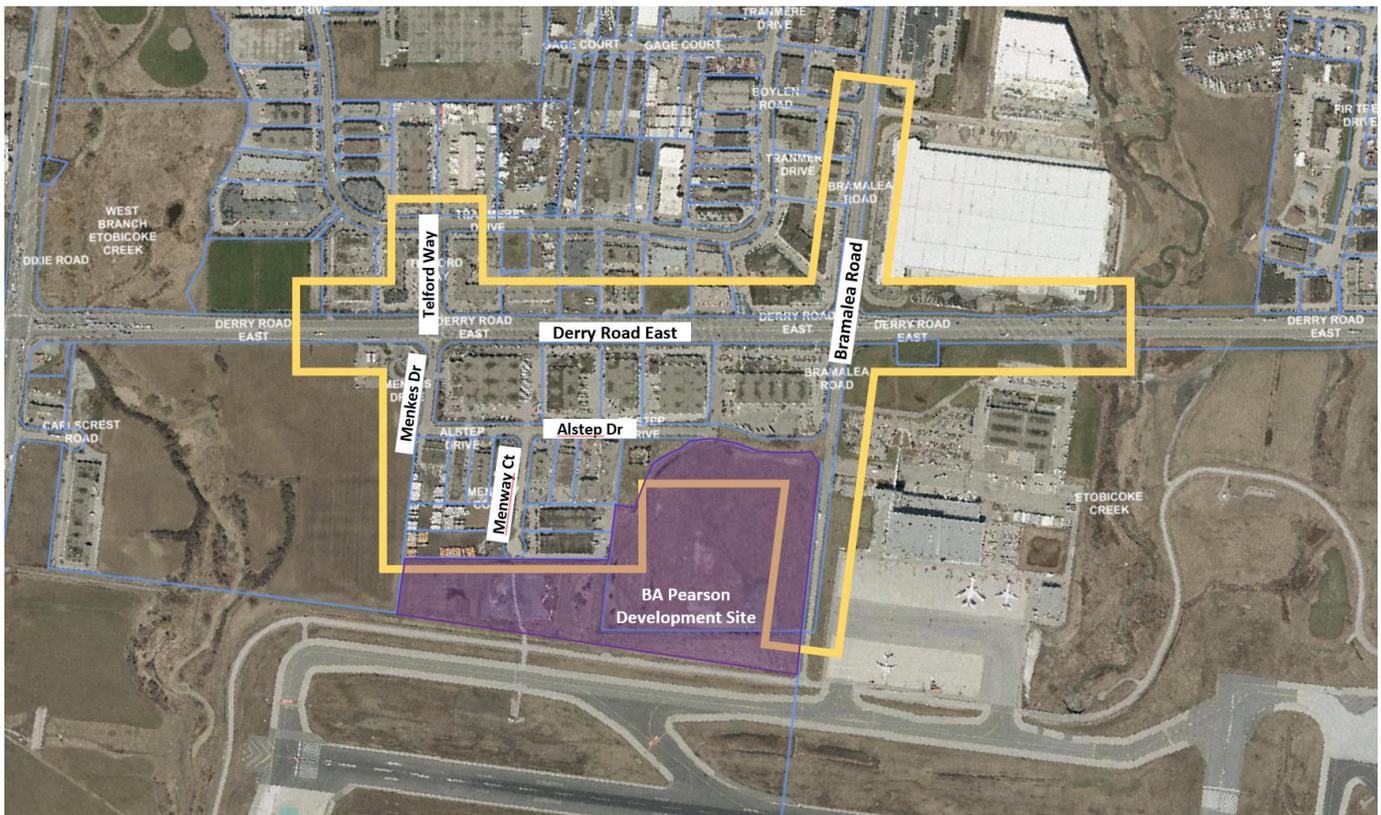


Figure 1: Class EA Project Study Area

The industrial development will generate an increase in traffic, which will have an impact on the existing roadway network. It has been determined that improvements are needed to accommodate the increase in traffic demands

To address the existing and future traffic demands near the development of 1890 Alstep Drive, several alternative solutions were proposed as per the Municipal Engineers Association (MEA) Class EA Manual (October 2000, as amended in 2007, 2011 & 2015).

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Based on feedback received from the TAC #1, it was understood that the recommended solution will consist in a combination of alternative solutions identified for this Class EA. The recommended solution includes:

- **Improve Local Intersection Operations** - The improvement of operations at the intersections of Derry Road East with Menkes Drive and Bramalea Road, including geometric and operational improvements.
- **TDM Measures** - Application of Transportation Demand Management (TDM) measures to help the redistribution of demand and reduce the overall traffic capacity peaks. Implementation of TDM in the Phase 3 Alternative Designs will include any available future transit infrastructure plans for the area, as well as improving active transportation facilities (such as adding or improving sidewalks and multi-use pathways (MUP's).
- **The extension of Alstep Drive** - The extension of Alstep Drive eastward to Bramalea Road. This will provide an additional route option for commuters to fulfill the City's original intent for the area, as depicted by the existing road allowance. Alternative designs for the extension will be undertaken in Phase 3.

An online narrated presentation was posted on the project website (<http://peelregion.ca/public-works/environmental-assessments/mississauga/derryrd-alstepdrive.asp>) to present the evaluation of Alternative Solutions and the recommended solution to the public. Based on the feedback received, the recommended solutions have been confirmed as the preferred alternative solution.

2. Alternative Design Concepts for Preferred Solution (EA Phase 3)

2.1. Design Criteria

Prior to developing alternative design concepts along the study area, a set of design criteria was developed to act as a set of guidelines to ensure consistent design standards were used throughout. The design criteria were developed based on Transportation Association of Canada (TAC) standards¹ as well as the Region of Peel and the City of Mississauga's design standards. The design criteria to be utilized in the preliminary design for the Derry Road Class EA study is presented in **Table 1**.

Table 1 - Roadway Design Criteria

DESIGN PARAMETERS	DESIGN STANDARD REFERENCE	Derry Rd	Bramalea Rd	Menkes Dr	Alstep Dr	Menway Ct
Road Classification	TAC Table 2.6.2	6 Lane UAD90	6 Lane UAD90	3 Lane UCU	3 Lane ULU	2 Lane ULU
Design Vehicle		WB-20	WB-20	WB-20	WB-20	WB-20
Posted Speed		70 km/h	60 km/h	50 km/h	50 km/h	50 km/h
Design Speed		90 km/h	90 km/h	60 km/h	60 km/h	60 km/h
Min. Stopping Sight Distance	TAC Table 2.5.2	160m	160m	85m	85m	85m
Equivalent Min. 'K' Factor Crest	TAC Table 3.3.2	39	39	11	11	11
Equivalent Min. 'K' Factor Sag	TAC Table 3.3.5	15-20	15-20	8-9	8-9	8-9
Max. Grade	TAC Table 3.3.1	6%	6%	6%	6%	6%
Min. Grade	TAC Section 3.3.2.5	0.5%	0.5%	0.5%	0.5%	0.5%
Min. Radius	TAC Table 3.2.4	2620m (Normal Crown)	2620m (Normal Crown)	1290 (Normal Crown)	1290 (Normal Crown)	1290 (Normal Crown)
Lane Width	TAC Table 4.2.3	3.5m Through lane 3.5m Curb Lane 3.5m Dual Left Lane	3.3m Through lane 3.5m Curb Lane 3.5m Dual Left Lane	3.5m Through lane 3.5m Curb Lane 3.5m Dual Left Lane	4.25m Curb Lane 3.50m Two-Way-Left Turn Lane	Existing (4.66m)
Median Width	TAC Section 4.5.2	2.0m	2.0m	N/A	N/A	N/A
-Right Turn Lane Taper - Right Turn Lane Deceleration Length	TAC Table 10.6.2	80m 160m	80m 160m	14:1 40m	14:1 40m	14:1 40m
-Left Turn Lane Taper -Left Turn Lane Deceleration Length	TAC Table 9.17.1	27:1 160m	15:1 85m	15:1 85m	15:1 85m	15:1 85m
Boulevard Width	OTM Book 18	VARIES	VARIES	VARIES	VARIES	VARIES
Sidewalk Width	ROP STD 5-2-5	1.8m	1.8m	1.8m	1.8m	1.8m
MUP Width	OTM Book 18	3.0m	N/A	N/A	N/A	N/A

¹ Transportation Association of Canada. Geometric Design Guide For Canadian Roads. June 2017

2.2. Design Concept Requirements

Derry Road is an east-west Regional arterial road under the jurisdiction of the Region of Peel. The road has a six-lane cross-section.

In developing the design concept for Derry Road as a multi-modal corridor, the following components were required based on TAC, the Region of Peel, and the City of Mississauga's design standards:

- At least two 3.5m wide through lanes (Derry Road for vehicular traffic in each direction²);
- Accommodation for Active Transportation via dedicated 1.8m wide sidewalk; and
- Provision of 3.5m wide left turn lanes at intersections, where appropriate.

In addition, the following aspects were considered:

- Minimizing impacts to adjacent properties;
- Minimizing impacts to natural environment;
- Minimizing construction costs; and
- Maximizing traffic operations and safety.

In developing the design concept for Alstep Drive as a multi-modal corridor, the following components were required based on TAC, the Region of Peel, and the City of Mississauga's design standards:

- At least two 4.25m wide through lanes for vehicular traffic;
- Accommodation for Active Transportation via dedicated 1.8m wide sidewalk;
- Provision of 3.5m wide left turn lanes at intersections, where appropriate; and
- Minimum pedestrian island size of 10 m² to accommodate pedestrian storage.

In addition, the following aspects were considered:

- Minimizing impacts to adjacent properties;
- Minimizing impacts to natural environment;
- Minimizing construction costs; and
- Maximizing traffic operations and safety.

² Derry Road currently exceeds this requirement, as it has up to three through lanes in each direction.

3. Description of Alternative Design Concepts

Identification of alternative design concepts is part of Phase 3 of the Class EA study. In this phase, various design concepts to planning a significant change to the existing infrastructure are all equally explored and evaluated according to a set of evaluation criteria. Alternative Design Concepts are identified in **Table 2** to address foreseeable capacity deficiencies.

The road improvement projects occur in three separate components (i.e., Alstep Drive extension plus improvements at three intersections), each with their own alternative design concepts. The alternative design concepts that are to be evaluated as part of Phase 3 of the Municipal Class EA process are discussed below.

Table 2: Identification and Description of Alternative Design Concepts³

Alternative Design Concepts	Descriptions
<i>Alstep Dr & Bramalea Rd.</i> <i>(note: includes Alstep Extension component)</i>	
Alternative 1:	Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road.
Alternative 2:	Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road.
Alternative 3:	Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road.
<i>Derry Rd E & Menkes Dr / Telford Way</i>	
Alternative 1:	Extend paved surface of Menkes Drive/Telford Way to the east.
Alternative 2:	Extend paved surface of Menkes Drive/Telford Way on both sides.
Alternative 3:	Extend paved surface of Menkes Drive/Telford Way to the west.
<i>Derry Rd E & Bramalea Rd.</i>	
Alternative 1:	Extend paved surface of Bramalea Road to the east and on Derry Road to the north.
Alternative 2:	Extend paved surface of Bramalea Road to the west and on Derry Road to the north.
Alternative 3:	Extend paved surface of Bramalea Road on both sides and on Derry Road to the north.
Alternative 4:	Modify Intersection using a hybrid approach.

It is noted that the design alternatives do not include a southbound dedicated right-turn lane on Telford Way at Derry Road East, which has been noted in the Region's current Capital program. Based on consultation with the Region, this dedicated right-turn lane was based on the Region's synchro analysis for the intersection, which shows that a southbound right-turn lane at Derry / Telford-Menkes may be required beyond this EA's planning horizon of 2031.

³ The definition for road widening in the MEA's Municipal Class EA guidance manual (2015 version) is "increasing the number of lanes of an existing road and may include the widening of the right-of-way but does not include localized operational improvements." The alternative designs in this Class EA include widening of the physical road surface to accommodate turning lanes, but additional through lanes are not being added. The term "extend paved surface" is being used instead of "widening" to describe the physical widening of the road surface to avoid confusion with the guideline definition.

3.1. Alstep Drive and intersection with Bramalea Road

Alstep Drive is an east-west local industrial road under the jurisdiction of the City of Mississauga. It is a 2-lane cross section with a sidewalk provided on the north side of the road. The speed limit is 50 km/h. It runs parallel to Derry Road East, with its main access via Menkes Drive. Alstep Drive currently ends in a cul-du-sac by the proposed Bombardier development.

In each alternative, Alstep Drive will be extended, with the existing road width, to Bramalea Road. Sidewalks would be provided along the north and south sides of Alstep Drive.

As noted in **Table 2**, there are three alternatives being considered for the extension of Alstep Drive from the cul-du-sac to Bramalea Road. These include:

- Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road
- Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road
- Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road

The alternatives are discussed below, followed by **Figure 2**, which illustrates a typical cross-section of Alstep Drive on the approach to the intersection with Bramalea Road for all three alternatives (see Appendix A for a plan view drawing of the three alternatives).

Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road

In this and the other alternatives, the Alstep Drive extension would be constructed within the existing municipal road ROW. The extension would consist of a two-lane cross-section. The intersection of Alstep Drive and Bramalea Road would operate under two-way stop control. The sidewalk that is considered for the west side of Bramalea Road and positioned north of the Alstep Drive extension would continue directly southward below the intersection and then further southward along Bramalea Road.

Bramalea Road would operate under freeflow conditions with Alstep Drive operating under stop-control.

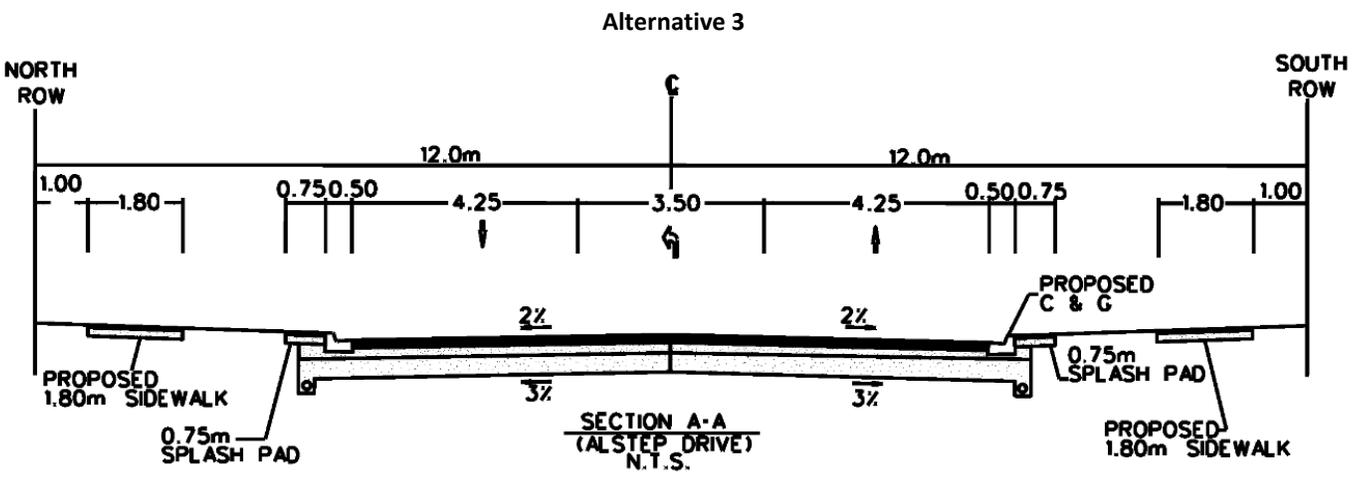
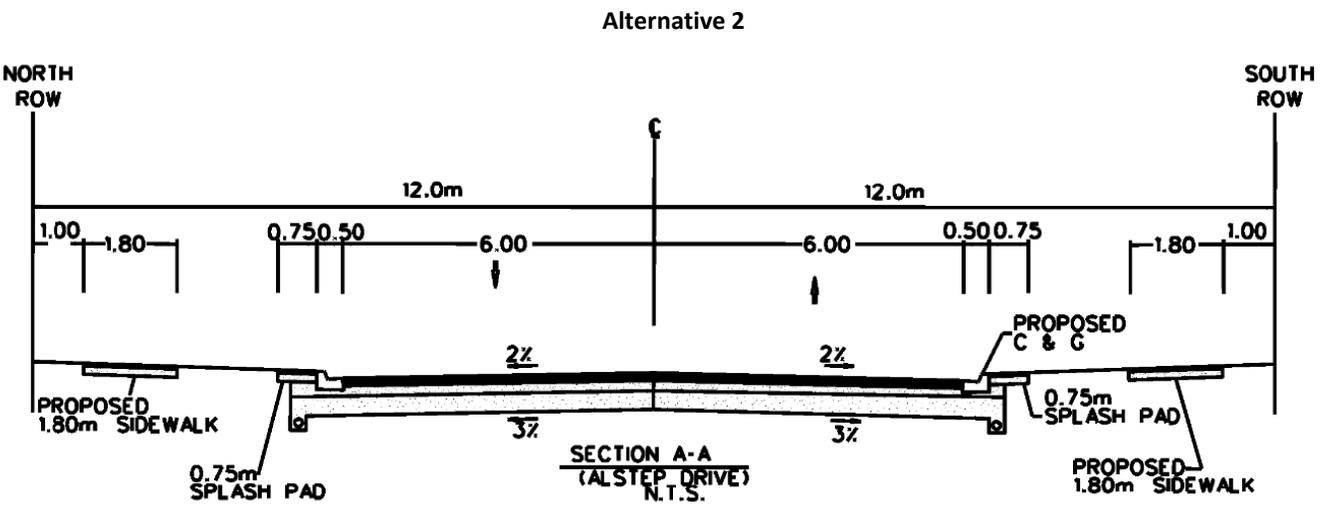
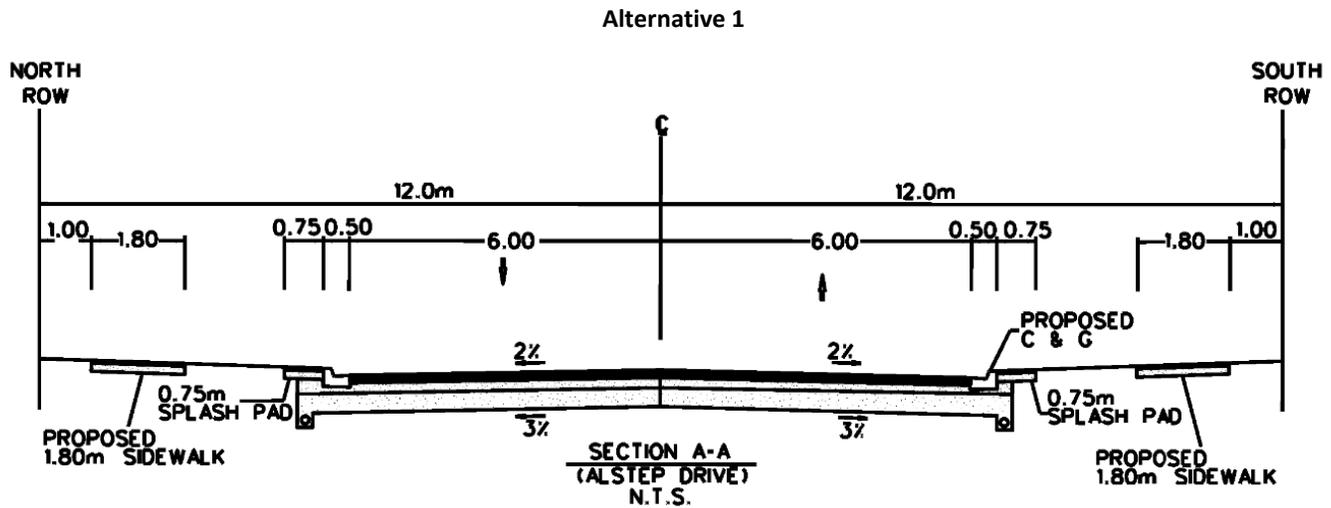
Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road

Alternative 2 has the same lane and sidewalk configuration as Alternative 1 but would operate as a signalized intersection. The sidewalk considered for the west side of Bramalea Road north of the Alstep Drive extension would continue directly southward below the intersection and then further southward along Bramalea Road.

Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road

In Alternative 3, Alstep Drive includes one westbound lane, one eastbound left turn lane, and one eastbound shared through-right turn lane. The intersection would be signalized. The sidewalk considered for the west side of Bramalea Road north of the Alstep Drive extension would continue directly southward below the intersection and then further southward along Bramalea Road.

Figure 2: Alternatives 1, 2 and 3 for Alstep Drive (in Descending Order)



3.2. Local Intersection Operation Improvements: Derry Rd E & Menkes Dr / Telford Way

Menkes Drive is located south of Derry Road. It is a 2-lane north-south road with an auxiliary left turn lane. It has a sidewalk on the east side of its signalized intersection with Derry Road. Telford Way is a north-south local road located north of Derry Road opposite Menkes Drive. It is a 2-lane north-south road with an auxiliary left turn lane. Telford Way has a sidewalk located on the west side of the road.

Active transportation design elements included in all three of the alternative designs include:

- A sidewalk with boulevard on the east side of Telford Way and on the northside of Derry Road East, west of Telford Way.
- Upgraded multi-use path on the south side of Derry Road East.

As noted above, there are three design alternatives under consideration for this intersection:

- Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east.
- Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides.
- Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west.

Retrofit of the existing traffic islands to smart channels will be reviewed for integration into the preferred alternative design, as feasible. This is being done instead of outright removal of the islands due to conflicts with existing above ground infrastructure within the islands. For example, the existing hydro pole in the southwest corner of the intersection (east-bound right-turn lane channel island) presents a barrier to its removal.

Typical cross-sections of the three alternatives are provided in **Figure 3**, with plan view drawings provided in Appendix B.

Alternative 1: Extend Paved surface of Menkes Drive/Telford Way to the East

Design Alternative 1 extends the paved surface of Menkes Drive eastward but still within the municipal road ROW. Two northbound left-turn lanes are proposed with vehicular storage along the entire length of Menkes.

Physical adjustments made to the intersection under this design alternative include:

- On Telford Way, southbound and northbound lanes separated by concrete median.
- Curb on southeastern corner of intersection is shifted eastward, with realignment of the sidewalk.
- Curb on northwestern corner of intersection is shifted westward to allow for an improved turning radius, with a corresponding realignment of the sidewalk.
- Median curbs shifted further back to improve truck-turning ability.
- Slight reduction to the pedestrian islands in the southwestern and northeastern corners of the intersection. Pedestrian island size continues to meet the standard.

Alternative 2: Extend Paved Surface of Menkes Drive/Telford Way on Both Sides

Design Alternative 2 extends the paved surface of Menkes Drive to the east and to the west but still within the municipal road ROW. The roadway changes in Alternative 2 are similar to that of Alternative 1, including two proposed northbound left-turn lanes with vehicular storage the entire length of Menkes. The physical adjustments required for the intersection under this design alternative are similar to Alternative 1 but with slightly different physical measurements.

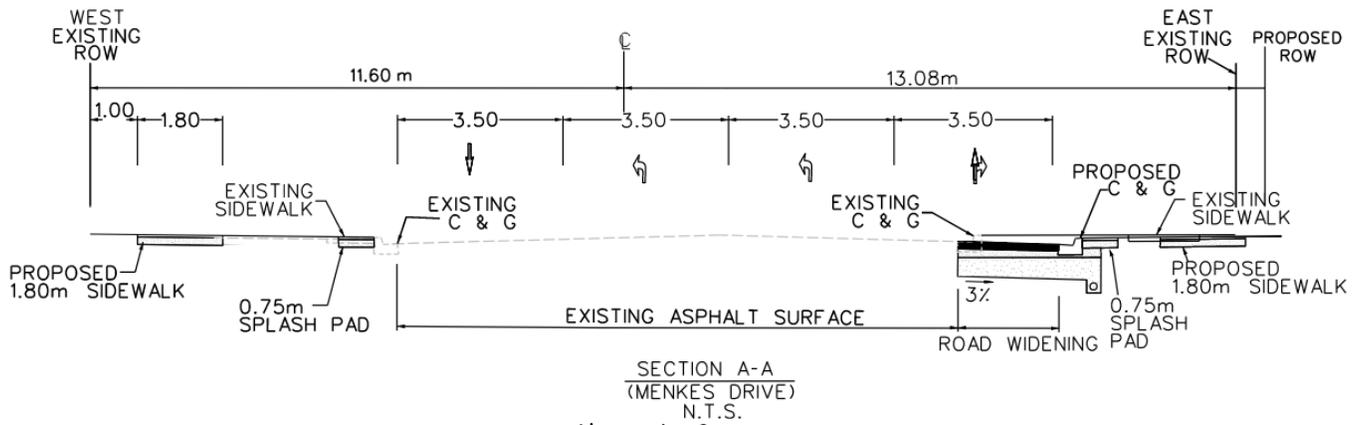
Alternative 3: Extend Paved Surface of Menkes Drive/Telford Way to the West

Design Alternative 3 extends the paved surface of Menkes Drive to the west but still within the municipal road ROW. The roadway changes in Alternative 3 are similar to that of Alternatives 1 and 2, including two proposed northbound left-turn lanes

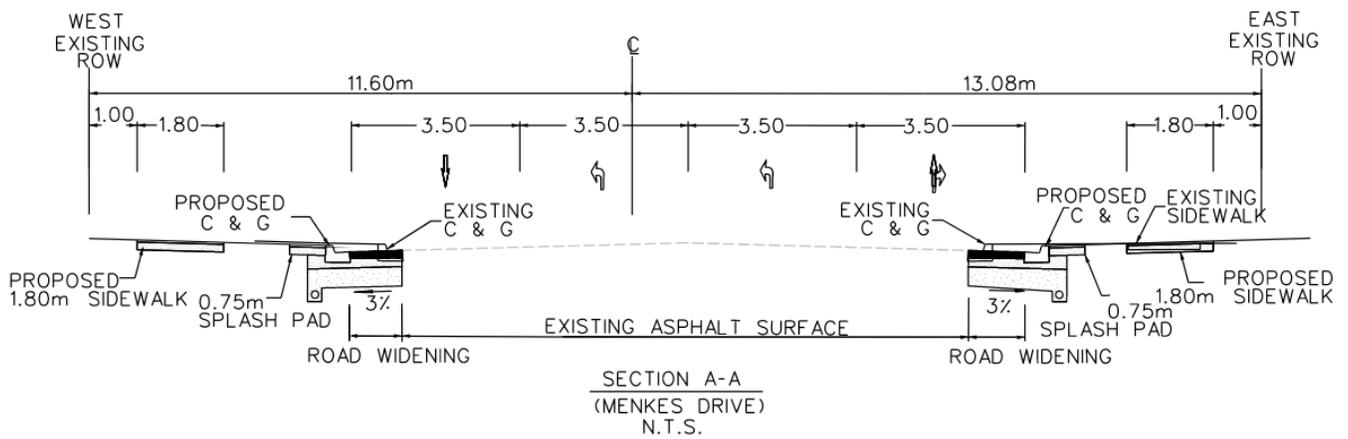
with vehicular storage the entire length of Menkes. The physical adjustments required for the intersection under this design alternative are similar to Alternatives 1 and 2 but with slightly different physical measurements.

Figure 3: Alternatives 1, 2 and 3 for Menkes Road (in Descending Order)

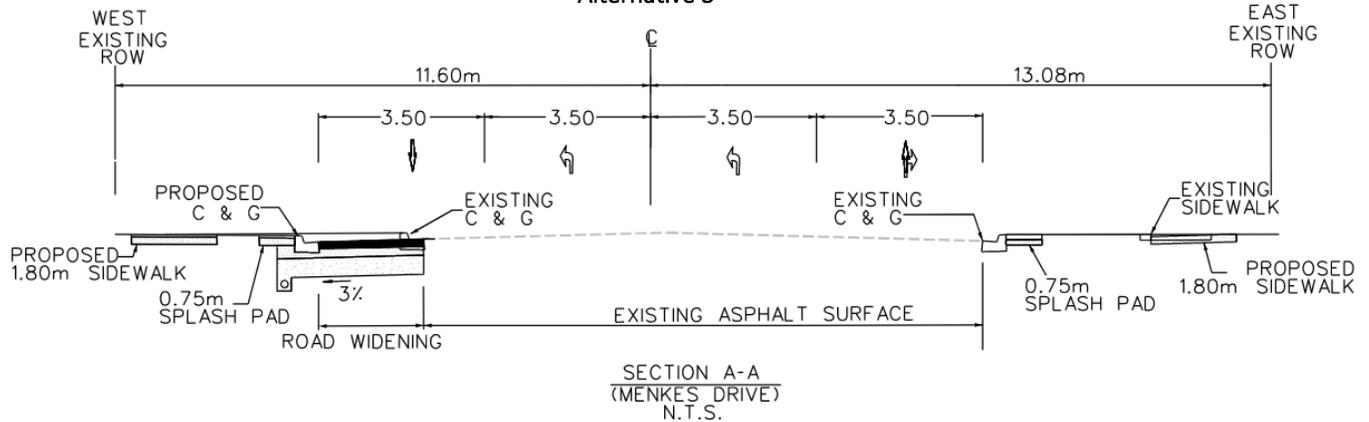
Alternative 1



Alternative 2



Alternative 3



3.3. Local Intersection Operation Improvements: Derry Rd E & Bramalea Rd

Bramalea Road is a north-south collector road that transects Derry Road East. The urban cross section varies from two lanes to a maximum of five lanes within the study area. North of Derry Road, the road has an existing five-lane urban cross section with auxiliary left and right turn lanes at the intersection. South of Derry Road the cross section tapered from four to two lanes. The road maintains a speed limit of 50 km/h. Bramalea Road is signalized at Derry Road with auxiliary left-turn lanes.

As noted previously, there are four alternative designs under consideration for this intersection:

- Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north.
- Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north.
- Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north.
- Alternative 4: Modify Intersection using a hybrid approach.

Active transportation design elements that have been included for all four alternatives include:

- Upgrading the multi-use path on the south side of Derry Road west of Bramalea Road.
- Adding a new multi-use path on the north side of Derry Road east of Bramalea Road.
- Addition of cross-rides or crosswalks with signals.
- Adding a new sidewalk on the north side of Derry Road west of Bramalea Road.
- Adding sidewalks on both sides of Bramalea Road south of Derry Road.
- Adding a westbound bus-stop queue jump lane along Derry Road to improve merging of transit vehicles into traffic, from the bus-stop located on the north side of Derry Road east of Bramalea Road⁴.

Retrofit of the existing traffic islands to smart channels will be reviewed for integration into the preferred alternative design, as feasible. This is being done instead of outright removal of the islands due to conflicts with existing above ground infrastructure within the islands as well as geometric considerations at the intersection that result in the requirement of islands. For example, the northeast corner of the Bramalea Road / Derry Road intersection is a less than 90-degree angle. Ensuring that trucks have the turning radius they require means that there is considerable encroachment into the angle. As such, an island is needed to provide pedestrians crossing the street a refuge during crossing.

Figure 4 and **Figure 5** present typical cross sections for Alternatives 1 to 4 for Bramalea Road approximately 20m south of Derry Road, and **Figure 6** and **Figure 7** present typical cross sections for Alternatives 1 to 4 for Bramalea Road approximately 60m north of Derry Road. The plan view drawings for all alternatives are provided in Appendix C.

The suggested changes to the North Side of Derry Road East are consistent cross all four alternatives. The suggested change to the north side of Derry Road East is depicted in **Figure 8**.

Alternative 1: Extend Paved Surface of Bramalea Road to the East and on Derry Road to the North

In Alternative 1, the paved surface of Bramalea Road south of Derry Road is extended eastward to make room for separate northbound through and right turn lanes, in addition to the existing northbound left turn lane and shadow lane. The paved surface north of Derry Road is extended eastward, from Derry Road to the northern limit of the project, to make room for separate southbound through and right turn lanes.

Along Derry Road, the paved surface would be extended approximately 3 m northward from Bramalea Road to the eastern limit of the project.

⁴ Configuration of the queue jump lane is to be confirmed in consultation with Mi-Way.

Alternative 2: Extend Paved Surface of Bramalea Road to the West and on Derry Road to the North

In Alternative 2, the paved surface of Bramalea Road south of Derry Road is extended to the west to make room for the separate northbound through and right turn lanes, in addition to the existing left turn lane and shadow lane. The paved surface north of Derry Road is extended westward, from Derry Road to the northern limit of the project, to make room for separate southbound through and right turn lanes.

As in Alternative 1 (and the other alternatives), the paved surface along Derry Road would be extended approximately 3 m northward from Bramalea Road to the eastern limit of the project.

Alternative 3: Extend Paved Surface of Bramalea Road on Both Sides and on Derry Road to the North

In Alternative 3, the paved surface of Bramalea Road south of Derry Road is extended to both the east and west to make room for the separate northbound through and right turn lanes, in addition to the existing left turn lane and shadow lane, as well as the sidewalk on the west side. The paved surface north of Derry Road is extended to both the east and west, from Derry Road to the northern limit of the project, to make room for separate southbound through and right turn lanes.

As in Alternative 1 (and the other alternatives), the paved surface along Derry Road would be extended approximately 3 m northward from Bramalea Road to the eastern limit of the project.

Alternative 4: Modify Intersection using a Hybrid Approach

In Alternative 4, the paved surface of Bramalea Road north of Derry Road is extended to the east, while south of Derry Road pavement is extended to both the east and west. The eastward expansion south of Derry Road would occur on the east side of the Bramalea / Alstep intersection and continue northward for about 100 m. The expansion westward would occur along Bramalea from Derry Road to about 100 m southward.

North of Derry Road, the eastward extension of Bramalea Road would make room for the separate southbound through and the two left turn lanes, in addition to the existing right turn lane. The extension of Bramalea Road to the east (south of Derry Road) is to make room for the separate northbound through and right turn lanes, in addition to the existing left turn lane and shadow lane, as well as the sidewalk on the west side. The hybrid approach allows the northbound and southbound lanes on Bramalea Road to align.

As in Alternative 1 (and the other alternatives), the paved surface along Derry Road would be extended approximately 3 m northward from Bramalea Road to the eastern limit of the project.

Figure 4: Alternatives 1 and 2 for Bramalea Road, South of Derry Road (in Descending Order)

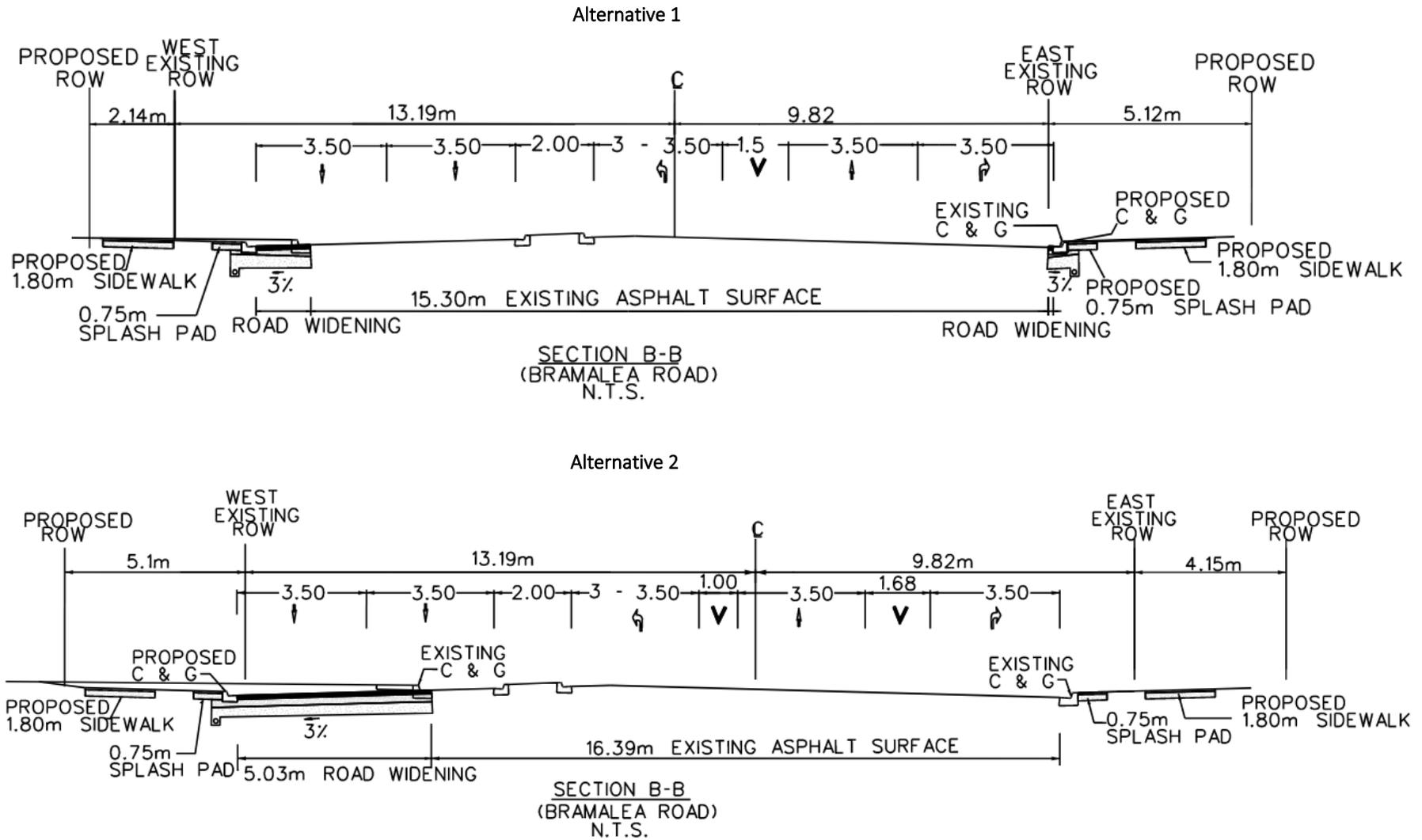


Figure 5: Alternatives 3 and 4 for Bramalea Road, South of Derry Road (in Descending Order)

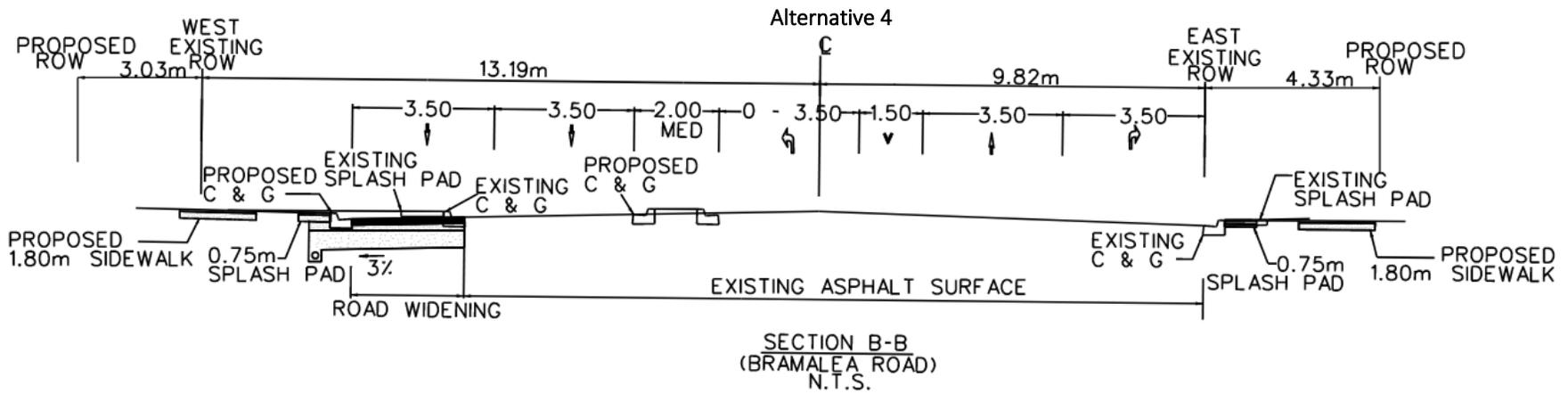
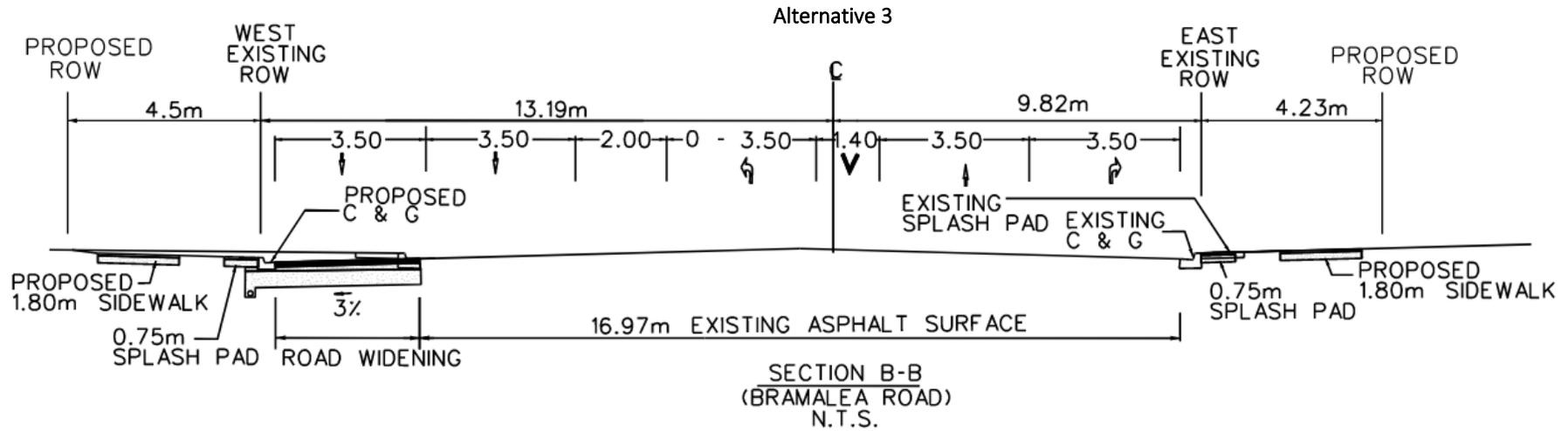


Figure 6: Alternatives 1 and 2 for Bramalea Road, North of Derry Road (in Descending Order)

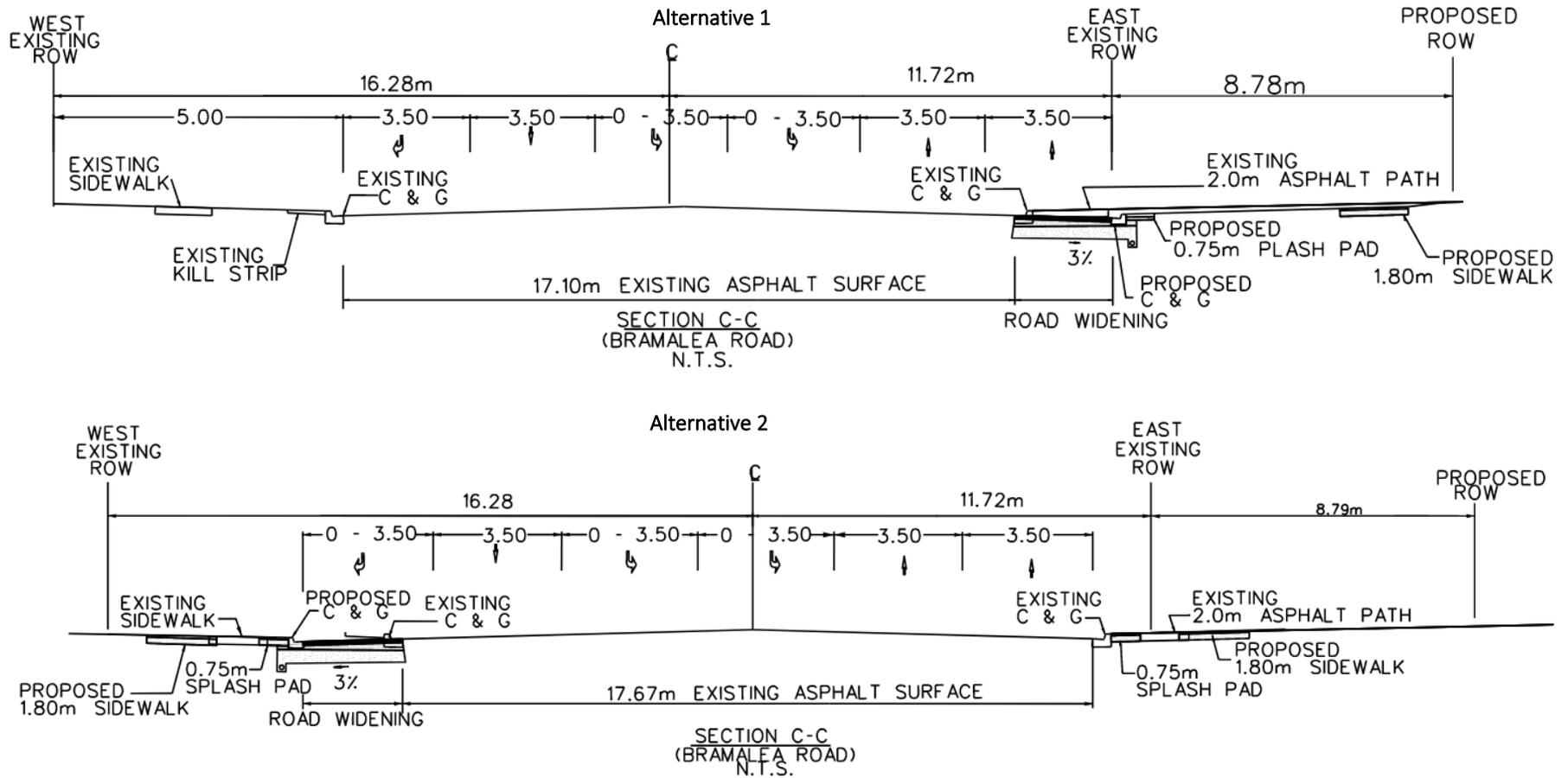
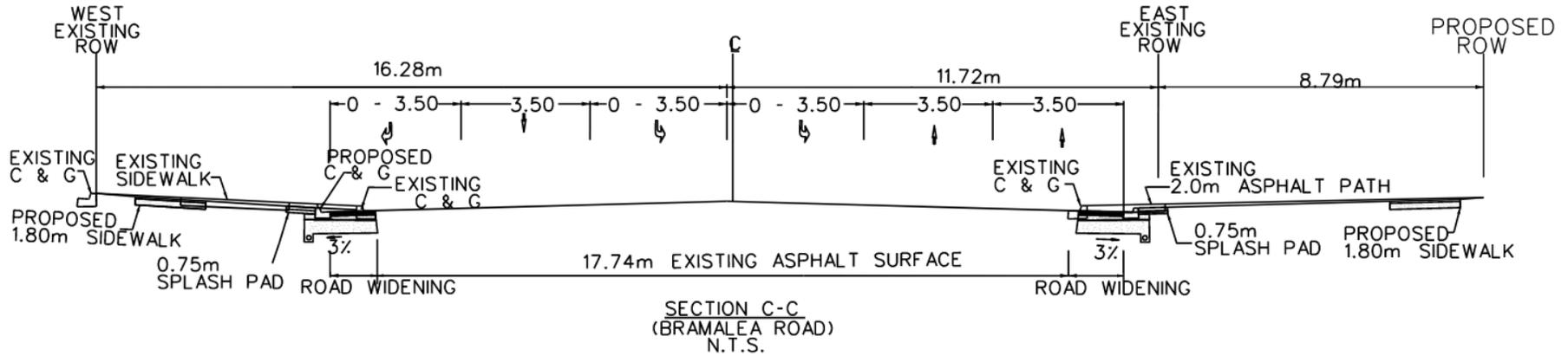


Figure 7: Alternatives 3 and 4 for Bramalea Road, North of Derry Road (in Descending Order)

Alternative 3



Alternative 4

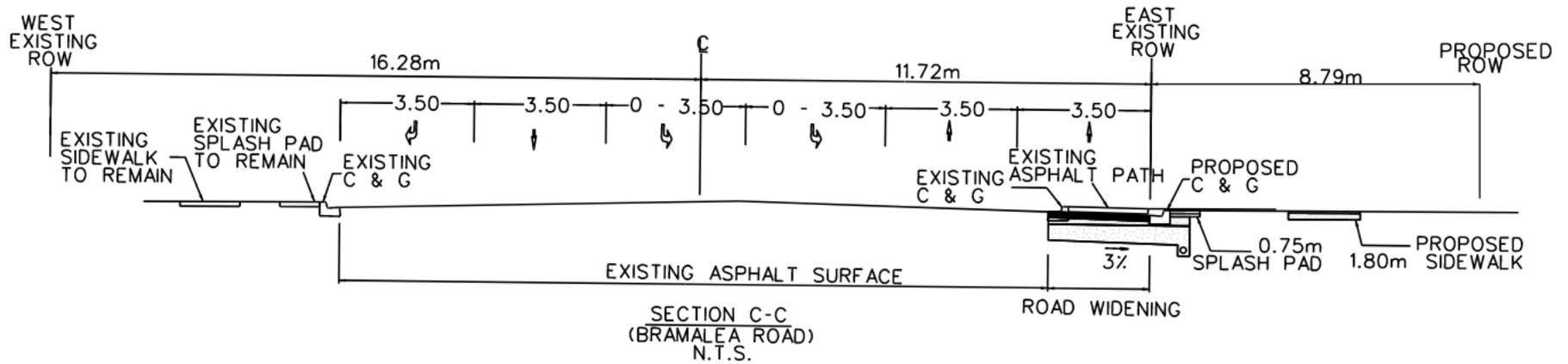
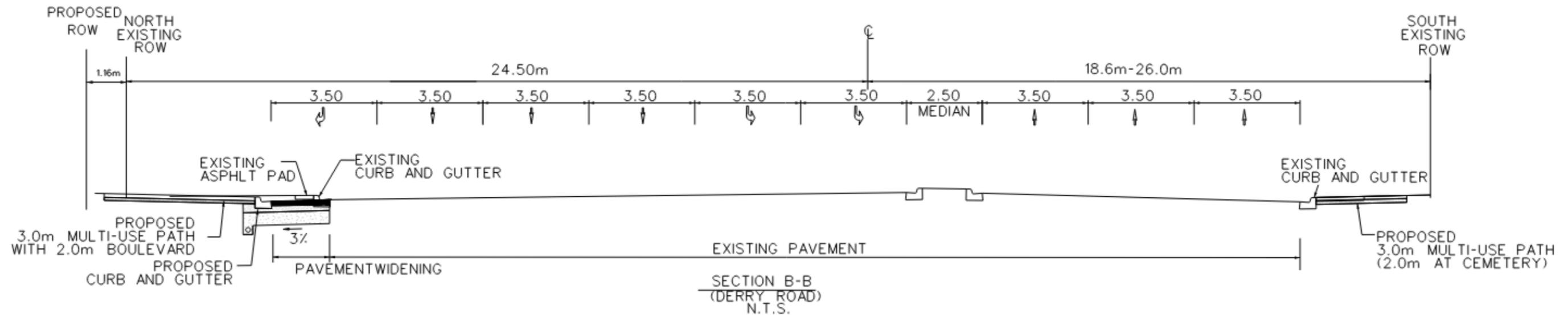


Figure 8: Derry Road Expansion on North Side (all alternatives)



3.4. Active Transportation within Study Area

In addition to the alternative designs described in the previous sections, sidewalks are proposed for inclusion throughout the remaining study area. This includes:

- North side of Derry Road from Bramalea Road to the western limits of the study area;
- North and south sides of the existing Alstep Drive; and
- West side of Menway Court.

Inclusion of the sidewalks will help to achieve the Region and the City's active transportation goals.

The MUP along Derry Road would also be upgraded, which may include widening of the MUP and inclusion of a boulevard, where feasible. The portion of the MUP extending out of the study area eastward would connect to a potential future Region of Peel MUP installation.

The Region of Peel currently does not have a defined criteria for measuring Pedestrian Level of Service (PLOS) or Bicyclist Level of Service (BLOS). A PLOS and BLOS has been considered based on the availability of facilities as identified in the Region's Pedestrian and Bicycle Facilities guidelines.

The pedestrian crossing distances for the intersections of Menkes Drive / Telford Way & Derry Road and at Bramalea Road & Derry Road may be impacted depending on the alternatives. The existing crossing distance has been compared to the proposed distances as a result of the modifications to the roadway in each alternative.

The methodology / evaluation of each alternative, as well as the pedestrian crossing distances for the two intersections where crosswalks distances are impacted are detailed in Appendix D.

4. Identification of Evaluation Criteria

The Evaluation Criteria that will be used to evaluate the alternative design concepts are described in **Table 3**. The criteria are grouped into categories that may be affected from actualizing each alternative design concept.

Table 3: Identification and Description of Evaluation Criteria

Category	Criteria	Descriptions
Planning and Transportation	Urban Environment	Consistency to the existing urban environment.
	Network Connectivity	Improvement of grid connection and the ability to provide additional route options.
	Transit Services	Ability to support and accommodate transit.
	Traffic Operations	Ability to improve traffic operations
	Safety	Improvement of safe traffic flow, pedestrian safety, cyclist safety. Consistency with the Vision Zero Goal of 10% reduction in fatal and injury collisions by 2022.
Healthy Communities	Continuity of Active Transportation (AT) facilities	Provision of continuous AT infrastructure along the length of the study corridor and connects to existing network.
	AT Facility type	Degree to which AT infrastructure is provided throughout the study corridor.

*Municipal Class Environmental Assessment for Road Improvements near Derry Road East and Alstep Drive:
Evaluation of Alternative Designs
November 16, 2021*

Category	Criteria	Descriptions
	Separation of facilities	Degree to which alternative design provides a physical barrier and/or separation between the sidewalk/MUP and the roadway.
	AT access to destinations near or within the study corridor	Improvement of AT access to destinations near the study corridor.
	Design speed of the roadway	Design speed relative to baseline.
	Number of trees within the study corridor, preferably in close proximity to AT facilities to provide shade	Change in the number of trees within the study corridor.
	Pedestrians Level of Service (PLOS)	The ease of which pedestrians have safe access through the area under evaluation. This would consider the ability of the alternative to allow for safe, comfortable and convenient travel. Additionally, the crossing distance would impact the amount of time that a pedestrian is at risk along the road.
	Bicycle Level of Service (BLOS)	The ease of which bicyclists have safe access through the area under evaluation. This would consider the ability of the alternative to allow for safe, comfortable and convenient travel.
	Alternative impacts on Accessibility	Design alternative includes roadway features that make the road more accessible to all pedestrians.
	Alternative impacts on Air Quality	Anticipated impacts of alternatives on air quality compared to “do nothing” scenario.
Natural Environment	Climate Change	Ability of design to reduce greenhouse gas emissions. Resiliency of design to climate change impacts.
	Natural Heritage Policies	Conformity of alternative design with Natural Heritage Policies.
	Trees and Vegetation	Impact to baseline tree canopy.
	Wildlife	Potential of design to disrupt wildlife.
	Ground Water	Potential impacts on ground water.
Socio-Economic Environment	Land Use Impacts	Impact of the alternative design on existing designated commercial and industrial land uses.
	Property Impacts	Amount of property requirements for alternative design.
	Streetscaping	To improve the aesthetic view of the streets.
	Noise and Vibration Impacts	Potential for Noise and Vibration Impacts.
Cultural Environment	Archaeological Resources	Impacts on archaeological resources.
	Built Heritage / Cultural Landscapes	Impacts on Built Heritage / Cultural Landscapes.
Technical	Construction Feasibility	Constructability of alternative design.
	Stormwater Management	Potential for stormwater impacts.
	Utilities	Utility relocation requirements.
Cost	Capital Costs	Cost of construction.
	Property Costs	Cost of property acquisition.
	Maintenance Costs	Difference in maintenance costs between alternative designs.

The evaluation of the alternative design concepts was based on an assessment of potential impacts and a review of input received from the public and regulatory agencies during Phase 2 of the study process. The evaluation of the alternative design concepts is presented in **Table 4-6**. Within each table, a description is provided for how each alternative design concept (option) compares to the other for each major criterion. The options that received the most favorable overall rating (taking in account all criteria) were put forward by the study team as the preliminary preferred design concepts.

5. Evaluation of Alternative Designs

The Evaluation Criteria that will be used to evaluate the alternative design concepts are described above in **Table 3**. The criteria are grouped by categories that may be affected from actualizing each alternative design concept.

The evaluation of the alternative design concepts will be completed using the evaluation criteria described above. The goal of the evaluation is to determine the best alternative to address the problem statement, while minimizing impacts to the environment. An evaluation matrix table was developed to provide a summary of the evaluation and is presented in **Table 4-6**.

The alternative design concepts are uniformly evaluated under a criteria list of environmental factors that need to be considered. For each category, each alternative will receive the following ratings:

-  Not preferred;
-  Neutral; and
-  Preferred.

5.1. Alternative Designs for Alstep Drive & Bramalea Road

Table 4: Evaluation of Alternative Design Concepts for Alstep Dr. & Bramalea Rd.

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road		Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
 Planning and Transportation						
Urban Environment		No significant change to the urban environment.		No significant change to the urban environment.		No significant change to the urban environment.
Network Connectivity		Improvement to the network connectivity as the extension completes the grid.		Improvement to the network connectivity as the extension completes the grid.		Improvement to the network connectivity as the extension completes the grid.
Transit Services		No significant improvement to transit services as transit is not serviced at the Alstep extension.		No significant improvement to transit services as transit is not serviced at the Alstep extension.		No significant improvement to transit services as transit is not serviced at the Alstep extension.
Traffic Operations		Alternative 1 has reduced traffic operations performance on Bramalea Road compared to Alternatives 2 and 3, as it has a comparatively higher volume to capacity ratio and greater vehicular delays for northbound and southbound traffic.		Alternative 2 has improved traffic operations performance on Bramalea Road compared to Alternative 1, as it has a comparatively lower volume to capacity ratio and reduced vehicular delays for northbound and southbound traffic.		Alternative 3 would experience similar traffic operations performance on Bramalea Road as Alternative 2, with reduction of vehicular delays and volume to capacity ratios for northbound and southbound traffic compared to Alternative 1. Alternative 3 would also provide additional flexibility and capacity for future eastbound through and right-turn volumes on Alstep Drive.
Safety		Safety improvements limited by the 2-lane configuration on Alstep Drive and the lack of active signal.		The 2-lane configuration on Alstep Drive with an active signal installed is safer than the unsignalized variant.		Safety optimized at the intersection with the 3-lane configuration on Alstep Drive and the active signal.

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road		Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
Planning and Transportation Summary		Alternative 1 is least preferred because it provides the least improvement to traffic operations along Bramalea Road and limited traffic safety improvements.		Alternative 2 is moderately preferred because it improves traffic operations along Bramalea Road and traffic safety compared to Alternative 1, but less than Alternative 3.		Alternative 3 is preferred because it provides the greatest traffic operations performance along Bramalea Road and optimizes safety through the use of a traffic signal.
Healthy Community						
Continuity of Active Transportation (AT) Facilities		Significant improvement to the sidewalk connectivity by extending Alstep Drive to Bramalea Road. However, no pedestrian crossing is provided across Bramalea Road.		Significant improvement to the sidewalk connectivity by extending Alstep Drive to Bramalea Road. Pedestrian crossing is provided across Bramalea Road with the signalized intersection.		Significant improvement to the sidewalk connectivity by extending Alstep Drive to Bramalea Road. Pedestrian crossing is provided across Bramalea Road with the signalized intersection
AT Facility Type		Sidewalk on the north and south sides of Alstep Drive.		Sidewalk on the north and south sides of Alstep Drive.		Sidewalk on the north and south sides of Alstep Drive.
Separation of Facilities		Improvement over existing conditions where there is no road; No significant change between the three alternative designs in boulevard width that separates the sidewalk from the asphalt pavement.		Improvement over existing conditions where there is no road; No significant change between the three alternative designs in boulevard width that separates the sidewalk from the asphalt pavement.		Improvement over existing conditions where there is no road; No significant change between the three alternative designs in boulevard width that separates the sidewalk from the asphalt pavement.
AT Access to Destinations near or within the Study Corridor		More access options for pedestrians compared to existing due to the extension of the sidewalk.		More access options for pedestrians compared to existing due to the extension of the sidewalk.		More access options for pedestrians compared to existing due to the extension of the sidewalk.
Design Speed of the Roadway		Design speed of the roadway will remain unchanged on Alstep Drive.		Design speed of the roadway will remain unchanged on Alstep Drive.		Design speed of the roadway will remain unchanged on Alstep Drive.

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road		Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
Number of Trees within the Study Corridor, Preferably in Close Proximity to AT Facilities to Provide Shade	●	Equal space available among the alternatives to plant trees that can provide shade in the 2-lane configuration compared to the 3-lane configuration.	●	Equal space available among the alternatives to plant trees that can provide shade in the 2-lane configuration compared to the 3-lane configuration.	●	Equal space available among the alternatives to plant trees that can provide shade in the 2-lane configuration compared to the 3-lane configuration.
Pedestrian Level of Services (PLOS)	●	Increase in PLOS compared to existing with the improvements to the sidewalk connectivity.	●	Increase in PLOS compared to existing with the improvements to the sidewalk connectivity.	●	Increase in PLOS compared to existing with the improvements to the sidewalk connectivity.
Bicycle Level of Services (BLOS)	○	No significant change in BLOS between the alternatives because a dedicated cycling facility is not offered.	○	No significant change in BLOS between the alternatives because a dedicated cycling facility is not offered.	○	No significant change in BLOS between the alternatives because a dedicated cycling facility is not offered.
Alternative Impacts on Accessibility	●	The extension allows opportunity to integrate accessibility features into final design. It allows additional accessible route options.	●	The extension allows opportunity to integrate accessibility features into final design. It allows additional accessible route options.	●	The extension allows opportunity to integrate accessibility features into final design. It allows additional accessible route options.
Alternative Impacts on Air Quality	○	No significant change in air quality compared to the “do nothing” scenario or between the alternatives as there are no significant improvements expected in traffic operations. Therefore, no significant change in the risk of respiratory and cardiovascular outcomes associated with exposure to traffic related air pollution.	○	No significant change in air quality compared to the “do nothing” scenario or between the alternatives as there are no significant improvements expected in traffic operations. Therefore, no significant change in the risk of respiratory and cardiovascular outcomes associated with exposure to traffic related air pollution.	○	No significant change in air quality compared to the “do nothing” scenario or between the alternatives as there are no significant improvements expected in traffic operations. Therefore, no significant change in the risk of respiratory and cardiovascular outcomes associated with exposure to traffic related air pollution.
Healthy Community Summary	○	All three alternatives generally have similar impacts from a Healthy Community perspective. However, Alternative 1 is slightly less preferred because a pedestrian crossing for Bramalea Road by Alstep Drive is not provided.	●	All three alternatives generally have similar impacts from a Healthy Community perspective. However, Alternatives 2 and 3 are most preferred because they provide a pedestrian crossing across Bramalea Road by Alstep Drive.	●	All three alternatives generally have similar impacts from a Healthy Community perspective. However, Alternatives 2 and 3 are most preferred because they provide a pedestrian crossing across Bramalea Road by Alstep Drive..

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road			Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
 Natural Environment							
Climate Change		No significant improvement compared to the “do nothing” scenario or between the alternatives in the reduction in GHG emissions because there are no significant improvements expected in traffic operation.			No significant improvement compared to the “do nothing” scenario or between the alternatives in the reduction in GHG emissions because there are no significant improvements expected in traffic operation.		
Natural Heritage Policies		All three alternatives are equally compatible with applicable natural heritage policies.			All three alternatives are equally compatible with applicable natural heritage policies.		
Trees and Vegetation		Most of the greenspace (grass) within the ROW would be removed; however, no sensitive areas would be impacted.			Most of the greenspace (grass) within the ROW would be removed; however, no sensitive areas would be impacted.		
Wildlife		No significant impact on wildlife.			No significant impact on wildlife.		
Ground and Surface Water		No direct impact on ground or surface water expected.			No direct impact on ground or surface water expected.		
Natural Environment Summary		All three alternatives are equally preferred from a Natural Environment perspective.			All three alternatives are equally preferred from a Natural Environment perspective.		

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road		Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
 Socio-Economic Environment						
Land Use Impacts		All alternatives are equally compatible with existing designated land uses.		All alternatives are equally compatible with existing designated land uses.		All alternatives are equally compatible with existing designated land uses.
Property Impacts		For each alternative, property acquisition is not required for the roadworks. However, the sidewalk on the east side of Bramalea Road across from Alstep Drive extends slightly past the existing ROW.		For each alternative, property acquisition is not required for the roadworks. However, the sidewalk on the east side of Bramalea Road across from Alstep Drive extends slightly past the existing ROW.		For each alternative, property acquisition is not required for the roadworks. However, the sidewalk on the east side of Bramalea Road across from Alstep Drive extends slightly past the existing ROW.
Streetscaping		Existing streetscaping on Alstep Drive to be matched at the extension.		Existing streetscaping on Alstep Drive to be matched at the extension.		Existing streetscaping on Alstep Drive to be matched at the extension.
Noise and Vibration Impacts		Marginal increase in noise and vibration near surrounding businesses.		Marginal increase in noise and vibration near surrounding businesses.		Marginal increase in noise and vibration near surrounding businesses.
Socio-Economic Environment Summary		All three alternatives are equally preferred from a Socio-Economic Environment perspective.		All three alternatives are equally preferred from a Socio-Economic Environment perspective.		All three alternatives are equally preferred from a Socio-Economic Environment perspective.

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road		Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
 Cultural Environment						
Archaeological Resources	●	No impact on archaeological resources.	●	No impact on archaeological resources.	●	No impact on archaeological resources.
Built Heritage / Cultural Landscapes	●	No impacts on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands. As detailed design progresses, potential impacts to adjacent properties identified as having cultural heritage resources will be monitored.	●	No impacts on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands. As detailed design progresses, potential impacts to adjacent properties identified as having cultural heritage resources will be monitored.	●	No impacts on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands. As detailed design progresses, potential impacts to adjacent properties identified as having cultural heritage resources will be monitored.
Cultural Environment Summary	●	All three alternatives are equally preferred from a Cultural Environment perspective.	●	All three alternatives are equally preferred from a Cultural Environment perspective.	●	All three alternatives are equally preferred from a Cultural Environment perspective.

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road		Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
 Technical						
Construction Feasibility		Reasonable construction feasibility compared to Alternatives 2 and 3 due to lack of a signal.		Alternatives 2 and 3 have increased construction complexity due to the installation of a 234 traffic signal at the intersection compared to Alternative 1. However, installation of traffic signals is a commonplace and both Alternatives 2 and 3 are considered feasible.		Alternatives 2 and 3 have increased construction complexity due to the installation of a traffic signal at the intersection compared to Alternative 1. However, installation of traffic signals is a commonplace and both Alternatives 2 and 3 are considered feasible.
Stormwater Management		Stormwater collection facilities are required to be extended to accommodate the additional lengths of pavement.		Stormwater collection facilities are required to be extended to accommodate the additional lengths of pavement.		Stormwater collection facilities are required to be extended to accommodate the additional lengths of pavement.
Utilities		All three alternatives will require either the installation or moving of some utility installations.		All three alternatives will require either the installation or moving of some utility installations.		All three alternatives will require either the installation or moving of some utility installations.
Technical Summary		Alternative 1 is preferred from a technical perspective, as the lack of a traffic signal installation improves the ease of construction.		Alternatives 2 and 3 are equally less preferred than Alternative 1 due to the traffic signal's increased construction complexity.		Alternatives 2 and 3 are equally less preferred than Alternative 1 due to the traffic signal's increased construction complexity.

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road		Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road		Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
\$ Cost						
Capital Costs		Alternative 1 will have lower capital costs compared to Alternatives 2 and 3, as it does not have a signalized intersection.		Alternatives 2 and 3 will have similarly higher capital costs compared to Alternative 1 due to the installation of the traffic signals.		Alternatives 2 and 3 will have similarly higher capital costs compared to Alternative 1 due to the installation of the traffic signals.
Property Costs		Property acquisition is unnecessary for all three alternatives given that road allowance already exists.		Property acquisition is unnecessary for all three alternatives given that road allowance already exists.		Property acquisition is unnecessary for all three alternatives given that road allowance already exists.
Maintenance Costs		Alternative 1 will have lower maintenance costs compared to Alternatives 2 and 3, as it does not have traffic signals to operate or maintain.		Alternatives 2 and 3 will have similarly moderate maintenance costs compared to Alternative 1 due to the operation and maintenance of the traffic signal.		Alternatives 2 and 3 will have similarly moderate maintenance costs compared to Alternative 1 due to the operation and maintenance of the traffic signal.
Cost Summary		Alternative 1 is preferred from a cost perspective, as it will have lower capital and maintenance costs due to a lack of traffic signals.		Alternatives 2 and 3 are similarly less preferred compared to Alternative 1 from a cost perspective, as the installation of traffic signals will result in higher capital and maintenance costs.		Alternatives 2 and 3 are similarly less preferred compared to Alternative 1 from a cost perspective, as the installation of traffic signals will result in higher capital and maintenance costs.

Evaluation Criteria		Alternative 1: Extend Alstep Drive to Bramalea Road, with 2-lane unsignalized intersection at Bramalea Road	Alternative 2: Extend Alstep Drive to Bramalea Road, with 2-lane signalized intersection at Bramalea Road	Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road
Overall Summary	○	<p>Alternative 1 is least preferred because it provides the least improvements of traffic operations and traffic safety compared to Alternatives 2 and 3.</p> <p>While Alternative 1 does have the least construction complexity and lower capital and maintenance costs compared to Alternatives 2 and 3, they are not to the extent that they outweigh optimized traffic operations and safety.</p>	<p>Alternative 2 is moderately preferred because it provides greatest improvements to traffic operations and traffic safety compared to Alternative 1, but less than Alternative 3.</p> <p>While Alternative 2 does have some increased construction complexity and capital and maintenance costs compared to Alternative 1, these are not to the extent that they outweigh the improvements to traffic operations and safety.</p> <p>Alternative 2 has similar construction complexity and capital and maintenance costs compared to Alternative 3, but it does not improve traffic operations and traffic safety to the same extent.</p>	●

5.2. Alternative Designs for Derry Road East & Menkes Drive/Telford Way

Table 5: Evaluation of Alternative Design Concepts for Derry Rd. E. & Menkes Dr. / Telford Way

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east		Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
 Planning and Transportation						
Urban Environment		No significant change to the urban environment.		No significant change to the urban environment.		No significant change to the urban environment.
Network Connectivity		No significant change to the network connectivity.		No significant change to the network connectivity.		No significant change to the network connectivity.
Transit Services		No significant improvement to transit services.		No significant improvement to transit services.		No significant improvement to transit services.
Traffic Operations		All three alternatives will have similar improvements to traffic operations compared to the “do nothing” scenario.		All three alternatives will have similar improvements to traffic operations compared to the “do nothing” scenario.		All three alternatives will have similar improvements to traffic operations compared to the “do nothing” scenario.
Safety		Similar safety improvements in all three alternatives at the intersection with the separation of the left-turn lane at Telford Way and the addition of dual left-turn lanes at Menkes Drive.		Similar safety improvements in all three alternatives at the intersection with the separation of the left-turn lane at Telford Way and the addition of dual left-turn lanes at Menkes Drive.		Similar safety improvements in all three alternatives at the intersection with the separation of the left-turn lane at Telford Way and the addition of dual left-turn lanes at Menkes Drive.
Planning and Transportation Summary		All three alternatives are equally preferred from a Planning and Transportation perspective.		All three alternatives are equally preferred from a Planning and Transportation perspective.		All three alternatives are equally preferred from a Planning and Transportation perspective.

Evaluation Criteria	Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east	Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides	Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
 Healthy Community			
Continuity of Active Transportation (AT) Facilities	 No significant impact, but the length of crosswalk will be increased compared to existing due to the extension of the right-of-way (ROW) in all three alternatives.	 No significant impact, but the length of crosswalk will be increased compared to existing due to the extension of the right-of-way (ROW) in all three alternatives.	 No significant impact, but the length of crosswalk will be increased compared to existing due to the extension of the right-of-way (ROW) in all three alternatives.
AT Facility Type	 Sidewalk provided on both sides of Menkes and Telford for all three alternatives, as well as upgraded MUP (south) and new sidewalk (north) on Derry Road.	 Sidewalk provided on both sides of Menkes and Telford for all three alternatives, as well as upgraded MUP (south) and new sidewalk (north) on Derry Road.	 Sidewalk provided on both sides of Menkes and Telford for all three alternatives, as well as upgraded MUP (south) and new sidewalk (north) on Derry Road.
Separation of Facilities	 Along the east side of Menkes Drive, Alternative 1 has the greatest decrease in the separation of the existing sidewalk from the road due to the eastern widening of the roadway and the constraint of the parking lot.	 Along the east side of Menkes Drive, Alternative 2 has a moderate decrease in the separation of the existing sidewalk from the road due to widening of the roadway on either side of the road.	 Along the east side of Menkes Drive, Alternative 3 does not decrease the separation of the existing sidewalk from the road, as the roadway widening occurs on the west side of Menkes.
AT Access to Destinations near or within the Study Corridor	 No significant impact on AT Access.	 No significant impact on AT Access.	 No significant impact on AT Access.
Design Speed of the Roadway	 Design speed of the roadway will remain unchanged.	 Design speed of the roadway will remain unchanged.	 Design speed of the roadway will remain unchanged.
Number of Trees within the Study Corridor, Preferably in Close Proximity to AT Facilities to Provide Shade	 Less space available for large trees on the east side of the corridor.	 Slightly less space available for large trees on both sides of the corridor.	 Less space available for large trees on the west side of the corridor.

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east	Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides	Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
Pedestrian Level of Services (PLOS)		<p>All three alternatives will result in an increase in the crossing distance across Menkes Drive on the south side of Derry Road. Alternative 1 will have the greatest increase of about 1.3m, which is more than Alternative 2 but less than Alternative 3.</p> <p>Crossing distances across Derry Road and Telford Way will not significantly change among the three alternatives.</p> <p>Alternatives 1, 2 and 3 will each reduce the size of the traffic islands by similar amounts. However, each will maintain minimum sizes required.</p> <p>Alternative 1 provides an opportunity for a wide separation of sidewalk facilities from the road on the west side of Menkes Drive but is limited on the east side.</p>	<p>All three alternatives will result in an increase in the crossing distance across Menkes Drive. Alternative 2 will have an increase of about 0.5m, which is least of all alternatives.</p> <p>Crossing distances across Derry Road and Telford Way will not significantly change among the three alternatives.</p> <p>Alternatives 1, 2 and 3 will each reduce the size of the traffic islands by similar amounts. However, each will maintain minimum sizes required.</p> <p>Because Alternative 2 distributes the necessary widening on both sides of Menkes Drive, it provides the greatest opportunity to maximize the separation of sidewalk facilities from the road on Menkes Drive.</p>	<p>All three alternatives will result in an increase in the crossing distance across Menkes Drive. Alternative 3 will have an increase of about 1.6m, which is the largest increase of the three alternatives.</p> <p>Crossing distances across Derry Road and Telford Way will not significantly change among the three alternatives.</p> <p>Alternatives 1, 2 and 3 will each reduce the size of the traffic islands by similar amounts. However, each will maintain minimum sizes required.</p> <p>Alternative 3 provides an opportunity for a wide separation of sidewalk facilities from the road on the east side of Menkes Drive but is limited on the west side.</p>
Bicycle Level of Services (BLOS)		<p>There is a slight improvement to BLOS for this intersection among all three alternatives due to the improvement of cycling facilities along Derry Road across Menkes Drive.</p> <p>While the roadway along Menkes Drive is being slightly widened to accommodate an extra turning lane, no new dedicated cycling facility is being installed along Menkes Drive or Telford Way.</p>	<p>There is a slight improvement to BLOS for this intersection among all three alternatives due to the improvement of cycling facilities along Derry Road across Menkes Drive.</p> <p>While the roadway along Menkes Drive is being slightly widened to accommodate an extra turning lane, no new dedicated cycling facility is being installed along Menkes Drive or Telford Way.</p>	<p>There is a slight improvement to BLOS for this intersection among all three alternatives due to the improvement of cycling facilities along Derry Road across Menkes Drive.</p> <p>While the roadway along Menkes Drive is being slightly widened to accommodate an extra turning lane, no new dedicated cycling facility is being installed along Menkes Drive or Telford Way.</p>

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east			Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
Alternative Impacts on Accessibility		<p>The impacts on accessibility are similar for all three alternatives. The extension of the pavement reduces the space available to address accessibility requirements. However, the intersection improvements would provide an opportunity to integrate age friendly and accessible living features.</p> <p>For all three alternatives, improvements would be designed to conform to AODA guidelines.</p>			<p>The impacts on accessibility are similar for all three alternatives. The extension of the pavement reduces the space available to address accessibility requirements. However, the intersection improvements would provide an opportunity to integrate age friendly and accessible living features.</p> <p>However, because Alternative 2 distributes the necessary widening on both sides of Menkes Drive, it provides the greatest opportunity to minimize potential impacts on accessibility.</p> <p>For all three alternatives, improvements would be designed to conform to AODA guidelines.</p>	<p>Extension of pavement reduces space available to address accessibility requirements. However, the intersection improvements would provide an opportunity to integrate age friendly and accessible living features.</p> <p>For all three alternatives, improvements would be designed to conform to AODA guidelines.</p>	
Alternative Impacts on Air Quality		<p>Municipal roads would not be at capacity, therefore extending the paved surface of municipal roads would not provide a significant improvement to air quality (compared to “do nothing”). Therefore, extending the paved surface of municipal roads is not anticipated to negatively impact or provide a significant improvement to air quality.</p>			<p>Municipal roads would not be at capacity, therefore extending the paved surface of municipal roads would not provide a significant improvement to air quality (compared to “do nothing”). Therefore, extending the paved surface of municipal roads is not anticipated to negatively impact or provide a significant improvement to air quality.</p>	<p>Municipal roads would not be at capacity, therefore extending the paved surface of municipal roads would not provide a significant improvement to air quality (compared to “do nothing”). Therefore, extending the paved surface of municipal roads is not anticipated to negatively impact or provide a significant improvement to air quality.</p>	

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east		Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
Healthy Community Summary		All three alternatives have similar impacts with respect to the healthy community criteria. However, Alternatives 1 and 3 provide a greater increase to the crossing distance across Menkes Drive compared to Alternative 2.		All three alternatives have similar impacts with respect to the healthy community criteria. However, while Alternative 2 has a slightly greater increase in crossing distance compared to Alternative 3, Alternative 2 provides greater flexibility for road and boulevard adjustment due to extension of the pave on either side of the street.		All three alternatives have similar impacts with respect to the healthy community criteria. However, Alternatives 1 and 3 provide a greater increase to the crossing distance across Menkes Drive compared to Alternative 2. It also does not provide the same flexibility for road and boulevard adjustment that Alternative 2 does.
 Natural Environment						
Climate Change		No significant improvement compared to the “do nothing” scenario or between the alternatives in the reduction in GHG emissions because municipal roads would not be at capacity.		No significant improvement compared to the “do nothing” scenario or between the alternatives in the reduction in GHG emissions because municipal roads would not be at capacity.		No significant improvement compared to the “do nothing” scenario or between the alternatives in the reduction in GHG emissions because municipal roads would not be at capacity.
Natural Heritage Policies		All three alternatives are equally compatible with applicable natural heritage policies.		All three alternatives are equally compatible with applicable natural heritage policies.		All three alternatives are equally compatible with applicable natural heritage policies.
Trees and Vegetation		The potential impact of the three alternatives on the existing boulevard trees is generally similar for all three alternatives. In Alternative 1, extension of the pavement to the east would require the removal of the boulevard trees on the east side of Menkes Drive, and there would be less space available on that side for replacement trees in the ROW.		The potential impact of the three alternatives on the existing boulevard trees is generally similar for all three alternatives. In Alternative 2, there may be some impacts to existing boulevard trees on either side of the road. However, Alternative 2 provides the greatest opportunity for the conservation of these trees.		The potential impact of the three alternatives on the existing boulevard trees is generally similar for all three alternatives. In Alternative 3, extension of the pavement to the west would require the removal of the boulevard trees on the west side of Menkes Drive, and there would be less space available on that side for replacement trees in the ROW.

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east		Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
Wildlife	●	No impact on wildlife.	●	No impact on wildlife.	●	No impact on wildlife.
Ground and Surface Water	●	No direct impact on ground or surface water expected.	●	No direct impact on ground or surface water expected.	●	No direct impact on ground or surface water expected.
Natural Environment Summary	○	In general, there is little difference in environmental impacts between the three alternatives. However, Alternatives 1 and 3 do not provide the same opportunity for the conservation of existing boulevard trees as Alternative 2.	●	In general, there is little difference in environmental impacts between the three alternatives. However, Alternative 2 provides greater opportunity for the conservation of existing boulevard trees than Alternatives 1 and 3.	○	In general, there is little difference in environmental impacts between the three alternatives. However, Alternatives 1 and 3 do not provide the same opportunity for the conservation of existing boulevard trees as Alternative 2.
 Socio-Economic Environment						
Land Use Impacts	○	All alternatives are equally compatible with existing designated land uses.	○	All alternatives are equally compatible with existing designated land uses.	○	All alternatives are equally compatible with existing designated land uses.
Property Impacts	●	All three alternatives have some property requirements at the southwest corner of Menkes and Derry due to encroachment of the MUP on the ROW/property line. There is minimal other encroachment.	○	All three alternatives have some property requirements at the southwest corner of Menkes and Derry due to encroachment of the MUP on the ROW/property line. There is some possible minor property acquisition required from near the same corner due to encroachment of the sidewalk on the ROW.	○	All three alternatives have some property requirements at the southwest corner of Menkes and Derry due to encroachment of the MUP on the ROW/property line. There is some additional property acquisition required from near the same corner due to encroachment of the sidewalk on the ROW.
Streetscaping	○	Alternative 1 provides opportunity for streetscaping on Menkes Drive on west side of road, but less potential on east side due to reduced boulevard space.	●	Alternative 2 provides opportunity for potential streetscaping along Menkes Drive on both sides of the road.	○	Alternative 3 provides opportunity for streetscaping on Menkes Drive on east side of road, but less potential on west side due to reduced boulevard space.

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east		Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
Noise and Vibration Impacts		Compared to the “do nothing” scenario, none of the three alternatives are expected to have any significant impacts on noise and vibration.		Compared to the “do nothing” scenario, none of the three alternatives are expected to have any significant impacts on noise and vibration.		Compared to the “do nothing” scenario, none of the three alternatives are expected to have any significant impacts on noise and vibration.
Socio-Economic Summary		Alternative 1 is less preferred than Alternative 2 because Alternative 1 provides less flexibility for streetscaping opportunities along Menkes Drive.		Alternative 2 is preferred because it provides greater flexibility for streetscaping opportunities on either side of Menkes Drive. While there are potentially some additional property requirements for the sidewalk, this is negligible, given that property will also be required for the upgraded MUP. Further, the requirement for property for the sidewalk could potentially be minimized during detailed design.		Alternative 3 is less preferred than Alternative 2 because Alternative 3 provides less flexibility for streetscaping opportunities along Menkes Drive.

Evaluation Criteria	Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east	Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides	Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
 Cultural Environment			
Archaeological Resources	<p>● No impact on archaeological resources anticipated. Southern portion of Menkes Drive (by farm field) would require additional archaeological investigation, but this widening does not encroach into the area.</p> <p>If the design is changed such that the widening encroaches into the area, a Stage 2 archaeological assessment would be undertaken to clear the area of archaeological resources prior to construction. It is expected that the potential risk to archaeological resources is low.</p>	<p>● No impact on archaeological resources anticipated. Southern portion of Menkes Drive (by farm field) would require additional archaeological investigation, but this widening does not encroach into the area.</p> <p>If the design is changed such that the widening encroaches into the area, a Stage 2 archaeological assessment would be undertaken to clear the area of archaeological resources prior to construction. It is expected that the potential risk to archaeological resources is low.</p>	<p>● No impact on archaeological resources anticipated. Southern portion of Menkes Drive (by farm field) would require additional archaeological investigation, but this widening does not encroach into the area.</p> <p>If the design is changed such that the widening encroaches into the area, a Stage 2 archaeological assessment would be undertaken to clear the area of archaeological resources prior to construction. It is expected that the potential risk to archaeological resources is low.</p>
Built Heritage / Cultural Landscapes	<p>● No impact on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands.</p>	<p>● No impact on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/ industrial lands.</p>	<p>● No impact on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/ industrial lands.</p>
Cultural Environment Summary	<p>● All three alternatives are equally preferred from a Cultural Environment perspective.</p>	<p>● All three alternatives are equally preferred from a Cultural Environment perspective.</p>	<p>● All three alternatives are equally preferred from a Cultural Environment perspective.</p>

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east		Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
 Technical						
Construction Feasibility		Alternative 1 has the highest construction feasibility (least complexity) because there is only one side of the Menkes Drive that will undergo modification work, and there are minimal impacts to the traffic islands.		Alternative 2 has moderate construction feasibility (moderate complexity) because both sides of Menkes Drive will undergo modification work. However, undertaking works on both sides also provides flexibility to optimize constructability. In addition, there would be fewer construction works undertaken on Derry Road compared to Alternative 3.		Alternative 3 has the least construction feasibility due to construction impacts along Derry Road, particularly on the traffic islands and resulting utility implications.
Stormwater Management		Extending the paved surface may require some realignment of stormwater collection facilities.		Extending the paved surface may require some realignment of stormwater collection facilities.		Extending the paved surface may require some realignment of stormwater collection facilities.
Utilities		Some utility relocation may be required along Menkes, including a fire hydrant.		Some utility relocation may be required along Menkes Drive, although balancing the extension of paved surface on either side of Menkes Drive may provide flexibility to minimize utility relocations.		Some utility relocation may be required along Menkes Drive, as well as potential impacts to the hydro pole on the intersections south west traffic island.
Technical Summary		Alternative 1 has adequate construction feasibility, but lacks the flexibility to optimize constructability and minimize impacts to utilities that Alternative 2 provides.		Alternative 2 is feasible for construction, and allowing expansion of the paved surface on either side provides a flexibility to optimize constructability and minimize impacts to utilities that the other alternatives lack.		Alternative 3 has the least construction feasibility due to construction impacts along Derry Road and potential impacts to the hydro pole on the south west traffic island.

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east		Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
\$ Cost						
Capital Costs		Alternative 1 has moderate capital costs, in part due to utility relocation on east side.		Alternative 2 has moderate to high capital costs due to works on both sides of the corridor, including potential utility relocations on one or both sides of Menkes Drive.		Alternative 3 has the highest capital costs, in part due to the utility relocations on Derry Road (i.e., the hydro pole on the south west island).
Property Costs		Alternative 1 would have the lowest property acquisition costs.		Alternative 2 would have medium property acquisition costs, although the property requirements could potentially be minimized through detailed design.		Alternative 1 would have the highest property acquisition costs.
Maintenance Costs		All three alternatives would have similar, moderate maintenance costs.		All three alternatives would have similar, moderate maintenance costs.		All three alternatives would have similar, moderate maintenance costs.
Cost Summary		Alternative 1 is most preferred with respect to the Cost category due to the lower capital and property costs.		Alternative 2 is less preferred with respect to the Cost category, as its capital and property costs are anticipated to be slightly more than Alternative 1.		Alternative 3 is least preferred with respect to the Cost category, as it would have the highest capital and property costs.

Evaluation Criteria		Alternative 1: Extend paved surface of Menkes Drive/Telford Way to the east		Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides		Alternative 3: Extend paved surface of Menkes Drive/Telford Way to the west
Overall Summary		<p>Alternative 1 is less preferred to Alternative 2 because it lacks the design flexibility of Alternative 2.</p> <p>While Alternative 1 likely has a lower capital and property cost than Alternative 2, this amount is likely not substantial and does not offset the advantages of Alternative 2.</p>		<p>While Alternative 2 may have slightly more capital and property costs than Alternative 1, it is most preferred because extending the pavement on both sides on Menkes Drive provides increased flexibility in the redesign of the street. This flexibility provides the opportunity to minimize potential impacts along Menkes Drive to sidewalk separation from the roadway, boulevard trees along the street, and utilities. It also provides flexibility with respect to streetscaping opportunities.</p>		<p>Alternative 3 is least preferred due to its potential impacts on major utilities and associated costs.</p>

5.3. Alternative Designs for Derry Road East & Bramalea Road

Table 6: Evaluation of Alternative Design Concepts for Derry Rd. E. & Bramalea Rd.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
 Planning and Transportation								
Urban Environment		No significant change to the urban environment.		No significant change to the urban environment.		No significant change to the urban environment.		No significant change to the urban environment.
Network Connectivity		No significant change to the network connectivity.		No significant change to the network connectivity.		No significant change to the network connectivity.		No significant change to the network connectivity.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Traffic Operations	●	<p>For each alternative, the intersection will be realigned to provide an unsplit signalized operation. This will improve traffic operations, reduce delays and improve vehicle maneuvering at this intersection.</p> <p>All four alternatives will have similar access impacts to the UPS and FedEx sites on Bramalea Road south of Derry Road requiring additional traffic lanes to be crossed:</p> <ul style="list-style-type: none"> • The eastbound left-turn traffic exiting the UPS driveway would need to cross additional southbound lanes. • The southbound left-turn traffic entering the FedEx driveway would need to cross additional northbound lanes 	●	<p>For each alternative, the intersection will be realigned to provide an unsplit signalized operation. This will improve traffic operations, reduce delays and improve vehicle maneuvering at this intersection.</p> <p>All four alternatives will have similar access impacts to the UPS and FedEx sites on Bramalea Road south of Derry Road requiring additional traffic lanes to be crossed:</p> <ul style="list-style-type: none"> • The eastbound left-turn traffic exiting the UPS driveway would need to cross additional southbound lanes. • The southbound left-turn traffic entering the FedEx driveway would need to cross additional northbound lanes 	●	<p>For each alternative, the intersection will be realigned to provide an unsplit signalized operation. This will improve traffic operations, reduce delays and improve vehicle maneuvering at this intersection.</p> <p>All four alternatives will have similar access impacts to the UPS and FedEx sites on Bramalea Road south of Derry Road requiring additional traffic lanes to be crossed:</p> <ul style="list-style-type: none"> • The eastbound left-turn traffic exiting the UPS driveway would need to cross additional southbound lanes. • The southbound left-turn traffic entering the FedEx driveway would need to cross additional northbound lanes 	●	<p>For each alternative, the intersection will be realigned to provide an unsplit signalized operation. This will improve traffic operations, reduce delays and improve vehicle maneuvering at this intersection.</p> <p>All four alternatives will have similar access impacts to the UPS and FedEx sites on Bramalea Road south of Derry Road requiring additional traffic lanes to be crossed:</p> <ul style="list-style-type: none"> • The eastbound left-turn traffic exiting the UPS driveway would need to cross additional southbound lanes. • The southbound left-turn traffic entering the FedEx driveway would need to cross additional northbound lanes
Transit Services	●	Improvement to transit services due to greater flow of Volume on Derry Road as a result of added turning lanes.	●	Improvement to transit services due to greater flow of Volume on Derry Road as a result of added turning lanes.	●	Improvement to transit services due to greater flow of Volume on Derry Road as a result of added turning lanes.	●	Improvement to transit services due to greater flow of Volume on Derry Road as a result of added turning lanes.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Safety		Safety improvements at the intersection with the addition of dedicated dual left-turn lanes at the north, east and west legs of the intersection. Safety is also improved with the separation of the through lanes from the auxiliary lanes on Bramalea Road.		Safety improvements at the intersection with the addition of dedicated dual left-turn lanes at the north, east and west legs of the intersection. Safety is also improved with the separation of the through lanes from the auxiliary lanes on Bramalea Road.		Safety improvements at the intersection with the addition of dedicated dual left-turn lanes at the north, east and west legs of the intersection. Safety is also improved with the separation of the through lanes from the auxiliary lanes on Bramalea Road.		Safety improvements at the intersection with the addition of dedicated dual left-turn lanes at the north, east and west legs of the intersection. Safety is also improved with the separation of the through lanes from the auxiliary lanes on Bramalea Road. The hybrid approach allows the optimal alignment of the lanes on Bramalea Road, increasing safety.
Planning and Transportation Summary		Alternatives 1, 2 and 3 are less preferred than Alternative 4, primarily due to the improved safety conditions with Alternative 4.		Alternatives 1, 2 and 3 are less preferred than Alternative 4, primarily due to the improved safety conditions with Alternative 4.		Alternatives 1, 2 and 3 are less preferred than Alternative 4, primarily due to the improved safety conditions with Alternative 4.		Alternative 4 is preferred because it improves traffic safety compared to the other alternatives.
 Healthy Community								
Continuity of Active Transportation (AT) Facilities		Significant improvement to the sidewalk connectivity by offering a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.		Significant improvement to the sidewalk connectivity by offering a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.		Significant improvement to the sidewalk connectivity by offering a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.		Significant improvement to the sidewalk connectivity by offering a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.
AT Facility Type		Opportunity to install a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.		Opportunity to install a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.		Opportunity to install a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.		Opportunity to install a sidewalk on the west side of Bramalea Road to the south of the Derry Road intersection.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Separation of Facilities		Opportunity to add a boulevard between the roadway and the newly offered sidewalk to separate the two facilities.		Opportunity to add a boulevard between the roadway and the newly offered sidewalk to separate the two facilities.		Opportunity to add a boulevard between the roadway and the newly offered sidewalk to separate the two facilities.		Opportunity to add a boulevard between the roadway and the newly offered sidewalk to separate the two facilities.
AT Access to Destinations near or within the Study Corridor		All four alternatives provide improved pedestrian access on Bramalea Road south of Derry Road compared to existing by extending the sidewalk south on both sides.		All four alternatives provide improved pedestrian access on Bramalea Road south of Derry Road compared to existing by extending the sidewalk south on both sides.		All four alternatives provide improved pedestrian access on Bramalea Road south of Derry Road compared to existing by extending the sidewalk south on both sides.		All four alternatives provide improved pedestrian access on Bramalea Road south of Derry Road compared to existing by extending the sidewalk south on both sides.
Design Speed of the Roadway		Design speed of the roadway will remain unchanged on both Bramalea Road and Derry Road.		Design speed of the roadway will remain unchanged on both Bramalea Road and Derry Road.		Design speed of the roadway will remain unchanged on both Bramalea Road and Derry Road.		Design speed of the roadway will remain unchanged on both Bramalea Road and Derry Road.
Number of Trees within the Study Corridor, Preferably in Close Proximity to AT Facilities to Provide Shade		No significant change to the existing number of trees and to the shading on sidewalks. Some trees on the north side of Derry Road may need to be relocated.		No significant change to the number of existing trees and to the shading on sidewalks. Some trees on the north side of Derry Road may need to be relocated.		No significant change to the number of existing trees and to the shading on sidewalks. Some trees on the north side of Derry Road may need to be relocated.		No significant change to the number of existing trees and to the shading on sidewalks. Some trees on the north side of Derry Road may need to be relocated.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Pedestrian Level of Services (PLOS)		<p>Increase in PLOS with the improvements to the sidewalk connectivity.</p> <p>The north-south crossing distances would not be significantly impacted, with increases less than a metre.</p> <p>The east-west crossing distance would be increased by approximately 2.4m north of Derry Road and by about 1.1m south of Derry Road.</p> <p>The additional crossing distance may require small increases to the crossing time and can be accommodated within the signalized intersection’s phase for each direction of travel.</p>		<p>Increase in PLOS with the improvements to the sidewalk connectivity.</p> <p>The north-south crossing distances would not be significantly impacted, with increases less than a metre.</p> <p>The east-west crossing distance would be increased by approximately 3.5m north of Derry Road and by about 1.8 m south of Derry Road.</p> <p>The additional crossing distance may require small increases to the crossing time and can be accommodated within the signalized intersection’s phase for each direction of travel.</p>		<p>Increase in PLOS with the improvements to the sidewalk connectivity.</p> <p>The north-south crossing distance would not be significantly impacted, with small increases less than a metre.</p> <p>The east-west crossing distance would be increased by approximately 2.5m north of Derry Road and by about 2.0 m south of Derry Road.</p> <p>The additional crossing distance may require small increases to the crossing time and can be accommodated within the signalized intersection’s phase for each direction of travel.</p>		<p>Increase in PLOS with the improvements to the sidewalk connectivity.</p> <p>The north-south crossing distance would not be significantly impacted, with small increases less than a metre.</p> <p>The east-west crossing distance would be increased by approximately 3.6m north of Derry Road and by about 2.2m south of Derry Road.</p> <p>The additional crossing distance may require small increases to the crossing time and can be accommodated within the signalized intersection’s phase for each direction of travel.</p>
Bicycle Level of Services (BLOS)		<p>All four alternatives will increase BLOS through the introduction of crossrides and the enhanced MUP on the north side of Derry Road east of Bramalea Road, which would ultimately connect with a potential future MUP east of the study area.</p>		<p>All four alternatives will increase BLOS through the introduction of crossrides and the enhanced MUP on the north side of Derry Road east of Bramalea Road, which would ultimately connect with a potential future MUP east of the study area.</p>		<p>All four alternatives will increase BLOS through the introduction of crossrides and the enhanced MUP on the north side of Derry Road east of Bramalea Road, which would ultimately connect with a potential future MUP east of the study area.</p>		<p>All four alternatives will increase BLOS through the introduction of crossrides and the enhanced MUP on the north side of Derry Road east of Bramalea Road, which would ultimately connect with a potential future MUP east of the study area.</p>

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Alternative Impacts on Accessibility		The sidewalk extension allows opportunity to integrate accessibility features into final design. The extension of sidewalk allows additional accessible route options.		The sidewalk extension allows opportunity to integrate accessibility features into final design. The extension of sidewalk allows additional accessible route options.		The sidewalk extension allows opportunity to integrate accessibility features into final design. The extension of sidewalk allows additional accessible route options.		The sidewalk extension allows opportunity to integrate accessibility features into final design. The extension of sidewalk allows additional accessible route options.
Alternative Impacts on Air Quality		Improvement in air quality by improving traffic efficiency, including reduction of idling and slow-moving traffic, thereby decreasing risk to respiratory and cardiovascular health from exposure to traffic-related air pollution.		Improvement in air quality by improving traffic efficiency, including reduction of idling and slow-moving traffic, thereby decreasing risk to respiratory and cardiovascular health from exposure to traffic-related air pollution.		Improvement in air quality by improving traffic efficiency, including reduction of idling and slow-moving traffic, thereby decreasing risk to respiratory and cardiovascular health from exposure to traffic-related air pollution.		Improvement in air quality by improving traffic efficiency, including reduction of idling and slow-moving traffic, thereby decreasing risk to respiratory and cardiovascular health from exposure to traffic-related air pollution.
Healthy Community Summary		<p>All four alternatives generally have similar impacts from a Healthy Community perspective.</p> <p>However, Alternatives 1 and 3 are slightly more preferred because they add roughly 1 metre less to the north side crossing of Bramalea Road compared to Alternatives 2 and 4.</p>		<p>All four alternatives generally have similar impacts from a Healthy Community perspective.</p> <p>However, Alternatives 2 and 4 are slightly less preferred because they add roughly 1 metre more to the north side crossing of Bramalea Road compared to Alternatives 1 and 3.</p>		<p>All four alternatives generally have similar impacts from a Healthy Community perspective.</p> <p>However, Alternatives 1 and 3 are slightly more preferred because they add roughly 1 metre less to the north side crossing of Bramalea Road compared to Alternatives 2 and 4.</p>		<p>All four alternatives generally have similar impacts from a Healthy Community perspective.</p> <p>However, Alternatives 2 and 4 are slightly less preferred because they add roughly 1 metre more to the north side crossing of Bramalea Road compared to Alternatives 1 and 3.</p>

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
 Natural Environment								
Climate Change	●	Compared to doing nothing, Alternative 1 will improve traffic efficiency due to the reduction in idling and slow-moving traffic. Hence, this contributes to the reduction in GHG emissions.	●	Compared to doing nothing, Alternative 2 will improve traffic efficiency due to the reduction in idling and slow-moving traffic. Hence, this contributes to the reduction in GHG emissions.	●	Compared to doing nothing, Alternative 3 will improve traffic efficiency due to the reduction in idling and slow-moving traffic. Hence, this contributes to the reduction in GHG emissions.	●	Compared to doing nothing, Alternative 4 will improve traffic efficiency due to the reduction in idling and slow-moving traffic. Hence, this contributes to the reduction in GHG emissions.
Natural Heritage Policies	●	All three alternatives are equally compatible with applicable natural heritage policies.	●	All three alternatives are equally compatible with applicable natural heritage policies.	●	All three alternatives are equally compatible with applicable natural heritage policies.	●	Compatible with applicable natural heritage policies.
Trees and Vegetation	○	Some boulevard greenspace may be removed; however, no sensitive areas would be impacted.	○	Some boulevard greenspace may be removed; however, no sensitive areas would be impacted.	○	Some boulevard greenspace may be removed; however, no sensitive areas would be impacted.	○	Some boulevard greenspace may be removed; however, no sensitive areas would be impacted.
Wildlife	●	No significant impact on wildlife.						
Ground and Surface Water	●	No direct impact on ground or surface water expected.	●	No direct impact on ground or surface water expected.	●	No direct impact on ground or surface water expected.	●	No direct impact on ground or surface water expected.
Natural Environment Summary	●	All four alternatives will similarly have minimal impacts to the natural environment.	●	All four alternatives will similarly have minimal impacts to the natural environment.	●	All four alternatives will similarly have minimal impacts to the natural environment.	●	All four alternatives will similarly have minimal impacts to the natural environment.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
 Socio-Economic Environment								
Land Use Impacts		All alternatives are equally compatible with existing designated land uses.		All alternatives are equally compatible with existing designated land uses.		All alternatives are equally compatible with existing designated land uses.		All alternatives are equally compatible with existing designated land uses.
Property Impacts		<p>The extension of the road paved surface on Bramalea Road will be contained within the ROW. However, temporary working easements may be required during construction.</p> <p>Some property requirements may be required for installation of sidewalk with boulevard along the west side of Bramalea Road south of Derry Road (similar amounts to Alternative 4).</p>		<p>Most of the extension of the road paved surface on Bramalea Road will be contained within the ROW, except for a small portion in the southwest corner of the Bramalea Road/Derry Road intersection. However, temporary working easements may be required during construction.</p> <p>The property requirements required for installation of sidewalk with boulevard along the west side of Bramalea Road south of Derry Road are the greatest for Alternative 2, as the sidewalk may encroach into the parking lot.</p>		<p>Most of the extension of the road paved surface on Bramalea Road north of Derry Road will be contained within the ROW. Some encroachment of the ROW occurs on either side of Bramalea Road south of Derry Road. Temporary working easements may also be required during construction.</p> <p>The property requirements required for installation of sidewalk with boulevard along the west side of Bramalea Road south of Derry Road are less than Alternative 2, but the sidewalk would come very close to the existing parking lot.</p>		<p>Most of the extension of the road paved surface on Bramalea Road north of Derry Road will be contained within the ROW. Some encroachment of the ROW occurs on either side of Bramalea Road south of Derry Road. Temporary working easements may also be required during construction.</p> <p>Some property requirements may be required for installation of sidewalk with boulevard along the west side of Bramalea Road south of Derry Road (similar amounts to Alternative 1).</p>
Streetscaping		No significant change to the existing streetscaping.		No significant change to the existing streetscaping.		No significant change to the existing streetscaping.		No significant change to the existing streetscaping.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Noise and Vibration Impacts		Compared to the “do nothing” scenario, none of the four alternatives are expected to have any significant impacts on noise and vibration.		Compared to the “do nothing” scenario, none of the four alternatives are expected to have any significant impacts on noise and vibration.		Compared to the “do nothing” scenario, none of the four alternatives are expected to have any significant impacts on noise and vibration.		Compared to the “do nothing” scenario, none of the four alternatives are expected to have any significant impacts on noise and vibration.
Socio-Economic Summary		All four alternatives generally have similar impacts from a Socio-Economic perspective. However, Alternatives 1 and 4 are most preferred because they allow for sidewalks with the least amount of encroachment on private property.		All four alternatives generally have similar impacts from a Socio-Economic perspective. However, Alternative 2 is least preferred because it requires the most encroachment on private property to provide a sidewalk on the west side of Bramalea Road south of Derry Road.		All four alternatives generally have similar impacts from a Socio-Economic perspective. However, Alternative 3 is less preferred because it requires some encroachment on private property to provide a sidewalk on the west side of Bramalea Road south of Derry Road.		All four alternatives generally have similar impacts from a Socio-Economic perspective. However, Alternatives 1 and 4 are most preferred because they allow for sidewalks with the least amount of encroachment on private property.
 Cultural Environment								
Archaeological Resources		No impact on archaeological resources is anticipated based on the alternative design. However, there would be the potential for additional archaeological work should the design encroach onto Moore’s Cemetery.		No impact on archaeological resources is anticipated based on the alternative design. However, there would be the potential for additional archaeological work should the design encroach onto Moore’s Cemetery.		No impact on archaeological resources is anticipated based on the alternative design. However, there would be the potential for additional archaeological work should the design encroach onto Moore’s Cemetery.		No impact on archaeological resources is anticipated based on the alternative design. However, there would be the potential for additional archaeological work should the design encroach onto Moore’s Cemetery.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Built Heritage / Cultural Landscapes		No impacts on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands. As detailed design progresses, potential impacts to adjacent properties identified as having cultural heritage resources will be monitored.		No impacts on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands. As detailed design progresses, potential impacts to adjacent properties identified as having cultural heritage resources will be monitored.		No impacts on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands. As detailed design progresses, potential impacts to adjacent properties identified as having cultural heritage resources will be monitored.		No impacts on built heritage resources and cultural landscapes are anticipated, as the study area consist of commercial/industrial lands. As detailed design progresses, potential impacts to adjacent properties identified as having cultural heritage resources will be monitored.
Cultural Environment Summary		All four alternatives are equally preferred from a Cultural Environment perspective.		All four alternatives are equally preferred from a Cultural Environment perspective.		All four alternatives are equally preferred from a Cultural Environment perspective.		All four alternatives are equally preferred from a Cultural Environment perspective.
 Technical								
Construction Feasibility		All four alternatives would have some complex construction with respect to widening the surface of Derry Road (a regional arterial road) on the north side to add a new turning lane, extending Derry Road. Alternatives 1 and 4 are more preferred because the widening of Bramalea Road south of Derry Road would require less complex staging than Alternatives 2 and 3.		All four alternatives would have some complex construction with respect to widening the surface of Derry Road (a regional arterial road) on the north side to add a new turning lane, extending Derry Road. Alternatives 2 and 3 are least preferred because they would require more complex staging for widening of Bramalea Road south of Derry Road.		All four alternatives would have some complex construction with respect to widening the surface of Derry Road (a regional arterial road) on the north side to add a new turning lane, extending Derry Road. Alternatives 2 and 3 are least preferred because they would require more complex staging for widening of Bramalea Road south of Derry Road.		All four alternatives would have some complex construction with respect to widening the surface of Derry Road (a regional arterial road) on the north side to add a new turning lane, extending Derry Road. Alternatives 1 and 4 are more preferred because the widening of Bramalea Road south of Derry Road would require less complex staging than Alternatives 2 and 3.

Evaluation Criteria		Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north		Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north		Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north		Alternative 4: Modify intersection using a hybrid approach
Stormwater Management		Each of the four alternatives would similarly have a minimal impact on the volume of stormwater requiring management. For each alternative, expanding the paved surface of the regional arterial road would require significant realignment of stormwater system.		Each of the four alternatives would similarly have a minimal impact on the volume of stormwater requiring management. For each alternative, expanding the paved surface of the regional arterial road would require significant realignment of stormwater system.		Each of the four alternatives would similarly have a minimal impact on the volume of stormwater requiring management. For each alternative, expanding the paved surface of the regional arterial road would require significant realignment of stormwater system.		Each of the four alternatives would similarly have a minimal impact on the volume of stormwater requiring management. For each alternative, expanding the paved surface of the regional arterial road would require significant realignment of stormwater system.
Utilities		Alternative 1 would require some utility relocation, particularly in the southwest corner of the intersection. Impacts to existing utilities for this alternative would have more than Alternative 4, but less than Alternatives 2 and 3.		Alternative 2 would require significant utility relocation. Impacts to existing utilities for this alternative would be more than Alternatives 1 and 4, but less than Alternative 3.		Alternative 3 would require significant utility relocation, with significant utility impacts on southwest, northwest, and northeast corners. Impacts to existing utilities for this alternative would be greater than the other three alternatives.		Alternative 1 would require some utility relocation. There would be some impacts in the southwest corner of the intersection, but this alternative would have less impact than the other alternatives.
Technical Summary		Alternative 1 is less preferred from a technical perspective because it would have less impact on existing public and private utility infrastructure than Alternatives 2 and 3, but more than Alternative 4.		Alternative 2 is not preferred due to its significant impacts on existing public and private utility infrastructure.		Alternative 3 is not preferred due to its significant impacts on existing public and private utility infrastructure.		Alternative 4 is preferred from a technical perspective because it would have the least impact on existing public and private utility infrastructure.

Evaluation Criteria	Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north	Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north	Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north	Alternative 4: Modify intersection using a hybrid approach
Cost				
Capital Costs	<p>The construction costs will be similar for all four alternatives.</p> <p>The main driver of cost difference will be the relocation of utilities. Since this alternative has moderate utilities relocation compared to the other alternatives, this alternative has moderate cost compared to the other alternatives.</p>	<p>The construction costs will be similar for all four alternatives.</p> <p>The main driver of cost difference will be the relocation of utilities. Since Alternative 2 and 3 have the greatest utilities relocation compared to the other alternatives, they have the greatest cost compared to the other alternatives.</p>	<p>The construction costs will be similar for all four alternatives.</p> <p>The main driver of cost difference will be the relocation of utilities. Since Alternatives 2 and 3 has the greatest utilities relocation compared to the other alternatives, they have the greatest cost compared to the other alternatives.</p>	<p>The construction costs will be similar for all four alternatives.</p> <p>The main driver of cost difference will be the relocation of utilities. Since this alternative has the least utilities relocation compared to the other alternatives, this alternative has the lowest cost compared to the other alternatives.</p>
Property Costs	<p>Some property acquisition may be required for sidewalk installation.</p>	<p>Some property acquisition may be required for sidewalk installation, possibly including a portion of existing private parking.</p>	<p>Some property acquisition may be required for sidewalk installation, possibly including a portion of existing private parking.</p>	<p>Some property acquisition may be required for sidewalk installation.</p>
Maintenance Costs	<p>Moderate increase in maintenance costs.</p>	<p>Moderate increase in maintenance costs.</p>	<p>Moderate increase in maintenance costs.</p>	<p>Moderate increase in maintenance costs.</p>

Evaluation Criteria	Alternative 1: Extend paved surface of Bramalea Road to the east and on Derry Road to the north	Alternative 2: Extend paved surface of Bramalea Road to the west and on Derry Road to the north	Alternative 3: Extend paved surface of Bramalea Road on both sides and on Derry Road to the north	Alternative 4: Modify intersection using a hybrid approach
<p>Cost Summary</p>	<p>It is anticipated that the relocation of utilities will be the main cost driver for all four alternatives.</p> <p>As Alternative 1 has the second least impact on existing public and private utility infrastructure for the four alternatives, it will have the second lowest cost impact and is therefore less preferred from a cost perspective.</p>	<p>As Alternatives 2 and 3 have the greatest impact on existing public and private utility infrastructure, they will have the highest cost impact and are therefore not preferred from a cost perspective.</p>	<p>As Alternatives 2 and 3 have the greatest impact on existing public and private utility infrastructure, they will have the highest cost impact and are therefore not preferred from a cost perspective.</p>	<p>It is anticipated that the relocation of utilities will be the main cost driver for all four alternatives.</p> <p>As Alternative 4 has the least impact on existing public and private utility infrastructure, it will have the lowest cost impact and is most preferred from a cost perspective.</p>
<p>Overall Summary</p>	<p>Alternative 1 is less preferred because, while it provides some improvements to traffic safety, it has less cost and fewer impacts on existing utilities than Alternatives 2 and 3 but more than 4.</p> <p>The impacts to healthy communities, the natural environment, and the cultural environment are not significantly different among the four alternatives.</p>	<p>Alternatives 2 and 3 are not preferred because they provide less optimization of traffic safety than Alternative 4 and have higher cost and greater impacts on existing utilities. They also have slightly greater encroachment into private property for the installation of the sidewalk on the west side of Bramalea Road, south of Derry Road.</p> <p>The impacts to healthy communities, the natural environment, and the cultural environment are not significantly different among the four alternatives.</p>	<p>Alternatives 2 and 3 are not preferred because they provide less optimization of traffic safety than Alternative 4 and have higher cost and greater impacts on existing utilities. They also have slightly greater encroachment into private property for the installation of the sidewalk on the west side of Bramalea Road, south of Derry Road.</p> <p>The impacts to healthy communities, the natural environment, and the cultural environment are not significantly different among the four alternatives.</p>	<p>Alternative 4 is preferred because it optimizes traffic safety compared to the other alternatives while minimizing cost and impacts on existing utilities.</p> <p>The impacts to healthy communities, the natural environment, and the cultural environment are not significantly different among the four alternatives.</p>

6. Recommended Alternative Design

Based on the results of the evaluation, the preferred alternative designs for the study area are discussed below.

6.1. Alstep Drive & Bramalea Road: Recommended Design

The recommended alternative design for Alstep Drive and its intersection with Bramalea Road is Alternative 3: Extend Alstep Drive to Bramalea Road, with 3-lane signalized intersection at Bramalea Road.

In this alternative, the Alstep Drive extension would be constructed within the existing municipal road ROW. The extension would consist of one westbound lane, one eastbound left turn lane, and one eastbound right turn lane, for three lanes in total. The intersection with Bramalea Road would be signalized. The sidewalk that is considered for the west side of Bramalea Road and positioned north of the Alstep Drive extension would continue directly southward below the intersection and then further southward along Bramalea Road.

This alternative was selected because it will provide the greatest optimization of traffic operations and traffic safety compared to the other alternatives.

6.2. Derry Road East & Menkes Drive/Telford Way: Recommended Design

The recommended design for the intersection of Derry Road East and Menkes Drive/Telford Way is Alternative 2: Extend paved surface of Menkes Drive/Telford Way on both sides.

In this alternative, the paved surface of Menkes Drive extends to the east and to the west but still within the municipal road ROW. Two northbound left-turn lanes are added with queue lengths the entire length of Menkes Drive.

Physical adjustments made to the intersection under this design alternative include:

- On Telford Way, southbound and northbound lanes separated by concrete median.
- Curb on southeastern corner of intersection is shifted eastward, with realignment of the sidewalk.
- Curb on northwestern corner of intersection is shifted westward to allow for an improved turning radius, with a corresponding realignment of the sidewalk;
- Median curbs shifted further back to improve truck-turning ability;
- Slight reduction to the pedestrian islands in the southwestern and northeastern corners of the intersection. Pedestrian island size continues to meet the standard.

Active transportation design elements included in this design include:

- A sidewalk with boulevard on the east side of Telford Way and on the northside of Derry Road East, west of Telford Way.
- Upgraded multi-use path on the south side of Derry Road East.

This key advantage to this alternative is that extending the pavement on both sides on Menkes Drive provides increased flexibility in the redesign of the street. This flexibility provides the opportunity to minimize potential impacts along Menkes

Drive to sidewalk separation from the roadway, boulevard trees along the street, and utilities. It also provides flexibility with respect to streetscaping opportunities.

6.3. Derry Road East & Bramalea Road: Recommended Design

The recommended design for the intersection of Derry Road East and Bramalea Road is Alternative 4: Modify intersection using a hybrid approach.

In this alternative, the paved surface of Bramalea Road north of Derry Road is extended to the east, while south of Derry Road pavement is extended to both the east and west. The eastward expansion south of Derry Road would occur on the east side of the Bramalea / Alstep intersection and continue northward for about 100 m. The expansion westward would occur along Bramalea from Derry Road to about 100 m southward.

North of Derry Road, the eastward extension of Bramalea Road would make room for the separate southbound through and the two left turn lanes, in addition to the existing right turn lane. The extension around the centreline to the south of Derry Road is to make room for the separate northbound through and right turn lanes, in addition to the existing left turn lane and shadow lane, as well as the sidewalk on the west side. The hybrid approach allows the northbound and southbound lanes on Bramalea Road to align.

The paved surface along Derry Road would be extended approximately 3 m northward from Bramalea Road to the eastern limit of the project.

Active transportation design elements included in this design are:

- Upgrading the multi-use path on the south side of Derry Road west of Bramalea Road;
- Adding a new multi-use path on the north side of Derry Road east of Bramalea Road;
- Addition of cross-rides or crosswalks with signals;
- Adding a new sidewalk on the north side of Derry Road west of Bramalea Road;
- Adding sidewalks on both sides of Bramalea Road south of Derry Road; and
- Adding a westbound bus-stop queue jump lane along Derry Road to improve merging of transit vehicles into traffic, from the bus-stop located on the north side of Derry Road east of Bramalea Road⁵.

The key advantage of this alternative is that it optimizes traffic safety compared to the other alternatives while minimizing cost and impacts on existing utilities.

⁵ Configuration of the queue jump lane is to be confirmed in consultation with Mi-Way.

6.4. Other Active Transportation Improvements

Other active transportation improvements included in the project study area include:

- Sidewalks in the following locations:
 - North side of Derry Road from Bramalea Road to the western limits of the study area, which would connect with future Region of Peel sidewalk improvements (or existing sidewalks, where applicable) beyond the study area to the west;
 - North and south sides of the existing Alstep Drive; and
 - West side of Menway Court.
- Upgrading the MUP along the south side of Derry Road, west of Bramalea Road. Adding an MUP along the north side of Derry Road, east of Bramalea Road.

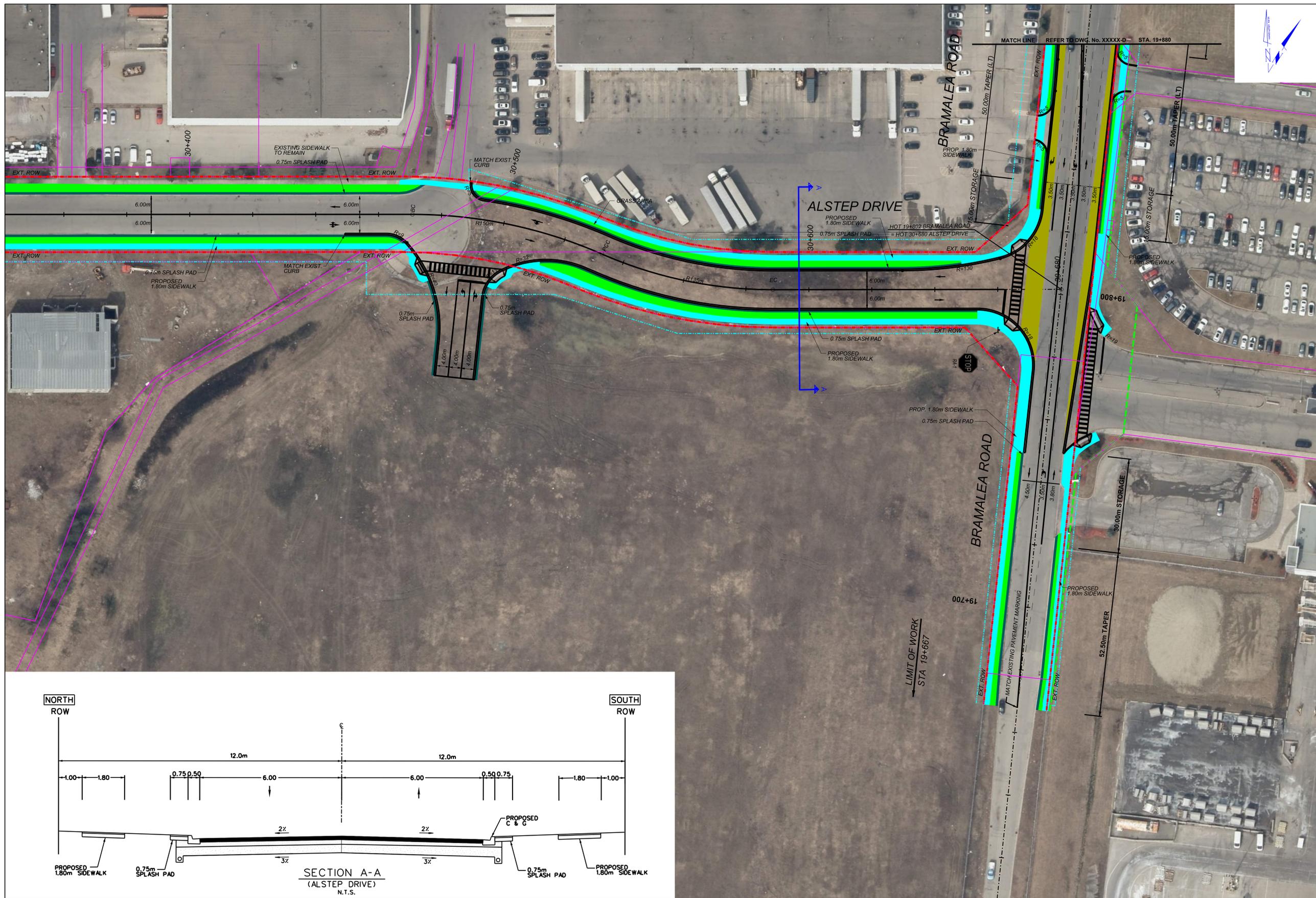
The proposed active transportation improvements noted above are illustrated in Appendix E.

Inclusion of the sidewalks and upgrading of the MUP will help to achieve the Region and the City's active transportation goals.

*Municipal Class Environmental Assessment for Road Improvements near Derry Road East and Alstep Drive:
Evaluation of Alternative Designs
November 16, 2021*



Appendix A: Alstep Drive Extension Alternatives



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS		
DATE	DETAILS	INIT.
APRIL 2021		M.F.
NOVEMBER 2021		C.G.

KEY PLAN (N.T.S.)

LEGEND

- MEDIAN REMOVAL
- ROAD WIDENING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE TRAIL
- SPLASH PAD
- PROPOSED MEDIAN
- GRASS AREA
- PARCEL FABRIC
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- TEMPORARY EASEMENT

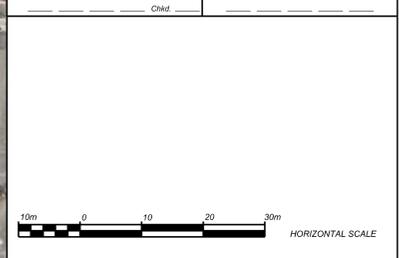
BOMBARDIER **exp.**

General Notes

All Driveways Are ASPHALT Unless Otherwise Noted
 All Water And Sanitary Service Locations Are Approximate And Must Be Located Accordingly In The Field
 All Horizontal And Vertical Bends Are In Degrees
 All Pipes Size In mm
 20C Existing Water Service, Size In mm
 W325 Proposed Water Service, Size In mm
 B.M. No. Description Elevation
 Location
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

Designed by:

Approved by:

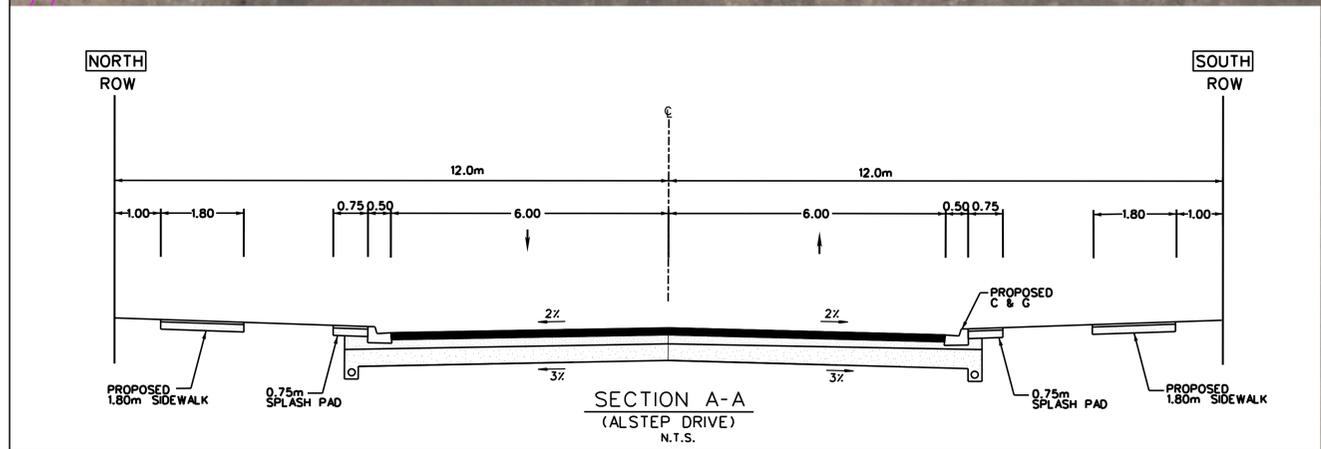


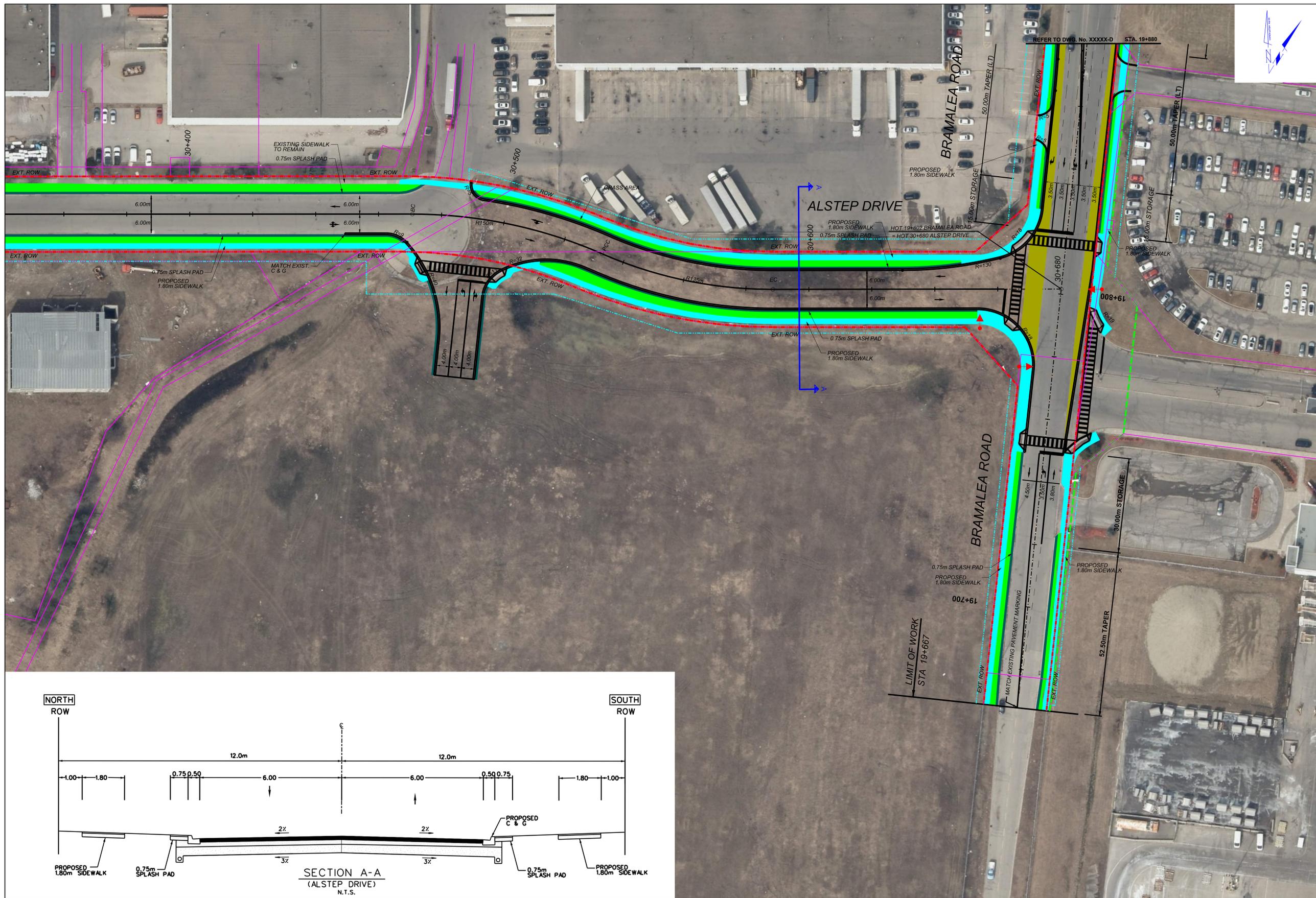
Region of Peel
working with you

ALSTEP DRIVE

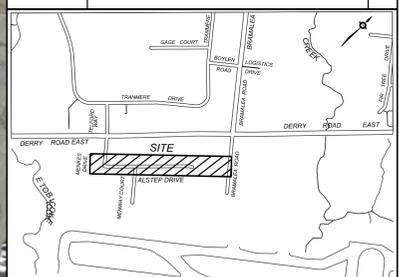
ALTERNATIVE 1
EXTEND ALSTEP WITH 2-LANE UNSIGNALIZED INTERSECTION AT BRAMALEA ROAD

CAD Area	X-XX	Area	X-XX	Project No.	XX-XXXX
Checked by	C.G.	Drawn by	K.S.	Sheet	X of X
Date	NOVEMBER 2021	Sheet	X of X	Plan No.	XXXXX-D





SERVICE DATA					
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REVISIONS					
DATE	DETAILS	INIT.			
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NOVEMBER 2021					



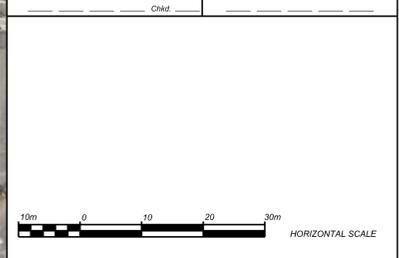
LEGEND	
	MEDIAN REMOVAL
	ROAD WIDENING
	PROPOSED SIDEWALK
	PROPOSED MULTI-USE TRAIL
	SPLASH PAD
	PROPOSED MEDIAN
	GRASS AREA
	PARCEL FABRIC
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	TEMPORARY EASEMENT

BOMBARDIER

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 All Horizontal And Vertical Bends Are In Degrees
 All Pipes Size In mm
 20C Existing Water Service, Size In mm
 W325 Proposed Water Service, Size In mm
 B.M. No. Description Location
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

Designed by:

Approved by:

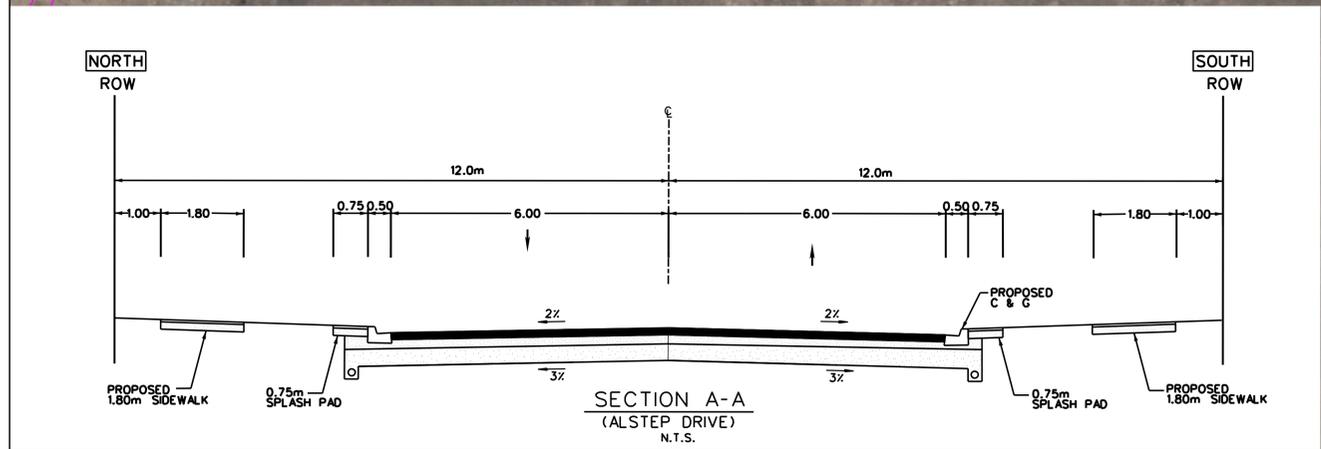


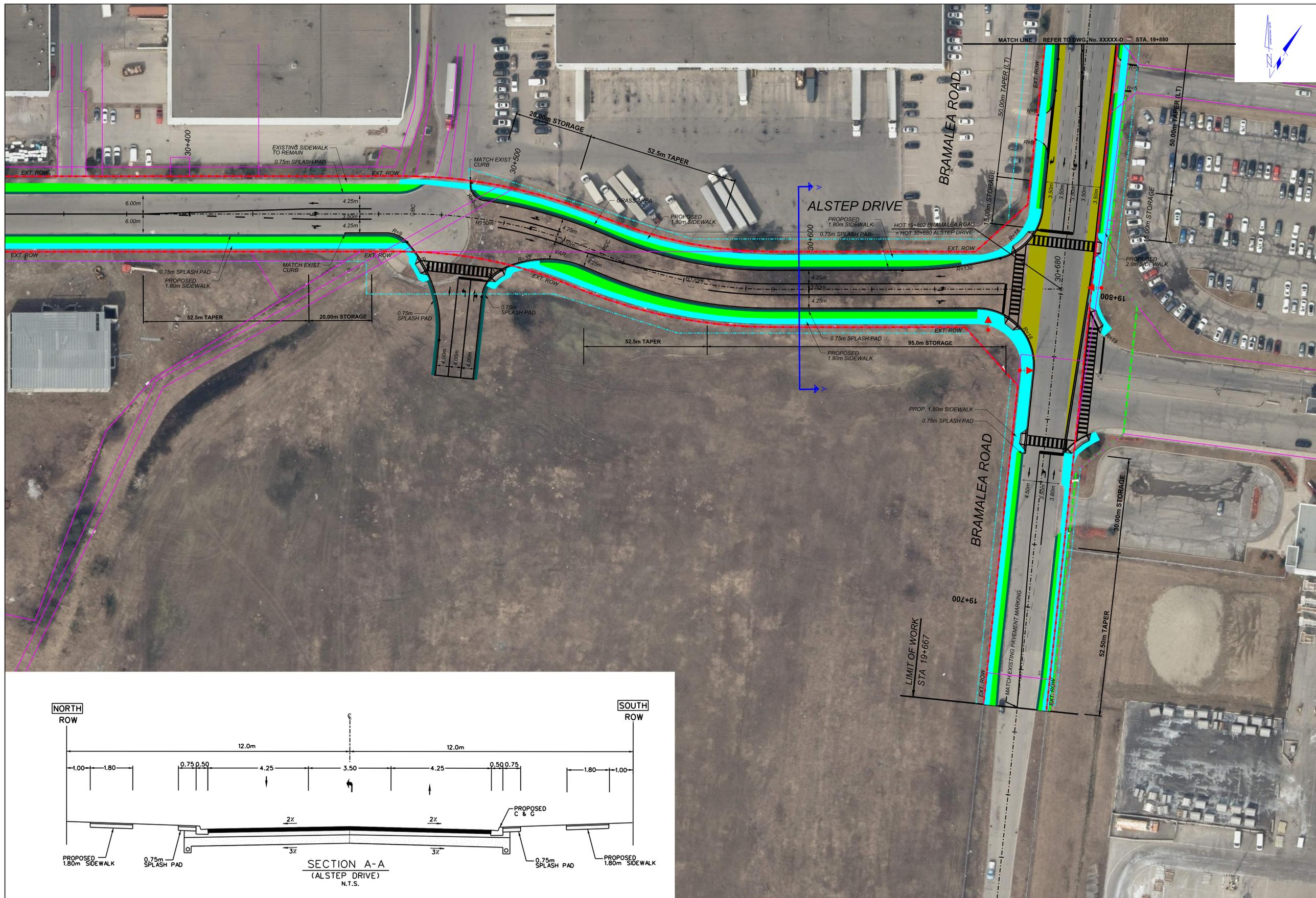
Region of Peel
working with you

ALSTEP DRIVE

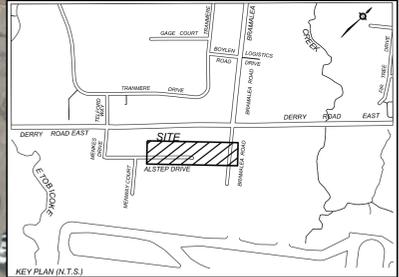
ALTERNATIVE 2
EXTEND ALSTEP WITH 2 - LANE SIGNALIZED INTERSECTION AT BRAMALEA ROAD

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Checked by	C.G.	Drawn by	K.S.	Sheet	X of X
Date	NOVEMBER 2021	Plan No.	XXXXX-D		





SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
REVISIONS					
DATE	DETAILS	INIT.			
APRIL 2021		M.F.			
NOVEMBER 2021		C.G.			



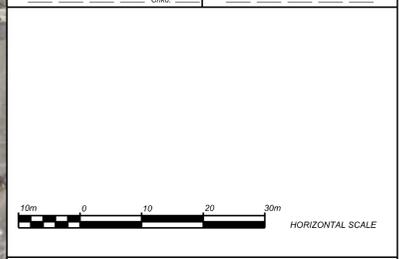
LEGEND	
	MEDIAN REMOVAL
	ROAD WIDENING
	PROPOSED SIDEWALK
	PROPOSED MULTI-USE TRAIL
	SPLASH PAD
	PROPOSED MEDIAN
	GRASS AREA
	PARCEL FABRIC
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	TEMPORARY EASEMENT

BOMBARDIER

General Notes
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 All Horizontal And Vertical Bends Are In Degrees
 All Pipes Size In mm
 20C Existing Water Service, Size In mm
 W325 Proposed Water Service, Size In mm
 B.M. No. Description Location
 ELEV.
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

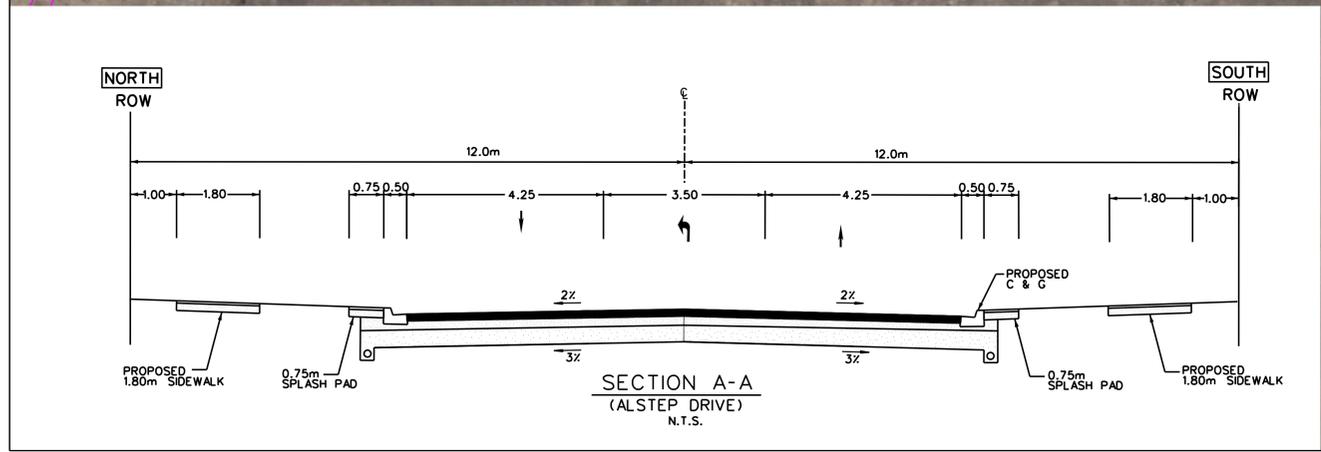
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Approved by:

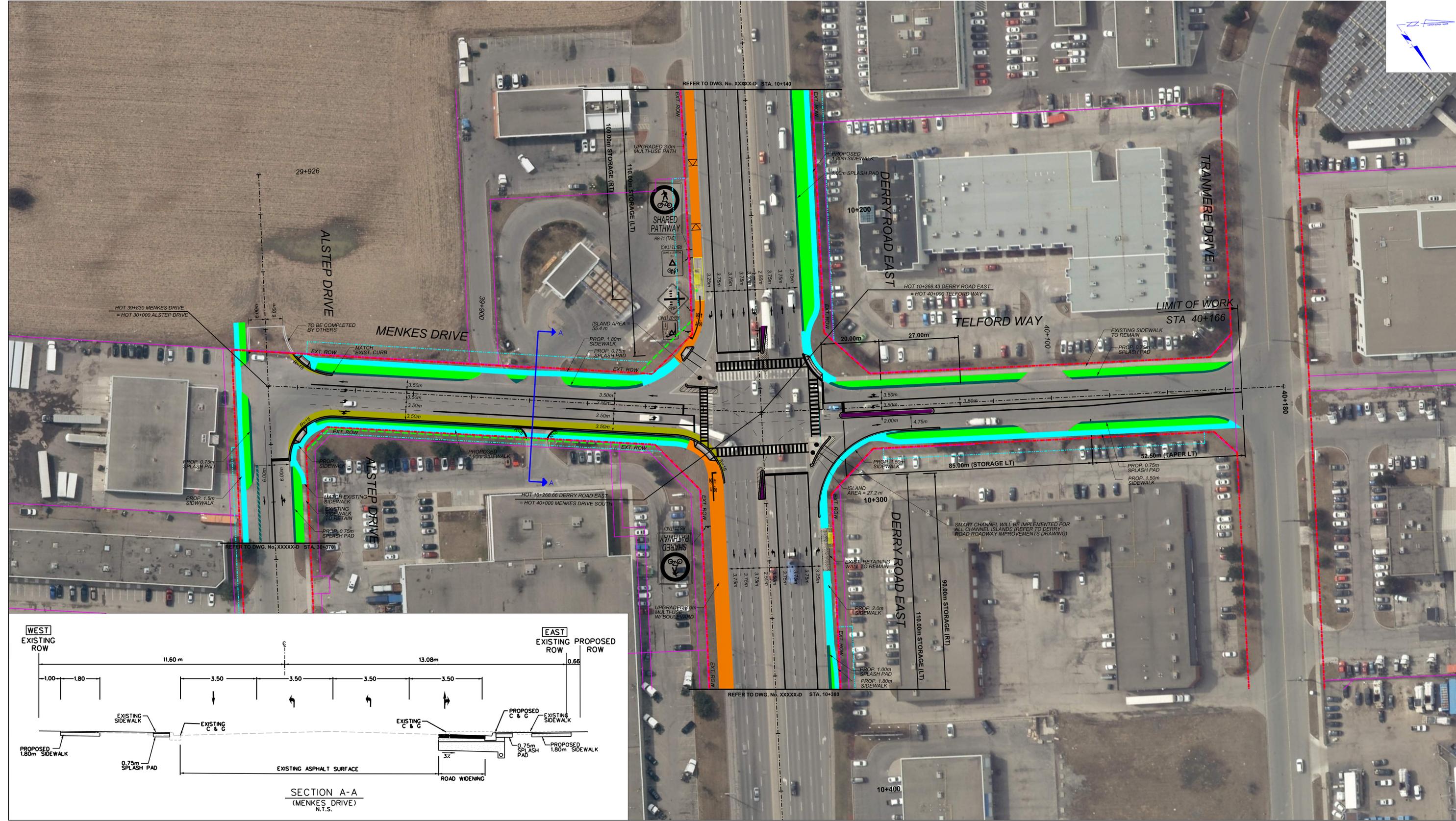


ALSTEP DRIVE
 ALSTEP DRIVE & BRAMALEA ROAD
 ALTERNATIVE 3
 EXTEND ALSTEP WITH 3-LANE SIGNALIZED INTERSECTION AT BRAMALEA ROAD

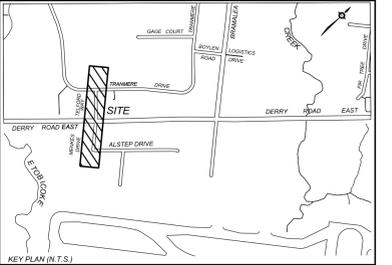
CAD Area	X-XX	Area	X-XX	Project No.	XX-XXXX
Checked by	C.G.	Drawn by	K.S.	Sheet	X of X
Date	NOVEMBER 2021	Sheet	X of X	Plan No.	XXXXX-D



Appendix B: Local Intersection Operation Improvements Alternatives: Derry Rd East and Menkes Drive / Telford Way



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
REVISIONS					
DATE	DETAILS	INIT.			
APRIL 2021		M.F.			
NOVEMBER 2021		C.G.			



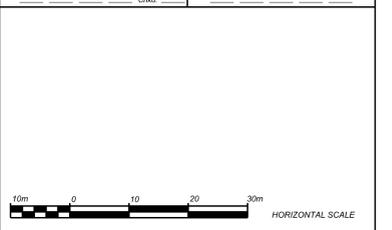
LEGEND	
	PROPOSED SIDEWALK
	PROPOSED MULTI-USE TRAIL
	EXISTING SIDEWALK TO REMAIN
	PARCEL FABRIC
	PROPOSED RIGHT OF WAY
	TEMPORARY EASEMENT

BOMBARDIER

General Notes

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 All Water And Sanitary Service Locations Are Approximate And Must Be Located Accurately In The Field
 All Horizontal And Vertical Bends Are In Degrees
 All Pipe Size In mm
 20C Existing Water Service, Size In mm
 W25 Proposed Water Service, Size In mm
 B.M. No. Benchmark Location
 Elev. Elevation
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

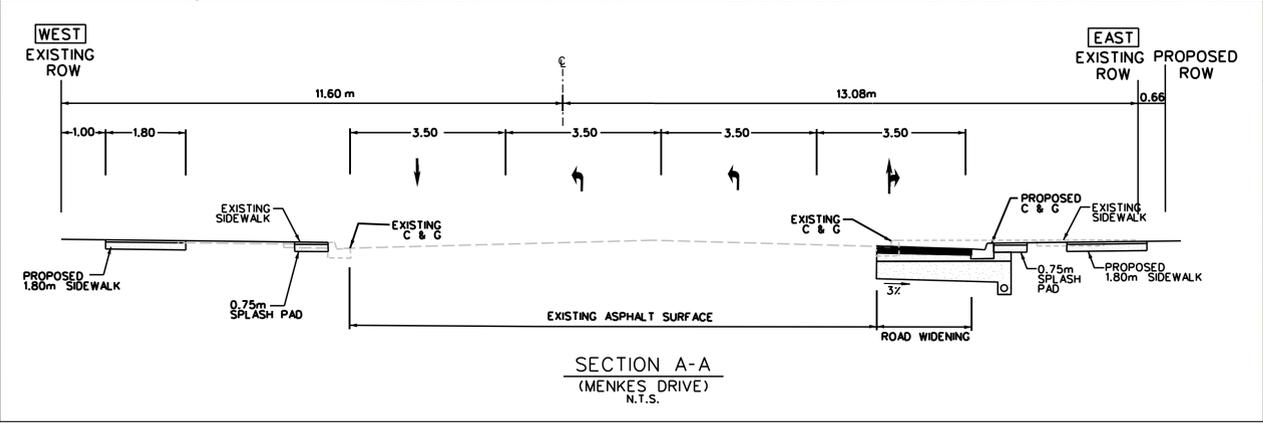
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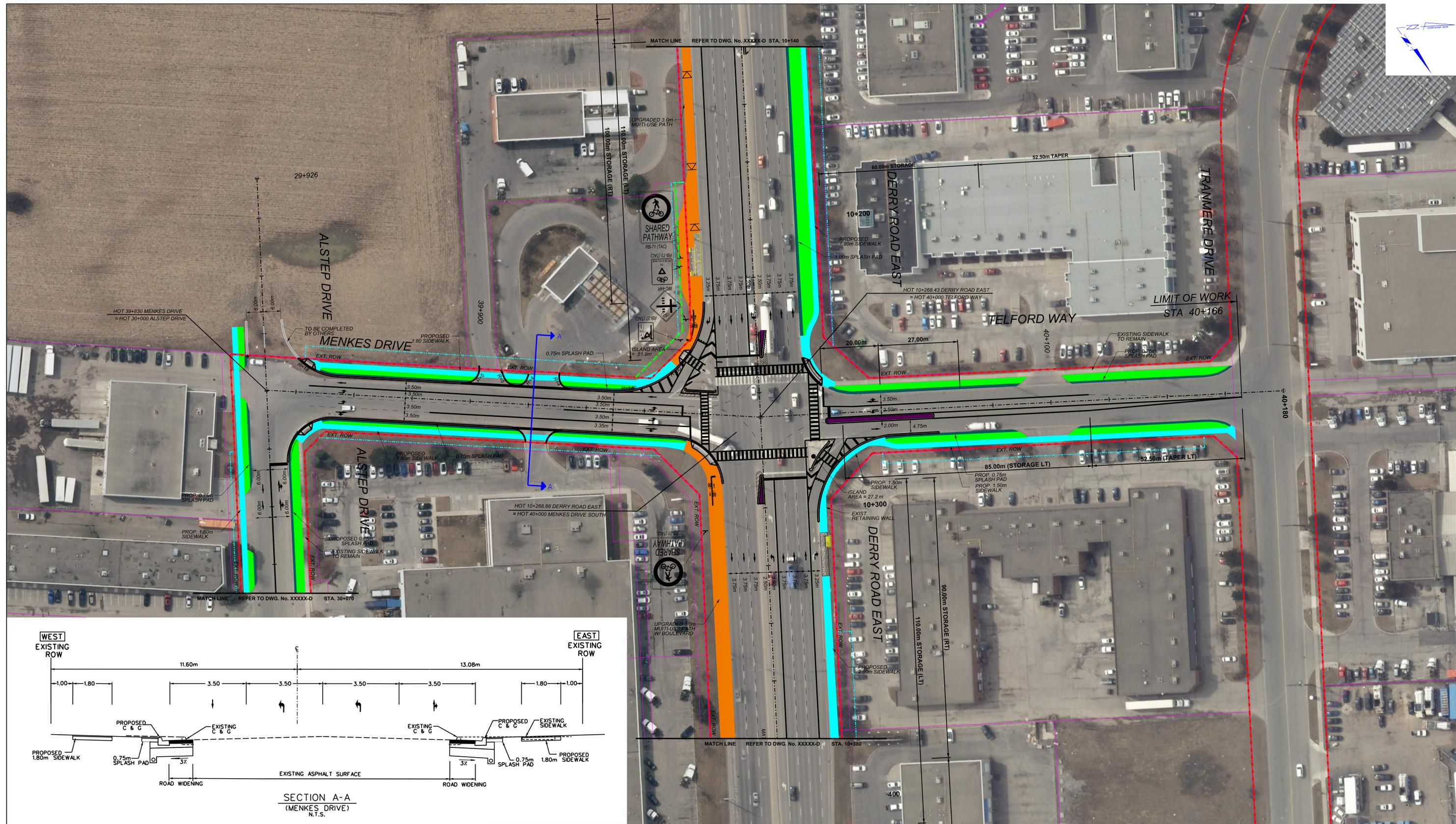


Region of Peel
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MENKES DRIVE/TELFDOR WAY
 DERRY ROAD & MENKES DRIVE / TELFDOR WAY
 ALTERNATIVE 1
 WIDEN MENKES DRIVE / TELFDOR WAY TO THE EAST

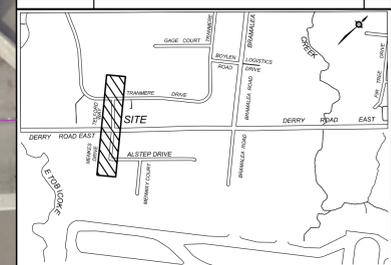
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Checked by	C.G.	Drawn by	K.S.		
Date	NOVEMBER 2021	Sheet	X of X	Plan No.	XXXXX-D





SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS		
DATE	DETAILS	INIT.
APRIL 2021		M.F.
NOVEMBER 2021		C.G.



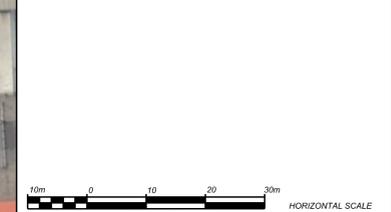
LEGEND

- MEDIAN REMOVAL
- ROAD WIDENING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE TRAIL
- SPLASH PAD
- PROPOSED MEDIAN
- GRASS AREA
- PARCEL FABRIC
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- TEMPORARY EASEMENT



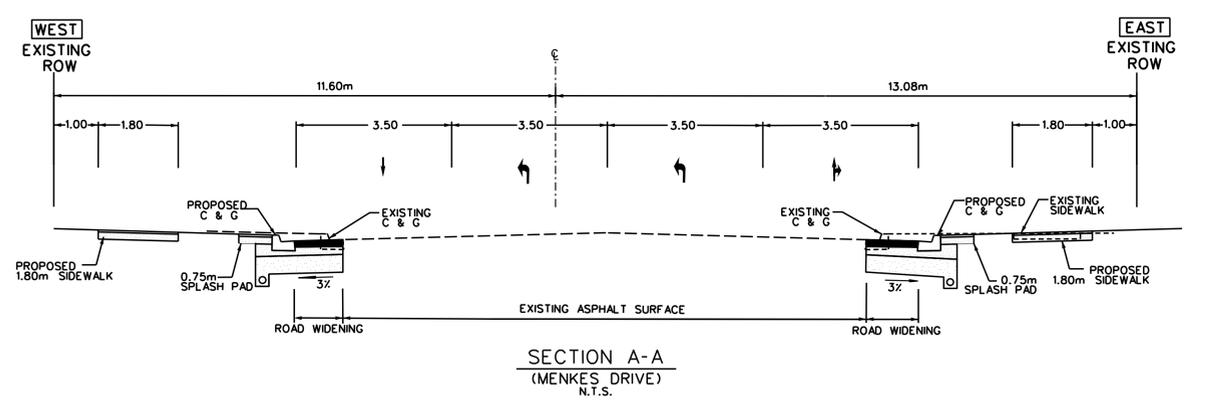
General Notes
 All Driveways Are ASPHALT Unless Otherwise Noted
 All Water And Sanitary Service Locations Are Approximate And Must Be Located Accurately In The Field
 All Horizontal And Vertical Bends Are In Degrees
 All Pipe Size In mm
 20C Existing Water Service, Size In mm
 WS25 Proposed Water Service, Size In mm
 E.M. No. Discharge Location
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

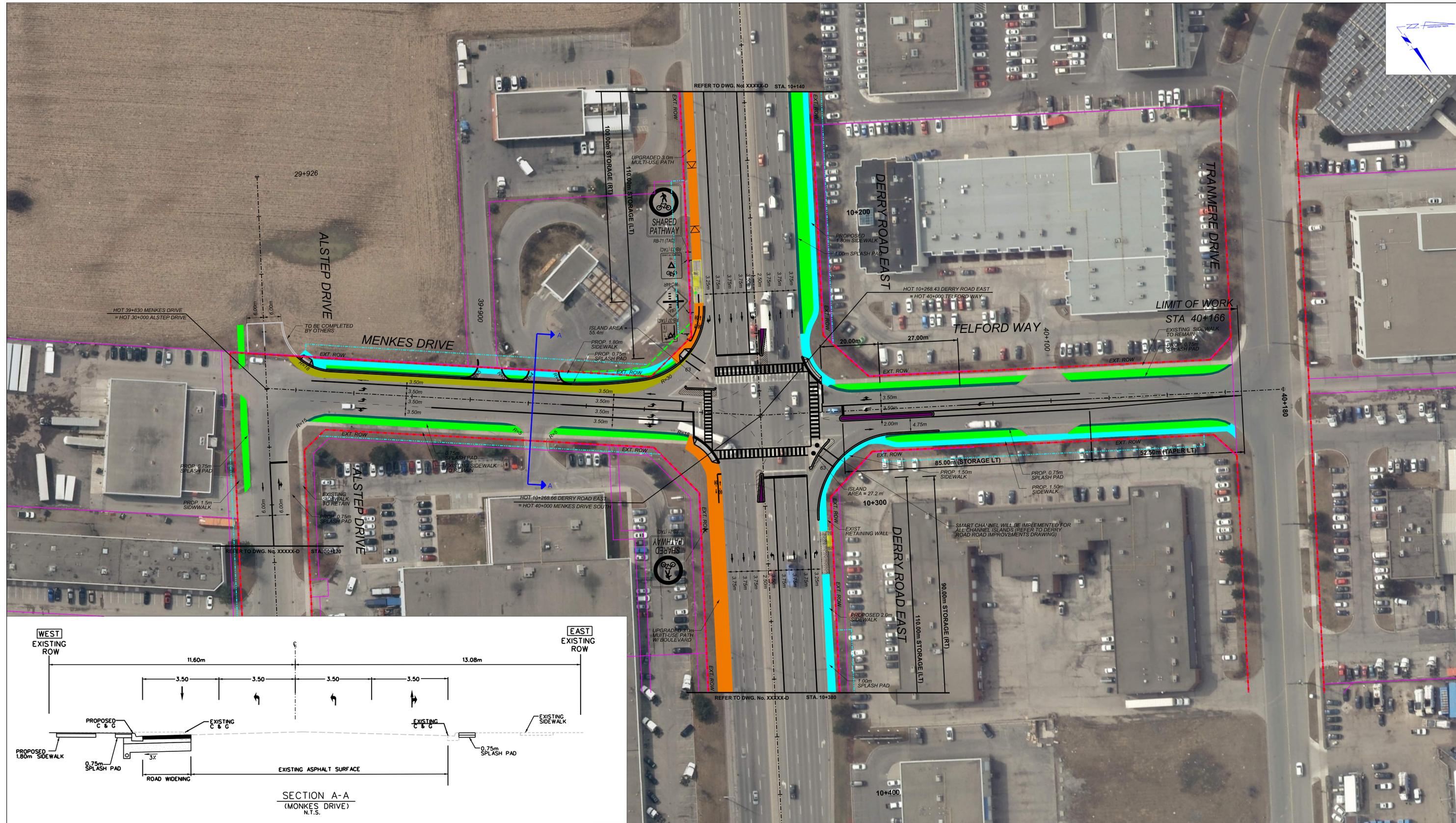
Designed by: *Chit*
 Approved by: _____



MENKES DRIVE/TELFORD WAY
 DERRY ROAD & MENKES DRIVE / TELFORD WAY
 ALTERNATIVE 2
 WIDEN MENKES DRIVE / TELFORD WAY TO BOTH SIDES

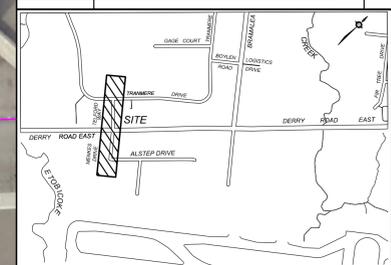
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Checked by	C.G.	Drawn by	K.S.		
Date	NOVEMBER 2021	Sheet	X of X	Plan No.	XXXXX-D





SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS		
DATE	DETAILS	INIT.
APRIL 2021		M.F.
NOVEMBER 2021		C.G.



LEGEND

- PROPOSED SIDEWALK
- PROPOSED MULTI-USE TRAIL
- EXISTING SIDEWALK TO REMAIN
- PARCEL FABRIC
- PROPOSED RIGHT OF WAY
- TEMPORARY EASEMENT



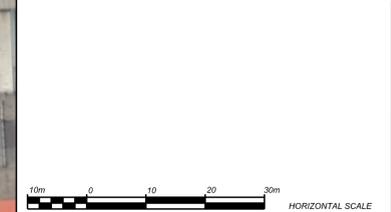
General Notes

All Driveways Are ASPHALT Unless Otherwise Noted
 All Water And Sanitary Service Locations Are Approximate And Must Be Located Accurately In The Field
 All Horizontal And Vertical Bends Are In Degrees
 All Pipe Size In mm
 20C Existing Water Service, Size In mm
 W25 Proposed Water Service, Size In mm
 E.M. No. Description Location Elev.

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

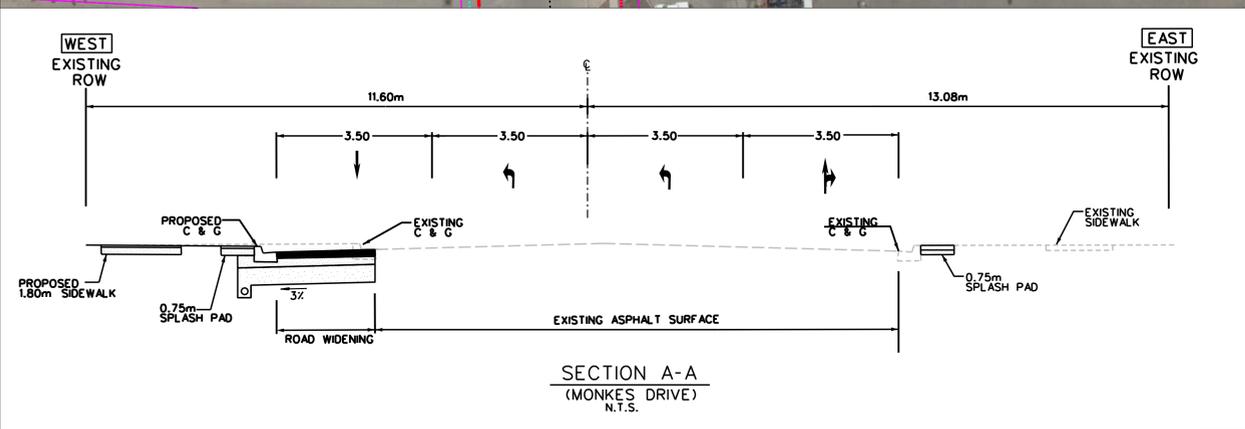
Designed by: *CHK*

Approved by: _____

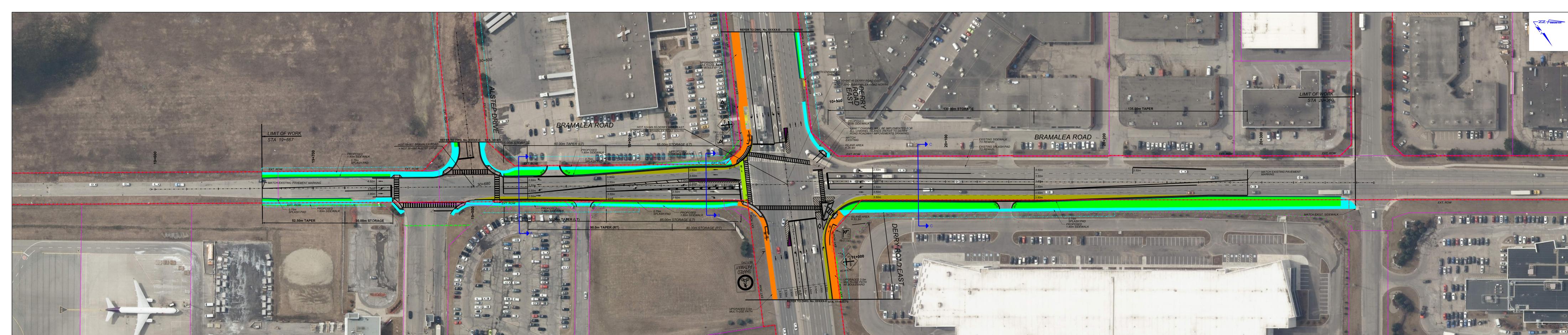


MENKES DRIVE/TELFORD WAY
 DERRY ROAD & MENKES DRIVE / TELFORD WAY
 ALTERNATIVE 3
 WIDEN MENKES DRIVE / TELFORD WAY TO THE WEST

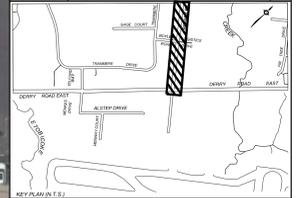
CAD Area	X-XX	Area	X-XX	Project No.	XX-XXXX
Checked by	C.G.	Drawn by	K.S.	Sheet	X of X
Date	NOVEMBER 2021	Plan No.	XXXX-D		



Appendix C: Local Intersection Operation Improvements Alternatives: Derry Rd East and Bramalea Rd



SERVICE DATA			
SERVICE	DATE	INT.	SERVICE
REVISIONS			
DATE	DETAILS	INIT.	SCALE
APRIL 2021			
NOVEMBER 2021			



LEGEND	
	MEDIAN REMOVAL
	ROAD WIDENING
	PROPOSED SIDEWALK
	PROPOSED MULTI-USE TRAIL
	SPLASH PAD
	PROPOSED MEDIAN
	GRASS AREA
	PARCEL FABRIC
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	TEMPORARY EASEMENT

BOMBARDIER **exp.**

General Notes
 All drawings are to be read in conjunction with the project description.
 All Water and Sewerage Services Locations Are Approximate.
 All Measurements Are Horizontal Unless Otherwise Specified.
 All Horizontal And Vertical Curves Are In Degrees.
 All Three Size In mm.
 200 Existing Water Service. Size In mm.
 150 Existing Water Service. Size In mm.
 100 Existing Water Service. Size In mm.
 75 Existing Water Service. Size In mm.
 50 Existing Water Service. Size In mm.
 25 Existing Water Service. Size In mm.
 15 Existing Water Service. Size In mm.
 10 Existing Water Service. Size In mm.
 5 Existing Water Service. Size In mm.
 3 Existing Water Service. Size In mm.
 2 Existing Water Service. Size In mm.
 1 Existing Water Service. Size In mm.
 The Customer Is Responsible For Locating And Protecting All Existing Utilities Prior To Any Construction. Location Of Existing Utilities Approximate. Call To Be Verified In Field By Contractor.

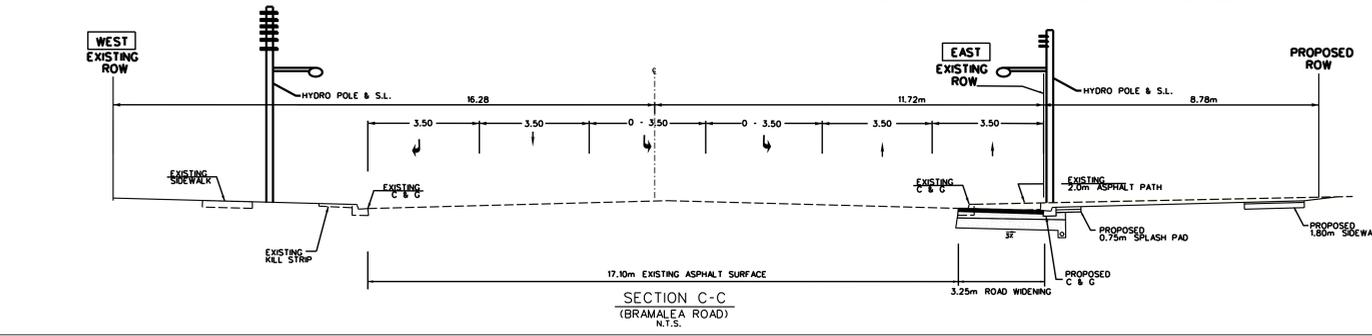
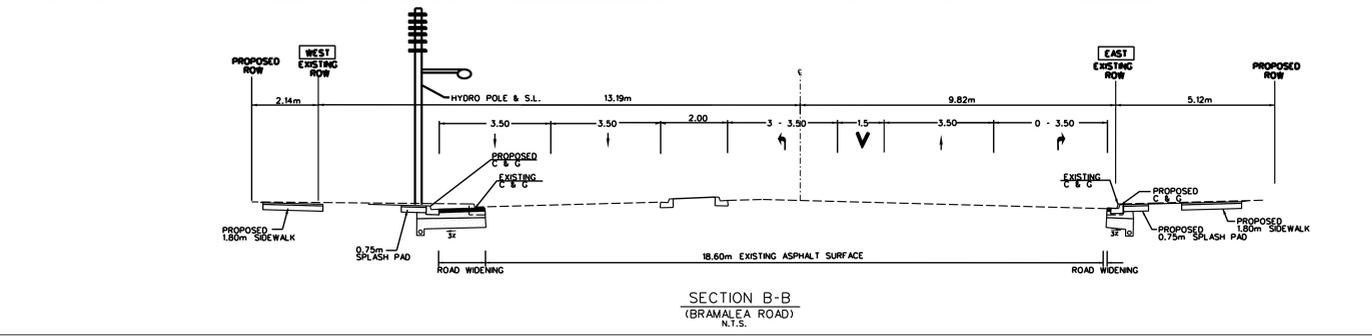
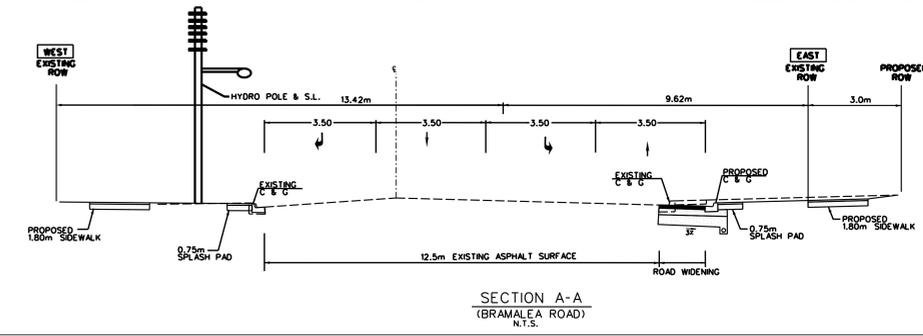
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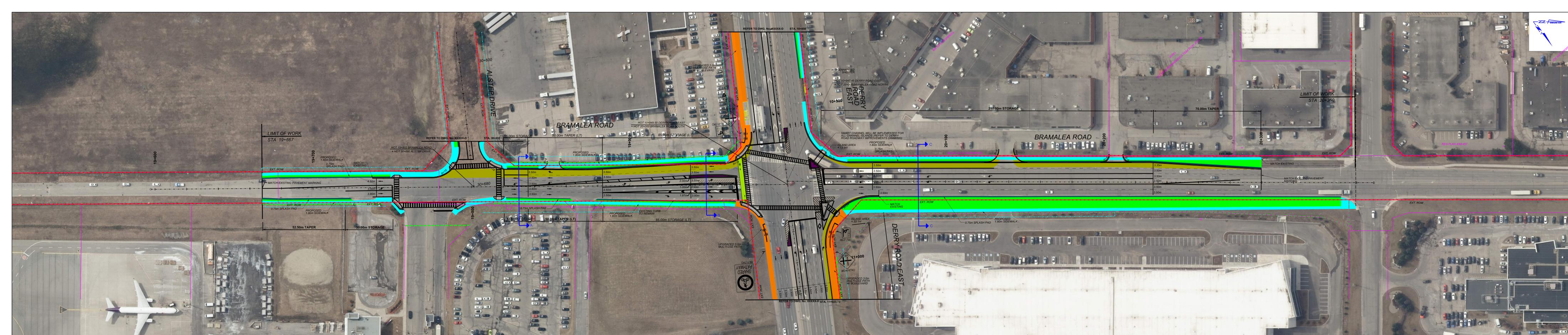


BRAMALEA ROAD
 DERRY ROAD EAST & BRAMALEA ROAD
 ALTERNATIVE 1

WIDEN BRAMALEA ROAD TO THE EAST AND WIDEN DERRY ROAD TO THE NORTH

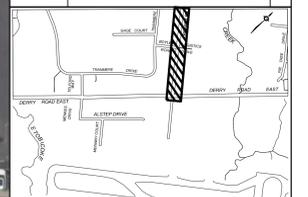
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Checked by	C.G.	Drawn by	K.S.	Sheet	X of X
Date	NOVEMBER 2021	Drawn	X of X	Plan No.	XXXX-D





SERVICE DATA			
SERVICE	DATE	INT.	SERVICE

REVISIONS			
DATE	DETAILS	INT.	BY
APRIL 2021			
NOVEMBER 2021			



LEGEND	
	ROAD WIDENING
	PROPOSED SIDEWALK
	PROPOSED MULTI-USE TRAIL
	SPLASH PAD
	PROPOSED MEDIAN
	GRASS AREA
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	TEMPORARY EASEMENT

BOMBARDIER

exp.

General Notes

- All drawings are to be used in accordance with the applicable standards.
- All Water and Sanitary Services Locations Are Approximate And Must Be Checked According To The Field.
- All Horizontal And Vertical Curves Are In Degrees.
- All Pipe Size In mm.
- 200 Existing Water Service. Size In mm.
- 150 Existing Water Service. Size In mm.
- 100 Existing Water Service. Size In mm.
- 150 Existing Water Service. Size In mm.
- 100 Existing Water Service. Size In mm.
- 150 Existing Water Service. Size In mm.
- 100 Existing Water Service. Size In mm.

Designed by:

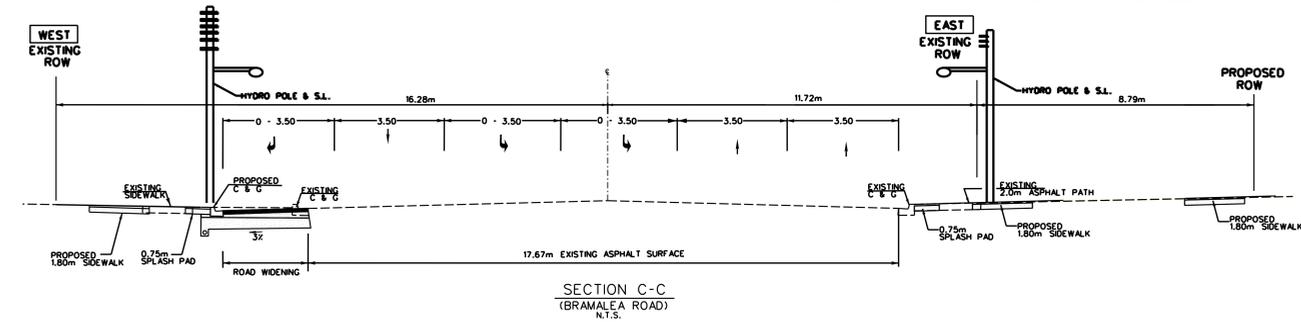
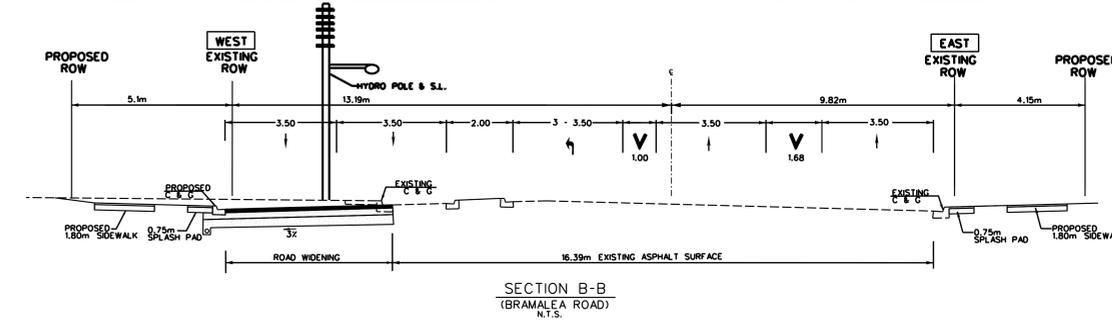
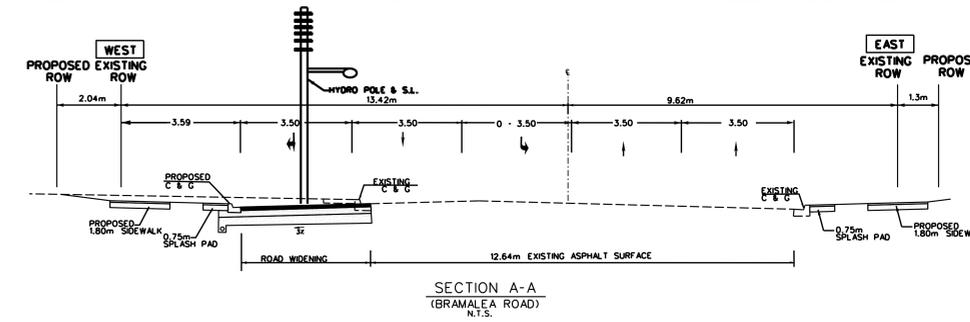
Approved by:

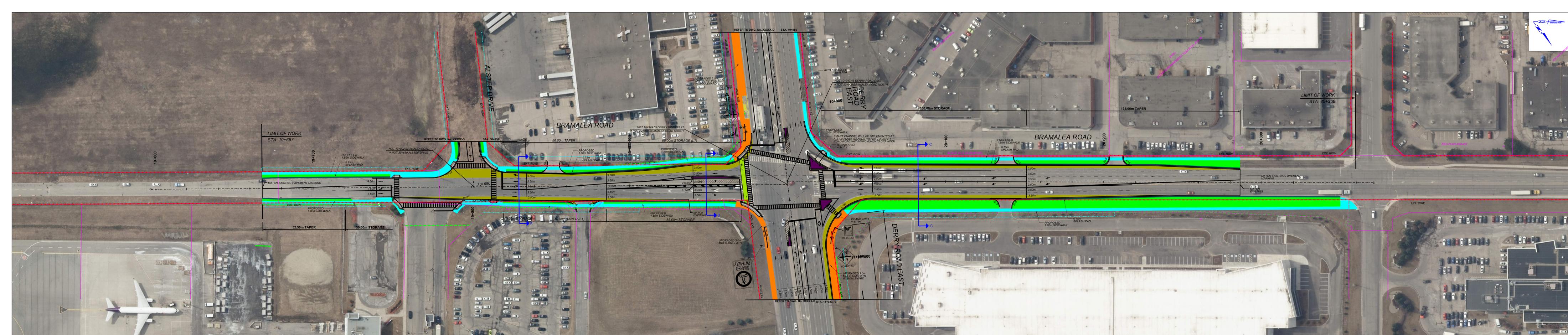


BRAMALEA ROAD
 DERRY ROAD EAST & BRAMALEA ROAD
 ALTERNATIVE 2

WIDEN BRAMALEA ROAD TO THE WEST AND WIDEN DERRY ROAD TO THE NORTH

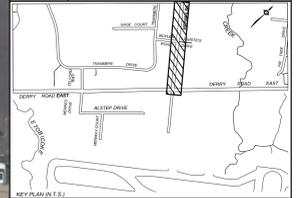
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 Checked by: C.G. Drawn by: K.S. Plan No.: XXXX-D
 Date: NOVEMBER 2021 Sheet: X of X





SERVICE DATA			
SERVICE	DATE	INT.	SERVICE

REVISIONS			
DATE	DETAILS	INIT.	BY
APRIL 2021			
NOVEMBER 2021			



LEGEND	
	MEDIAN REMOVAL
	ROAD WIDENING
	PROPOSED SIDEWALK
	PROPOSED MULTI-USE TRAIL
	SPLASH PAD
	PROPOSED MEDIAN
	GRASS AREA
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	TEMPORARY EASEMENT

BOMBARDIER

exp.

General Notes
 All drawings are to be read in conjunction with the Contract Documents.
 All Water and Sanitary Services Locations Are Approximate And Must Be Checked According To The Field.
 All Horizontal And Vertical Curves Are In Degrees.
 All Pipe Size In mm.
 200 Existing Water Service, Size In mm.
 150 Existing Water Service, Size In mm.
 100 Existing Water Service, Size In mm.
 75 Existing Water Service, Size In mm.
 50 Existing Water Service, Size In mm.
 25 Existing Water Service, Size In mm.
 15 Existing Water Service, Size In mm.
 10 Existing Water Service, Size In mm.
 5 Existing Water Service, Size In mm.
 3 Existing Water Service, Size In mm.
 2 Existing Water Service, Size In mm.
 1 Existing Water Service, Size In mm.
 The Customer Is Responsible For Locating And Protecting All Existing Utilities Prior To Any Digging Operations. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

Designed by:

Checked by:

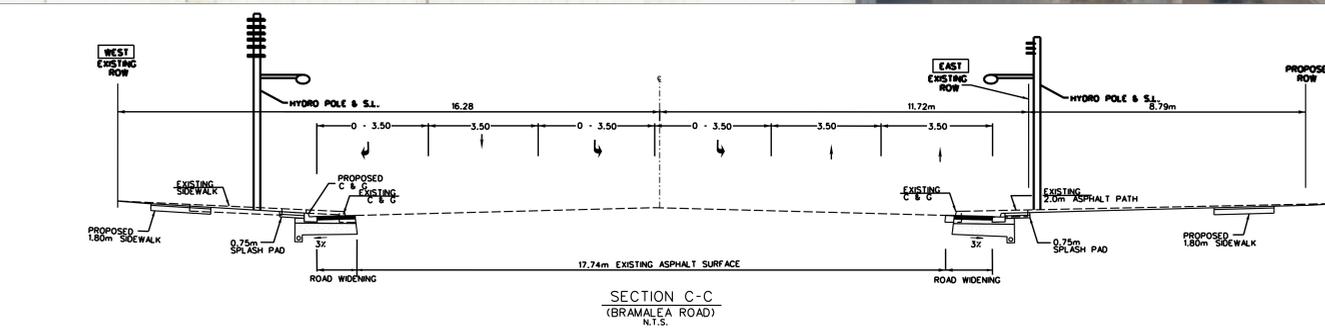
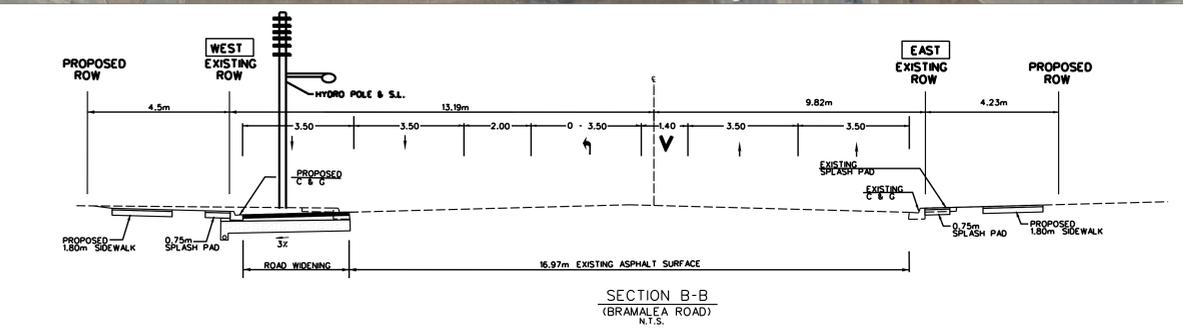
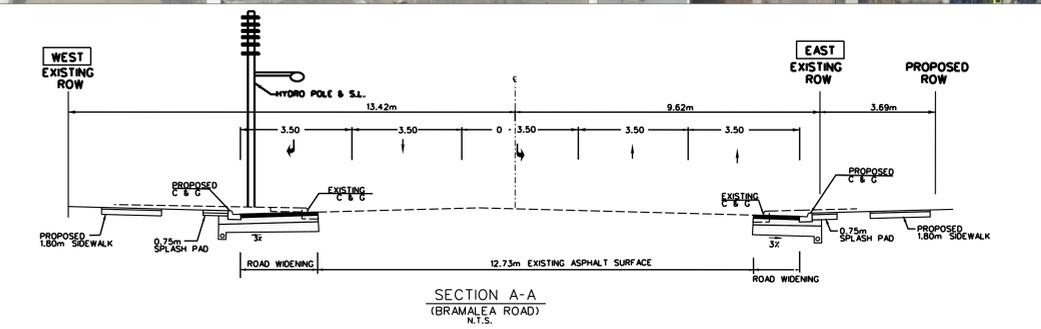
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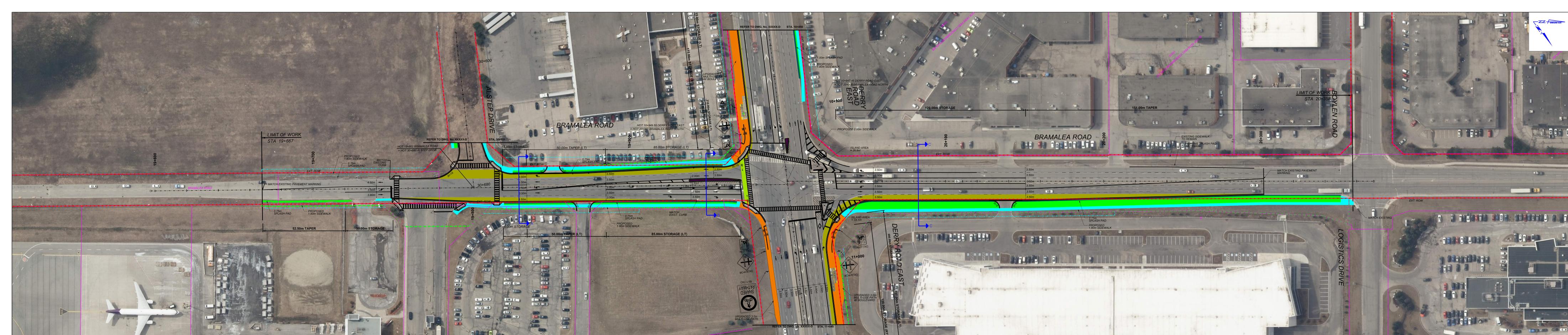


BRAMALEA ROAD

ALTERNATIVE 3
 WIDEN BRAMALEA ROAD ON BOTH SIDES AND WIDEN DERRY ROAD TO THE NORTH

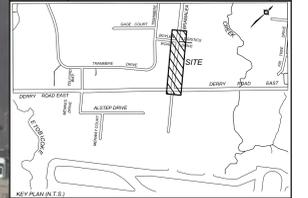
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Checked by	C.G.	Drawn by	K.S.	Sheet	X of X
Date	NOVEMBER 2021	Plan No.	XXXXX-D		





SERVICE DATA			
SERVICE	DATE	INT.	SERVICE

REVISIONS			
DATE	DETAILS	INT.	BY
APRIL 2021			
NOVEMBER 2021			



LEGEND	
	ROAD WIDENING
	PROPOSED SIDEWALK
	PROPOSED MULTILANE TRAIL
	SPLASH PAD
	PROPOSED MEDIAN
	GRASS AREA
	PARCEL FABRIC
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY
	TEMPORARY EASEMENT

BOMBARDIER

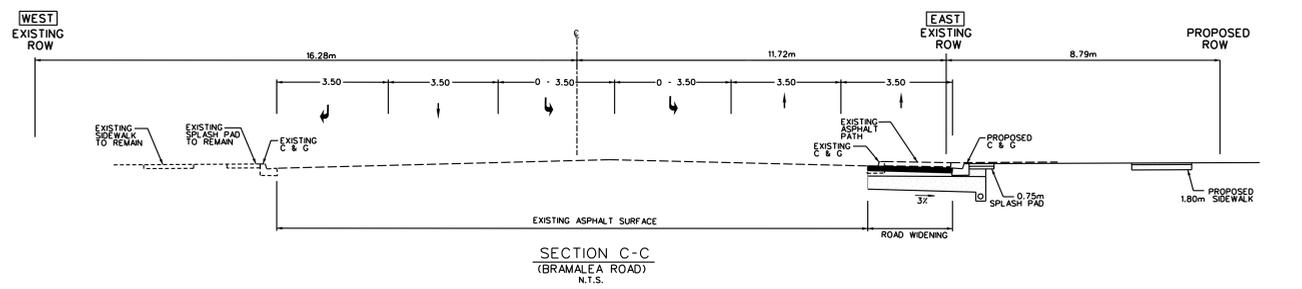
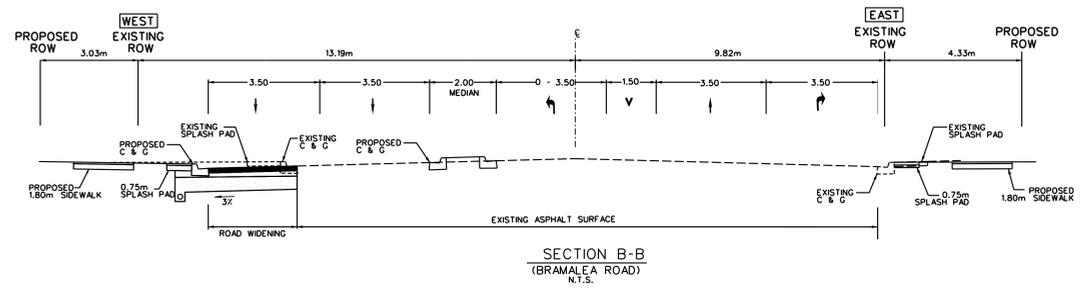
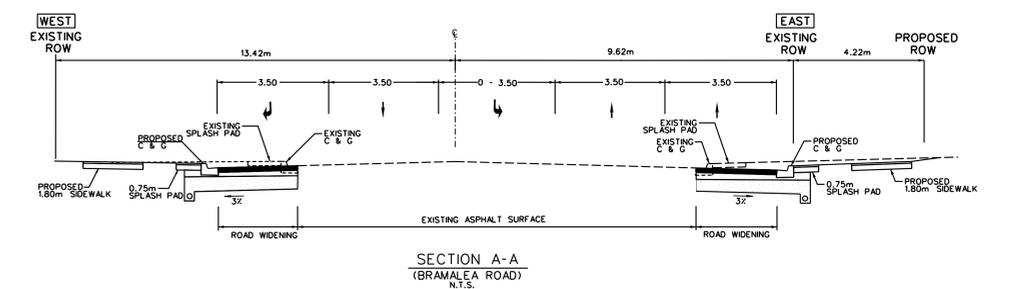
General Notes
 All drawings are to be used in accordance with the following:
 All Water and Sewerage Services Locations Are Approximate
 All Road To Be Constructed To The Road
 All Horizontal And Vertical Curves Are In Degrees
 All Files Are In mm
 Existing Water Service: Size In mm
 Proposed Water Service: Size In mm
 Existing Sewer Service: Size In mm
 Proposed Sewer Service: Size In mm
 Location
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Assumed. Call To Be Verified In Field By Contractor.

Designed by: Approved by:



BRAMALEA ROAD
 DERRY ROAD EAST & BRAMALEA ROAD
 ALTERNATIVE 4
 MODIFY INTERSECTION USING HYBRID APPROACH

CAD Area	X-XX	Area	X-XX	Project No.	XX-XXXX
Checked by	C.G.	Drawn by	K.S.	Sheet	X of X
Date	NOVEMBER 2021	Plan No.	XXXXX-D		



Appendix D: Pedestrian & Bicycle LOS Methodology

Pedestrian and Bicycle Level of Service

Methodology

The proposed pedestrian and bicycle levels of service have been considered based on Peel Region’s Pedestrian and Bicycle Facility Design Guidance.

It is noted that the pedestrian and bicycle levels of service used are based on the availability of facilities for the users and does not include an assessment of other variables such as user volume, adjacent vehicular volume, intersection crossing distances or streetscape.

Bicycle level of service is primarily based on **Section 2.2** of the report, “Bicycle Facility Types”. This section indicates levels of comfort based on the type of roadway as well as the presence of dedicated bicycle facilities such as off-street pathways, cycle tracks and shoulder bikeways.

Bicycle Facility	Bicycle Level of Service
Multi-Use Pathways / Cycle Track	A
Local Street Bikeway	B
Bicycle Lane	C
Shared Use Lane	D
Shoulder Bikeway	E
No Bicycle Facilities	F

Pedestrian level of service is primarily based on **Section 3.2** of the report, “Pedestrian Facility Types” where levels of comfort are determined based on the available pedestrian walkways. This ranges from off-street pedestrian paths to paved shoulders along roadways. The provision of each pedestrian facility has been assigned to a different level of service.

Pedestrian Facility	Pedestrian Level of Service
Off-Street Pedestrian Only / Multi Use Pathway	A
Wide Sidewalk	B
Buffered Sidewalk	C
Sidewalk	D
Unpaved sidewalk	E
Paved Shoulder	F

Bicycle Level of Service

The bicycle facilities at each intersection have been assessed based on the proposed alternatives. Under all alternatives the bicycle facilities would be consistent.

Intersection	Direction of Travel	Bicycle Level of Service
Bramalea Rd & Alstep Dr	Northbound	F
	Southbound	F
	Eastbound	F
	Westbound	F
Derry Rd & Menkes Dr / Telford Way	Northbound	F
	Southbound	F
	Eastbound	B
	Westbound	B
Derry Rd & Bramalea Rd	Northbound	B
	Southbound	B
	Eastbound	B
	Westbound	B

Pedestrian Level of Service

The pedestrian level of service for each alternative has been assessed based on the available and proposed pedestrian facilities.

Intersection	Pedestrian Level of Service
Bramalea Rd & Alstep Dr Alternative 1	D
Bramalea Rd & Alstep Dr Alternative 2	D
Bramalea Rd & Alstep Dr Alternative 3	D

Intersection	Pedestrian Level of Service
Derry Rd & Bramalea Rd Alternative 1	C
Derry Rd & Bramalea Rd Alternative 2	D
Derry Rd & Bramalea Rd Alternative 3	D
Derry Rd & Bramalea Rd Alternative 4	D

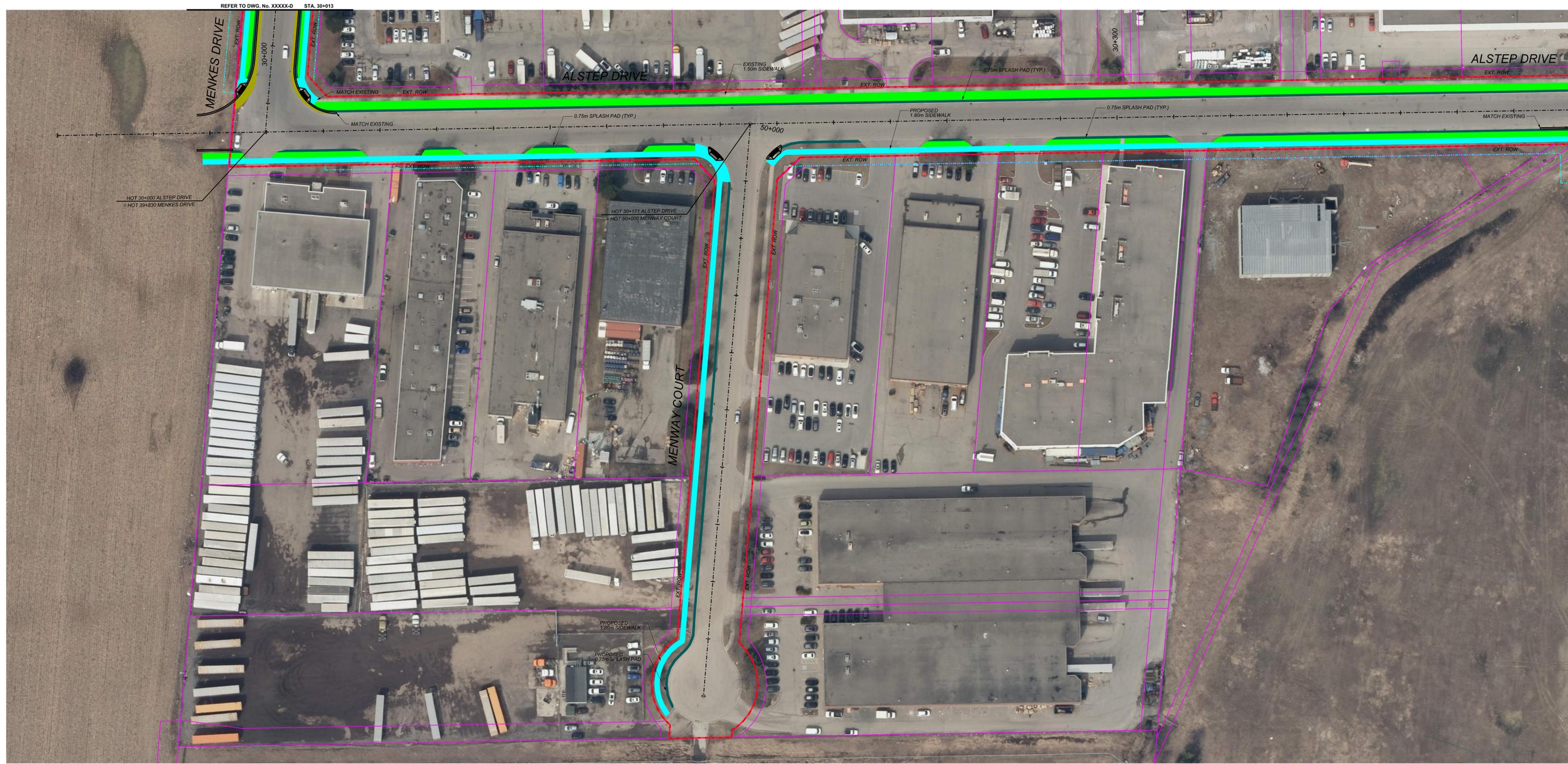
Intersection	Pedestrian Level of Service
Derry Rd & Menkes Dr / Telford Way Alternative 1	C
Derry Rd & Menkes Dr / Telford Way Alternative 2	C
Derry Rd & Menkes Dr / Telford Way Alternative 3	C

Pedestrian Crossing Distances

Two intersections would have the pedestrian crosswalks impacted as a result of the proposed alternatives. The following table identifies the existing crossing distance as well as the proposed crossing distance for each alternative where the crossing distance is affected.

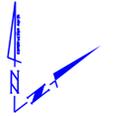
Intersection	Alternative	Crossing Distance (N/S)	Crossing Distance (E/W)
Menkes Drive / Telford Way & Derry Rd (South Side & East Side)	Existing	32.5 m	16.5 m
	Alternative 1	32.5 m	20.5 m
	Alternative 2	32.5 m	19.5 m
	Alternative 3	32.5 m	19.0 m
Bramalea Rd & Derry Rd (South Side & West Side)	Existing	38.5 m	27.0 m
	Alternative 1	38.5 m	28.5 m
	Alternative 2	39.0 m	31.0 m
	Alternative 3	38.5 m	31.5 m
	Alternative 4	39.0 m	31.5 m

Appendix E: Active Transportation Improvements (Sidewalks and Multi-Use Path Upgrades)



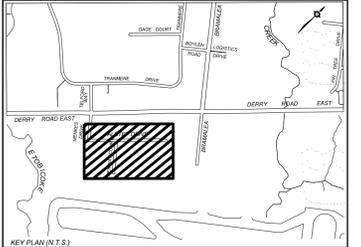
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REFER TO DWG. No. XXXX-D STA. 30+468



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.

REVISIONS		
DATE	DETAILS	INIT.
APRIL 2021		M.F.
NOVEMBER 2021		C.S.



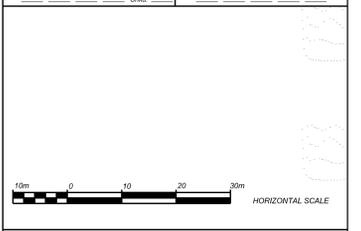
LEGEND

- MEDIAN REMOVAL
- ROAD WIDENING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE TRAIL
- SPLASH PAD
- PROPOSED MEDIAN
- GRASS AREA
- PARCEL FABRIC
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- TEMPORARY EASEMENT

BOMBARDIER **exp.**

General Notes
 All Driveways Are ASPHALT Unless Otherwise Noted
 All Water And Sanitary Service Locations Are Approximate And Must Be Located Accurately In The Field
 All Horizontal And Vertical Bends Are In Degrees
 All Pipe Size In mm
 20C Existing Water Service, Size In mm
 WS25 Proposed Water Service, Size In mm
 ELEV. No. Description ELEV.
 Location
 The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only. To Be Verified In Field By Contractor.

Designed by _____
 Checked by _____
 Approved by _____



Region of Peel
 working with you

ALSTEP DR & MENWAY CRT
 PROPOSED SIDEWALK & BOULEVARD

CAD Area	X-XX	Area	X-XX	Project No.	XX-XXXX
Checked by	C.G.	Drawn by	K.S.		
Date	NOVEMBER 2021	Sheet	X of X	Plan No.	XXXXX-D