

City of Mississauga

# Burnhamthorpe Road West Improvements Municipal Class Environmental Assessment Study

Environmental Study Report

January 2020





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# 1. Introduction and Study Background

## 1.1. Introduction

Burnhamthorpe Road West is an east-west arterial road in the City of Mississauga. Within the study limits Burnhamthorpe Road provides a connection between the City of Mississauga in the east and Town of Oakville in the west, servicing local residential and commercial traffic as well as commercial and commuter traffic. East of Ninth Line, Burnhamthorpe Road West is within the City of Mississauga jurisdiction and ultimately terminates in the City of Toronto.

Between Ninth Line and Loyalist Drive, Burnhamthorpe Road West consists of a 2-lane road cross-section. East of Loyalist Drive, Burnhamthorpe Road West is a 4-lane road with an existing multi-use trail that is located on the north side of the road. West of Loyalist Drive (at the east study limit), the multi-use trail terminates and the road transitions into the 2-lane cross-section.

The 2-lane section of Burnhamthorpe Road between the west City limit and Loyalist Drive is reaching capacity during peak periods, creating queuing along the corridor that will require capacity and operational improvements to resolve this issue.

The City of Mississauga is undertaking a Schedule C Municipal Class Environmental Assessment Study to review the existing and future needs of the Burnhamthorpe Road West corridor. This study considers the City’s planning principles to build a multi-modal city, which will support a successful, vibrant and active community with a wide cross-section of transportation modes including walking, cycling, transit and vehicles.

## 1.2. Study Area

The study area, as shown in Figure 1, includes Burnhamthorpe Road West from Loyalist Drive to the West City Limit at Ninth Line including intersections and approaches.

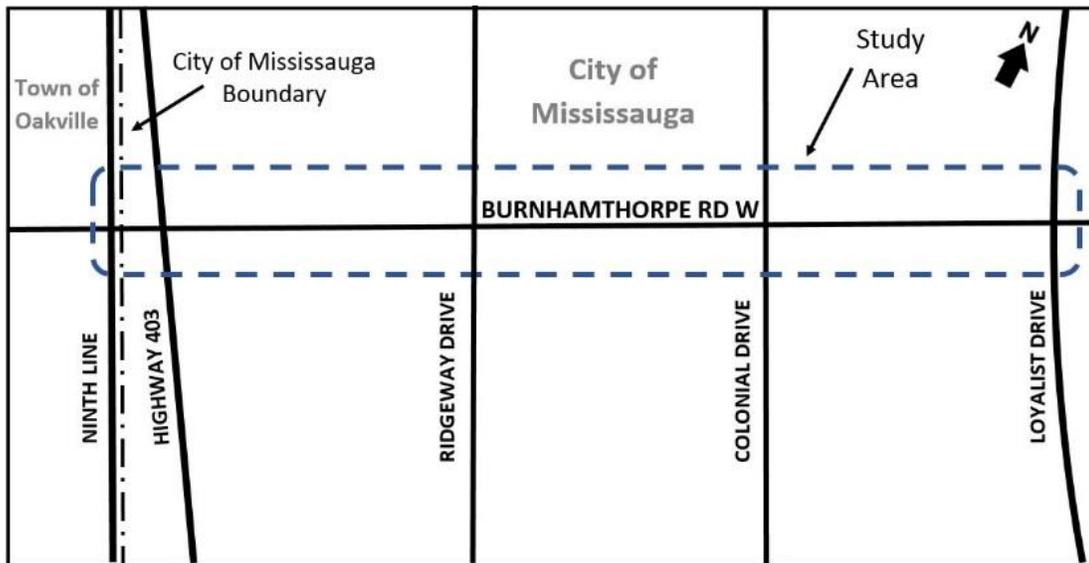


Figure 1: Study Area

As identified in the City’s Official Plan, this section of Burnhamthorpe Road is classified as an arterial road, with a designated right-of-way (R.O.W.) of 35 metres. The existing section of

Burnhamthorpe Road West has a posted speed limit of 60 km/h. The study area intersections include:

- Burnhamthorpe Road W & Ninth Line;
- Burnhamthorpe Road W & Ridgeway Drive;
- Burnhamthorpe Road W & Colonial Drive; and
- Burnhamthorpe Road W & and Loyalist Drive.

There is one crossing over Highway 403 in the study area.

The section of Burnhamthorpe is currently served seven days a week by MiWay Route 36 – South Common Mall to Winston Churchill Transitway. There are existing on-street stops and future stops planned within the study area.

### 1.3. Municipal Class Environmental Assessment Process

This study follows the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment process for a Schedule C project (October 2000, as amended in 2007, 2011 and 2015).

The Ontario Environmental Assessment Act (2010) guides the process for reviewing the environmental impact of proposed activities. The Act applies to government agencies, conservation authorities, and municipalities. The City of Mississauga is the proponent in this study and the Municipal Class Environmental Assessment for the Burnhamthorpe Road West Improvements has been completed in accordance with the Ontario Environmental Assessment Act (2010).

Municipal projects that affect the purpose, capacity or function of a roadway, or propose new roadways are subject to the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 and 2015). The Municipal Class Environmental Assessment (Class EA) is a planning and design process for transportation/transit and water/wastewater infrastructure projects which have a predictable range of impacts that can be mitigated. The Municipal Class EA process is approved by the Ministry of Environment, Conservation and Parks to meet the requirements of the Environmental Assessment Act (2010).

Based on their potential range of impacts, projects are classified under the Municipal Class EA by Schedules:

<b>Schedule A</b>	Activities have minimal environmental effects. Projects are pre-approved.
<b>Schedule A+</b>	Activities have minimal environmental effects. Projects are pre-approved so long as the public is advised prior to implementation.
<b>Schedule B</b>	Activities have some adverse environmental effects. Projects typically involve improvements and minor expansions to existing facilities. These projects proceed through a screening process (Phases 1 and 2 of the Class EA), including consultation with the potentially affected public.
<b>Schedule C</b>	Activities have some adverse environmental effects. Projects typically involve the construction of new facilities and major expansions to existing facilities. These projects proceed through the full Class EA planning and design process (Phases 1 through 5).

In particular, road widening or extensions with an estimated construction cost of \$2.4M or more are classified as a Schedule C project under the Municipal Class EA. As noted above, Schedule C projects must follow Phases 1 through 5 of the Class EA process:

- Phase 1** Identify the problem or opportunity.
- Phase 2** Identify alternative solutions to address the problem or opportunity.
- This Phase will identify and assess the positive and negative effects of alternative planning solutions for the identified problem and/or opportunity, taking into account the natural, social, cultural, and economic environment and input from all agencies and the public.
- Phase 3** Examine alternative methods of implementing the preferred solution.
- Phase 3 will identify and assess the positive and negative effects of alternative design concepts for the preferred solution, taking into account the natural, social, cultural, and economic environment and input from all agencies and the public.
- Phase 4** Document the rationale for the preferred solution and design concept, and the planning, design and consultation process in an Environmental Study Report for public and agency review.
- The Environmental Study Report is placed on the public record for at least 30 calendar days. If any outstanding issues raised by the public or agencies cannot be resolved during this review period, the public and agencies have the right to request the Minister of Environment and Climate Change to order an Individual Environmental Assessment as per Part II of the Ontario Environmental Assessment Act. If no requests for a Part II order are received during the review period, the project will proceed to Phase 5 for implementation.
- Phase 5** Complete contract drawings and documents, and proceed to construction, operation and environmental monitoring.

### 1.3.1. Part II Order

The Municipal Class EA process includes an appeal provision to change the status of a project from being subject to the Municipal Class EA process to being subject to an Individual Environmental Assessment as per Part II of the Ontario EA Act. The latter requires the submission of an EA document to the Minister of the Environment, Conservation and Parks (MECP) for government review and approval.

## 1.4. Study Approach and Organization

Figure 2 demonstrates the process for a Schedule C project under the Municipal Class EA. This study approach begins with a thorough understanding of the problem being addressed followed by assessing the alternative solutions and alternative design concepts. The approach is organized around study phases, including Public Information Centres (PICs), stakeholder engagement and participation of technical review/regulatory agencies at study milestones. This study began in January 2018, with completion scheduled for early 2019.

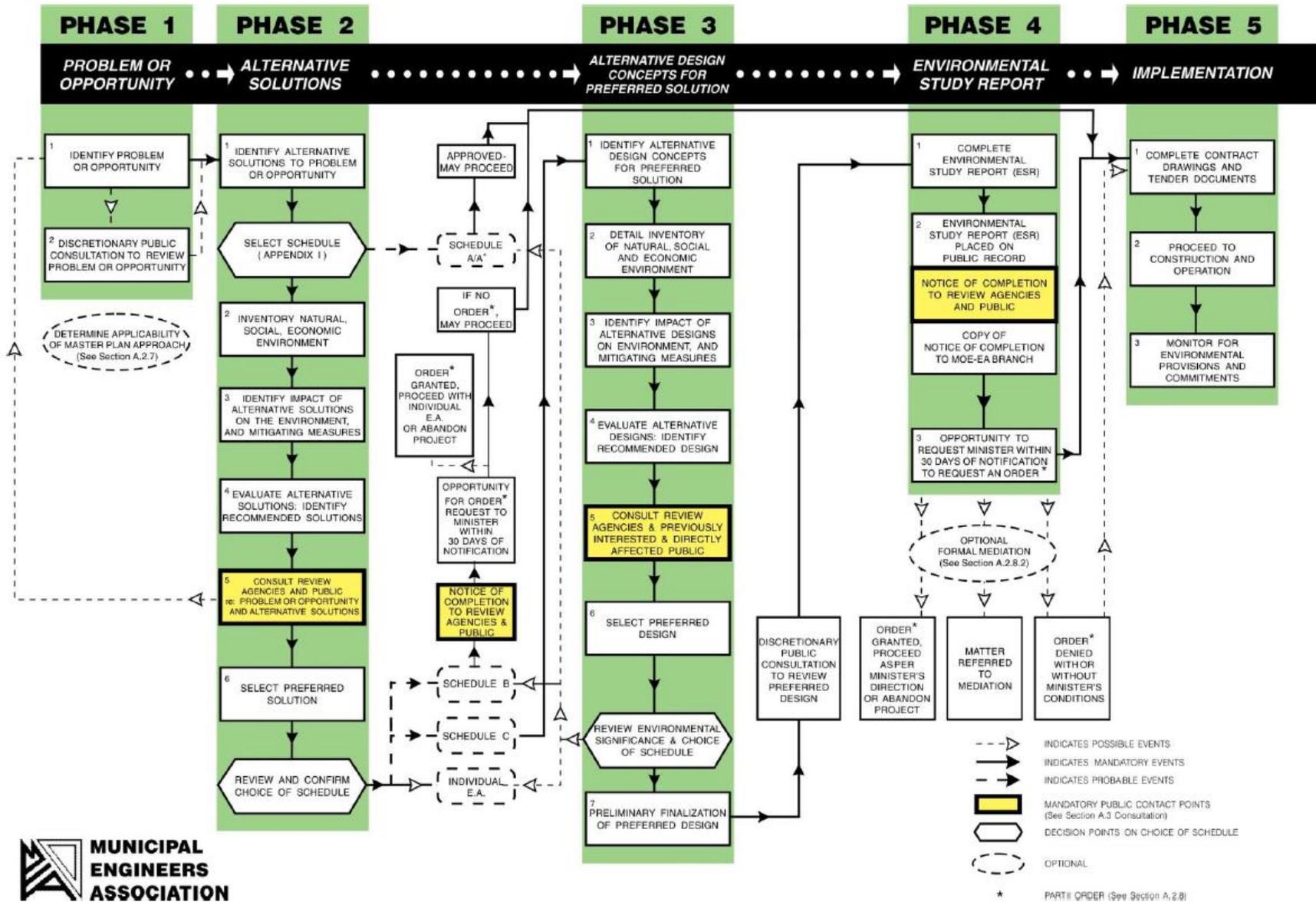


Figure 2: Municipal Class EA Flow Chart

The study was organized to ensure meaningful input was gathered from internal and external stakeholders, including review agencies. Figure 3 illustrates the key stakeholders included in the study.

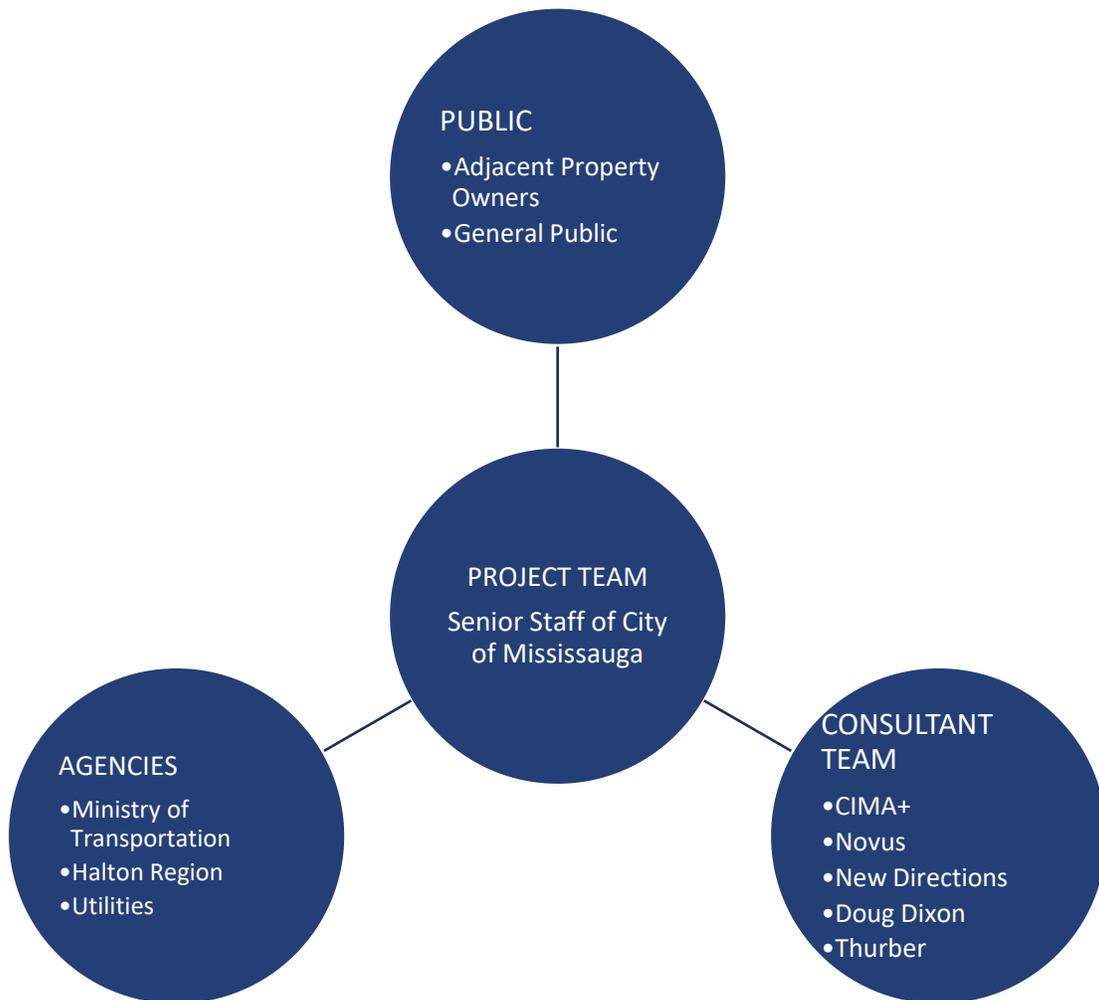


Figure 3: Project Stakeholders

#### 1.4.1. Core Project Team

The project team as illustrated in Table 1 is comprised of City of Mississauga staff, who are leading the direction of the study.

*Table 1: City of Mississauga Project Team*

Lin Rogers	Role
<b>Emily Pelleja</b>	Transportation Project Engineer
<b>Lin Rogers</b>	Manager, Transportation Projects
<b>Raniel Pinto</b>	Engineer In Training, Transportation Projects, Transportation Infrastructure Management
<b>Norbert Orzel</b>	Transportation Modelling Specialist, Transportation Planning
<b>Elizabeth Dollimore</b>	Environmental Services
<b>Yvonne Gwyn</b>	Transit Planner , Mississauga Transit
<b>Colin Patterson</b>	Traffic Engineering and Operations – Safety Performance, Works Operation and Maintenance
<b>Jim Kartsomanis</b>	Traffic Engineering and Operations – Traffic Signals System Coordinator, Works Operation And Maintenance
<b>Romas Juknevicus,</b>	City-wide Planning, City Planning Strategies
<b>Ashlee Rivet</b>	Urban Designer, Development and Design
<b>Janet Squair</b>	Landscape Architect, Community Services, Park Planning
<b>Wayne Holder</b>	Forestry, Parks and Forestry
<b>Mojan Jianfar</b>	Heritage Planning,Culture

#### 1.4.2. Consultant Project Team

The consultant team has been retained by the City of Mississauga to assist in carrying out the study. As outlined in Table 2, the consultant team is comprised of CIMA+ as the prime consultant, CIMA+ retained the services of New Directions Archaeology/ARA, Novus Environmental, Doug Dixon and Associates and Thurber Engineering Limited.

*Table 2: Consultant Project Team*

Member	Role
<b>CIMA Canada Inc. (CIMA)</b>	Project Management EA Process Public Consultation Transportation Planning Transportation and Traffic Analysis Traffic Safety Natural Environment Socio-Economic Environment Streetscaping, Illumination and Tree Inventory Active Transportation Stormwater Management and Drainage Utility Coordination Roadway Design
<b>New Directions Archaeology/ ARA</b>	Archaeology Heritage
<b>Novus Environmental</b>	Noise Air Quality
<b>Doug Dixon and Associates</b>	Structures
<b>Thurber Engineering Limited</b>	Geotechnical Phase 1 ESA

## 2. Needs and Justification

### 2.1. Planning and Policy Context

Phase 1 of the Municipal Class EA process involves the identification of the problems and opportunities to be addressed by the study. For this study, this included a review of City of Mississauga planning policies.

#### 2.1.1. Growth and Transportation

##### **City of Mississauga Official Plan (August 2017)**

The City of Mississauga Official Plan (2017) establishes policies to create a multi-modal transportation system for transit, vehicular travel, active transportation, rail and air.

In the Official Plan, arterial roads are designated as principal transportation corridors for high volumes of people and goods. This section of Burnhamthorpe Road West is classified as an arterial road, with a designated right-of-way (R.O.W.) of 35 metres.

##### **Moving Mississauga from Vision to Action (2011)**

Moving Mississauga from Vision to Action (2011) is the Interim Transportation Master Plan for the City that guides investment in transportation programs. The City established the vision to have a safe and connected multi-modal transportation system that enhances our environment, supports our economy, connects people to places and moves goods to market. In accordance with this vision, there is an opportunity to add multi-modal elements to Burnhamthorpe Road.

##### **City of Mississauga Strategic Plan (2009, Update 2014)**

The City of Mississauga Strategic Plan (2009, Update 2014) directs strategic decision making in the City based on five Strategic Pillars; Move, Belong, Connect, Prosper and Green. This study focuses on the following:

- Increasing transportation capacity for all road users
- Creation of complete streets that support active modes of transportation
- Develop walkable, connected communities
- Maintain a safe city

##### **Growth Plan for the Greater Golden Horseshoe (2017)**

A Place to Grow is the Ontario government's initiative to plan for growth and development in a way that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life. The Places to Grow Act, 2005 enables the development of regional growth plans that guide government investments and land use planning policies.

The Growth Plan for the Greater Golden Horseshoe (GGH) (2006), was the first growth plan to provide a framework for implementing Ontario's vision for building stronger, prosperous communities by better managing growth in this region. It established the long-term framework for where and how the region will grow, while recognizing the realities facing our cities and smaller communities and acknowledging what governments can and cannot influence. It also demonstrated leadership for improving the ways in which our cities, suburbs, towns, and villages will grow over the long-term.

This study focuses on the following guiding principles of the Growth Plan for the Greater Golden Horseshoe:

- Support the achievement of complete communities that are designed to support healthy and active living and meet people’s needs for daily living throughout an entire lifetime.
- Provide for different approaches to manage growth that recognize the diversity of communities in the GGH.
- Protect and enhance natural heritage, hydrologic, and landform systems, features, and functions.
- Conserve and promote cultural heritage resources to support the social, economic, and cultural well-being of all communities, including First Nations and Métis communities.
- Integrate climate change considerations into planning and managing growth such as planning for more resilient communities and infrastructure – that are adaptive to the impacts of a changing climate – and moving towards environmentally sustainable communities by incorporating approaches to reduce greenhouse gas emissions.

## 2.1.2. Cycling

### Mississauga Cycling Master Plan (2018)

The City of Mississauga Cycling Master Plan (CMP) envisions The City of Mississauga as a place where people choose to cycle for recreation, fitness and daily transportation needs. Cycling can contribute to a way of life that supports vibrant, safe and connected communities and enhances our overall health and quality of life.

Burnhamthorpe Road is identified as a proposed primary multi-use trail route (for cycling) in the CMP (Figure 4). To the east of the study area, an existing multi-use trail is located on the north side of Burnhamthorpe Road West currently terminating at Loyalist Drive. Cycling within the Burnhamthorpe Road corridor will be reviewed as part of this study and recommendations will be made.

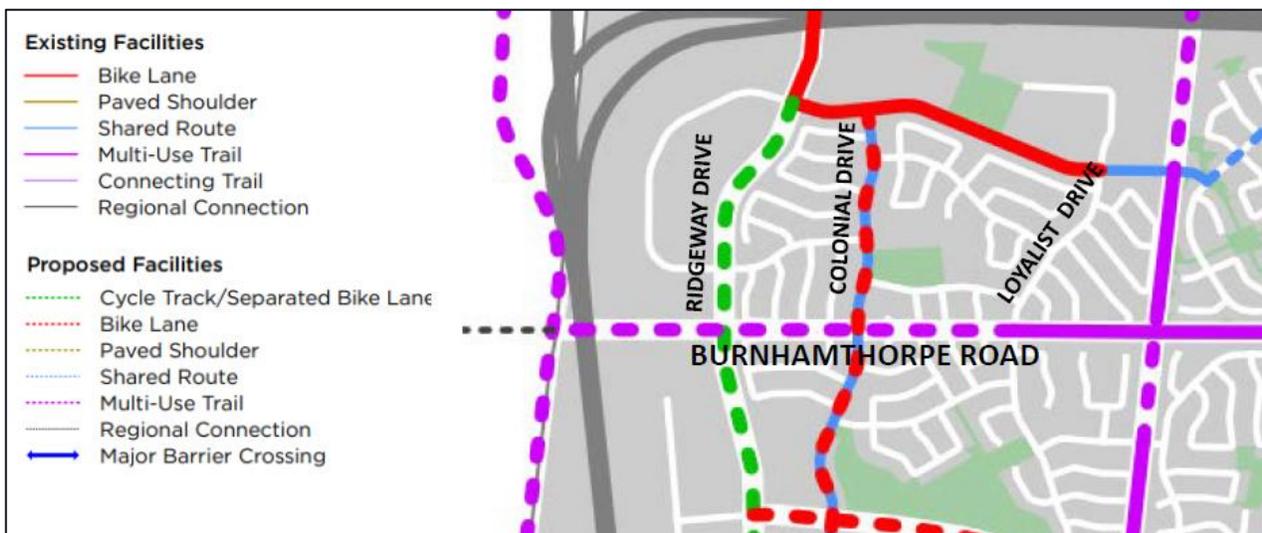


Figure 4: Cycling Master Plan (2018) Proposed Cycling Route

### 2.1.3. Transit

Burnhamthorpe Road is currently serviced by Route 36: South Common Mall to Winston Churchill Transitway with service from Colonial Drive to Ridgeway Drive and Loyalist Drive to Winston Churchill Boulevard (Figure 5). There are currently two eastbound transit stops and one westbound transit stop along Burnhamthorpe Road West within the study limits. All three transit stops are located between Colonial Drive and Ridgeway Drive.



Figure 5: MiWay Route 36 Transit Map

## 2.2. Transportation and Traffic Assessment

A transportation and traffic assessment was conducted as part of the study to review the existing and projected future transportation and traffic conditions to determine the future needs of the study area.

### 2.2.1. Cycling and Pedestrian Network

Sidewalks are present on the north and south side of Burnhamthorpe Road West between Ridgeway Drive and Loyalist Drive. The sidewalks are located approximately 10 metres from the edge of the through lanes on either side of the road. The sidewalks are 1.5-metre wide, which

conforms to AODA requirements<sup>1</sup>, and were noted to be in good condition during field investigations.

At some locations along Burnhamthorpe Road West, there are sidewalks perpendicular to Burnhamthorpe Road that connect the edge of the shoulder to residential areas and may encourage pedestrians to cross Burnhamthorpe Road outside of the designated crossing locations (Figure 6). These sidewalks are located:

- Approximately 200 metres east of Colonial Drive on the south side of Burnhamthorpe Road;
- Approximately 75 metres west of Colonial Drive on the north side of Burnhamthorpe Road; and
- Approximately 50 metres east of Ridgeway Drive on the south side of Burnhamthorpe Road



*Figure 6: Pedestrian Pathway Between Colonial Drive and Loyalist Drive*

Each intersection within the study area has crosswalks on all four approaches. They are standard crosswalks (i.e. marked with two parallel white lines) that range between 2.0 and 3.25 metres in width which conforms with OTM Book 11<sup>2</sup>.

Pedestrian signal heads are provided at all intersections in the study area, with the north/south crossings requiring the use of a pushbutton in order to call the pedestrian phase. The pedestrian push buttons at each of the intersections within the study area do not comply with the requirements outlined in the Accessibility of Ontarians with Disabilities Act (AODA).

An example of the existing pedestrian push buttons at intersection is shown in Figure 7.

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<sup>1</sup> O.Reg. 191/11 – Integrated Accessibility Standards, Part IV.1 80.23

<sup>2</sup> OTM Book 11 Pavement Markings, page 80



*Figure 7: Non-AODA Compliant Pedestrian Push Button*

The pedestrian performance along the corridor was evaluated using the following level-of-service (LOS) criteria from York Region’s Transportation Mobility Plan Guidelines in Figure 8. Given that the City of Mississauga does not have guidelines in place for evaluating pedestrian performance, the York Region guidelines can be utilized to establish “best practices”. The pedestrian LOS target is C for both Segment and Intersection categories.

Level of Service	Segment	Intersection
A	≥2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥3.0 m multi-use path	<ul style="list-style-type: none"> <li>▪ ≥2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥3.0 m multi-use path</li> <li>▪ Pedestrian signal head with sufficient pedestrian clearance time</li> <li>▪ Clearly delineated cross-walk</li> </ul>
B	≥1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or <3.0 m multi-use path	<ul style="list-style-type: none"> <li>▪ ≥1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or &lt;3.0 m multi-use path</li> <li>▪ Pedestrian signal head with sufficient pedestrian clearance time</li> <li>▪ Clearly delineated cross-walk</li> </ul>
C	≥1.5 m curb-faced sidewalk (no buffer)	<ul style="list-style-type: none"> <li>▪ ≥1.5 m curb-faced sidewalk (no buffer)</li> <li>▪ Pedestrian signal head with sufficient pedestrian clearance time</li> <li>▪ Clearly delineated cross-walk</li> </ul>
D	<1.5 m sidewalk	<ul style="list-style-type: none"> <li>▪ &lt;1.5 m sidewalk</li> <li>▪ Pedestrian signal head sufficient pedestrian clearance time</li> <li>▪ No clearly delineated cross-walk</li> </ul>
E	Paved shoulder or no sidewalk provision	<ul style="list-style-type: none"> <li>▪ Paved shoulder or no sidewalk provision</li> <li>▪ No pedestrian signal head</li> <li>▪ No clearly delineated cross-walk</li> </ul>
F	No sidewalk provision	<ul style="list-style-type: none"> <li>▪ No sidewalk provision</li> <li>▪ No pedestrian signal head</li> <li>▪ Not clearly delineated cross-walk</li> </ul>

*Figure 8: Pedestrian Level of Service Criteria*

The pedestrian performance for the entire corridor and intersections within the study area operates at a LOS of B which meets the pedestrian LOS target of C.

The total number of crossings at the intersections of Ninth Line, Colonial Drive, and Loyalist Drive are summarized in Table 3. The crossing direction with the highest volume of crossings is also provided. Due to relatively low pedestrian volumes, the maximum pedestrian volumes between these three intersections was reported.

*Table 3: Pedestrian Volumes along Burnhamthorpe Road at Intersections of Ninth Line, Colonial Drive, and Loyalist Drive*

Peak Hour	Pedestrian Volumes	
	Total Number of Crossings	Individual Crossing with Highest Number of Crossings / Volume
<b>AM Vehicular Peak (7:45 – 8:45)</b>	39	South Crossing / 15
<b>PM Vehicular Peak (16:30 – 17:30)</b>	23	North Crossing / 10

Higher pedestrian volumes are seen at the intersection of Burnhamthorpe Road & Ridgeway Drive, due to its close proximity to Loyola Catholic Secondary School. The total number of crossings at this intersection along with the individual crossing with the highest number of crossings are summarized in Table 4. A breakdown of the pedestrian volumes at each crossing at this intersection is summarized in Figure 9.

*Table 4: Pedestrian Volumes along Burnhamthorpe Road at Ridgeway Drive Intersection*

Peak Hour	Pedestrian Volumes	
	Total Number of Crossings	Individual Crossing with Highest Number of Crossings / Volume
<b>AM Vehicular Peak (7:45 – 8:45)</b>	421	North Crossing / 152
<b>PM Vehicular Peak (16:30 – 17:30)</b>	33	East Crossing / 12

Pedestrian volumes are fairly high, with the highest volume during the AM vehicular peak hour, at 421 crossings. The north crossing (i.e. the pedestrian crossing on the north leg of the intersection) has the highest percentage of pedestrian crossings with 152 (36%) during the AM peak hour.

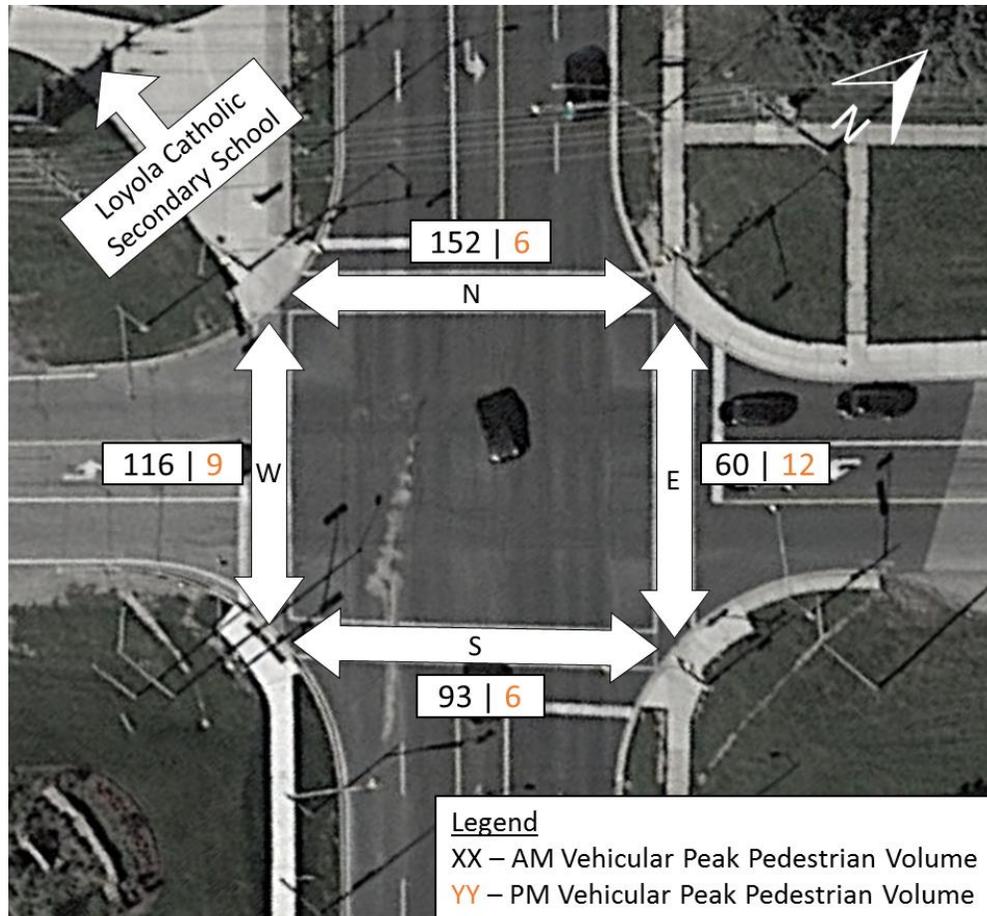


Figure 9: Pedestrian Volumes at Burnhamthorpe Drive & Ridgeway Drive

As discussed in Section 2.1.2, no dedicated bicycle facilities are provided on Burnhamthorpe Road West within the study area, resulting in cyclists having to share the road with vehicular traffic. The existing AADT (Average Annual Daily Traffic) for Burnhamthorpe Road, provided by the City of Mississauga, ranges from 7,249 to 8,705 and the 85<sup>th</sup> percentile speed is 71-73 km/h, as measured from a speed study conducted for the field investigation.

Based on OTM Book 18 – Cycling Facilities Nomograph, illustrated in Figure 10, a separate facility such as separate bicycle lanes, buffered paved shoulders or in-boulevard active transportation pathway would be appropriate for Burnhamthorpe Road West, especially considering future growth in traffic volumes.

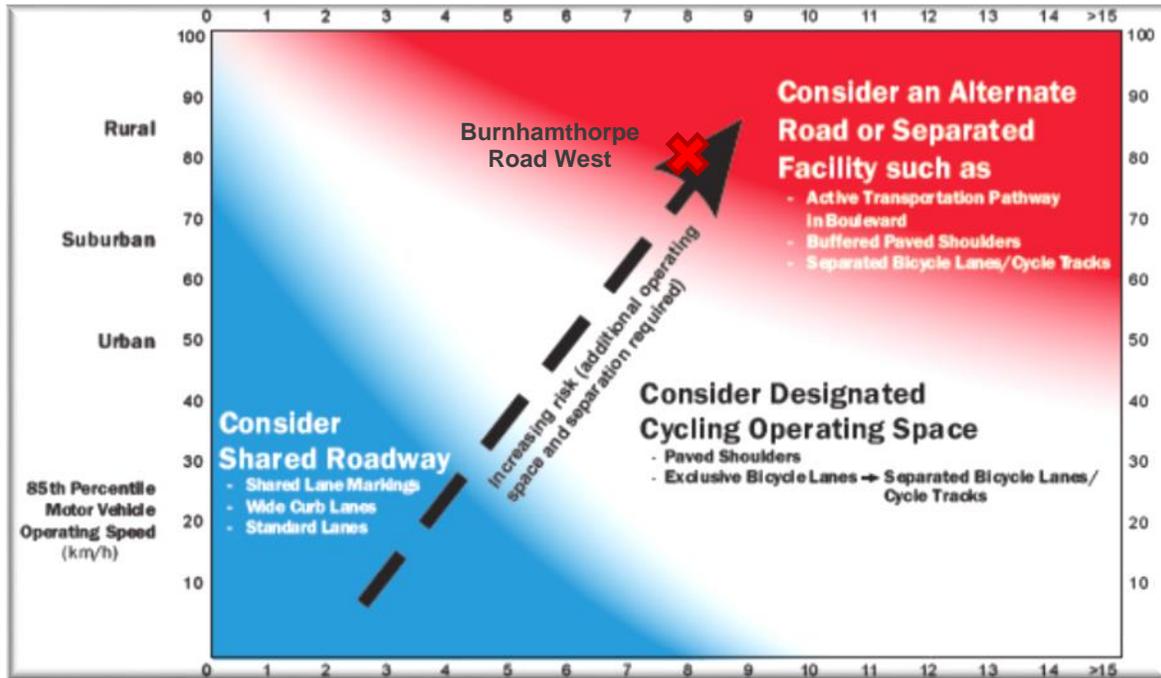


Figure 10: Desirable Cycling Facility Nomograph<sup>3</sup>

The bicycle performance along the corridor was evaluated using the following LOS criteria from York Region’s Transportation Mobility Plan Guidelines in Figure 11. Similarly, to pedestrian performance, the City of Mississauga does not have guidelines in place for evaluating bicycle performance and therefore the York Region guidelines were utilized to establish “best practices”. The bicycle LOS target is C for both Segment and Intersection categories.

<sup>3</sup> OTM Book 18 Cycling Facilities, Figure 3.3 page 30

Level of Service	Segment	Intersection
A	Separated cycling facilities (e.g. cycle tracks, multi-use path)	Separated cycling facilities Bicycle box or clearly delineated bicycle treatment or bicycle signal head
B	≥1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer)	>1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer), Bicycle box, clearly delineated bicycle treatment or bicycle signal head
C	<1.8 m dedicated cycling facilities with no buffer	<1.8 m dedicated cycling facilities with no buffer, Bicycle box, clearly delineated bicycle treatment or bicycle signal head
D	≤1.5 m bicycle lane with no buffer	≤1.5 m bicycle lane and no buffer Bicycle treatment
E	Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area)	Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area) No clearly delineated bicycle treatment
F	No bicycle provision	No bicycle provision

*Figure 11: Bicycle Level of Service Criteria*

The bicycle performance for the entire corridor and intersections within the study area operate at a LOS of F due to the lack of any bicycle facility. As discussed in Section 2.1.2, Mississauga’s Proposed Cycling Route Network indicates that the City plans to add a primary bicycle boulevard route along the Burnhamthorpe Road segment between Winston Churchill Boulevard and Ridgeway Drive. If separated cycling facilities were implemented along this segment of Burnhamthorpe Road West, the bicycle LOS would increase to a LOS of A within the York Region framework.

### 2.2.2. Transit

As discussed in Section 2.1.3, the Mississauga Transit (MiWay) Route 36 is the only (north-south) transit line through the Burnhamthorpe Road corridor. There are two east-west lines through Burnhamthorpe Road that travel between Winston Churchill Boulevard and Loyalist Drive, Route 347 and Route 368. Route 347 and Route 368 are school/summer school routes that are effective from July 3 to July 31, 2018 and from September to June 2018 respectively. However, since these two routes are school/summer school routes, this section will only focus on the regular local route, Route 36. Route 36 is summarized in Figure 12 below:



Figure 12: MiWay Route 36 Map

Route 36 operates north-south approximately every 20 - 30 minutes on weekdays from 04:30 AM until after midnight and approximately every 40 – 50 minutes on weekends from 07:00 AM until midnight. The locations of existing Route 36 bus stops along the Burnhamthorpe Road corridor within the study area are summarized in Figure 13.



*Figure 13: Existing Route 36 Bus Stops in the Study Area*

The transit performance along the corridor was evaluated using the following LOS criteria from York Region’s Transportation Mobility Plan Guidelines in Figure 14. The York Region guidelines were used to establish “best practices”. A target LOS of C or better was assumed for Access to Transit Stops and Transit Headways, and a LOS of D or better for Intersection Approach.

Level of Service	Access to Transit Stops	Transit Headways	Intersection Approach (transit or curb lanes)	
			Delay (seconds/veh)	V/C
A	90% within ≤200 m	≤5 minutes	≤10	0 to 0.60
B	90% within ≤500m and 70% within ≤200	>5-10 minutes	>10-20	0.61 to 0.70
C	90% within ≤500m and 50% within ≤200m	>10-15 minutes	>20-35	0.71 to 0.80
D	100% within ≤600m	>15-20 minutes	>35-55	0.81 to 0.90
E	100% within ≤800m	>20-30 minutes	>55-80	0.91 to 1.00
F	100% >800m	>30 minutes	>80	>1.00

Figure 14: Transit Level of Service Criteria

The transit level of service for each intersection and neighbourhood pedestrian access path (i.e. sidewalks perpendicular to Burnhamthorpe Road that connect the edge of the shoulder to residential areas) is summarized in Table 5. The intersection of Burnhamthorpe Road & Ninth Line was not reviewed because there are no major points of origin/destination for transit users.

*Table 5: Transit Level of Service in the Study Area*

Location	Direction	Access to Transit Stops	Transit Headways	Intersection Approach (transit or curb lanes)
		LOS	LOS	LOS
Burnhamthorpe Road & Ridgeway Drive	Northbound	A	<b>E</b>	B (D)
	Southbound	<b>D</b>		<b>E</b> (B)
Neighbourhood Pedestrian Access Path 1	Northbound	A		B (D)
	Southbound	<b>D</b>		A (A)
Neighbourhood Pedestrian Access Path 2	Northbound	A		B (D)
	Southbound	A		A (A)
Burnhamthorpe Road & Colonial Drive	Northbound	A		B (D)
	Southbound	A		A (A)
Neighbourhood Pedestrian Access Path 3	Northbound	<b>D</b>		A (A)
	Southbound	<b>D</b>		A (A)
Burnhamthorpe Road & Loyalist Drive	Northbound	A		A (A)
	Southbound	A		A (A)

**Legend: AM (PM)**

Based on these results, several criteria at all locations fail to meet the transit LOS target of C or better for Access to Transit Stops and Transit Headways. LOS of D or better for Intersection Approach. In order to address these issues, the following recommendations should be considered to improve transit performance along the corridor:

- Adding a bus route that operates along Burnhamthorpe Road that provides service between Winston Churchill Boulevard and Ridgeway Drive;
- Ensure that 90% of transit stops are located within ≤ 500 m and 50% within 200 m from each intersection/neighborhood pedestrian access path; and
- Reduce time interval between transit vehicles to >10 to 15 minutes.

### 2.2.3. Existing Traffic Volumes

Turning Movement Counts (TMC) for both the AM and PM peak hours under existing conditions are summarized in the Transportation and Traffic Assessment Report in Appendix A. The TMCs, indicate that the AM Peak Hour occurs between 7:45 and 8:45, and the PM Peak Hour occurs between 16:30 and 17:30 (corridor peak hours).

### 2.2.4. Existing Intersection Capacity Analysis

Intersection capacity assessment was undertaken using procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), volume to capacity (v/c) ratio, and 95<sup>th</sup> percentile queues.

LOS is a qualitative measure of operational performance and is based on control delay. The LOS criteria for signalized intersections is shown in Table 6.

The v/c ratio is the ratio between traffic volumes and the capacity of an intersection movement. A v/c ratio greater than 1.0 indicates that the movement is operating over capacity.

The 95<sup>th</sup> Percentile Queue is the queue length that has only a 5 percent probability of being exceeded during the analysis period. It is industry practice and accepted methodology to use the 95<sup>th</sup> percentile queue length for design and operational analysis purposes.

*Table 6: LOS Criteria for Signalized and Unsignalized Intersections*

LOS	Control Delay (seconds/vehicle)	Traffic Flow Characteristics
<b>A</b>	0 – 10	Very Good
<b>B</b>	> 10 – 20	Good
<b>C</b>	> 20 – 35	Typically preferred planning objective
<b>D</b>	> 35 – 55	Typically acceptable
<b>E</b>	> 55 – 80	Undesirable; potentially unstable traffic flow
<b>F</b>	> 80	Failing movements may impede traffic flow

Existing intersection operations are summarized in Table 7.

*Table 7: Existing Intersection Operations (2017)*

Direction / Movement		Storage (m)	v/c	LOS	95 <sup>th</sup> ile Queue <sup>4</sup> (m)
<b>Burnhamthorpe Road &amp; Ninth Line</b>					
EB	L	18	0.29 (0.52)	C (E)	110 (62)
	T/R	-	0.93 (0.86)	D (D)	816 (195)
WB	L	48	<b>1.33 (1.26)</b>	<b>F (F)</b>	173 (183)
	T	-	0.38 ( <b>1.10</b> )	<b>C (F)</b>	<b>697<sup>5</sup> (637)<sup>6</sup></b>
	R	46	0.07 (0.35)	C (B)	34 (200)
NB	L	29	0.41 (0.25)	D (B)	61 (94)
	T/R	-	0.87 ( <b>1.11</b> )	<b>D (F)</b>	151 (721)
SB	L	27	0.68 (0.71)	C (D)	113 (46)
	T/R	-	0.89 (0.47)	D (B)	223 (79)
<b>Overall</b>		-	<b>1.08 (1.08)</b>	<b>D (E)</b>	-

<sup>4</sup> Queues at Burnhamthorpe Road & Ridgeway Drive, Burnhamthorpe Road & Colonial Drive, and Burnhamthorpe Road & Loyalist were modelled with a 50% reduction of westbound-left turn volumes at Burnhamthorpe Road & Ninth Line to be more consistent with field observations in the AM and PM peak

<sup>5</sup> Queue extends beyond the signal at Ridgeway Drive

<sup>6</sup> Queue extends beyond the signal at Ridgeway Drive

Direction / Movement		Storage (m)	v/c	LOS	95% <sup>ile</sup> Queue <sup>4</sup> (m)
<b>Burnhamthorpe Road &amp; Ridgeway Drive</b>					
EB	L	47	0.74 (0.55)	C (B)	172 (57)
	T/R	-	1.00 (0.66)	D (C)	601 <sup>7</sup> (133)
WB	L	58	1.08 (0.57)	F (C)	95 (157)
	T/R	-	0.70 (0.83)	B (C)	164 (452) <sup>8</sup>
NB	L	37	0.52 (0.92)	C (D)	26 (172)
	T/TR	-	0.49 (0.88)	C (D)	66 (448)
SB	L	56	0.67 (0.57)	D (C)	81 (38)
	T/TR	-	0.98 (0.64)	E (D)	173 (79)
Overall		-	<b>0.94 (0.84)</b>	<b>D (D)</b>	-
<b>Burnhamthorpe Road &amp; Colonial Drive</b>					
EB	L	61	0.04 (0.08)	A (A)	9 (13)
	T/R	-	0.51 (0.47)	A (A)	77 (90)
WB	L	43	0.15 (0.28)	A (A)	43 (82)
	T/R	-	0.52 (0.54)	B (A)	123 (224)
NB	L	30	0.38 (0.20)	D (D)	33 (20)
	T/R	-	0.23 (0.44)	D (D)	46 (41)
SB	L	28	0.86 (0.45)	E (D)	50 (22)
	T/R	-	0.26 (0.30)	D (D)	46 (31)
Overall		-	<b>0.58 (0.52)</b>	<b>C (B)</b>	-
<b>Burnhamthorpe Road &amp; Loyalist Drive</b>					
EB	L	39	0.04 (0.15)	A (A)	9 (24)
	T/TR	30	0.39 (0.30)	A (A)	48 (52)
WB	L	35	0.07 (0.15)	A (A)	24 (46)
	T/TR	-	0.31 (0.40)	A (A)	101 (120)
NB	L	14	0.32 (0.09)	D (D)	23 (11)
	T/R	-	0.14 (0.18)	D (D)	25 (32)
SB	L	20	0.55 (0.54)	D (D)	29 (28)
	T/R	-	0.17 (0.14)	D (D)	28 (21)
Overall		-	<b>0.40 (0.41)</b>	<b>B (B)</b>	-

*Legend: AM (PM)*

Based on these results, the following movements operate at or above capacity under existing conditions:

- Burnhamthorpe Road & Ninth Line:
  - Westbound left-turn, with a v/c of 1.33 in the AM peak, and 1.26 in the PM peak;

<sup>7</sup> Queue extends beyond the signal at Ninth Line

<sup>8</sup> Queue extends beyond the signal at Colonial Drive

- Westbound through, with a v/c of 1.10 in the PM peak; and
- Northbound through/right-turn with a v/c of 1.11 in the PM peak.
- Burnhamthorpe Road & Ridgeway Drive:
  - Eastbound through/right-turn, with a v/c ratio of 1.00 in the AM peak; and
  - Westbound left-turn, with a v/c of 1.08 in the AM peak.

Several movements present 95<sup>th</sup> percentile queues that exceed available storage. However, based on the SimTraffic animation, only the following movements present excessive queuing that is sustained over multiple signal cycles:

- Burnhamthorpe Road & Ninth Line:
  - Westbound through/right-turn in the AM and PM peak.
- Burnhamthorpe Road & Ridgeway Drive:
  - Eastbound through/right-turn in the AM peak; and
  - Westbound through/right-turn in the PM peak.

The westbound through/right-turn at Burnhamthorpe Road & Ninth Line presents long queues that are sustained over multiple cycles in the AM and PM peak hour. The westbound left-turn does not have a protected phase which causes left-turning vehicles to reduce the through/right-turn lane. This through/right-turn was operating better than reported by Synchro/SimTraffic, presumably due to drivers being more aggressive when making the westbound left turn than the modelled behaviour.

The eastbound through/right-turn at Burnhamthorpe Road & Ridgeway Drive presents long queues that extend west beyond Ninth Line during the AM peak hour. The westbound through/right-turn at Burnhamthorpe Road & Ridgeway Drive presents long queues that extend beyond Colonial Drive during the PM peak hour.

CIMA+ also completed queue/delay studies for the following movements, in order to ensure that the Synchro model represents real world operations:

- Burnhamthorpe Road & Loyalist Drive WBT, PM Peak Hour;
- Burnhamthorpe Road & Colonial Drive EBT, AM Peak Hour;
- Burnhamthorpe Road & Ridgeway Drive NBL, PM Peak Hour; and
- Burnhamthorpe Road & Ridgeway Drive EBT, AM Peak Hour.

Table 8 summarizes the results of the queue/delay studies compared to the Synchro/SimTraffic results.

Table 8: Queue/delay Study Comparison with Synchro/SimTraffic Results

Intersection	Movement	Peak Hour	Peak 1-hour Delay (s)	Synchro Delay (s)	Queue/Delay Study 95 <sup>th</sup> Percentile Queue (m)	SimTraffic 95 <sup>th</sup> Percentile Queue (m)
Burnhamthorpe Road & Colonial Drive	Eastbound Through	AM	12.0	7.7	78	77
Burnhamthorpe Road & Loyalist Drive	Westbound Through	PM	3.9	5.3	97	120
Burnhamthorpe Road & Ridgeway Drive	Northbound Left	PM	25.7	53.0	140	172

The average delays for the movements at the Colonial Drive and Loyalist Drive intersections surveyed resulted within 2 to 5 seconds from the delays reported by Synchro. While the calculated 95<sup>th</sup> percentile queues presented some differences, these differences correspond to only 5 vehicles, which is not unreasonable.

The eastbound through movement at Ridgeway Drive presented congestion during most of the AM peak hour, which distorted the results, therefore queue/delay calculations could not be completed. However, the SimTraffic animation was generally consistent with field conditions. The delay for the northbound left-turn movement at Ridgeway Drive was considerably lower than reported by Synchro, presumably due to the permissive left-turns distorting the results. However, the SimTraffic animation was consistent with field conditions, presenting frequent long queues which would occasionally dissipate.

Therefore, based on the queue/delay studies, the Synchro model was considered to be an adequate representation of actual traffic conditions.

## 2.2.5. Existing Roadway Capacity Analysis

### Screenline Assessment (Do-Nothing)

A screenline assessment was conducted for all horizon years as well as the projected traffic link volumes. The purpose of a screenline assessment is to assess the total east-west traffic demand and total north-south road capacity available considering other parallel roads in the area, thereby, identifying the capacity deficiency.

For the purpose of the assessment, the Burnhamthorpe Road corridor was divided into five sections: east and west of Ninth Line, east of Colonial Drive, and east and west of Winston Churchill Boulevard. Figure 15 illustrates how the study area was broken down for the preliminary assessment as well as the approximate location of the selected screenlines.

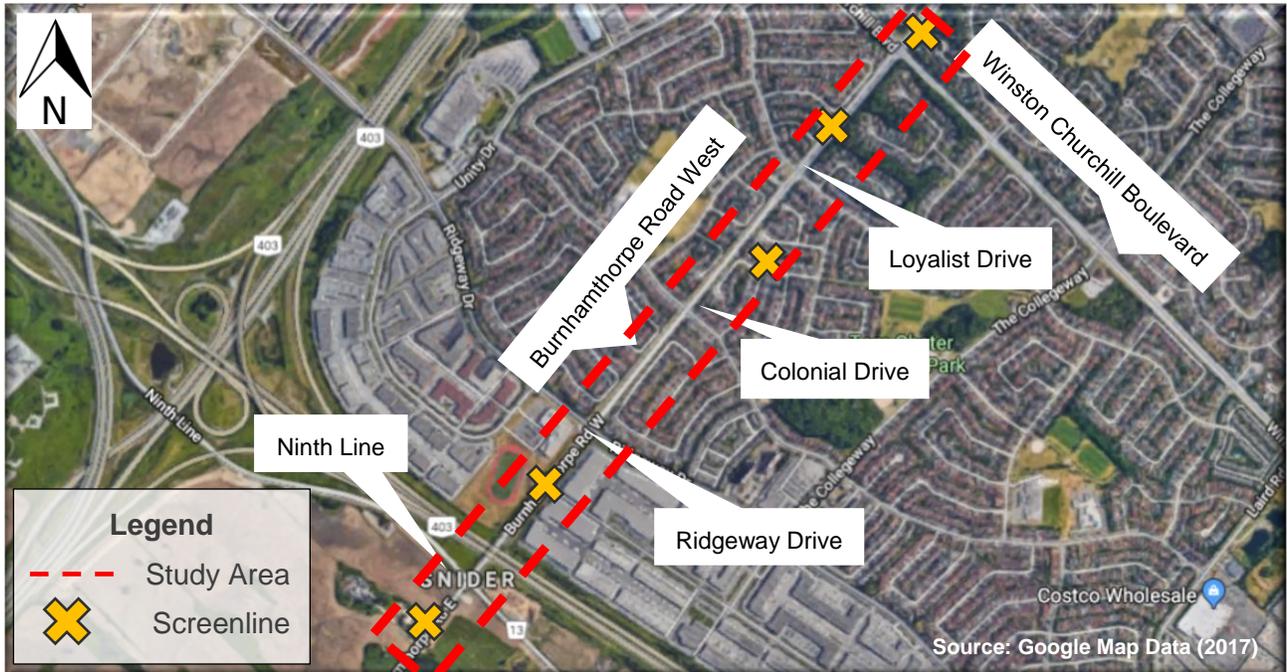


Figure 15: Screenline Locations

To conduct the screenline assessment of the existing and future Burnhamthorpe Road traffic operations and needs under the Do-Nothing scenario (meaning no improvements to the existing Burnhamthorpe Road including intersections within the project limits), the following information was utilized:

- The forecasted future volume for Burnhamthorpe Road and the surrounding roadway network for the 2011 (existing), 2021, 2031 and 2041 horizon years (AM and PM)<sup>9</sup>;
- The per hour per lane capacities for Arterial, Major Collector and Minor Collector roads under the jurisdiction of the City of Mississauga to estimate the capacity of each road segment; and
- The performance measure for each of the roadway segments in the screenline analysis was the v/c ratio.

The results of the screenline assessment for the base year of 2011 and the horizon years of 2021, 2031 and 2041 (based on EMME results) are available in Appendix A. The main findings of the screenline analysis under the Do-Nothing scenario can be summarized as follows:

- Under the base year of 2011, total traffic conditions at Screenline No. 1 (west of Ninth Line) are approaching capacity with a v/c ratio over 0.85.
- Under the 2021 scenario, total traffic conditions at Screenline No. 1 (west of Ninth Line) remains over capacity. Under this scenario total traffic conditions at Screenline No. 2 (west of Ridgeway Drive) are also over capacity.
- Under the 2031 and 2041 scenarios total traffic conditions at Screenline No. 1 and Screenline No. 2 are over capacity.

<sup>9</sup> From the City's current travel demand forecasting EMME model

## Screenline Assessment (With Widening)

To conduct the screenline assessment of the existing and future Burnhamthorpe Road traffic operations and needs under the With Widening scenario (meaning proposed and/or approved improvements to the entire roadway network within the project limits), the following information was utilized:

- The forecasted future volume for Burnhamthorpe Road and the surrounding roadway network for the 2021, 2031 and 2041 horizon years (AM and PM)<sup>10</sup> under the with widening conditions;
- The per hour per lane capacities for Arterial, Major Collector and Minor Collector roads under the jurisdiction of the City of Mississauga to estimate the capacity of each road segment; and
- The performance measure for each of the roadway segments in the screenline analysis was the v/c ratio.

The results of the screenline assessment under the With Widening scenario for the horizon years of 2021, 2031 and 2041 (based on EMME results) are available in Appendix A. The main findings of the screenline assessment can be summarized as follow:

- Under the 2021 scenario, total traffic conditions at Screenline No. 1 (west of Ninth Line) remains over capacity. Under this scenario total traffic conditions at Screenline No. 2 (west of Ridgeway Drive) are also over capacity during the PM peak hour (westbound)
- Under the 2031 and 2041 scenarios total traffic conditions at Screenline No. 1 and Screenline No. 2 are over capacity along the main direction of traffic

### 2.2.6. Future Traffic Conditions

Projected traffic volumes for all horizon years along the corridor under study were used to estimate turning movements at intersections using the Fratar growth factor model. The results of the iterative calculation process for the horizon years of 2021, 2031 and 2041 are graphically presented as part of Appendix A.

Similarly to the assessment of existing conditions, intersection capacity assessment was undertaken using procedures described in the Highway Capacity Manual (HCM). The analysis primarily focuses on performance measures such as level-of-service (LOS), volume to capacity (v/c) ratio, and 95<sup>th</sup> percentile queues. The results for each of the horizon years are described in the following sections.

#### Future Intersection Operations – Do Nothing (2021)

This section explores the expected intersection operational issues by the 2021 horizon year if Burnhamthorpe Road remains a 2-lane road cross section. Projected traffic operations without widening are summarized in Table 9.

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<sup>10</sup> From the City's current travel demand forecasting EMME model

*Table 9: 2021 Intersection Operations (Without Widening)*

Direction / Movement		Storage (m)	v/c	LOS	95% <sup>ile</sup> Queue (m)
<b>Burnhamthorpe Road &amp; Ridgeway Drive</b>					
EB	L	47	0.97 (0.98)	F (F)	37 (66)
	T/R	-	0.99 (0.86)	E (E)	105 (133)
WB	L	58	0.95 (0.66)	F (D)	118 (190)
	T/R	-	0.96 (0.96)	E (E)	234 (504)
NB	L	37	0.71 (1.01)	E (F)	26 (162)
	T/R	-	0.75 (0.86)	E (E)	80 (579)
SB	L	56	0.79 (0.60)	E (E)	85 (89)
	T/R	-	1.00 (0.99)	F (F)	138 (168)
Overall		-	0.99 (1.03)	E (E)	-
<b>Burnhamthorpe Road &amp; Colonial Drive</b>					
EB	L	61	0.16 (0.08)	A (A)	19 (13)
	T/R	-	0.66 (0.42)	B (A)	79 (66)
WB	L	43	0.06 (0.23)	A (A)	9 (135)
	T/R	-	0.49 (0.60)	B (A)	86 (436)
NB	L	30	0.73 (0.20)	D (C)	50 (21)
	T/R	-	0.12 (0.41)	C (C)	48 (37)
SB	L	28	0.18 (0.33)	C (C)	19 (20)
	T/R	-	0.34 (0.31)	C (C)	37 (31)
Overall		-	0.68 (0.56)	B (B)	-
<b>Burnhamthorpe Road &amp; Loyalist Drive</b>					
EB	L	39	0.01 (0.13)	A (A)	2 (22)
	T/R	30	0.41 (0.33)	A (A)	40 (42)
WB	L	35	0.17 (0.18)	A (A)	32 (70)
	T/R	-	0.35 (0.47)	A (A)	79 (150)
NB	L	14	0.03 (0.06)	C (C)	7 (8)
	T/R	-	0.14 (0.17)	C (C)	21 (28)
SB	L	20	0.60 (0.52)	C (C)	34 (27)
	T/R	-	0.04 (0.11)	C (C)	19 (17)
Overall		-	0.46 (0.48)	B (A)	-

*Legend: AM (PM) | N/R = Not Reported*

*\*Ninth Line was not reviewed due to planned roundabout (Halton Region)*

Although signal cycle and splits were optimized to accommodate the future volumes using a maximum cycle length of 160 seconds, several movements at Burnhamthorpe Road & Ridgeway Drive exceed the City of Mississauga's Traffic Impact Study Guidelines thresholds and operate at LOS F. The high v/c ratios and failing LOS for multiple movements indicate the need for more capacity at this intersection. In addition, a SimTraffic simulation shows that, during the PM peak, westbound queues at Burnhamthorpe Road & Ridgeway Drive may extend to the signal at Burnhamthorpe Road & Colonial Drive.

The results of the assessment also indicate that there are multiple 95<sup>th</sup> percentile queues that exceed available storage at all intersections but were not reported to be a major concern.

### Future Intersection Operations With Widening

This section provides the results of widening Burnhamthorpe Road to a 4-lane road cross section with no additional improvements on intersection operations for horizon years 2021, 2031, and 2041, and based on the following considerations:

- Burnhamthorpe Road & Ninth Line will be converted to a 2-lane roundabout by 2021. ARCADY results were reported for the intersection operations at Burnhamthorpe Road & Ninth Line for all future scenarios.

### 2021 Future Intersection Operations

The results of the traffic operational analysis conducted for the 2021 horizon year are presented in Table 10. Main findings are summarized below:

- Signal cycle, phasing, and splits were optimized to accommodate the future volumes using a maximum cycle length of 160 seconds.
- No turning movements at the intersections of Burnhamthorpe Road & Ninth Line, Burnhamthorpe Road & Ridgeway Drive, Burnhamthorpe Road & Colonial Drive and Burnhamthorpe Road & Loyalist Drive present operational issues, with all individual movements presenting a v/c ratio of 0.94 or lower and a LOS of E or better.
- 95th percentile queues exceed available storage for multiple turning movements at all intersections.

Table 10: 2021 Intersection Operations (With Widening, No Additional Improvements)

Direction / Movement		Storage (m)	v/c	LOS	95 <sup>th</sup> Queue (m)
<b>Burnhamthorpe Road &amp; Ninth Line</b>					
EB	T	-	0.67 (0.53)	A (A)	15 (13)
WB	T	-	0.27 (0.82)	A (B)	7 (96)
NB	T	-	0.37 (0.63)	A (A)	7 (15)
SB	T	-	0.45 (0.46)	A (A)	7 (7)
<b>Burnhamthorpe Road &amp; Ridgeway Drive</b>					
EB	L	47	0.84 (0.72)	E (C)	49 (110)
	T/TR	-	0.81 (0.47)	D (C)	109 (105)
WB	L	58	0.93 (0.64)	E (E)	92 (61)
	T/TR	-	0.41 (0.76)	C (D)	67 (136)
NB	L	37	0.57 (0.94)	C (E)	35 (130)
	T/TR	-	0.48 (0.73)	C (C)	59 (114)
SB	L	56	0.69 (0.44)	D (C)	60 (31)
	T/TR	-	0.91 (0.74)	D (D)	125 (86)
Overall		-	<b>0.82 (0.78)</b>	<b>D (D)</b>	-

Direction / Movement		Storage (m)	v/c	LOS	95 <sup>th</sup> ile Queue (m)
<b>Burnhamthorpe Road &amp; Colonial Drive</b>					
EB	L	61	0.11 (0.06)	B (A)	22 (11)
	T/TR	-	0.36 (0.24)	B (A)	98 (27)
WB	L	43	0.06 (0.26)	A (A)	12 (29)
	T/TR	-	0.26 (0.36)	B (A)	72 (47)
NB	L	30	0.84 (0.17)	E (D)	49 (19)
	T/R	-	0.14 (0.34)	D (D)	51 (39)
SB	L	28	0.30 (0.59)	D (D)	27 (24)
	T/R	-	0.34 (0.23)	D (D)	45 (27)
Overall		-	<b>0.45 (0.39)</b>	<b>C (A)</b>	-
<b>Burnhamthorpe Road &amp; Loyalist Drive</b>					
EB	L	39	0.02 (0.21)	A (B)	7 (25)
	T/TR	30	0.40 (0.34)	B (A)	67 (70)
WB	L	35	0.11 (0.14)	A (A)	23 (16)
	T/TR	-	0.30 (0.43)	A (A)	56 (77)
NB	L	14	0.14 (0.14)	D (D)	19 (19)
	T/R	-	0.11 (0.19)	D (D)	30 (34)
SB	L	20	0.69 (0.48)	E (D)	36 (28)
	T/R	-	0.09 (0.15)	D (D)	31 (31)
Overall		-	<b>0.45 (0.43)</b>	<b>B (B)</b>	-

*Legend: AM (PM)*

### 2031 Future Intersection Operations

The results of the traffic operational assessment conducted for the 2031 horizon year are presented in Table 11. The main findings are summarized below:

- Signal cycle, phasing, and splits were optimized to accommodate the future volumes using a maximum cycle length of 160 seconds.
- No turning movements at the intersections of Burnhamthorpe Road & Colonial Drive and Burnhamthorpe Road & Loyalist Drive present operational issues, with all individual movements presenting a v/c ratio of 0.68 or lower and a LOS of E or better.
- The following movements operate at or above capacity:
  - Burnhamthorpe Road & Ninth Line:
    - Westbound through, with a v/c ratio of 1.00 in the PM peak.
- Several movements at Burnhamthorpe Road & Ninth Line and Burnhamthorpe Road & Ridgeway Drive operate at LOS F.
- During the PM peak, westbound queues at Burnhamthorpe Road & Ninth Line may extend beyond the signal at Ridgeway Drive.
- 95<sup>th</sup> percentile queues exceed available storage for multiple turning movements at all intersections.

Table 11: 2031 Intersection Operations (With Widening, No Additional Improvements)

Direction / Movement		Storage (m)	v/c	LOS	95% <sup>ile</sup> Queue (m)
<b>Burnhamthorpe Road &amp; Ninth Line</b>					
EB	T	-	0.75 (0.54)	A (A)	37 (13)
WB	T	-	0.38 (1.00)	A (F)	7 (691) <sup>11</sup>
NB	T	-	0.45 (0.83)	A (B)	7 (96)
SB	T	-	0.54 (0.76)	A (B)	7 (44)
<b>Burnhamthorpe Road &amp; Ridgeway Drive</b>					
EB	L	47	0.74 (0.82)	C (D)	67(91)
	T/TR	-	0.89 (0.59)	D (C)	140 (105)
WB	L	58	0.91 (0.95)	F (F)	80 (100)
	T/TR	-	0.63 (0.91)	C (E)	100 (203)
NB	L	37	0.90 (0.98)	E (E)	84 (164)
	T/TR	-	0.50 (0.67)	C (C)	73 (281)
SB	L	56	0.55 (0.41)	D (C)	49 (48)
	T/TR	-	0.89 (0.88)	D (D)	114 (125)
Overall		-	<b>0.87 (0.88)</b>	<b>D (D)</b>	-
<b>Burnhamthorpe Road &amp; Colonial Drive</b>					
EB	L	61	0.12 (0.08)	A (A)	15 (10)
	T/TR	-	0.38 (0.28)	A (A)	52 (26)
WB	L	43	0.09 (0.34)	A (A)	12 (31)
	T/TR	-	0.32 (0.40)	A (A)	54 (62)
NB	L	30	0.68 (0.24)	D (D)	52 (32)
	T/R	-	0.12 (0.52)	D (D)	58 (60)
SB	L	28	0.38 (0.44)	D (D)	34 (29)
	T/R	-	0.53 (0.25)	D (D)	58 (36)
Overall		-	<b>0.47 (0.42)</b>	<b>B (B)</b>	-

<sup>11</sup> Queue extends beyond the signal at Ridgeway Drive

Direction / Movement		Storage (m)	v/c	LOS	95% <sup>ile</sup> Queue (m)
<b>Burnhamthorpe Road &amp; Loyalist Drive</b>					
EB	L	39	0.01 (0.23)	B (A)	6 (27)
	T/TR	30	0.41 (0.35)	B (A)	77 (53)
WB	L	35	0.14 (0.14)	A (A)	26 (24)
	T/TR	-	0.34 (0.40)	A (A)	79 (78)
NB	L	14	0.33 (0.23)	E (D)	22 (19)
	T/R	-	0.19 (0.31)	E (D)	40 (41)
SB	L	20	0.59 (0.61)	D (E)	36 (31)
	T/R	-	0.08 (0.20)	D (D)	29 (36)
Overall		-	<b>0.45 (0.42)</b>	<b>B (B)</b>	-
Overall		-	<b>1.00 (1.10)</b>	<b>E (F)</b>	-

*Legend: AM (PM)*

### 2041 Future Intersection Operations

The results of the traffic operational assessment conducted for the 2041 horizon year are presented in Table 12. Detailed Synchro/SimTraffic Reports can be found in Appendix F. The main findings are summarized below:

- Signal cycle, phasing, and splits were optimized to accommodate the future volumes using a maximum cycle length of 160 seconds.
- No turning movements at the intersections of Burnhamthorpe Road & Colonial Drive and Burnhamthorpe Road & Loyalist Drive present operational issues, with all individual movements presenting a v/c ratio of 0.64 or lower and a LOS of E or better.
- The following movements operate at or above capacity:
  - Burnhamthorpe Road & Ninth Line:
    - Westbound through, with a v/c ratio of 1.19 in the PM peak.
- Several movements at Burnhamthorpe Road & Ninth Line and Burnhamthorpe Road & Ridgeway Drive and operate at LOS F.
- During the PM peak, westbound queues at Burnhamthorpe Road & Ninth Line may extend beyond the signal at Colonial Drive.
- A SimTraffic simulation shows that, during the PM peak, southbound queues at Burnhamthorpe Road & Ridgeway Drive may extend beyond the signal at Drummond Road/Sladeview Crescent.
- 95<sup>th</sup> percentile queues exceed available storage for multiple turning movements at all intersections.

Table 12: 2041 Intersection Operations (With Widening, No Additional Improvements)

Direction / Movement		Storage (m)	v/c	LOS	95% <sup>ile</sup> Queue (m)
<b>Burnhamthorpe Road &amp; Ninth Line</b>					
EB	T	-	0.87 (0.63)	C (A)	154 (7)
WB	T	-	0.33 (1.19)	A (F)	7 (1411) <sup>12</sup>
NB	T	-	0.54 (0.96)	A (E)	13 (515)
SB	T	-	0.59 (0.93)	A (D)	7 (323)
<b>Burnhamthorpe Road &amp; Ridgeway Drive</b>					
EB	L	47	0.63 (0.85)	C (E)	63 (150)
	T/TR	-	0.93 (0.81)	E (E)	157 (163)
WB	L	58	0.88 (0.72)	F (E)	79 (116)
	T/TR	-	0.50 (0.97)	C (E)	89 (190)
NB	L	37	0.88 (0.94)	F (E)	49 (159)
	T/TR	-	0.60 (0.66)	D (C)	86 (410)
SB	L	56	0.73 (0.47)	E (C)	67 (152)
	T/TR	-	0.91 (0.97)	E (E)	127 (357) <sup>13</sup>
Overall		-	<b>0.89 (0.93)</b>	<b>D (E)</b>	-
<b>Burnhamthorpe Road &amp; Colonial Drive</b>					
EB	L	61	0.10 (0.09)	B (A)	16 (12)
	T/TR	-	0.41 (0.28)	B (A)	49 (26)
WB	L	43	0.14 (0.35)	B (A)	12 (29)
	T/TR	-	0.31 (0.40)	A (A)	62 (66)
NB	L	30	0.62 (0.27)	D (E)	56 (37)
	T/R	-	0.15 (0.64)	D (E)	71 (73)
SB	L	28	0.42 (0.40)	E (D)	41 (37)
	T/R	-	0.59 (0.34)	E (D)	75 (54)
Overall		-	<b>0.48 (0.44)</b>	<b>C (B)</b>	-

<sup>12</sup> Queue extends beyond the signal at Colonial Drive

<sup>13</sup> Queue extends beyond the signal at Drummond Road/Sladeview Crescent

Direction / Movement		Storage (m)	v/c	LOS	95 <sup>th</sup> ile Queue (m)
<b>Burnhamthorpe Road &amp; Loyalist Drive</b>					
EB	L	39	0.01 (0.25)	B (A)	4 (23)
	T/TR	30	0.40 (0.38)	B (A)	81 (58)
WB	L	35	0.17 (0.23)	A (A)	19 (28)
	T/TR	-	0.33 (0.47)	A (A)	70 (80)
NB	L	14	0.26 (0.20)	E (E)	20 (23)
	T/R	-	0.21 (0.49)	E (E)	48 (56)
SB	L	20	0.55 (0.50)	D (D)	41 (36)
	T/R	-	0.06 (0.15)	D (D)	37 (40)
<b>Overall</b>		-	<b>0.40 (0.47)</b>	<b>B (B)</b>	-

*Legend: AM (PM)*

### Future Intersection Operations With Widening and Additional Improvements

The intersections of Burnhamthorpe Road & Colonial Drive and Burnhamthorpe Road & Loyalist Drive were observed to operate without issues with widening scenarios discussed in Section 0. Although there are operational issues at the intersection of Burnhamthorpe Road & Ninth Line, it is expected that Halton Region will conduct further studies to address capacity restrictions at this intersection. However, additional improvements were explored for the intersections of Burnhamthorpe Road & Ridgeway Drive to address expected operational issues which were still reported after widening for horizon years 2031 and 2041.

#### Burnhamthorpe Road & Ridgeway Drive - 2031

The westbound left-turn at the intersection of Burnhamthorpe Road & Ridgeway Drive operates at LOS F in the AM and PM peak. Additionally, some queues exceed available storage. In order to address these issues, an additional left-turn lane was included in the northbound direction of this intersection. The resulting traffic operations are summarized in Table 13. With the additional lane and signal timing adjustments, the westbound left-turn improves from LOS F to LOS E and LOS D in the AM and PM peak, respectively. However, some queues still exceed available storage.

Table 13: 2031 Intersection Operations (With Widening, Dual LT on NB Ridgeway Drive)

Direction / Movement		Storage (m)	v/c	LOS	95% <sup>ile</sup> Queue (m)
<b>Burnhamthorpe Road &amp; Ridgeway Drive</b>					
EB	L	47	0.70 (0.67)	C (C)	61 (64)
	T/TR	-	0.85 (0.46)	D (C)	139 (93)
WB	L	58	0.89 (0.57)	E (D)	81 (45)
	T/TR	-	0.59 (0.65)	C (C)	94 (124)
NB	L/L	37	0.46 (0.85)	C (D)	16 (67)
	T/TR	-	0.53 (0.88)	C (D)	75 (143)
SB	L	56	0.62 (0.59)	D (D)	72 (46)
	T/TR	-	0.96 (0.88)	E (D)	133 (130)
Overall		-	<b>0.85 (0.75)</b>	<b>D (D)</b>	-

*Legend: AM (PM)*

### 2.3. Problems and Opportunities

Under existing conditions, several intersections within the study limits are experiencing congestion and delays leading to significant queuing along Burnhamthorpe Road West.

These poor traffic conditions are anticipated to worsen in the future as vehicle demand on Burnhamthorpe Road West increases.

There is an opportunity to improve Burnhamthorpe Road West to accommodate not only existing and future vehicle demand, but also active transportation elements. There is opportunity to incorporate active transportation elements to match the cross-section elements to the east of the study area and promote active transportation connectivity to the west, particularly over the Highway 403. The possible improvements to Burnhamthorpe Road West also includes improvements to the aesthetics of the corridor.

### 3. Existing Conditions

Background information was collected from various sources in order to analyze the existing conditions of the study area:

- Various background studies and reports (i.e. stormwater management reports, Highway 403 condition survey report, etc.);
- Data provided by the City of Mississauga (i.e. traffic data, tree survey data, etc.);
- Investigations undertaken as part of this Class EA study;
- Meetings with the Project Team;
- Meetings and correspondence with agencies including Ministry of Transportation and Halton Region;
- Consultation with members of the public;
- Site visits.

The existing conditions of the study area are discussed in the subsequent sections of this report.

#### 3.1. Socio-Economic Environment

##### 3.1.1. Land Use

As illustrated in Figure 16, The City of Mississauga Official Plan (2017) designates the lands east of Ridgeway Drive as Residential Low Density. This section of road is comprised of a mix of uses including business employment, place of worship, schools and residential low density areas. West of Ridgeway Drive, land use is designated as Business Employment, and there are multiple businesses on the south side of Burnhamthorpe Road West and a secondary school on the north side.



Figure 16: Land Use Designation

### 3.1.2. Community Features

There are two community features located within the study limits between Ninth Line and Loyalist Parkway, Loyola Catholic Secondary School and Iglesia Ni Christo Church. Loyola Catholic Secondary School is located on the north west corner of the Burnhamthorpe Road and Ridgeway Drive intersection. Iglesia Ni Christo is located on the north west corner of the Burnhamthorpe Road and Loyalist Drive intersection.

## 3.2. Natural Environment

A Natural Environment Assessment was conducted to document existing conditions, assess potential impacts to any natural heritage features present within the Study Area and provide recommendations and supporting documentation for the study. A copy of the Natural Environment Assessment Report is available in Appendix B.

Available existing natural heritage data relevant to the Study Area was reviewed and included in the assessment. These data sets include:

- Aerial imagery (current and historic)
- Surficial geology mapping (Ontario Geological Survey)
- Prior site investigations and reports conducted in relation to the proposed project
- Data published through wildlife atlases
- Environment mapping in the Official Plans of the City of Mississauga and Region of Peel
- Fish and wildlife data records from the Land Information Ontario (LIO) Natural
- Heritage Areas database
- Natural heritage features identified through LIO
- Data sets provided by Credit Valley Conservation (CVC), Conservation Halton, and the Ministry of Natural Resources and Forestry (MNR)

Available background information was reviewed to evaluate the landscape context for the Study Area and identify natural heritage features that require further site-specific assessment. CIMA+ also conducted field investigations on May 17, 2018 between the hours of 7:20 am and 10:30 am to evaluate existing ecological conditions within the Study Area. The field program included the following surveys:

- Full vascular plant inventories;
- Existing habitat assessments, including ecological community characterization completed in general accordance with MNR Ecological Land Classification (ELC) for Southern Ontario standard procedures and protocols;
- Breeding bird survey in general accordance with Ontario Breeding Bird Atlas standard procedures and protocols;
- Incidental wildlife and wildlife habitat observations (auditory, visual, tracks, scat, burrows, nests, etc.) throughout the Study Area; and
- Technical evaluation of ecological features within the Study Area for meeting provincial, regional and/or municipal natural heritage criteria within the Study Area which may be impacted by the Project.

### 3.2.1. Provincial Policy Statement

The Provincial Policy Statement (PPS) 2014 was issued under Section 3 of the Planning Act (R.S.O. 1990, as amended May 30, 2017). The PPS is applicable province-wide to all planning decisions made on or after April 30th, 2014, and replaces the PPS 2005.

The Study Area is located in Ecoregion 7E, and there is potential for presence of features of provincial significance. The following policies are relevant to the Study Area:

*2.1.5 Development and site alteration shall not be permitted in:*

- a) *significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E*
- b) *significant woodlands in Ecoregions 6E and 7E*
- c) *significant valley lands in Ecoregions 6E and 7E*
- d) *significant wildlife habitat*
- e) *significant areas of natural and scientific interest*
- f) *coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4 (b)*

*2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements*

*2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species except in accordance with provincial and federal requirements*

*2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, 2.1.6 and 2.1.7, unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on the ecological functions*

The Ontario Natural Heritage Reference Manual for the Provincial Policy Statement defines adjacent lands as:

- 120 m from provincially significant wetlands
- 50 m from significant woodlands, significant valley lands, significant wildlife habitat, significant portions of habitat for threatened or endangered species, significant ANSIs
- 30 m from fish habitat

The results of the background review did not identify the presence of any previously recognized provincial Designated Areas within the Study Area.

A Natural Environment Assessment is required to assess the presence and potential impact to any features within the Study Area, which are covered under the PPS but have not been previously identified (E.g. significant wildlife habitat, habitats of endangered or threatened species, fish habitat, etc.).

### 3.2.2. Watercourses and Surface Drainage Features

The Study Area predominantly resides within the Loyalist Subwatershed, with portions to the north-east situated in the Sawmill Subwatershed within the greater Credit River Watershed under the administrative jurisdiction of the CVC. A small portion at the west end of the Study Area is situated within the Oakville East Urban Creeks watershed under the jurisdiction of Conservation Halton.

At the time of the site investigation, surface waters were observed within a drainage feature located west of Ninth Line within the recently plowed agricultural lands north of the Burnhamthorpe Road. Further north of Burnhamthorpe Road, this feature meanders along Ninth Line before veering west and cutting cross the field draining into the road side ditch present along the north side of Burnhamthorpe Road. This feature is hydraulically connected to another branch of the unnamed tributary on the north side of Burnhamthorpe Road located further west (approximately 150 m from Ninth Line and outside of the Study Area). Both of these features have been previously identified and mapped by Conservation Halton. A culvert connects these features to a tributary south of Burnhamthorpe Road which drains in a southerly direction and connecting to the North Oakville-Milton East Provincially Significant Wetland Complex located approximately 220 m south of the Study Area.

CIMA+ consulted with the CVC to obtain GIS data records for any tributaries crossing the Study Area. CVC records indicated the presence of a historic tributary crossing Burnhamthorpe Road West located approximately 202 m east of Colonial Drive East. Specifically, this tributary was identified to be present along Dolson Court, north of Burnhamthorpe Road West and connecting underneath the road and continuing southbound along Bangor Road. CVC records indicated dry conditions in both the early summer of 1954 and spring of 1965. The results of CIMA+'s field investigations have determined that this highly urbanized drainage path is intermittent and flow is considered either historical or extremely limited; conditions were dry (including the east west ditches along both the north and south sides of Burnhamthorpe Road West in this area). There is a major trunk storm sewer in this corridor (drainage path). Very little erosion scarring or changes in soil moisture were observed, and limited changes in species composition to hydrotolerant or hydrophilic vegetation species were observed in these areas at the time of the field investigation.

Drainage ditches are present on both the north and south sides of Burnhamthorpe Road West along the length of the Study Area, however, standing water was only observed in the naturalized ditches west of Highway 403. These ditches were predominantly occupied by Common Reed (*Phragmites australis*) with associates of Common Cattail (*Typha latifolia*). East of Highway 403, the manicured grass swales were dry and catch basins were observed to be present along their lengths.

### 3.2.3. Aquatic Habitat

CIMA+ evaluated existing conditions at all drainage feature and tributary locations (present or historically mapped) throughout the Study Area. The features observed were evaluated based on data obtained from the background review, and observations during field investigations which included an assessment of substrate conditions, water presence and water quality, stream width, top of bank and water depth (if applicable), and aquatic and riparian vegetation community composition.

Standing waters and low flow conditions were observed in the drainage ditches and tributary features west of Highway 403. The previously mapped tributary features north and south of Burnhamthorpe Road East in this area were either recently plowed and barren drainage pathways (across the agricultural field to the north) or were densely established with invasive tall narrow leaved emergents (*P. australis*). Features east of Highway 403, are urban drainage swales established with actively maintained manicured grass, which are not connected to any natural

tributaries, nor exhibited hydrologic or ecological conditions capable of supporting any aquatic species.

None of the features evaluated within or adjacent to the Study Area meet the criteria of fish habitat based on the results of the site investigation. None of the features observed east of Highway 403 are considered suitable for supporting fish populations at any time throughout the year.

### 3.2.4. Terrestrial Habitat

Lands within the Study Area were assessed to determine the presence or absence of any vegetation species of conservation concern and evaluate habitat conditions. The assessment included detailed biological inventories and vegetation community characterization.

Six community classes were identified across the Study Area. The locations of the various vegetation communities present within the Study Area are outlined in Figure 17.

Vegetation communities classified via standard ELC procedures and protocols are grouped to represent lands 0.5 hectares or greater, however, given anticipated Project impacts, the following provides a summary of the main findings within the Study Area's Rights-of-Way (ROW).

The greenspaces within the ROW associated with the Study Area east of Ridgeway Drive are characteristic of cultural urban features and are established with manicured grass intermixed with disturbance adapted graminoids and forbs. Streetscaping and naturalized trees were also inventoried as part of the assessment. No listed vegetation species covered under the Endangered Species Act (2007) were observed within the Study Area limits in this location. No vegetation species of conservation concern were observed within the Study Area limits in this location.

The greenspaces within the ROW associated with the Study Area between Ridgeway Drive and Ninth Line, included predominantly cultural features; manicured grass and establishment of invasive and disturbance adapted graminoids, forbs. Landscaping associated with adjacent developments (commercial/industrial to the south and institutional school sports field north of Burnhamthorpe Road West) as well as naturalized trees/shrubs were inventoried as part of the assessment. No listed vegetation species covered under the Endangered Species Act (2007) were observed within the Study Area limits in this location. No vegetation species of conservation concern were observed within the Study Area limits in this location.

The greenspaces within the ROW west of Ninth Line included naturalized ditches occupied by Reed Canarygrass (*Phalaris arundinacea*), and Common Reed (*P. australis*) and the establishment of a mixture of native and disturbance adapted or invasive graminoids, forbs (predominantly members of the *Astereaceae* family and monocultures of Common Teasel; *Dipsacus fullonum*). Disturbance adapted shrubs and trees have established along the north side of Burnhamthorpe Road East in this area between the road and the recently plowed agricultural field to the north (E.g. Common Buckthorn; *Rhamnus cathartica*, honeysuckles; *Lonicera* sp., Crabapple; *Malus* sp., Wild Rose; *Rosa acicularis*, Common Lilac; *Syringa vulgaris*). Lands to the south included a vacant gravel parking lot with associated access road, followed by undeveloped lands characterized as a mixed graminoid-forb meadow dominated by asters (*Aster* sp.), goldenrods (*Solidago* sp.), Tufted Vetch (*Vicia cracca*), clovers (*Trifolium* sp.), Common Teasel (*Dipsacus fullonum*), Reed Canarygrass (*Phalaris arundinacea*), Wild Carrot (*Daucus carota*), and Common Milkweed (*Asclepias syriaca*). Portions of these lands (inclusions) were occupied by monocultures of tall narrow leaved emergents (Common Reed and cattails), however, a defined drainage path was not acutely visible and a full inventory and assessment of these lands was not completed as they lay outside of the Study Area. No listed vegetation species covered under the Endangered Species Act (2007) were observed within the Study Area limits in this location. No vegetation species of conservation concern were observed within the Study Area limits in this location.

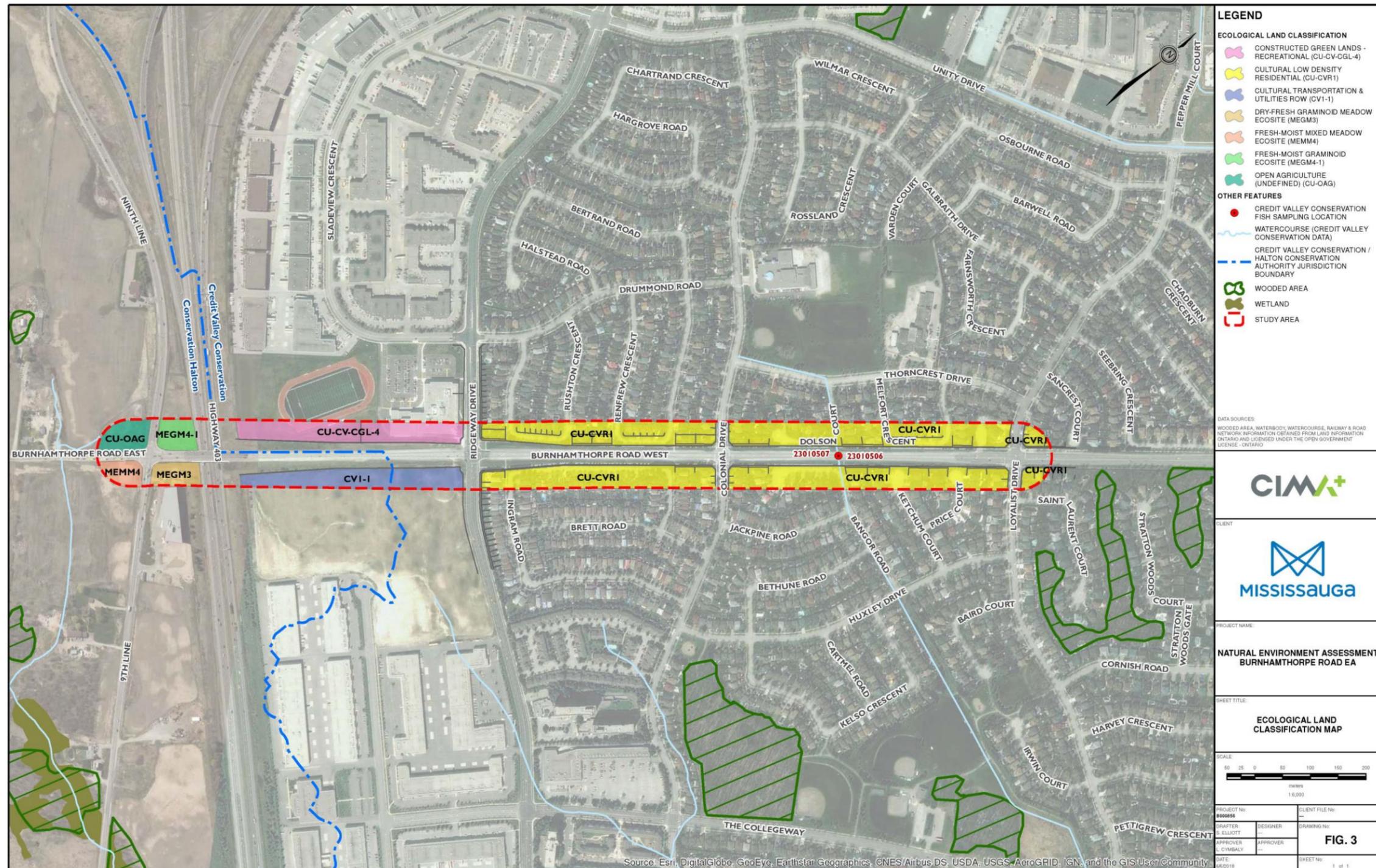


Figure 17: Ecological Land Classification Map

### 3.2.5. Wildlife

#### Mammals

The Study Area falls within Ecoregion 7E (Lake Simcoe-Rideau). Representative mammalian fauna in this region include White-tailed Deer (*Odocoileus virginianus*), Northern Raccoon (*Procyon lotor*), Striped Skunk (*Mephitis mephitis*), Virginia Opossum (*Didelphis virginiana*), and Woodchuck (*Marmota monax*). Eastern Cottontail (*Sylvilagus floridanus*), and Grey Squirrel (*Sciurus carolinensis*) was observed in the Study Area, east of Highway 403.

No other mammals were observed at the time of the site investigation, however, portions of the undeveloped meadows may be utilized by deer populations should they occur in the area.

#### Birds

A review of available bird observation data from the Ebirds Canada and Ontario Breeding Bird Atlas (OBBA) databases was completed as part of the assessment. Records for 30 species have been observed within 10 km of the Study Area (see Appendix B – Biological Inventory Lists for details). A review of MNRF records indicated the historical presence of Henslow's Sparrow (*Ammodramus henslowii*) within a 1 km radius of the Study Area (last observation record dated 1932). This observation was taken into consideration as part of the assessment.

CIMA+ observed 17 birds species throughout the duration of the field investigations which included point counts taken from the ROW across the length of the Study Area. Point counts were taken in late May 2018 in the morning hours (between 7:20 am and 9:00 am). Visual and auditory observations outside of the point count stations were also noted. The dominant species observed through visual confirmation and/or auditory calls included American Robin (*Turdus migratorius*), Rock Pigeon (*Columba livia livia*), Mourning Dove (*Zenaida macroura*), Cedar Waxwing (*Bombycilla cedrorum*), American Goldfinch (*Spinus tristis*), Northern Cardinal (*Cardinalis cardinalis*), House Finch (*Haemorhous mexicanus*), European Starling (*Sturnus vulgaris*), American Crow (*Corvus brachyrhynchos*), Red-winged Blackbird (*Agelaius phoeniceus*), and Ring-billed Gull (*Larus delawarensis*).

One American Robin nest was observed in a Manitoba Maple tree adjacent to the recreational sports field on the north side of Burnhamthorpe Road West at the west end of the Study Area. No other wildlife nests were observed in the Study Area at the time of the site investigations.

Barn Swallows (*Hirundo rustica*) were listed in the Ebirds Canada database, however, no Barn Swallows were observed (visual or auditory) in the Study Area at the time of the site investigation. Barn Swallows are known to occasionally nest in culverts. All culverts were inspected during the site investigation; no Barn Swallows or other wildlife nesting structures were observed within any of the culverts present within the Study Area.

No SAR species were observed (visual or auditory) within or adjacent to the Study Area at the time of the investigations. See Appendix B for the full species list. SAR species which have been historically recorded for the area, have been included in the SAR Screening Assessment to determine whether local habitat features may support populations at any given time of year.

#### Amphibians and Reptiles

CIMA+ biologists accessed the Ontario Reptile and Amphibians Atlas to perform a search of reptile and amphibian observations recorded within the 10 km<sup>2</sup> grid which covers the Study Area. 537 herpetofauna observation records were found, totaling 25 species, 16 species of which have been observed within the last 15 years (see full list located in Appendix B – for details). Six species of conservation concern were among the list.

One Eastern Gartersnake (*Thamnophis sirtalis sirtalis*) was observed in the field edge adjacent to the agricultural development located at the north-west corner of Burnhamthorpe Road East and Ninth Line. No other herpetofauna species were observed during the field investigation. No roadkill, carapaces, snakeskins, egg shells, tracks, nests or other evidence of turtles or snakes were observed at the time of the field investigations.

Where records of listed species at risk or species of conservation concern were observed by others (conservation authority, MNRF, wildlife atlases, etc.), they were included in the Species at Risk (SAR) Screening Assessment.

### 3.2.6. Species at Risk

A SAR Screening Assessment was completed to evaluate known SAR occurrences in the area against specific local habitat features identified during field investigations to determine the likelihood of SAR utilizing lands within or near the Study Area. Table 14 outlines the results of the assessment.

*Table 14: SAR Screening Assessment Table*

Species	Provincial Status	COSEWIC Status	Habitat Requirements	Likelihood of Occurrence	Site Area Suitability/ Observations
<b>Barn Swallow</b> <i>(Hirundo rustica)</i>	THR	THR	Terrestrial open and man-made structures. Barn Swallow nesting sites include the use of a variety of artificial structures (E.g. beams, posts, light fixtures, ledges over windows and doors) that provide either a horizontal nesting surface or a vertical face, often with some sort of overhang that provides shelter. Often nesting sites are associated with open barns, sheds, garages, and docks.	Low	No Barn Swallows were observed (visual or auditory) during field investigations. All culvert locations and posts within the ROW were inspected – no Barn Swallow nests were observed.
<b>Henslow's Sparrow</b> <i>(Ammodramus henslowii)</i>	END	END	The Henslow's Sparrow is a grassland-obligate bird; in Ontario, Henslow's Sparrow colonies have been located in abandoned fields, ungrazed and lightly grazed pasture, fallow hayfields with high clover and alfalfa content, grassy swales in open farmland, wet meadows, infrequently mowed fields, and recent reports of colonies located in tallgrass prairie systems in southwestern Ontario.	Low	The last known occurrence of Henslow's Sparrow within a 1km radius of the Study Area was recorded in July of 1932 (MNRF, 2018). No Henslow's Sparrows were observed (visual or auditory) during field investigations, however undisturbed lands associated with MEMM4 exhibit general habitat characteristics conducive for Henslow's Sparrow affinity to this area. The Project does extend into undisturbed portions of these lands (outside the ROW).
<b>Jefferson Salamander</b> <i>(Ambystoma jeffersonianum)</i>	END	END	Adult Jefferson Salamander throughout their range are found near or within deciduous or mixed upland forests containing suitable breeding ponds. These sites include limestone sinkhole ponds, kettle ponds and other natural basins.	Low/ Negligible	The last known occurrence of Jefferson Salamander within a 10 km radius of the Study Area was recorded in April of 2004 (MNRF, 2018). Habitat requirements not present within the Study Area. The presence of Jefferson Salamander within the Study Area is considered highly unlikely.

Species	Provincial Status	COSEWIC Status	Habitat Requirements	Likelihood of Occurrence	Site Area Suitability/ Observations
<b>Eastern Milksnake</b> ( <i>Lampropeltis triangulum</i> )	NAR	SC	The Eastern Milksnake is quite often found in prairies, meadows, pastures, hayfields, rock outcrops, and rocky hillsides. The Eastern Milksnake can also be found in a variety of forest types such as deciduous forests, pine plantations, bog forests, pine forests, and mixed pine-hardwoods.	Medium - Low	Recent records of Eastern Milksnake indicate observations within a 10 km radius of the Study Area in May, 2018. Habitat requirements are present though limited to areas west of Ninth Line. The presence of Milksnake east of Highway 403 is considered highly unlikely.
<b>Eastern Ribbonsnake</b> ( <i>Thamnophis sauritus</i> )	SC	SC	Eastern Ribbonsnakes are semi-aquatic and found in a variety of wetland habitats with both flowing and standing water including marshes, bogs, fens, ponds, lake shorelines and wet meadows. They are sometimes found in vernal pools and moist woods.	Low	The last known occurrence of Eastern Ribbonsnake within a 10 km radius of the Study Area was recorded in July, 1952. Some of the habitat requirements are present though limited and restricted to areas west of Ninth Line. The presence of Eastern Ribbonsnake east of Highway 403 is considered highly unlikely.
<b>Snapping Turtle</b> ( <i>Chelydra serpentina</i> )	SC	SC	Slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges and slow streams, or areas combining several types of wetland habitat.	Low	Recent records of Snapping Turtle indicate observations within a 10 km radius of the Study Area in June, 2018. Habitat requirements are present though limited to areas west of Ninth Line. If populations are present in the area, they would concentrate around the PSW near open waters as aquatic habitat conditions conducive to Snapping Turtle presence in the Study Area is limited. The presence of Snapping Turtle east of Highway 403 is considered highly unlikely.

Species	Provincial Status	COSEWIC Status	Habitat Requirements	Likelihood of Occurrence	Site Area Suitability/ Observations
<b>Blanding's Turtle</b> <i>(Emydoidea blandingii)</i>	THR	END	The Blanding's Turtle is a largely aquatic turtle that occurs in a variety of wetland habitats including lakes, permanent ponds, temporary ponds, slow flowing brooks, creeks, marshes, river sloughs, marshy meadows, man-made channels, farm fields, coastal areas and the bays of Lake Erie. In general, the preferred wetlands occupied by the Blanding's Turtle are eutrophic and are characterized by shallow water with an organic substrate and high density of aquatic vegetation. Terrestrial habitat is also important, as these turtles will travel overland more than 2.5 km to nest and will nest up to 410m from the nearest water source. Terrestrial habitat is generally upland wooded areas, consisting of mixed deciduous or coniferous forest.	Low	Recent records of Blanding's Turtle indicate observations within a 10 km radius of the Study Area in July, 2015. Habitat requirements are present though limited in extent and limited to areas west of Ninth Line. If populations are present in the area, they would concentrate around the PSW near open waters as aquatic habitat conditions conducive to Blanding's Turtle presence in the Study Area is limited. The presence of Blanding's Turtle east of Highway 403 is considered highly unlikely.
<b>Northern Map Turtle</b> <i>(Graptemys geographica)</i>	SC	SC	The Northern Map Turtle inhabits both lakes and rivers, preferring slow moving currents, muddy bottoms, and abundant aquatic vegetation. The habitat must contain suitable basking sites, such as rocks and deadheads, with an unobstructed view from which a turtle can drop immediately into the water if startled.	Low/ Negligible	Recent records of Northern Map Turtle indicate observations within a 10 km radius of the Study Area in July, 2015. Habitat requirements are not present within the Study Area.

### 3.3. Phase One Environmental Site Assessment

A Phase One Environmental Site Assessment (ESA) was conducted to determine the likelihood for the presence or absence of areas of potential environmental concern in relation to the proposed construction works where one or more contaminants of concern may have impacted the land or water on, in or under the study area. The Phase One ESA also assesses the need for Phase 2 ESA through an evaluation of the contributions of potentially contaminating activities in the study area. For the Phase One ESA, the study area extended approximately 250 metres north and south of Burnhamthorpe Road as illustrated in Figure 18. A copy of the Phase One ESA Report is available in Appendix C.



*Figure 18: Phase One ESA Study Area*

A review was conducted of the environmental, geological, and historical land use records, persons with knowledge of the property were interviewed and a site reconnaissance was undertaken. The results of the review identified 30 potentially contaminating activities (PCAs) within the study area, of which two were directly adjacent to Burnhamthorpe Road West.

The PCAs were evaluated as possible areas of potential environmental concern (APECs) in relation to the proposed construction works on the basis of the observations noted during the site reconnaissance, the location and distance of the PCA from Burnhamthorpe Road, the nature and timeframe of the activity, the quantity and nature of substances involved in the PCA, the low permeability of the underlying silty clay soils that are typical of the area, and preferential transport pathways between the PCA location and Burnhamthorpe Road. The evaluation results identified five PCAs related to the potential presence of fill materials and the historical application of pesticides that are expected to contribute to two APECs on Burnhamthorpe Road.

The potential media impacts, if any, are anticipated to consist of the shallow soil conditions since the PCAs involve surface applications of pesticides and the presence of shallow fill materials that may exist within the road allowance or within the raised embankments for the Highway 403 overpass. In addition, low permeable silty clay soils likely underlie Burnhamthorpe Road which would help minimize the vertical migration of potential contaminants, and the depth to the water-bearing layers is more than approximately 10 m below grade.

In this regard, a Phase Two ESA involving an investigation of the shallow soil conditions is recommended to address the APECs identified on Burnhamthorpe Road that may impact the planned construction activities associated with the widening of Burnhamthorpe Road West. The Phase Two ESA may be coordinated with the geotechnical investigation for the proposed road widening to obtain soil samples within the planned excavation depths for chemical analysis to address the identified APECs. If impacted soils and/or groundwater are encountered within the

proposed boreholes, further investigation involving additional soil sampling as well as groundwater sampling and testing may be required.

Although de-icing activities were not identified as a PCA since there is a proposed amendment to O. Reg. 153/04 that would exempt salt-related impacts (i.e., electrical conductivity [EC] and sodium adsorption ratio [SAR]) associated with the applications of brine/salt on municipal roads for traffic and public safety, it is recommended that certain soil samples be analyzed for these parameters if the off-site management and re-use of the soils is anticipated during construction.

### 3.4. Tree Inventory

An ISA Certified Arborist from CIMA+ conducted a tree inventory on November 13, 2017 using accepted standard arboriculture techniques as outlined in the Council of Tree and Landscape Appraisers Guide for Plant Appraisal, 9th Edition (2000). These techniques include visual examination of above ground parts of each tree, and do not include climbing, coring, dissecting, or excavating for detailed root crown inspections. As the inventory is based on visual inspection, the observations that can be made may be limited by the time of year the trees are inspected. Tree location and species were identified and each tree was numbered, with Diameter at Breast Height recorded as well as general condition and any specific observations of structural or health problems, if present. A copy of the Tree Inventory Report is available in Appendix D.

There were 223 trees included in the inventory along Burnhamthorpe Road West between Ninth Line and Loyalist Drive. The majority of the trees are Colorado Spruce (*Picea pungens*) in Good or Fair-Good condition, which means there were mostly only minor problems with structure or health with some trees at this site. The most common observation was of dieback of lower branches due to shading because the trees are growing close together. The trees provide good screening of the adjacent properties, and they should maintain this function as they are located outside of any work required for this project. All trees are located behind the existing sidewalks along Burnhamthorpe Road West. Adjacent to window streets, there are deciduous trees behind the fence that are not included in the tree inventory.

### 3.5. Illumination

The existing lighting condition along Burnhamthorpe Road has luminaires along the north side of the road from Loyalist Drive to Ridgeway Drive. Burnhamthorpe Road west of Ridgeway Drive to Ninth Line is not illuminated, however, the bridge section over Highway 403 is illuminated by the highmast lighting along Highway 403.

The luminaires are mounted on the hydro poles at 14.0m height with arm length 2.4m, and the attachment is below the secondary line. The hydro pole spacing is around 40 to 55 metres. From the proposed road design layout, most of the hydro poles will remain in place in the future. The LED fixtures CNX-LRL3-P1-2M-42-120-L-CTR-GRY have been installed by the City along the road, and the wattage of the fixture is 262W. Six free standing lighting poles are in place on the south side of the road within the study area. Three are west of the Burnhamthorpe Road and Ridgeway Drive Intersection, one is at the southwest quadrant of the intersection, and the other two with 80m spacing towards Ninth Line along the road. The other three are east of the intersection, one is at the southeast quadrant of the intersection, and the other two with 80m spacing towards Colonial Drive.

Three intersections along Burnhamthorpe Road are illuminated within the study area, the Loyalist Drive intersection, the Colonial Drive intersection, and the Ridgeway Drive intersection.

## 3.6. Cultural Environment

### 3.6.1. Archaeology

A Stage 1 Archaeological Assessment was completed for the Burnhamthorpe Road West Improvements Class EA. A copy of the report can be found in Appendix E.

The Stage 1 assessment was conducted in November 2017. The Stage 1 background assessment resulted in the identification of several features of archaeological potential within the vicinity of the study corridor. The closest and most relevant indicators of archaeological potential include a variety of secondary water sources (i.e., tributaries of the Credit River and Joshua's Creek), two historically-surveyed roadways (Burnhamthorpe Road West and Ninth Line), one church, one schoolhouse, twelve farmsteads, and one registered archaeological site. One historic community (Snider's Corners) is located adjacent to the southwestern extent of the study corridor however it is not located within the study area.

The study corridor was subject to a property inspection that consisted of a systematic visual inspection that encompassed the entirety of the study area. The property coupled with the analysis of aerial photography, satellite imagery, topographic mapping and digital environmental data, resulted in the determination that the study corridor contains no archaeological potential due to previous disturbance by past earth-moving construction activities. Since the study corridor does not contain archaeological potential, further assessment is not required.

### 3.6.2. Cultural and Built Heritage

A Cultural Heritage Resource Assessment (CHRA) was completed for the Burnhamthorpe Road West corridor within the study limits. The purpose of the assessment was to identify and evaluate the cultural heritage resources within the study area that may be impacted by improvements to Burnhamthorpe Road West. A copy of the Cultural Heritage Resources Assessment Report can be found in Appendix F. The CHRA included:

- Background research concerning the project context and historical context of the study area;
- Consultation with the City of Mississauga, Town of Oakville, and Peel Art Gallery Museum + Archives (PAMA) staff regarding heritage matters in the study area;
- Identification of any designated or recognized properties within the limits of the study area; and
- On-site inspection and photo documentation

After conducting historical research, consultation, and field survey, no cultural heritage resources were identified within the study area. Therefore, there are no concerns with respect to built heritage resources and cultural heritage landscapes related to any proposed improvements to Burnhamthorpe Road West from Loyalist Drive to the West City Limit (Ninth Line) in the City of Mississauga.

## 3.7. Drainage and Stormwater Management

A Drainage and Stormwater Management Assessment was conducted to review the existing and future drainage conditions for the study area. The Drainage and Stormwater Assessment Report is available in Appendix G.

### 3.7.1. Existing Surficial Soils

The soil within the study area consist primarily of clay loam which is classified as hydrologic soil group C. In terms of drainage this type of soil is considered to have a moderate to poor drainage capability, meaning very little rainfall in the open areas will soak into the ground, leaving most of the water as runoff. The existing soils map is provided in Figure 19.

### 3.7.2. Existing Minor Storm Sewer System

Minor storm systems for Burnhamthorpe Road West generally consist of existing swales and open ditches in the west and existing ditch inlet storm sewer system in the east. Fundamentally, these systems convey flows to four (4) different outlets:

- Outlet 1 (Highway 403): Burnhamthorpe Road West from Ninth Line to approximately 175 m west of Ridgeway Drive, is a rural cross-section with a gravel shoulder and ditching draining to the Highway 403 drainage system, ultimately discharging to Joshua's Creek tributary.
- Outlet 2 (Ridgeway Drive North): Burnhamthorpe Road West from approximately 175 m west of Ridgeway Drive to Ridgeway Drive, is a rural cross-section with a gravel shoulder and ditching draining to a ditch inlet storm sewer. Runoff from the north ditch drains to a 375 mm diameter storm sewer that runs north on Ridgeway Drive.
- Outlet 3 (Ridgeway Drive South): Burnhamthorpe Road West from approximately 175 m west of Ridgeway Drive to Ridgeway Drive, is a rural cross-section with a gravel shoulder and ditching draining to a ditch inlet storm sewer. Runoff from the south ditch drains to a 675 mm diameter storm sewer that runs south on Ridgeway Drive.
- Outlet 4 (Trunk Sewer at Bangor Road): Burnhamthorpe Road West from Ridgway Drive to Loyalist Drive is a semi-rural cross-section with a gravel shoulder and ditching. Roadway runoff drains to a ditch inlet concrete storm sewer system, ranging in size from 375 mm to 675 mm diameter, that discharges to a 2100 mm diameter trunk sewer running north / south at Bangor Road.

The trunk sewer crossing at Bangor Road ultimately drains to the Collegeway SWM facility. This trunk sewer services an external drainage area of 79.5 ha consisting of 38.4 ha of industrial lands (0.75 coefficient) and 40.7 ha of residential lands (0.5 coefficient). The time of concentration was based on External Drainage Area Plan – G10 by Proctor & Redfern Consulting Engineers plus the travel time from Ridgeway to Bangor Road. The external drainage area is shown on Figure 20.

A review of the existing storm sewer capacity leading to outlets 1 through 4 was completed utilizing the City of Mississauga Transportation and Works Department's Development Requirements Manual. This assessment was based on runoff coefficients shown on available as-built drawings and storm sewer design sheets. The existing conditions for the transportation corridor were further delineated to allow for an assessment of proposed conditions due to increased hard surface area associated with the roadway improvements. Runoff coefficients are based on City of Mississauga design standards noted on the storm sewer design sheets.

### 3.7.3. Existing Major Drainage System

Major drainage systems for Burnhamthorpe Road West generally follow the swales and open ditches to the Highway 403 drainage system in the west section and the path of the existing local and trunk sewer within the existing right of way in the east section. Fundamentally, these systems convey flows to three (3) different outlets:

- Outlet 1 (Highway 403): In the western portion of the study area, from 9th Line to 175 m west of Ridgeway Drive, overland flow is collected along the roadside ditches and conveyed towards the Highway 403 drainage system which ultimately discharges to Joshua's Creek.
- Outlet 3 (Ridgeway Drive): In the western portion of the study area, from 175 m west of Ridgeway Drive to Ridgeway Drive, overland flow is conveyed by roadside ditches to Ridgeway Drive where it flows south on Ridgeway Drive. The major flows eventually discharge to the Laird Road SWM Facility.
- Outlet 4 (Trunk Sewer at Bangor Road): In the central portion of the study area, overland flow is conveyed by roadside ditches to Bangor Road, at the historical Loyalist Creek headwater tributary that was infilled as part of the Erin Mills Subdivision, where the flows follow an overland flow route eventually discharging to the Collegeway SWM Facility at the southwest corner of the Collegeway and Winston Churchill Boulevard.

#### 3.7.4. Existing Stormwater Management Facilities

The existing Collegeway SWM facility was originally designed for quantity control for the Erin Mills subdivision in the 1980's and was retrofitted in 2016 to provide additional erosion and water quality controls. The retrofitted SWM Pond provides flow controls for the 2-year through 100-year events, a basic level of water quality treatment (60% TSS removal), and extended detention of 11.6 mm over 24 hours. The Collegeway SWM facility subsequently drains to a Loyalist Creek tributary.

The Laird Road facility is part of a two-pond system on the south branch of the Loyalist Creek and was originally designed to provide quantity control for the 2-year to 100-year storms. In 2014 to 2015 the City of Mississauga undertook a project to retrofit the existing pond, bringing up to current standards. According to as-built drawings for the project, dated August 2015, the pond has a permanent pool which indicates that it provides some level of quality control. Further analysis should be undertaken to determine the level of water quality control.



Figure 19: Existing Conditions - Soils Map



### 3.8. Utilities

The utilities in the corridor include aerial hydro, telephone, cable, storm sewer and future watermain. A brief description follows, and the existing utilities are illustrated on the Existing Utilities Plan in Appendix H.

Alectra Utilities has hydro poles located primarily on the north side of Burnhamthorpe Road West within the study limits. Hydro poles are also located on the south side of the road at intersections and intermittently along the corridor.

Peel Region has plans to complete construction for a watermain along Burnhamthorpe Road West within the study limits in December 2018. An existing storm sewer is present that was built when the road was reconstructed at the time of development.

Bell Canada has an existing conduit and buried cable on the south side of Burnhamthorpe Road. The facilities cross Burnhamthorpe intermittently.

Rogers Communications has facilities that cross Burnhamthorpe Road at Ridgeway Drive and Colonial Drive. East of Colonial Drive, the facilities are present on the south side of Burnhamthorpe Road extending past Loyalist Drive.

## 4. Alternative Solutions

Alternative solutions were identified and evaluated as part of Phase 1 and 2 of the Class EA process as there are numerous potential solutions for the improvements to Burnhamthorpe Road. Seven alternative solutions are being examined as part of this Class EA study (Table 15).

*Table 15: Alternative Solutions*

Alternative Solution	Description
<b>Alternative Solution #1</b>	<p><b>Do Nothing</b></p> <p>Burnhamthorpe Road West would remain a two-lane road between Loyalist Drive and Ninth Line. There would not be any improvement to active transportation elements or to local intersections. Level of Service would decrease over time resulting in a relative decrease in air quality due to increased congestion.</p>
<b>Alternative Solution #2</b>	<p><b>Diverting traffic or developing Transportation Demand Management (TDM) strategies</b></p> <p>Includes the promotion of the use of alternative modes of transportation including transit, cycling and walking in order to reduce vehicle volumes on Burnhamthorpe Road. TDM strategies also include measures to manage travel demand, such as carpooling and flexible work hours. These TDM strategies can be achieved through implementation of the City-wide TDM policies. TDM does not result in sufficient traffic reductions to adequately address future transportation needs. However, TDM strategies are included in the City's overall Transportation strategy and can be incorporated as part of an overall solution but TDM is not sufficient as a stand-alone solution.</p>
<b>Alternative Solution #3</b>	<p><b>Resolving the deficiency elsewhere in the network</b></p> <p>Involves improvements to roadways adjacent to the immediate study area, such as Dundas Street and Eglinton Avenue, to reduce future traffic demand on Burnhamthorpe Road West. Given the built up nature of the lands surrounding Burnhamthorpe Road, there are no opportunities for new east-west roads that would attract traffic away from Burnhamthorpe Road. Dundas Street is an existing 6-lane arterial with limited opportunity for widening. Eglinton Avenue is 4-lanes west of Winston Churchill Boulevard (WCB) and 6-lanes east of WCB and would have limited opportunities for widening.</p>
<b>Alternative Solution #4</b>	<p><b>Providing and/or improving active transportation facilities including extending the multi-use trail</b></p> <p>Implementation of new active transportation facilities on Burnhamthorpe Road West would support future traffic demands and improve accessibility for pedestrians and cyclists within the study area. Burnhamthorpe Road is identified as a proposed</p>

	primary boulevard route within the Mississauga Cycling Master Plan (September 2010) and the implementation of a multi-use trail on the north side would provide connectivity to the existing active transportation network east of the study area.
<b>Alternative Solution #5</b>	<p><b>Improving operations at localized intersections</b></p> <p>Improving traffic operations at intersections within the study area, such as the retiming of traffic signals and provision of turning lanes, would improve the overall efficiency of Burnhamthorpe Road West (i.e. maximize throughput) and the surrounding road network. The improvement of intersections as a stand-alone solution does not support the future traffic demand on Burnhamthorpe Road West and provides a marginal increase in Level of Service. However, improvements to localized intersections are incorporated in 'Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening' solution.</p>
<b>Alternative Solution #6</b>	<p><b>Improving transit operations with safe access to transit stops</b></p> <p>Between Loyalist Drive and the West City Limit, Burnhamthorpe Road West is serviced by one bus route which operates between Colonial Drive and Ridgeway Drive, and Loyalist Drive and Winston Churchill Boulevard. Implementation or improvement of transit services on Burnhamthorpe Road West and the provision of transit infrastructure including transit stops can improve transit access to the study area, however this route (or corridor) is not identified in the City's long-range transportation policies.</p>
<b>Alternative Solution #7</b>	<p><b>Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening</b></p> <p>Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening involves widening the roadway to increase capacity with additional travel lanes, to support future traffic demands and deficiencies identified in the long-range transportation policies. This solution also includes improvements to localized intersections.</p>

#### 4.1. Analysis and Evaluation of Alternative Solutions

Each of the seven (7) alternative solutions were assessed for effectiveness based on their advantages and disadvantages. The alternatives were evaluated to determine the recommended solution based on a comparison as illustrated in Table 16.

Table 16: Analysis and Evaluation of Alternative Solutions

TECHNICAL CRITERIA	Do Nothing	Traffic Diversion/ TDM	Resolving the deficiency elsewhere in the network	Providing and/or improving active transportation facilities	Improving operations at localized intersections	Improving transit operations with safe access to transit stops	Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening
<b>Transportation and Transit</b>							
<b>Level of Service (LOS)</b>	No impact.	Moderate reduction in traffic volumes. Moderate improvement to LOS.	Minor reduction in traffic volumes. Moderate improvement to LOS.	No significant impact to existing traffic volumes. No significant improvement to LOS.	Minor reduction in traffic volumes. Minor improvement to LOS.	Minor reduction in traffic volumes. Minor improvement to LOS.	Increases road capacity thus improving LOS.
<b>Traffic Safety</b>	No impact.	No opportunities for safety improvements within the study area.	No opportunities for safety improvements within the study area.	Improves safety for cyclists if separated facilities are provided.	Safety improvements at intersections can be implemented simultaneously with road infrastructure improvements.	Improves safety for pedestrians at transit stops	Safety improvements can be implemented simultaneously with road infrastructure improvements.
<b>Compatibility with Existing Network and City Planning Policies</b>	Not compatible with the City planning policies. No opportunities for corridor improvements and does not support future growth.	Included in the overall City vision as outlined in the Official Plan. Will not fully address future growth as a stand-alone solution.	May marginally decrease congestion in the study area. Will not fully address future growth as a stand-alone solution.	Burnhamthorpe Road is identified as a proposed primary boulevard route within the Mississauga Cycling Master Plan (September 2010).	May marginally decrease the congestion in the study area. Will not fully address future growth as a stand-alone solution.	May marginally decrease the number of vehicles on the roadway. Will not fully address future growth as a stand-alone solution.	Best addresses future traffic demand and identified deficiencies in keeping with the City planning policies.
<b>Summary of Transportation and Transit</b>	○	◐	◑	◒	◓	◔	●

TECHNICAL CRITERIA	Do Nothing	Traffic Diversion/ TDM	Resolving the deficiency elsewhere in the network	Providing and/or improving active transportation facilities	Improving operations at localized intersections	Improving transit operations with safe access to transit stops	Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening
<b>Natural Environment</b>							
<b>Terrestrial</b>	No impact.	No impact.	Potential to have impact on natural environment features depending on location and type of improvement.	May impact street trees adjacent to sidewalk on both sides of the roadway however all trees in corridor are along the edge of the ROW.	No impact.	No impact.	May impact street trees adjacent to sidewalk on both sides of the roadway.
<b>Fisheries/ Aquatic</b>	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.
<b>Wildlife</b>	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.
<b>Summary of Natural Environment</b>	●	●	◐	◐	●	●	◐

TECHNICAL CRITERIA	Do Nothing	Traffic Diversion/ TDM	Resolving the deficiency elsewhere in the network	Providing and/or improving active transportation facilities	Improving operations at localized intersections	Improving transit operations with safe access to transit stops	Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening
<b>Socio-Economic</b>							
<b>Land Use (Compatibility)</b>	No impact.	No direct effects or changes to existing land use.	No direct effects or changes to existing land use.	No direct effects or changes to existing land use.	No direct effects or changes to existing land use.	No direct effects or changes to existing land use.	No direct effects or changes to existing land use.
<b>Air Quality</b>	Air quality could decrease over time due to additional vehicle delays.	May result in a minor decrease in air quality impacts if traffic volumes are reduced.	May result in a minor decrease in air quality impacts if traffic volumes are reduced.	Air quality could decrease over time with additional vehicle delays.	Air quality could decrease over time with additional vehicle delays.	Air quality could decrease over time with additional vehicle delays.	Low/ negligible impact anticipated.
<b>Noise</b>	No impact.	No noise impacts anticipated.	Minor noise impacts anticipated. Mitigation will be provided if required.				
<b>Archaeology</b>	No impact.	No impact.	Potential archaeological impacts along other corridors.	No impact. The study corridor does not contain archaeological potential.	No impact. The study corridor does not contain archaeological potential.	No impact. The study corridor does not contain archaeological potential.	No impact. The study corridor does not contain archaeological potential.
<b>Cultural/Built Heritage</b>	No impact.	No impact.	Potential cultural / heritage impacts along other corridors	No impact. No cultural heritage resources are present within the study area.	No impact. No cultural heritage resources are present within the study area	No impact. No cultural heritage resources are present within the study area.	No impact. No cultural heritage resources are present within the study area.
<b>Accessibility (AODA)</b>	No impact.	No associated accessibility improvements	No associated accessibility improvements.	Improves accessibility for cyclists and pedestrians.	Potential to incorporate accessibility improvements at intersections.	May improve access to transit within the study area	Potential to incorporate accessibility improvements at intersections.
<b>Summary of Socio-Economic</b>							

TECHNICAL CRITERIA	Do Nothing	Traffic Diversion/ TDM	Resolving the deficiency elsewhere in the network	Providing and/or improving active transportation facilities	Improving operations at localized intersections	Improving transit operations with safe access to transit stops	Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening
<b>Engineering</b>							
<b>Drainage</b>	No impact.	No impact.	No impact.	Minor/no drainage impacts anticipated.	No impact	Minor/no drainage impacts anticipated.	Requires a stormwater drainage assessment to identify existing drainage concerns or issues and recommend a stormwater management plan.
<b>Utilities</b>	No impact.	No impact.	No impact.	Utility relocation may be required.	Utility relocation may be required.	Utility relocation may be required at transit stops.	Utility relocation may be required.
<b>Staging</b>	No impact.	No impact.	Minor to moderate complexity for infrastructure improvements.	Minor to moderate complexity for AT infrastructure improvements.	Minor to moderate complexity for intersection infrastructure improvements.	Minor complexity for transit infrastructure improvements.	Moderate complexity for roadway infrastructure improvements.
<b>Implementation</b>	No impact.	Requires additional studies/public engagement to implement.	Requires additional studies to implement.	Can be implemented simultaneously with other infrastructure improvements.	Requires additional analysis to implement.	Can be implemented simultaneously with other infrastructure improvements.	Requires road reconstruction. Opportunity to incorporate additional improvements simultaneously.
<b>Summary of Engineering</b>	●	●	◐	◑	◐	◑	◐
<b>Cost</b>							
<b>Cost</b>	No cost.	No cost.	High cost anticipated.	Moderate cost anticipated.	Moderate cost anticipated.	Moderate cost anticipated.	High cost anticipated.
	●	●	◑	◐	◐	◐	◑

TECHNICAL CRITERIA	Do Nothing	Traffic Diversion/ TDM	Resolving the deficiency elsewhere in the network	Providing and/or improving active transportation facilities	Improving operations at localized intersections	Improving transit operations with safe access to transit stops	Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening
<b>Summary</b>							
<b>Overall</b>	No opportunities for corridor improvements and does not support future growth.	Included in the overall City vision as outlined in the Official Plan. Will not fully address future growth as a stand-alone solution.	May marginally decrease congestion in the study area. Will not fully address future growth as a stand-alone solution.  Minor to moderate complexity for infrastructure improvements.	Burnhamthorpe Road is identified as a proposed primary boulevard route within the Mississauga Cycling Master Plan (September 2010).  Improves safety for cyclists and pedestrians if active transportation facilities are provided.  Can be implemented simultaneously with other infrastructure improvements.  Improves accessibility for cyclists and pedestrians.	May marginally decrease the congestion in the study area. Will not fully address future growth as a stand-alone solution.  Requires additional analysis to implement.	May marginally decrease the number of vehicles on the roadway. Will not fully address future growth as a stand-alone solution.  Can be implemented simultaneously with other infrastructure improvements.	Best addresses future traffic demand and identified deficiencies in keeping with the LRTP.  Safety improvements can be implemented simultaneously with road improvements.  Moderate complexity for roadway infrastructure improvements.  Potential to incorporate accessibility improvements at intersections.
<b>Recommendation</b>	 Not Carried Forward	 Carry Forward	 Not Carried Forward	 Carry Forward	 Not Carried Forward	 Not Carried Forward	 Carry Forward

In summary, three alternative solutions were carried forward for further assessment. Five alternative solutions were not carried forward.

Alternative #1 - 'Do Nothing,' is not a feasible solution as it would not address the problems and/or opportunities identified for the study corridor. Although this alternative is not feasible, it was included in the assessment as a benchmark for comparison purposes.

Implementing Alternative #2 - Travel demand management measures, does not fully address the problems and/or opportunities identified for the study corridor. This alternative however, will be carried forward in the Class EA as part of the preferred solution.

Alternative #3 - Resolving the deficiency elsewhere in the network, was also considered as an alternative solution. However, this alternative was identified in the City of Mississauga TMP and will be implemented separately as part of a city-wide transportation improvement strategy to support future travel demand. The TMP confirmed the need for improvements to Burnhamthorpe Road in addition to other roadways, and therefore any plans to improve other roadways as part of the city-wide transportation strategy does not eliminate the need to improve Burnhamthorpe Road.

Alternative #4 - Providing and/or improving active transportation facilities, does not fully address the problems and/or opportunities identified for the study corridor given the magnitude of the projected increase in traffic volumes. However, this alternative was carried forward in the Class EA as part of the preferred solution.

Alternative #5 - Improving operations at localized intersections, does not fully address the problems and/or opportunities identified for the study corridor as a stand-alone solution as it does not support the future traffic demand on Burnhamthorpe Road West and provides a marginal increase in Level of Service. This alternative was carried forward in the Class EA as part of the preferred solution as the improvement to Level of Service provides contributes to the preferred solution in conjunction with improvements through widening (Alternative #7).

Alternative #6 - Improving transit operations with safe access to transit stops, was also considered as an alternative solution. However, modifications to the transit service within the study limits is not identified in the City's long-range transportation policies. Improvements to transit infrastructure (i.e. bus shelters) will be considered as part of the 'improvements to Burnhamthorpe Road West' alternative solution.

Alternative #7 - Improvements to Burnhamthorpe Road West through widening was identified in the City of Mississauga long-range transportation policies. Further, this alternative solution was justified by the needs analysis completed during Phase 1 of this Class EA. Improving Burnhamthorpe Road West through widening combined with transportation demand management and active transportation, is the only solution among the alternatives considered that fully addresses the problems and/or opportunities identified in this study.

Based on the evaluation of alternative planning solutions, a combination of alternatives was selected as the recommended solution:

- Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening
  - Providing and/or improving active transportation facilities including extending the multi-use trail
  - Improving operations at localized intersections
- Diverting traffic or developing Transportation Demand Management strategies

## 4.2. Phase 1 and 2 Consultation

### 4.2.1. Notice of Study Commencement

The Notice of Study Commencement was prepared to inform agencies and the public of the initiation of the Class EA study. The notice was advertised in Mississauga News the on January 11 and January 18, 2018. It was mailed to approximately 1,312 landowners in the study area. Copies of the notice is provided in Appendix I.

Invitations to participate in the study were mailed to approximately 24 agency representatives. The invitations were sent with the Notice of Commencement and accompanying reply form to indicate interest in participating in the study. Copies of the invitations and agency mailing list are available in Appendix I.

### 4.2.2. Public Information Centre No.1

#### Notice of Public Information Centre No. 1

The Notice of Public Information Centre No. 1 was prepared to inform the public and agencies of the opportunity to review the project and provide input. The Notice was advertised in the Mississauga News on February 22 and March 1, 2018. The Notice was emailed or mailed to 19 agency representatives and 1,359 property owners and interested members of the public on February 22, 2018. A covering letter was provided with the Notice to agencies. A copy of the Notice, agency letters and the list of agency representatives is included in Appendix J.

The Notice of Public Information Centre No. 1 outlined the purpose of the meeting and identified the time, date, and location for the PIC. The Notice invited public comments on the study by either attending the PIC or contacting the project team.

#### Public Information Centre No. 1

The PIC was held on March 7, 2018 from 6:00 PM to 8:00 PM at the Erin Mills Twin Arena All Purpose Room (AODA accessible) at 3205 Unity Drive in the City of Mississauga. The PIC was held in an open-house format where the public was invited to review display boards, ask questions, and discuss comments with the project team. The display boards described the following:

- Welcome and Introduction
- Purpose of Public Information Centre No. 1
- Study Context and Overview
- Comment Received to Date
- Survey Results
- Municipal Class EA Process and Study Schedule
- Planning and Policy Context
  - Growth and Transportation
  - Cycling & Transit
- Existing Conditions
  - Land Use, Natural Heritage and Tree Inventory
  - Cultural Heritage
  - Transportation
- Future Conditions Without Improvements

- Problem and Opportunity Statement
- Alternative Solutions
- Evaluation Criteria
- Analysis and Evaluation of Alternative Solutions
- Preferred Alternative Solution
- Consideration of Design Concepts
- Initial Look at Design Concepts
- Next Steps

A sign-in sheet and comment sheets were provided to record attendance and obtain written comments. A copy of the PIC material is included in Appendix J. Thirty-seven (37) people signed into the PIC and twelve (12) comments were received through comment sheets and email correspondence.

The following general comments were submitted and noted by the project team during the PIC:

### **Traffic Operations and Traffic Safety**

- Desire to widen Burnhamthorpe Road and provide additional traffic lanes
- Heavy truck volumes and consideration for a by-law restricting commercial vehicles along this section of Burnhamthorpe Road
- Concerns that widening the road will lead to an increase in vehicle traffic
- Consideration for the provision of a dedicated “kiss & go” drop-off for Loyola High School or police enforcement at this location
- Excessive vehicle speeds on Burnhamthorpe Road
- Need for improved signal timing and advanced left-turns at all intersections in the study area
- Need for traffic calming along Burnhamthorpe Road (i.e. speed bumps)

### **Parking**

- Insufficient parking at Iglesia Ni Christo church resulting in cars parking along the shoulder of Burnhamthorpe Road and suggestions that a shuttle service could be considered to relocate the parking

### **Social Impacts**

- Noise concerns related to vehicle volumes and discussion regarding noise barriers

### **Transit**

- Consideration for bus pull-offs at mid-block transit stops
- Desire for an increase in transit service

### **Streetscaping and Illumination**

- Relocation of hydro poles to a buried facility and additional illumination
- Concern that the recently installed hydro poles will require relocation if Burnhamthorpe Road is widened to 4-lanes
- Desire for improved landscaping and maintenance of existing trees

### **Active Transportation and Pedestrian/Cyclist Safety**

- Request for sidewalks and multi-use path on both sides of the roadway that are accessible for wheelchairs

- Existing safety hazard for students crossing Burnhamthorpe Road via the Bangor Road sidewalk opening which can be misleading causing pedestrians to cross Burnhamthorpe Road without a pedestrian crossing
- Consideration for a dedicated pedestrian underpass at Bangor Road across to Dolson Court
- Desire for bicycle lanes
- Concerns regarding high bicycle speeds if dedicated facilities are provided

#### 4.2.3. Ministry of Transportation

Two meetings were held with the Ministry of Transportation (MTO) as part of the study. The first meeting was held on January 19, 2018 in advance of Public Information Centre No. 1. The purpose of the meeting was to introduce the study and receive feedback from MTO on the proposed cross-section over Highway 403. A copy of the minutes of meeting are available in Appendix K.

A second meeting with MTO was held during Phase 3 of the study as discussed in Section 5.5.2.

#### 4.2.4. Iglesia Ni Cristo

Two meetings were held with representatives of Iglesia Ni Cristo. The first meeting was held on April 4, 2018. The congregation currently utilizes the shoulders of Burnhamthorpe Road West within the study limits for overflow parking during services. The purpose of the meeting was to provide Iglesia Ni Cristo with an overview of the study and discuss the preferred solution as well as options regarding the parking, as the gravel shoulders along Burnhamthorpe would no longer be available if widened to 4-lanes with an urban cross-section. A copy of the minutes of meeting are available in Appendix K.

A second meeting with Iglesia Ni Cristo was held during Phase 3 of the study as discussed in Section 5.5.3.

#### 4.2.5. Indigenous Communities

At the onset of the study, the Ministry of Environment, Conservation and Parks (MECP) was contacted to confirm the list of Indigenous Communities that were identified as being potentially interested in the study. The following communities were identified and confirmed by MECP:

- Six Nations of the Grand River
- Haudenosaunee Confederacy
- Mississaugas of the New Credit First Nation
- Huron Wendat (they will be notified if artifacts are discovered through any archaeological studies completed)

The communities identified above were sent a copy of the Notice of Study Commencement and Notice of Public Information Centre No.1. Comments in response to the notice were received from Huron Wendat. A copy of the correspondence is provided in Appendix I.

### 4.3. Preferred Alternative Solution

The results of Phases 1 and 2 of the Class EA, including the recommended planning solution, was presented to agencies and the public for review and input at Public Information Centre (PIC) No. 1 (Section 4.2.2). No comments were received during or following the PIC that could not be addressed or which were not in support of the recommended solution.

Following the PIC and based on consultation with agencies and the public, the preferred planning solution was selected as a combination of the following:

- Alternative Solution # 7- Improvement of Burnhamthorpe Road West from Loyalist Drive to the West City Limit through widening
  - Providing and/or improving active transportation facilities including extending the multi-use trail
  - Improving operations at localized intersections
- Alternative Solution #2 - Diverting traffic or developing Transportation Demand Management strategies

The improvements to Burnhamthorpe Road West include:

- Widening Burnhamthorpe Road from 2-lanes to 4-lanes from Loyalist Drive to the West City Limit
- Providing multi-use trail connections
- Implementing intersection improvements to improve traffic operations

## 5. Alternative Design Concepts

### 5.1. Development of Alternative Design Concepts

In this phase of the EA process, alternative design concepts for the preferred solution, improvements to Burnhamthorpe Road through widening, were developed, analyzed and evaluated. Five (5) alternative design concepts were examined as part of this Class EA study (Figure 21 through Figure 25). Alternative Design Concept #1 - ‘Do Nothing,’ was included in the set of alternatives as a baseline measure of the effects of the other alternatives on the environment.

*Table 17: Alternative Design Concepts*

Alternative Design Concept	Description
<b>Alternative Design Concept #1</b>	<p><b>‘Do Nothing’</b></p> <p>Burnhamthorpe Road West would remain a two-lane road between Loyalist Drive and Ninth Line. There would not be any improvement to active transportation elements or to local intersections. Level of Service would decrease over time resulting in a relative decrease in air quality due to increased congestion.</p>
<b>Alternative Design Concept #2</b>	<p><b>Widen Burnhamthorpe Road West to 4 Lanes</b></p> <p>Involves widening the roadway to increase capacity with additional travel lanes, to support future traffic demands and deficiencies identified in the long-range transportation policies. This solution also includes improvements to localized intersections. The alternative includes a multi-use trail on the north side of Burnhamthorpe Road within the study limits.</p>
<b>Alternative Design Concept #3</b>	<p><b>Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side</b></p> <p>Involves widening the roadway to increase capacity with additional travel lanes, to support future traffic demands and deficiencies identified in the long-range transportation policies. This option also includes the provision of approximately 150 metres of in boulevard parking on the south of Burnhamthorpe Road west of Loyalist Drive and a multi-use trail on the north side of Burnhamthorpe Road within the study limits.</p>
<b>Alternative Design Concept #4</b>	<p><b>Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive</b></p> <p>Involves widening the roadway to increase capacity with additional travel lanes, to support future traffic demands and deficiencies identified in the long-range transportation policies. This option also includes double left turn lanes northbound at Ridgeway Drive to improve intersection operations and a multi-</p>

	use trail on the north side of Burnhamthorpe Road within the study limits.
<b>Alternative Design Concept #5</b>	<p><b>Widen Burnhamthorpe Road West to 4 Lanes with a Roundabout at Ridgeway Drive</b></p> <p>Involves widening the roadway to increase capacity with additional travel lanes, to support future traffic demands and deficiencies identified in the long-range transportation policies. This option also includes a roundabout at the intersection of Burnhamthorpe Road and Ridgeway Drive and a multi-use trail on the north side of Burnhamthorpe Road within the study limits.</p>

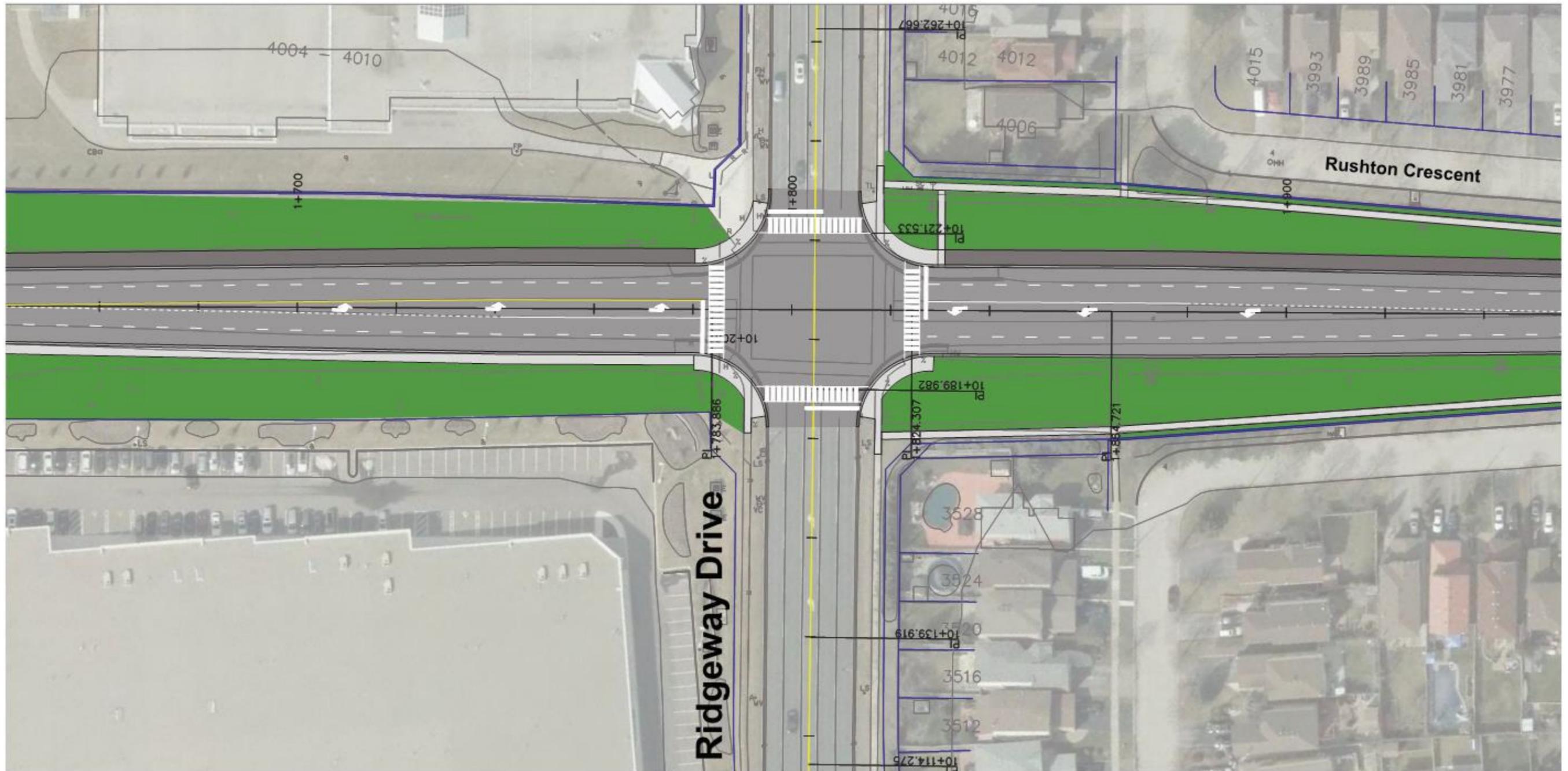


Figure 21: Alternative Design Concept #2 - Widen Burnhamthorpe Road West to 4 Lanes (No intersection Improvements at Ridgeway Drive)

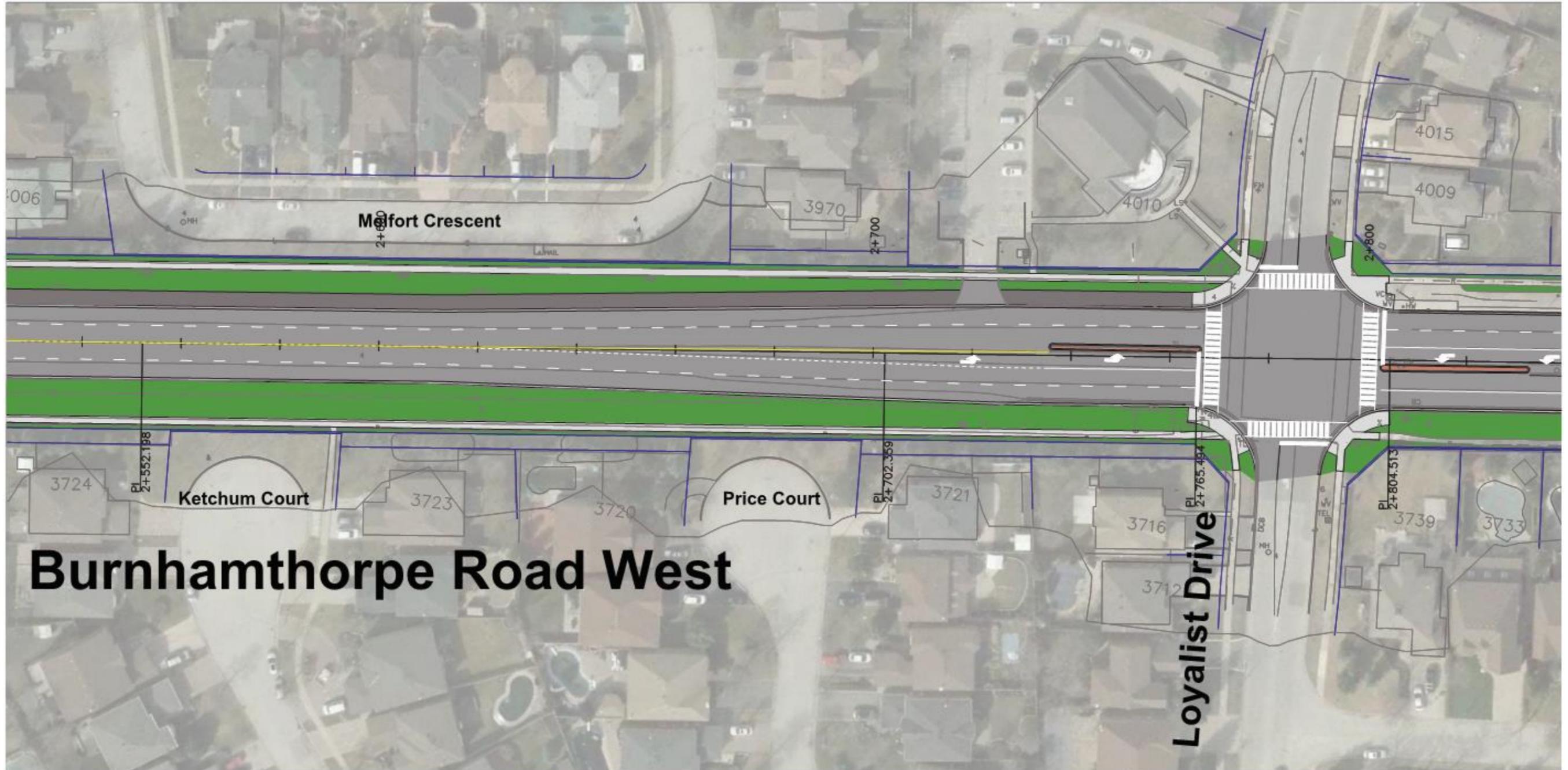


Figure 22: Alternative Design Concept #2 - Widen Burnhamthorpe Road West to 4 Lanes (No In-Boulevard Parking on the South Side)

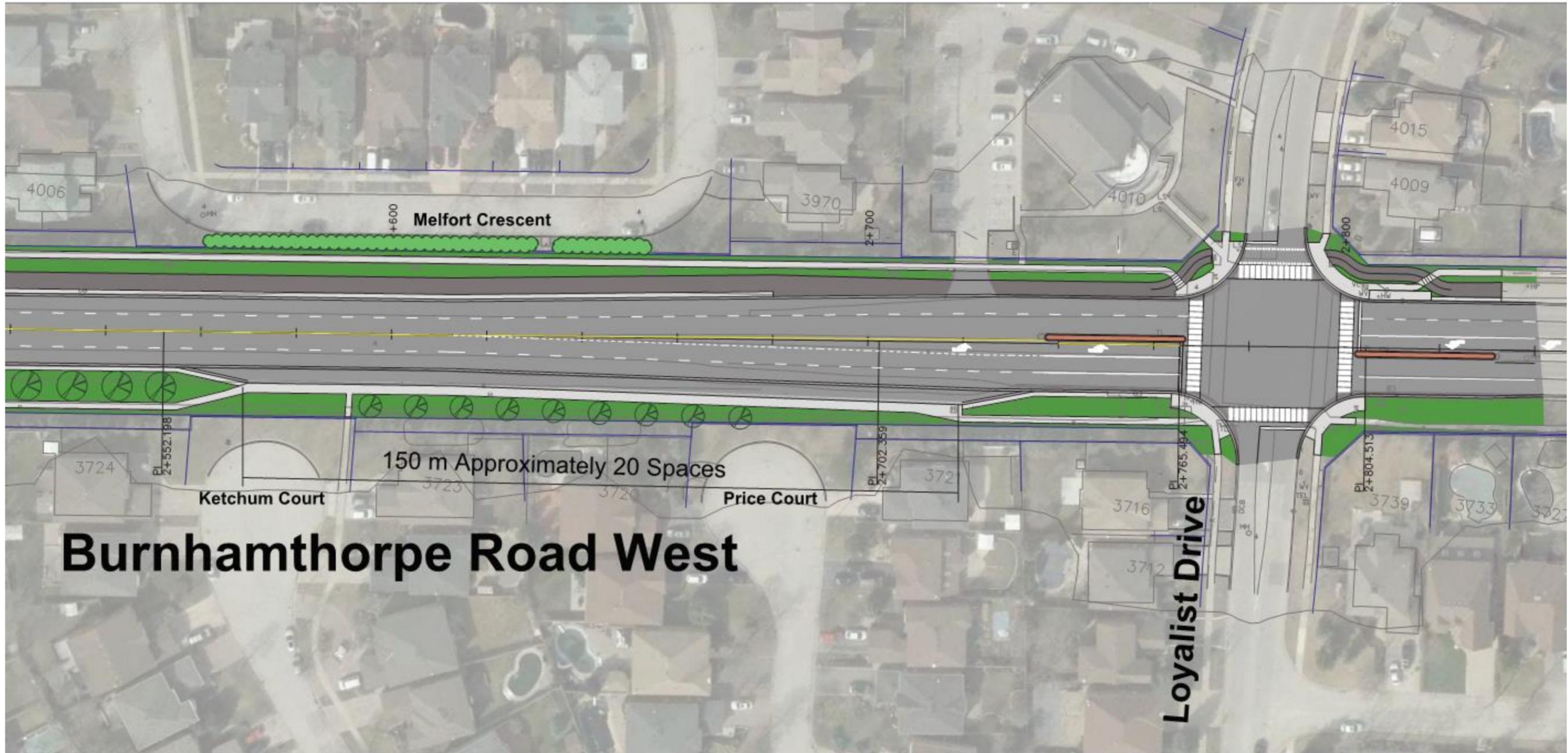


Figure 23: Alternative Design Concept #3 - Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side

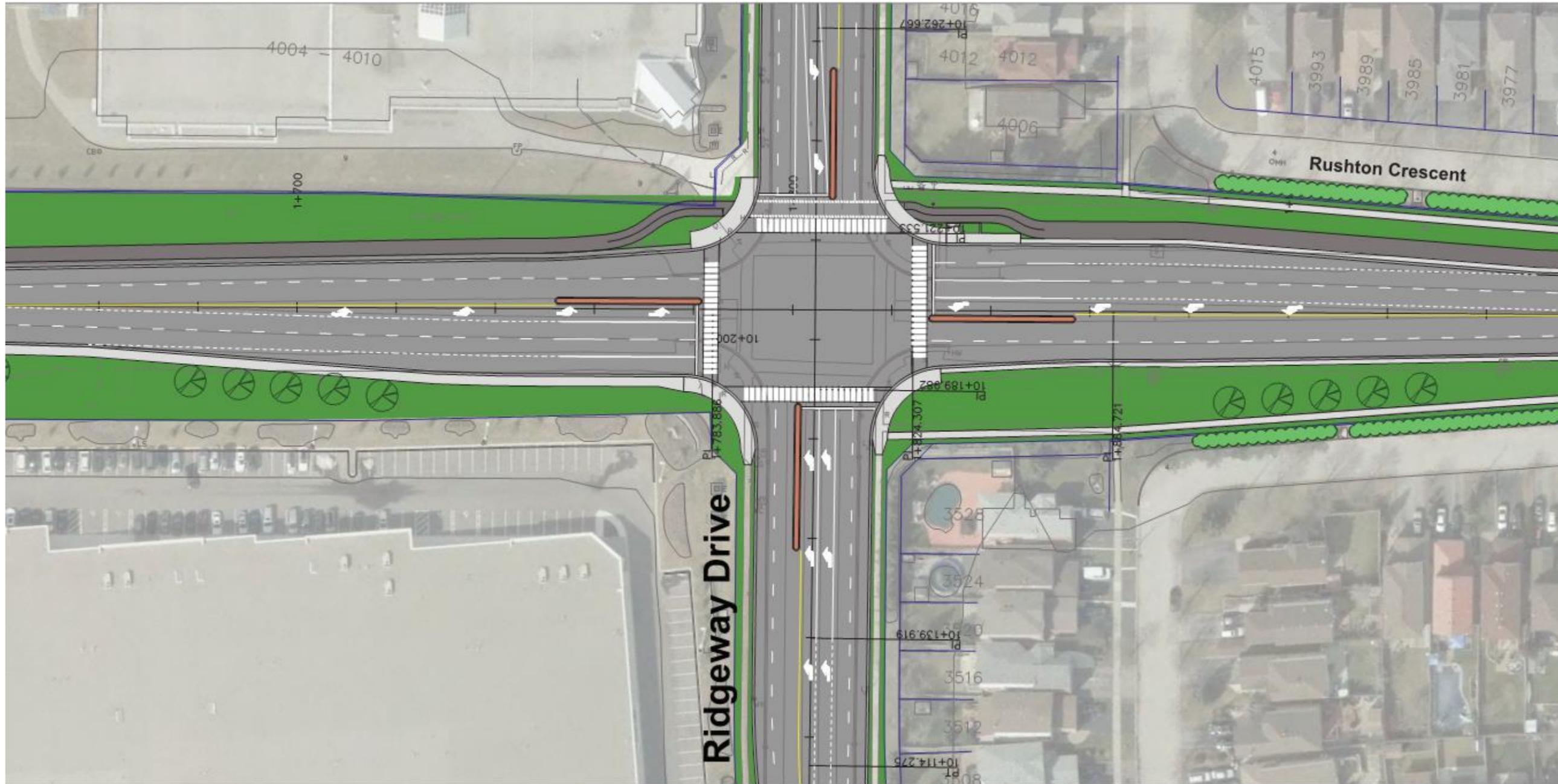


Figure 24: Alternative Design Concept #4 - Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive

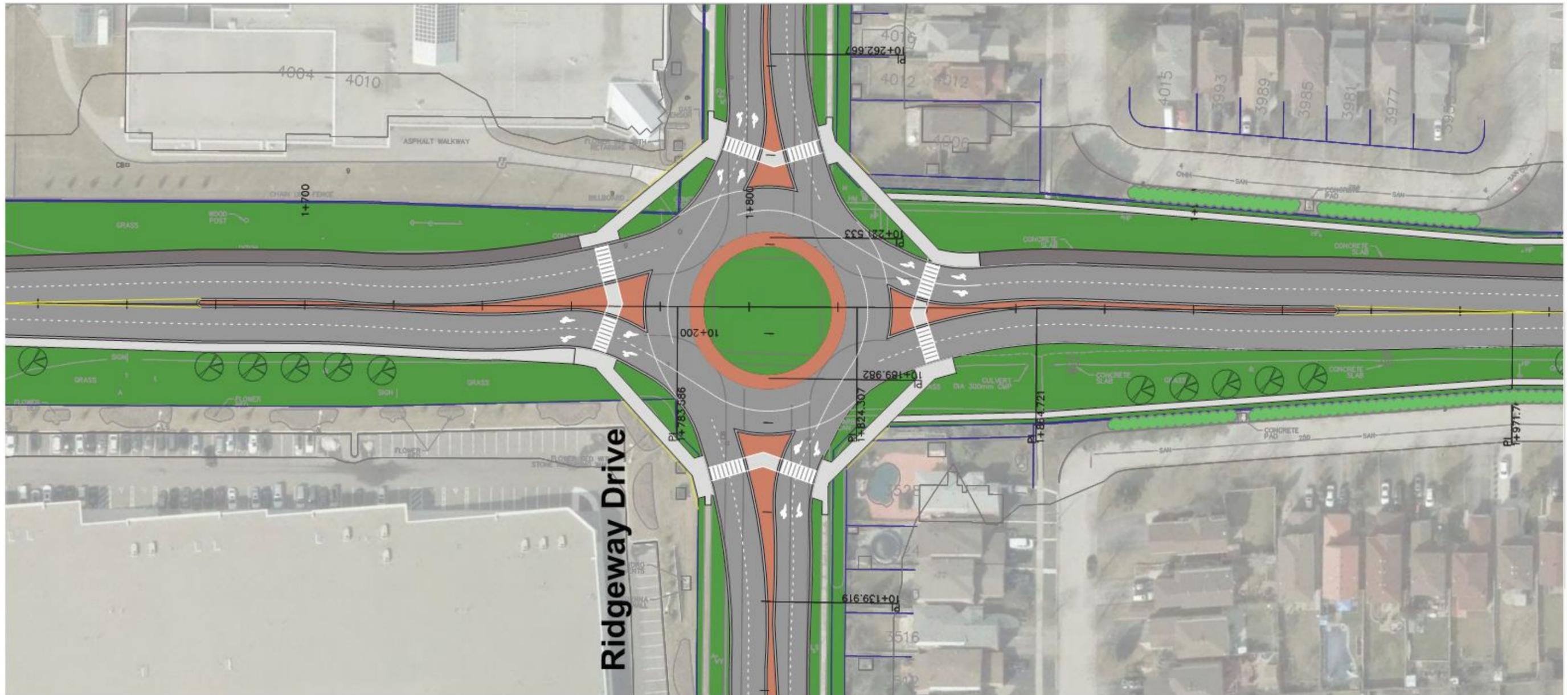


Figure 25: Alternative Design Concept #5 - Widen Burnhamthorpe Road West to 4 Lanes with a Roundabout at Ridgeway Drive

## 5.2. Analysis and Evaluation of Alternative Designs

The alternatives were evaluated to determine the recommended alternative design concept based on the factors listed in Table 18. The analysis and evaluation of alternative design concepts is provided in Table 19.

*Table 18: Evaluation Factors*

Evaluation Category	Evaluation Factor
<b>Transportation and Transit</b>	<ul style="list-style-type: none"> <li>• Level of Service (LOS)</li> <li>• Traffic Safety</li> <li>• Compatibility with Existing Network and City Planning Policies</li> </ul>
<b>Natural Environment</b>	<ul style="list-style-type: none"> <li>• Terrestrial</li> <li>• Wildlife</li> </ul>
<b>Socio-Economic</b>	<ul style="list-style-type: none"> <li>• Land Use</li> <li>• Air Quality</li> <li>• Noise</li> <li>• Archaeology</li> <li>• Cultural/ Built Heritage</li> <li>• Accessibility</li> </ul>
<b>Climate Change</b>	<ul style="list-style-type: none"> <li>• Climate Change</li> </ul>
<b>Engineering</b>	<ul style="list-style-type: none"> <li>• Drainage</li> <li>• Utilities</li> <li>• Staging</li> <li>• Implementation</li> <li>• Property Impacts</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>• Cost</li> </ul>

Table 19: Analysis and Evaluation of Alternative Designs

TECHNICAL CRITERIA	Do Nothing	Widen Burnhamthorpe Road West to 4 Lanes	Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side	Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive	Widen Burnhamthorpe Road West to 4 Lanes with a Roundabout at Ridgeway Drive
<b>Transportation</b>					
<b>Level of Service (LOS)</b>	In the 2021 horizon year, the intersection of Ridgeway Drive & Burnhamthorpe Road will operate over capacity (LOS F). During the PM peak, WB queues at Burnhamthorpe Road & Ridgeway Drive may extend to the signal at Burnhamthorpe Road & Colonial Drive.	In the 2021 horizon year, the intersection of Ridgeway Drive & Burnhamthorpe Road will operate near capacity (LOS E). During the PM peak, WB queues at Burnhamthorpe Road & Ridgeway Drive may extend to the signal at Burnhamthorpe Road & Colonial Drive.	In the 2021 horizon year, the intersection of Ridgeway Drive & Burnhamthorpe Road will operate near capacity (LOS E). During the PM peak, westbound queues at Burnhamthorpe Road & Ridgeway Drive may extend to the signal at Burnhamthorpe Road & Colonial Drive.	In the 2021 horizon year, the intersection of Ridgeway Drive & Burnhamthorpe Road will operate under capacity (LOS D).	Improves intersection operations by reducing queueing along Burnhamthorpe Road.
<b>Traffic Safety</b>	Does not address safety deficiencies identified along the study corridor.	Safety improvements can be implemented simultaneously with road infrastructure improvements.	Safety improvements can be implemented simultaneously with road infrastructure improvements. Increased risk for doorings for vehicles parking on south side of Burnhamthorpe Road.	Safety improvements can be implemented simultaneously with road infrastructure improvements.	Safety improvements can be implemented simultaneously with road infrastructure improvements. Pedestrians are required to cross 2 lanes of traffic and a PXO is required on all legs of the roundabout. High pedestrian volumes due to close proximity to a secondary school. Cyclists are required to negotiate the roundabout to cross Ridgeway Drive.
<b>Compatibility with Existing Network and City Planning Policies</b>	Not compatible with the City planning policies.	Addresses future traffic demand and identified deficiencies in keeping with City planning policies.	Addresses future traffic demand and identified deficiencies in keeping with City planning policies.	Best addresses future traffic demand and identified deficiencies in keeping with City planning policies.	Addresses future traffic demand and identified deficiencies in keeping with City planning policies.
<b>Summary of Transportation</b>	○	◐	◑	●	◔
<b>Natural Environment</b>					
<b>Terrestrial</b>	No impact.	No impact to street trees adjacent to the roadway.	No impact to street trees adjacent to the roadway.	No impact to street trees adjacent to the roadway.	Impact to street trees on the east side of the Ridgeway Drive and Burnhamthorpe Road intersection.
<b>Wildlife</b>	No impact.	No impact.	No impact.	No impact.	No impact.

Summary of Natural Environment					
<b>TECHNICAL CRITERIA</b>	<b>Do Nothing</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes with a Roundabout at Ridgeway Drive</b>
<b>Socio-Economic</b>					
<b>Land Use (Compatibility)</b>	No impact.	No direct effects or impacts to existing land uses.	No direct effects or impacts to existing land uses.	No direct effects or impacts to existing land uses.	No direct effects or impacts to existing land uses.
<b>Air Quality</b>	Air quality could decrease over time due to additional vehicle delays.	Total greenhouse gas emissions are expected to decrease in the study area due to the reduction in idling.	Total greenhouse gas emissions are expected to decrease in the study area due to the reduction in idling.	Total greenhouse gas emissions are expected to decrease in the study area due to the reduction in idling.	Total greenhouse gas emissions are expected to decrease in the study area due to the reduction in idling.
<b>Noise</b>	No impact.	Changes in sound levels are expected to be no higher than approximately 1 to 2 dBA and noise mitigation is not warranted.	Changes in sound levels are expected to be no higher than approximately 1 to 2 dBA and noise mitigation is not warranted.	Changes in sound levels are expected to be no higher than approximately 1 to 2 dBA and noise mitigation is not warranted.	Changes in sound levels are expected to be no higher than approximately 1 to 2 dBA and noise mitigation is not warranted.
<b>Archaeology</b>	No impact.	No impact. The corridor does not contain archaeological potential.	No impact. The corridor does not contain archaeological potential.	No impact. The corridor does not contain archaeological potential.	No impact. The corridor does not contain archaeological potential.
<b>Cultural/Built Heritage</b>	No impact.	No impact. No cultural heritage resources are present within the study area.	No impact. No cultural heritage resources are present within the study area.	No impact. No cultural heritage resources are present within the study area.	No impact. No cultural heritage resources are present within the study area.
<b>Accessibility (AODA)</b>	No associated accessibility improvements.	Accessibility improvements at intersections can be implemented (e.g. AODA compliant features).	Accessibility improvements at intersections can be implemented (e.g. AODA compliant features).	Accessibility improvements at intersections can be implemented (e.g. AODA compliant features).	Roundabout is less preferred for pedestrians with accessibility needs.
Summary of Socio-Economic					
<b>Climate Change</b>					
<b>Climate Change</b>	Queuing at Ridgeway Drive intersection leads to increased emissions.  No impact to landscaping and green space.  	Queuing at Ridgeway Drive intersection leads to increased emissions.  No impact to landscaping and green space.  	Queuing at Ridgeway Drive intersection leads to increased emissions.  No impact to landscaping and green space.  	Reduced queuing at Ridgeway Drive intersection leads to reduced emissions.  No impact to landscaping and green space.  	Reduced queuing at Ridgeway Drive intersection leads to reduced emissions.  Impact to street trees on the east side of the Ridgeway Drive and Burnhamthorpe Road intersection.  
<b>Engineering</b>					

<b>Drainage</b>	No impact.	No improvements to existing infrastructure are required.  Opportunities for low impact development.	No improvements to existing infrastructure are required.  Opportunities for low impact development.	No improvements to existing infrastructure are required.  Opportunities for low impact development.	No improvements to existing infrastructure are required.  Opportunities for low impact development.
<b>Utilities</b>	No impact.	May require utility relocation.			
<b>TECHNICAL CRITERIA</b>	<b>Do Nothing</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive</b>	<b>Widen Burnhamthorpe Road West to 4 Lanes with a Roundabout at Ridgeway Drive</b>
<b>Staging</b>	No impact.	Maintain traffic on one side of the road and construct the other side then shift and maintain traffic on the opposite side and build the remaining portion of the road.	Maintain traffic on one side of the road and construct the other side then shift and maintain traffic on the opposite side and build the remaining portion of the road.	Maintain traffic on one side of the road and construct the other side then shift and maintain traffic on the opposite side and build the remaining portion of the road.	Maintain traffic on one side of the road and construct the other side then shift and maintain traffic on the opposite side and build the remaining portion of the road. This staging technique will be more complicated at the roundabout.
<b>Property Impacts</b>	No impact.	Roadway improvements can be completed within the ROW.	Roadway improvements can be completed within the ROW.	Roadway improvements can be completed within the ROW.	Impacts properties on all four corners of the intersection.
<b>Summary of Engineering</b>	●	◐	◐	◐	◐
<b>Cost</b>					
<b>Cost</b>	No impact.  ●	Moderate cost for road improvements.  ◐	Moderate cost for road improvements and the provision of parking.  ◐	Higher cost than options 1 or 2 for road and intersection improvements.  ◐	Highest cost due to construction of roundabout and property impacts.  ○

TECHNICAL CRITERIA	Do Nothing	Widen Burnhamthorpe Road West to 4 Lanes	Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side	Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive	Widen Burnhamthorpe Road West to 4 Lanes with a Roundabout at Ridgeway Drive
<b>Summary</b>					
<b>Summary</b>	<p>In the 2021 horizon year, the intersection of Ridgeway Drive &amp; Burnhamthorpe Road will operate over capacity (LOS F).</p> <p>During the PM peak, westbound queues at Burnhamthorpe Road &amp; Ridgeway Drive may extend to the signal at Burnhamthorpe Road &amp; Colonial Drive.</p> <p>Does not address safety deficiencies identified along the study corridor.</p> <p>Not compatible with the City planning policies.</p> <p>No associated accessibility improvements.</p> <p>Queuing at Ridgeway Drive intersection leads to increased emissions.</p> <p>No impact to landscaping and green space</p>	<p>In the 2021 horizon year, the intersection of Ridgeway Drive &amp; Burnhamthorpe Road will operate near capacity (LOS E).</p> <p>During the PM peak, westbound queues at Burnhamthorpe Road &amp; Ridgeway Drive may extend to the signal at Burnhamthorpe Road &amp; Colonial Drive.</p> <p>Safety improvements can be implemented simultaneously with road infrastructure improvements.</p> <p>Accessibility improvements at intersections can be implemented (e.g. AODA compliant features).</p> <p>Queuing at Ridgeway Drive intersection leads to increased emissions.</p> <p>No impact to landscaping and green space.</p> <p>Moderate cost for road improvements.</p>	<p>In the 2021 horizon year, the intersection of Ridgeway Drive &amp; Burnhamthorpe Road will operate near capacity (LOS E).</p> <p>During the PM peak, westbound queues at Burnhamthorpe Road &amp; Ridgeway Drive may extend to the signal at Burnhamthorpe Road &amp; Colonial Drive.</p> <p>Safety improvements can be implemented simultaneously with road infrastructure improvements.</p> <p>Increased risk for doorings for vehicles parking on south side of Burnhamthorpe Road.</p> <p>Accessibility improvements at intersections can be implemented (e.g. AODA compliant features).</p> <p>Queuing at Ridgeway Drive intersection leads to increased emissions.</p> <p>No impact to landscaping and green space.</p> <p>Moderate cost for road improvements and the provision of parking.</p>	<p>In the 2021 horizon year, the intersection of Ridgeway Drive &amp; Burnhamthorpe Road will operate under capacity (LOS D).</p> <p>Safety improvements can be implemented simultaneously with road infrastructure improvements.</p> <p>Best addresses future traffic demand and identified deficiencies in keeping with City planning policies.</p> <p>Accessibility improvements at intersections can be implemented (e.g. AODA compliant features).</p> <p>Reduced queuing at Ridgeway Drive intersection leads to reduced emissions.</p> <p>No impact to landscaping and green space</p> <p>Higher cost than options 1 or 2 for road and intersection improvements.</p>	<p>Improves intersection operations by reducing queueing along Burnhamthorpe Road.</p> <p>Pedestrians are required to cross 2 lanes of traffic and a PXO is required on all legs of the roundabout. High pedestrian volumes due to close proximity to a secondary school.</p> <p>Cyclists are required to negotiate the roundabout to cross Ridgeway Drive.</p> <p>Impact to street trees on the east side of the Ridgeway Drive and Burnhamthorpe Road intersection.</p> <p>Roundabout is less preferred for pedestrians with accessibility needs.</p> <p>Reduced queuing at Ridgeway Drive intersection leads to reduced emissions.</p> <p>Impacts properties on all four corners of the intersection.</p> <p>Highest cost due to construction of roundabout and property impacts.</p>
<b>Recommendation</b>					

Based on the evaluation of alternative design concepts and feedback received from the public and stakeholders, Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive was selected as the preliminary preferred alternative design.

Alternative Design Concept #1 – ‘Do Nothing’, is was not selected as the recommended alternative design concept as the future traffic demand and safety deficiencies within the study area are not addressed.

Both Alternative Design Concept #2 - Widen Burnhamthorpe Road West to 4 Lanes and Alternative Design Concept #3 - Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side, address some of the operational and safety deficiencies within the study area however, during the PM peak, westbound queues at Burnhamthorpe Road & Ridgeway Drive may extend to the signal at Burnhamthorpe Road & Colonial Drive.

Alternative Design Concept #3 - Widen Burnhamthorpe Road West to 4 Lanes with In-Boulevard Parking on the South Side provides on-road parking to accommodate vehicles that currently park on the shoulder of Burnhamthorpe Road. The on-road parking has been carried forward to the preferred design concept (to be revisited during detailed design).

Alternative Design Concept #5- Widen Burnhamthorpe Road West to 4 Lanes with a Roundabout at Ridgeway Drive, addresses the future traffic demand and safety deficiencies within the study area, including the queuing at the intersection of Ridgeway Drive and Burnhamthorpe Road. The implementation of a roundabout would have impacts to properties on all four corners of the intersection and has the highest cost compared to other alternative design concepts. Pedestrians would also be required to cross two lanes of traffic and a PXO is required on all legs of the roundabout.

Alternative Design Concept #4 - Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive, addresses future traffic demand and safety deficiencies within the study area, including the queuing at the intersection of Ridgeway Drive and Burnhamthorpe Road. There are no impacts to private property or green space associated with this design concept. Therefore, Alternative Design Concept #4 was identified as the preferred alternative.

### 5.3. Technically Preferred Alternative Design

Based on the evaluation of alternative design concepts, Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive and in-boulevard parking on the south side was selected as the preliminary preferred alternative design, subject to agency and public review. Elements of the Preferred Alternative include:

- Widening to 4-thorough lanes within the existing right-of-way
- Sidewalks on both sides of the road
- A multi-use trail on the north side
- Approximately 150 metres of in-boulevard parking on the south of Burnhamthorpe Road west of Loyalist Drive (to be revisited at detailed design)
- No significant structural impacts to the Highway 403 Bridge
- No impacts to street trees adjacent to the roadway
- Intersection design compliance with Accessibility for Ontarians with Disabilities Act (AODA)
- Improvements at local intersections without impacting property
- Intersection improvements at Ridgeway Drive & Burnhamthorpe Road
- Enhanced landscaping features

## 5.4. Highway 403 Structure Alternative Cross-Sections

As discussed in Sections 4.2.3 and 5.5.2, three meetings with MTO were held to discuss the Highway 403 structure cross-section and receive MTO's feedback. Ongoing correspondence was conducted between the Project Team and MTO to ensure MTO feedback and concerns were addressed and incorporated into the cross-section.

At the initial stage of considering options, a widening of the existing bridge or a pedestrian only structure was discussed at a Project Team meeting and it was determined that options would be developed that would not require significant changes to the existing structure because of economic considerations.

Four alternative cross-section were presented to MTO at the second meeting on June 12, 2018. The cross-sections are presented in Figure 26 through Figure 29 below. All of the options presented were flush with the travel lanes, lane widths of 3.5m and 3.25m were considered, the width of the multi-use path ranged from 2.0m to 3.0m, and there was variation in the buffer / shoulder width.

MTO provided the following direction to the project team regarding the requirements of the structure cross-section (see meeting minutes in Appendix K):

- Based on a 70 km/h design speed, the minimum required lane width is 3.3 metres.
- The multi-use trail could be raised and reduced to 2.8 metres and a visual barrier (i.e. bollards) can be provided in the remaining 0.2 metres.

Based on these comments Options 3 and 4 would not meet the requirement for minimum lane width, and all of the options would not meet the requirement for a raised platform. Therefore, following meeting #2, MTO comments were taken into consideration and a revised recommended cross-section presented at PIC #2 (Figure 31) was developed. This option provides a raised platform, has lane widths that meet the suggested minimum, provides a 1.0m shoulder for the sidewalk and provides a 2.90 m platform for the multi-use trail.

**OPTION 1 CROSS SECTION**  
1.0M SHOULDER/ BUFFER  
3.5M LANE WIDTH  
FLUSH MULTI-USE TRAIL

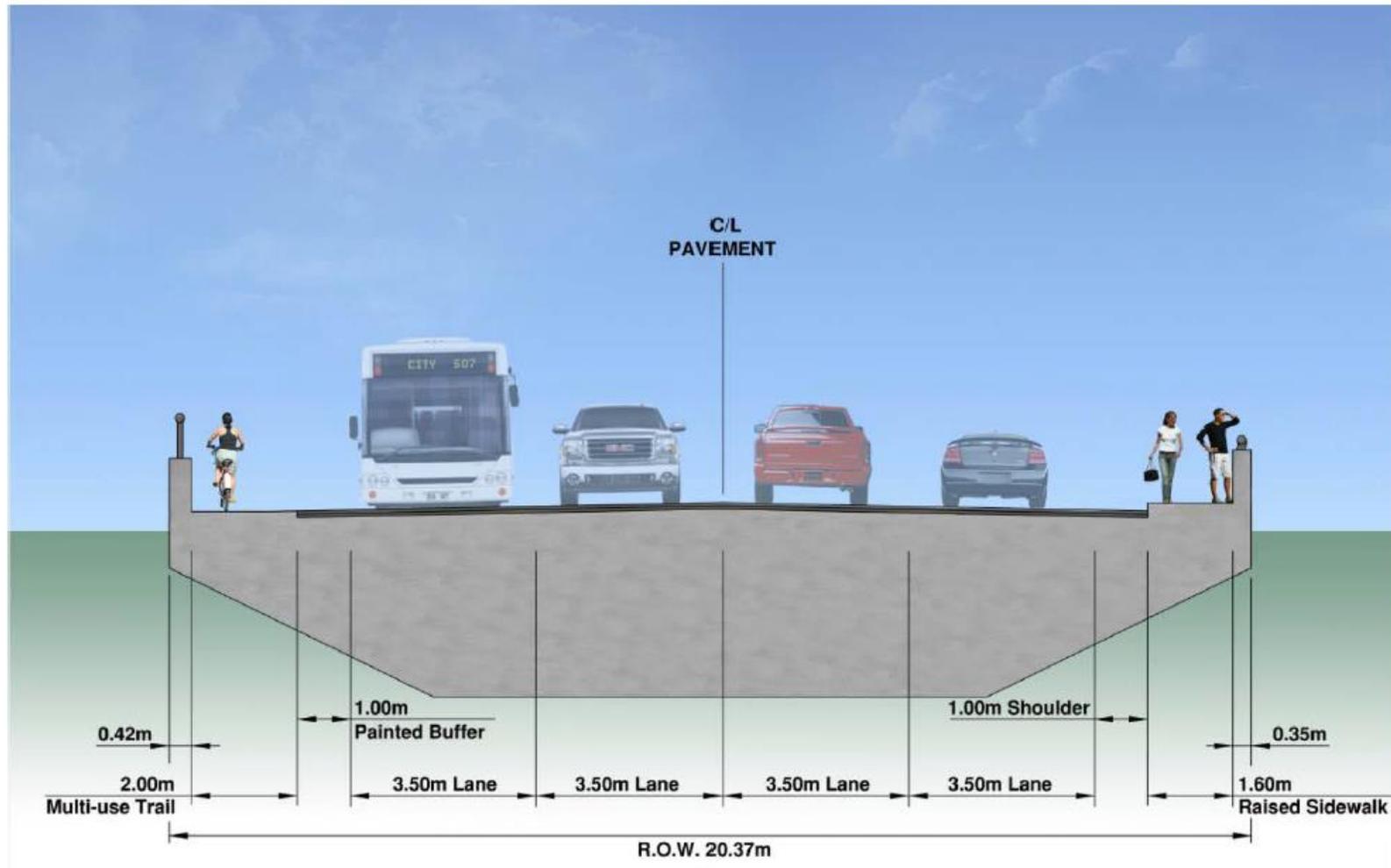


Figure 26: Option 1 Cross-Section

**OPTION 2 CROSS SECTION**  
0.5M SHOULDER/ BUFFER  
3.5M LANE WIDTH  
FLUSH MULTI-USE TRAIL

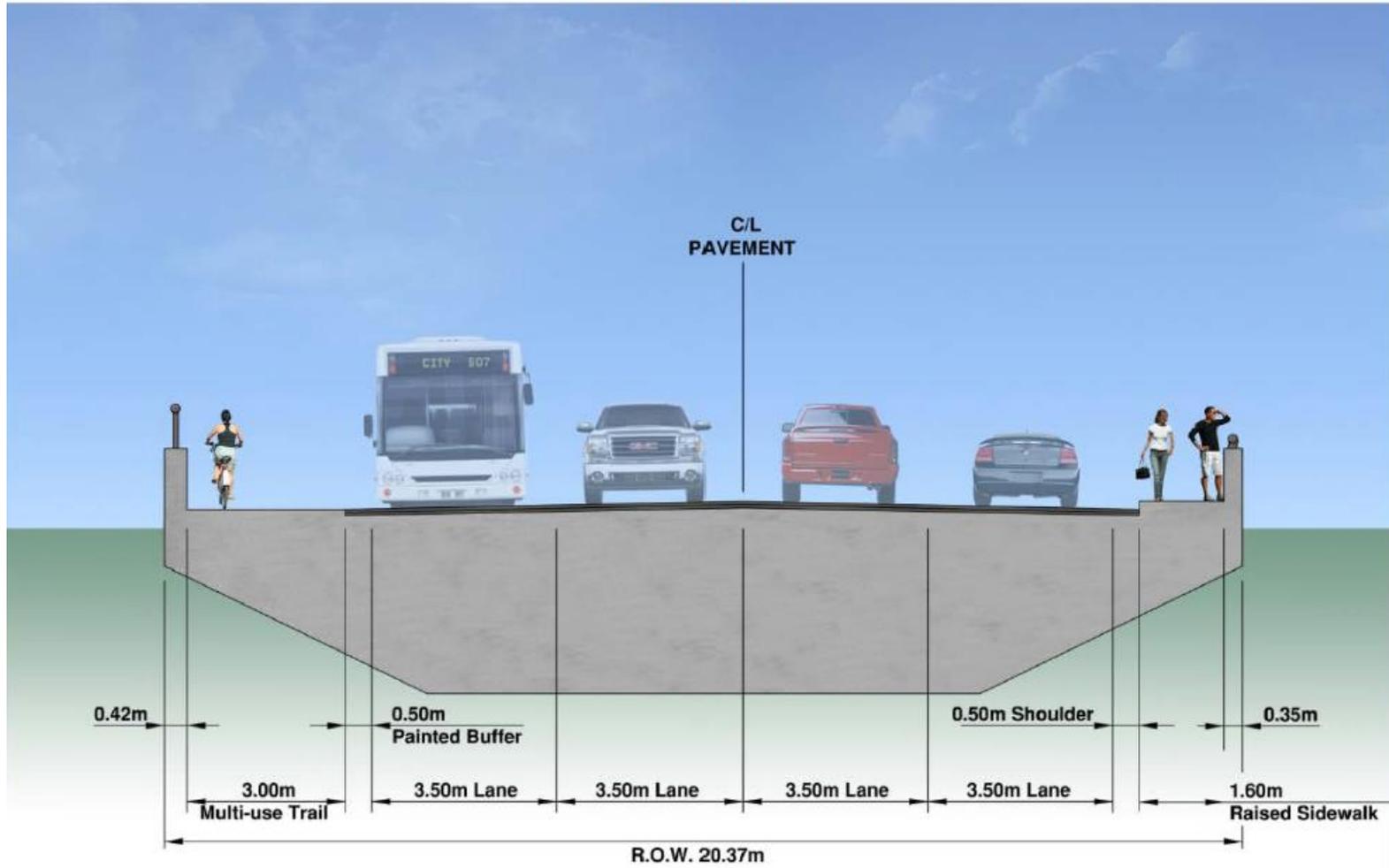


Figure 27: Option 2 - Cross-Section

**OPTION 3 CROSS SECTION**  
1.0M SHOULDER/ 0.5M BUFFER  
3.25M INSIDE LANE WIDTH  
FLUSH MULTI-USE TRAIL

NOTE: 3.25M LANE COULD BE FOR SECTION FROM RIDGEWAY DRIVE TO NINTH LINE

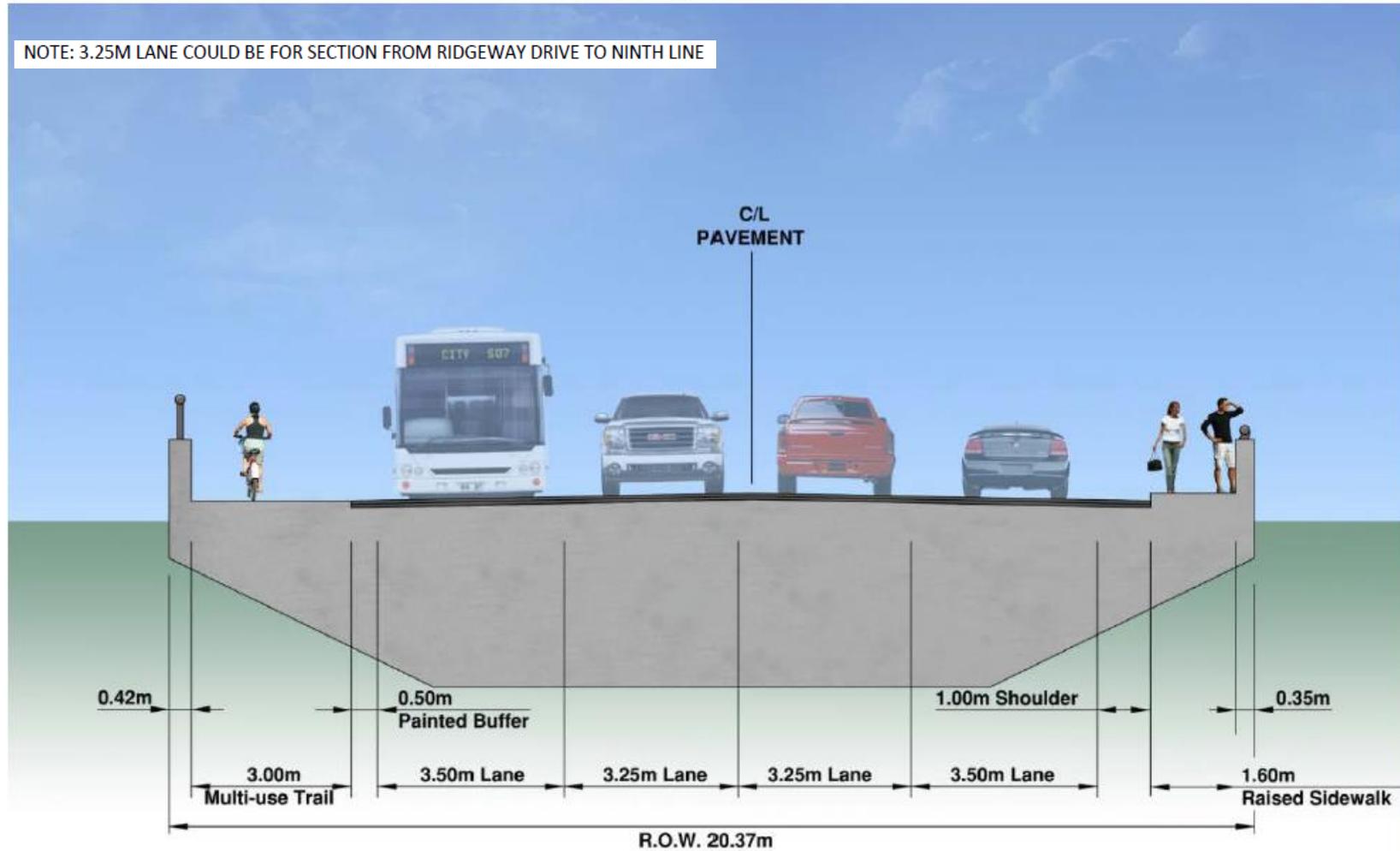


Figure 28: Option 3 - Cross-Section

**OPTION 4 CROSS SECTION**  
 0.5M SHOULDER/ BUFFER  
 3.25M INSIDE LANE WIDTH  
 FLUSH MULTI-USE TRAIL

NOTE: 3.25M LANE COULD BE FOR SECTION FROM RIDGEWAY DRIVE TO NINTH LINE

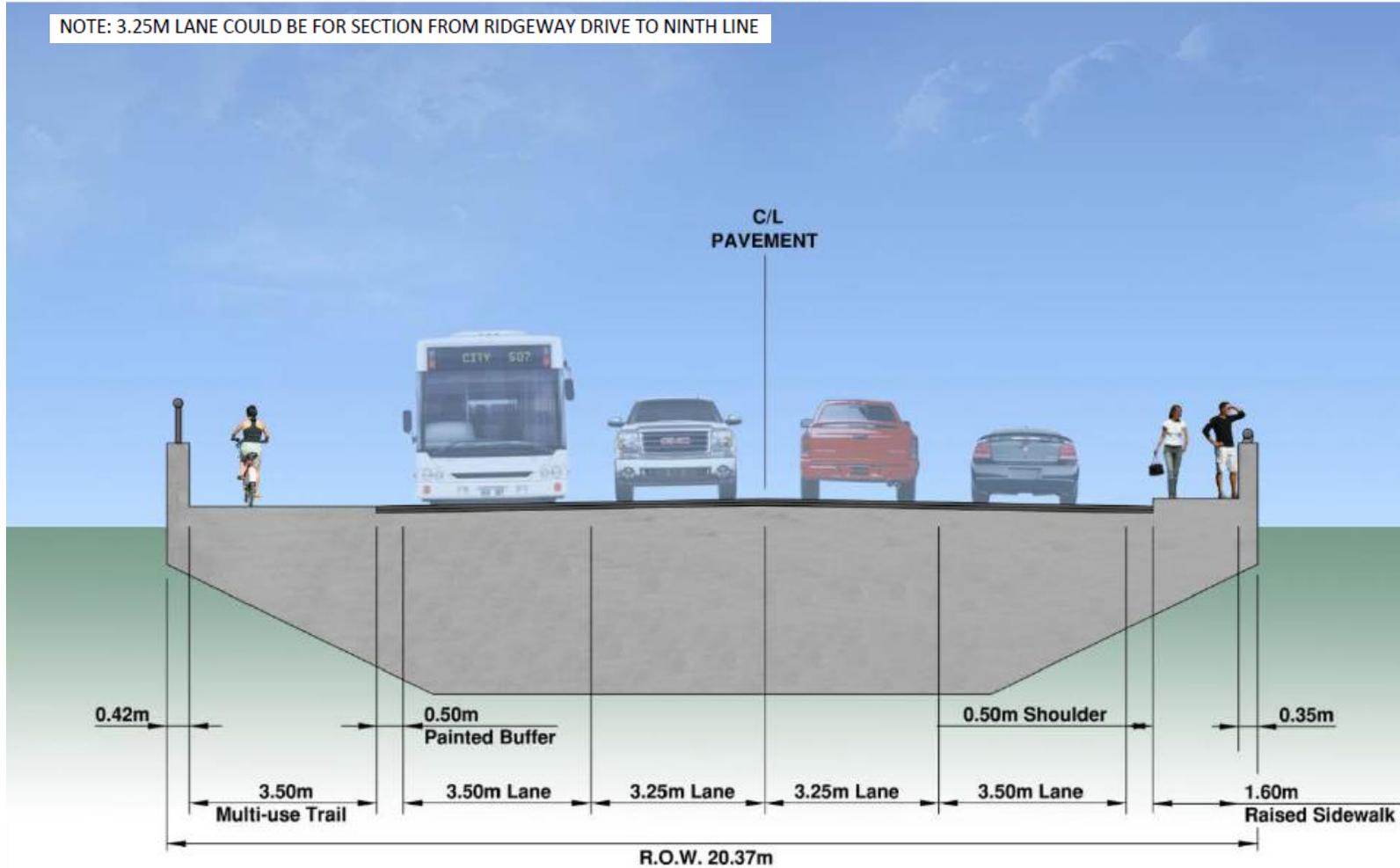


Figure 29: Option 4 - Cross-Section

Following PIC #2 and ongoing consultation with MTO, further revisions to the cross-section were made. MTO expressed a preference to maintain the 3.5m travel lanes consistent with the cross-section of Burnhamthorpe Road to the east and to maintain the multi-use trail on the north side. Based on structural concerns regarding crash testing a modified barrier wall, a full replacement of the north barrier wall was noted to be preferable. Based on feedback received from MTO Senior Management, the recommended cross-section for the structure over Highway 403 was confirmed to include the following:

- A 0.3m limited widening of the structure (in conjunction with the parapet wall replacement)
- A new parapet wall on the north side with a bicycle height railing
- A new 3.17 raised multi-use trail on the north side
- 0.5 m painted buffer on the north side
- 3.5 m travel lanes
- 1.6 m raised sidewalk on the south side
- 0.7 m shoulder on the south side

The recommended cross-section for the Highway 403 structure is illustrated in Figure 31 in Section 6.1.3.

## 5.5. Phase 3 Consultation

### 5.5.1. Public Information Centre #2

#### Notice of Public Information Centre No.2

The Notice of Public Information Centre No. 2 was prepared to inform the public and agencies of the opportunity to review and provide comments on the alternative design concepts and the preliminary preferred design. The Notice was advertised in the Mississauga News on June 7 and 14, 2018. The Notice was emailed or mailed to 19 agency representatives and 1,332 property owners and interested members of the public on June 6, 2018. A covering letter was provided with the Notice to agencies. A copy of the Notice, agency letters and the list of agency representatives is included in Appendix M.

The Notice of Public Information Centre No. 2 outlined the purpose of the meeting and identified the time, date, and location for the PIC. The Notice invited public comments on the study by either attending the PIC or contacting the project team.

#### Public Information Centre No. 2

The PIC was held on June 19, 2018 from 6:00 PM to 8:00 PM at the South Common Community Centre Arbour Green Room (AODA accessible) at 2233 South Millway in the City of Mississauga. The PIC was held in an open-house format where the public was invited to review display boards, ask questions, and discuss comments with the project team. The display boards described the following:

- Welcome and Introduction
- Purpose of Public Information Centre No. 2
- Study Context and Overview
- Municipal Class EA Process and Study Schedule
- Summary of Public Information Centre No. 1
- Existing Conditions

- Land Use, Natural Heritage and Tree Inventory
- Cultural Heritage
- Transportation
- Future Conditions Without Improvements
- Recommended Planning Solution
- Future Conditions
  - Noise
  - Air Quality
  - Stormwater Management
- Alternative Design Concepts
  - Typical Cross-Section
  - Typical Cross-Section with In Boulevard Parking
- Evaluation Criteria
- Analysis and Evaluation of Alternative Design Concepts
- Preliminary Preferred Alternative Design
- Ridgeway Drive and Burnhamthorpe Road Intersection
- Typical Cross-Section Over Highway 403
- Enhanced Landscaping Features
- Next Steps

A sign-in sheet and comment sheets were provided to record attendance and obtain written comments. A copy of the PIC material is included in Appendix M. Twenty (20) people signed into the PIC and ten (10) comments were received through comment sheets and emails. A copy of the PIC display boards was also available on City's website.

The following general comments were submitted and noted by the project team during the PIC:

- Desire for improved signal timing along the corridor.
- Support for a buffer between the multi-use path and travel lanes.
- Concern regarding vehicles stopping on the road in non-designated areas near Loyola High School to drop students off.
- Support for not carrying forward the roundabout at Ridgeway Drive.
- Support for intersection improvements at Ridgeway Drive.
- Concerns regarding noise levels and preference for natural solutions (i.e. landscaping) rather than noise walls.
- Desire for noise attenuation.
- Request for a truck prohibition within the study limits.
- Request for a pedestrian crossing at the Dolson Court opening and traffic calming.
- Support for additional landscaping.
- Desire for a 50 km/h speed limit because of the proximity to the school.
- Support for the in-boulevard parking on Burnhamthorpe Road.
- Request for the in-boulevard parking to be provided on the north side.
- Opposition to the widening of Burnhamthorpe Road.
- Opposition to the in-boulevard parking on Burnhamthorpe Road.

### 5.5.2. Ministry of Transportation

A second meeting with the Ministry of Transportation (MTO) was held on June 12, 2018. The purpose of the meeting was to discuss the proposed Highway 403 structure cross-section and receive MTO's feedback.

Following ongoing correspondence and coordination with the MTO project team, a meeting with MTO Senior Management was held on June 24, 2019 to receive final sign-off on the recommended cross-section for the Highway 403 structure. The MTO approved cross-section is discussed in Sections 5.4 and 6.1.3.

A copy of the meeting minutes from both meetings with MTO are available in Appendix K.

### 5.5.3. Iglesia Ni Cristo

A second meeting with representatives of Iglesia Ni Cristo was held on June 8, 2018 to provide an overview of the preliminary recommended plan to be presented at PIC No. 2. The recommended plan included in-boulevard parking on the south side of Burnhamthorpe Road west of Loyalist Drive. A copy of the minutes of meeting are available in Appendix K.

### 5.5.4. Halton Region

A meeting with Halton Region was held on June 13, 2018 to provide an overview of the preliminary recommended alternative and discuss the approved roundabout at Ninth Line (Halton Region project). A copy of the minutes of meeting are available in Appendix K.

### 5.5.5. Indigenous Communities

The following Indigenous Communities were contacted during Phase 3 of the study with a copy of the Notice of Public Information Centre No.2:

- Six Nations of the Grand River
- Haudenosaunee Confederacy
- Mississaugas of the New Credit First Nation
- Huron Wendat

No comments were received from the Indigenous Communities in response to the Notice of Public Information Centre No. 2.

## 5.6. Preferred Design Concept

The results of Phases 3 of the Class EA, including the preliminary preferred design, was presented to agencies and the public for review and input at Public Information Centre (PIC) No. 2 (Section 5.5.1). No comments were received during or following the PIC that could not be addressed or which were not in support of the recommended solution.

During Phase 4, the study recommendations were taken to City of Mississauga Council for endorsement. At the meeting Council advised to remove the in-boulevard parking on the south side of Burnhamthorpe Road from the preferred design concept for the EA. Instead, a separate independent parking study will be undertaken by the City of Mississauga to assess possible alternatives to the parking concerns raised by Iglesia Ni Cristo Church and local residents.

Therefore, the preferred design concept for the study is to Widen Burnhamthorpe Road West to 4 Lanes with Intersection Improvements at Ridgeway Drive. Elements of the Preliminary Preferred Alternative include:

- Widening to 4-thorough lanes
- Sidewalks on both sides of the road
- A multi-use trail on the north side
- No significant structural impacts to the Highway 403 Bridge
- No impacts to street trees adjacent to the roadway
- Intersection design compliance with Accessibility for Ontarians with Disabilities Act (AODA)
- Improvements at local intersections without impacting property
- Intersection improvements at Ridgeway Drive & Burnhamthorpe Road
- Enhanced landscaping features
- A noise assessment was completed and no additional noise barriers are recommended at this time

## 6. Description of the Recommended Plan

The main features of the recommended plan for the Burnhamthorpe Road West Improvements are discussed in Section 6. While refinements to the recommended plan may occur during detailed design, any modifications should not alter the function of the recommended undertaking.

Drawings for the preferred design are provided in Appendix N. The recommended undertaking includes the following:

- Widening to 4-through lanes
- Sidewalks on both sides of the road
- A multi-use trail on the north side
- Intersection improvements at Ridgeway Drive and Burnhamthorpe Road
- Intersection design compliance with Accessibility for Ontarians with Disabilities Act (AODA)
- Full illumination
- Enhanced landscaping features

### 6.1. Roadway Geometry

#### 6.1.1. Design Criteria

Currently, Burnhamthorpe Road West is a rural arterial road with a posted speed limit of 60 km/h. Between Ninth Line (west City limit) and Loyalist Drive, Burnhamthorpe Road West consists of a 2-lane road cross-section. Once the improvements have been implemented, Burnhamthorpe Road West will be a 4-lane roadway within the study limits (consistent with Burnhamthorpe Road West East of Loyalist Drive). The designated right-of-way (R.O.W.) within the study limits is 35 metres. The design criteria used in the development of the preferred design is provided in Table 20.

*Table 20: Design Criteria*

Criteria Design	Standard	Proposed
<b>Design Speed</b>	70 km/h	70 km/h
<b>Minimum Horizontal Radius</b>	190 m	190 m
<b>Minimum Vertical Curve</b>	K <sub>crest</sub> curve – 25	K <sub>crest</sub> curve – 25
	K <sub>sag</sub> curve – 25	K <sub>sag</sub> curve – 25
<b>Maximum Vertical Grade</b>	5%	2.9%
<b>Minimum Vertical Grade</b>	0.5%	0.5%
<b>Right of Way</b>	35 m	35 m
<b>Cross Section / Lane Width</b>	3.5 m	3.5 m
<b>Provision for Pedestrians and Cyclists (General)</b>	<b>Sidewalk:</b> 1.5 m <b>Multi-use Trail:</b> 3.0 m (minimum) 4.0 (desired)	<b>Sidewalk:</b> 1.5 m on both sides <b>Multi-use Trail:</b> 3.5 m on north side
<b>Provision for Pedestrians and Cyclists – Highway 403 Structure</b>	<b>Sidewalk:</b> 1.5 m <b>Bicycle Path:</b> 2.4 m (minimum in constrained corridors) + 0.3 m buffer from vertical obstacles 4.0 (desired)	<b>Sidewalk:</b> 1.605m on south side, <b>Bicycle Path:</b> 2.9 m on north side

### 6.1.2. Profile and Alignment

The proposed vertical alignment of Burnhamthorpe Road West is generally consistent with the existing road profile. The minimum grade is 0.5% located from station 2+507 to 2+693 and station 2+743 to 2+890. The maximum grade is 2.93% located from station 1+215 to 1+311.

### 6.1.3. Typical Cross Sections

The typical cross-section for the recommended plan is illustrated in Figure 30. The features provided in the typical cross-section include the following:

- 35 metre right-of-way
- 4 lanes (2 lanes in each direction)

- 1.5 metre sidewalks on both sides
- 3.5m multi-use trail on the north side
- 1.0 metre splash strip on the north side

In areas where the right-of-way is constrained (i.e. intersections), the cross-section has been modified in order to avoid impacts to private property.

As discussed in Section 1.2, there is one Highway 403 crossing within the study limits. The recommended typical cross-section for the Highway 403 crossing is illustrated in Figure 31. The existing right-of-way across the structure is 20.37 metres. A 0.3 metre limited widening of the structure is recommended in conjunction with the replacement of the north parapet wall to provide additional right-of-way for the active transportation elements.

The recommended cross-section was developed in consultation with the Ministry of Transportation as discussed in Section 4.2.3 and Section 5.5.2.

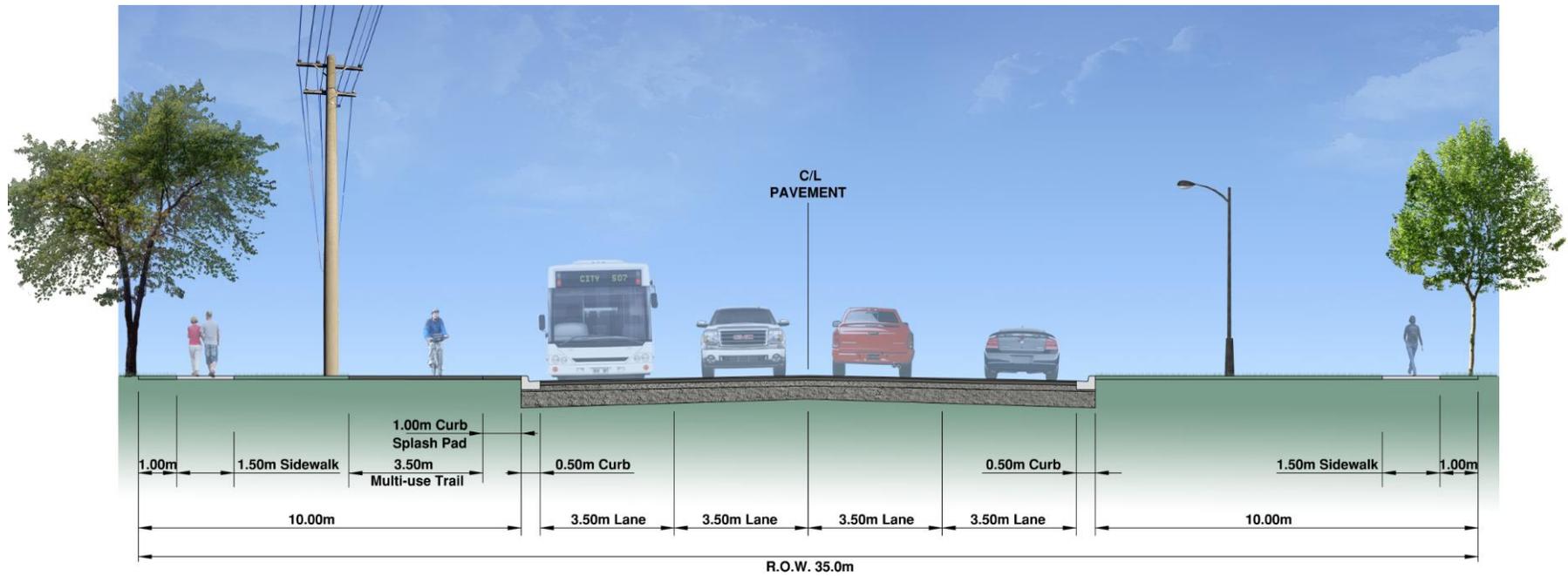


Figure 30: Typical Cross-Section

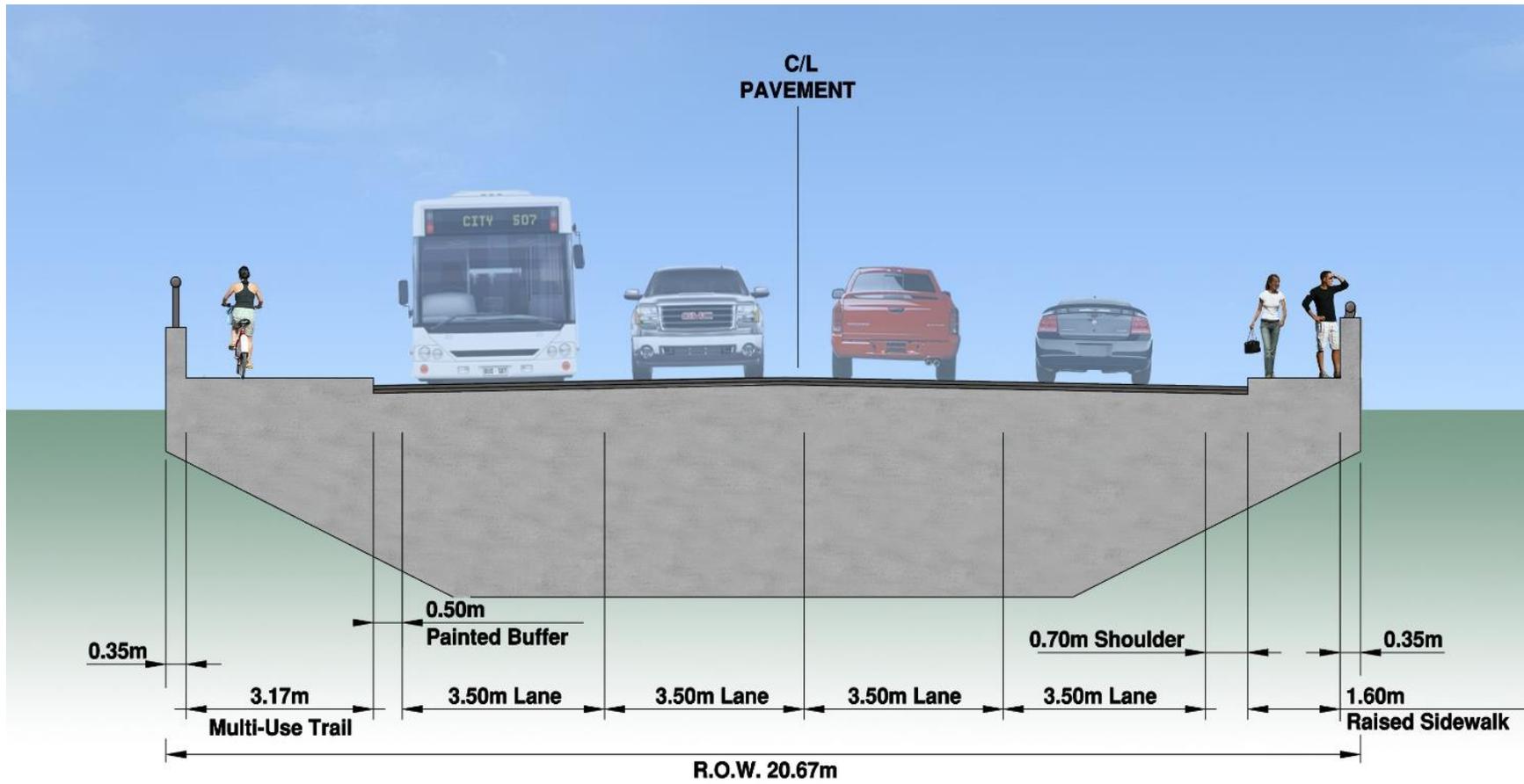


Figure 31: Typical Cross-Section - Highway 403 Crossing

#### 6.1.4. Active Transportation

A continuous 3.5 metre multi-use trail (MUT) is recommended on the north side of Burnhamthorpe Road consistent with the existing section of Burnhamthorpe Road east of Loyalist Drive. A 1.0 metre splash strip provides a buffer between the MUT and vehicles (however the MUT becomes curb-face at intersections). Cross-rides are also proposed at intersections to provide dedicated space for cyclists crossing east-west along Burnhamthorpe Road.

The multi-use trail reduces to 2.9 metres across the Highway 403 structure due to the limited right-of-way available. Flexible bollards will be considered at detailed design (in consultation with the Ministry of Transportation).

Continuous 1.5 metre sidewalks are provided on both sides of the road adjacent to the boulevard. Crosswalks are also provided at intersections to facilitate pedestrian movement along the corridor.

Under existing conditions, sidewalk connections from local roads adjacent to Burnhamthorpe Road are present and extend from the local roads to the Burnhamthorpe Road curb as discussed in Section 2.2.1. These sidewalk connections will be maintained to provide access to Burnhamthorpe Road from the residential areas however, the connection will terminate at the sidewalk/multi-use trail on Burnhamthorpe Road (Figure 32).

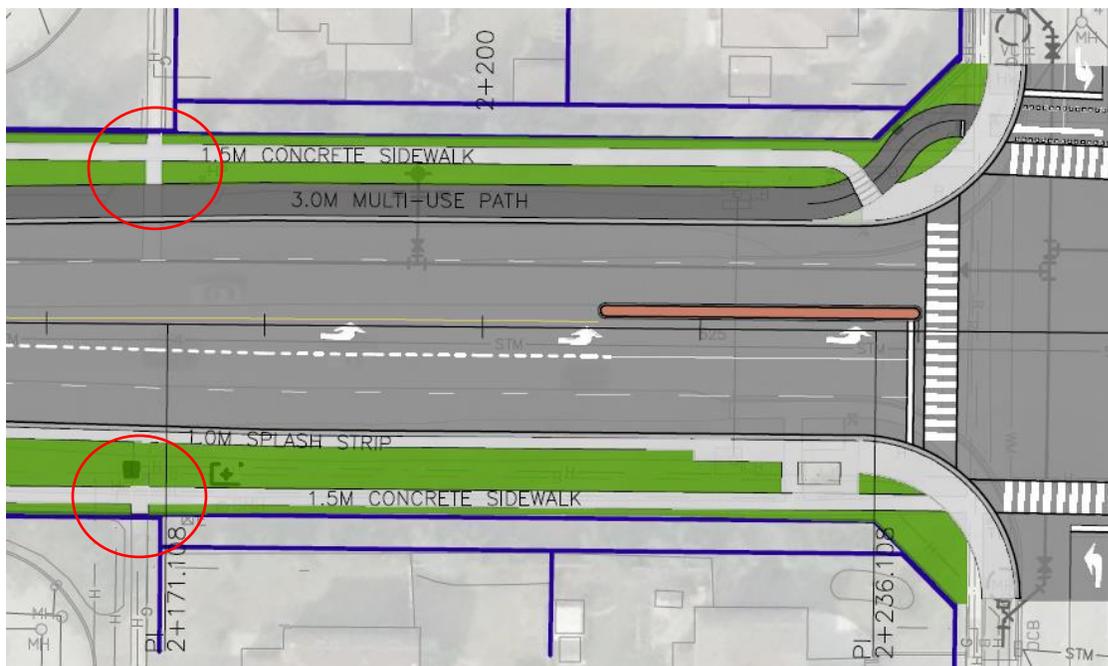


Figure 32: Sidewalk Connections from Local Roads

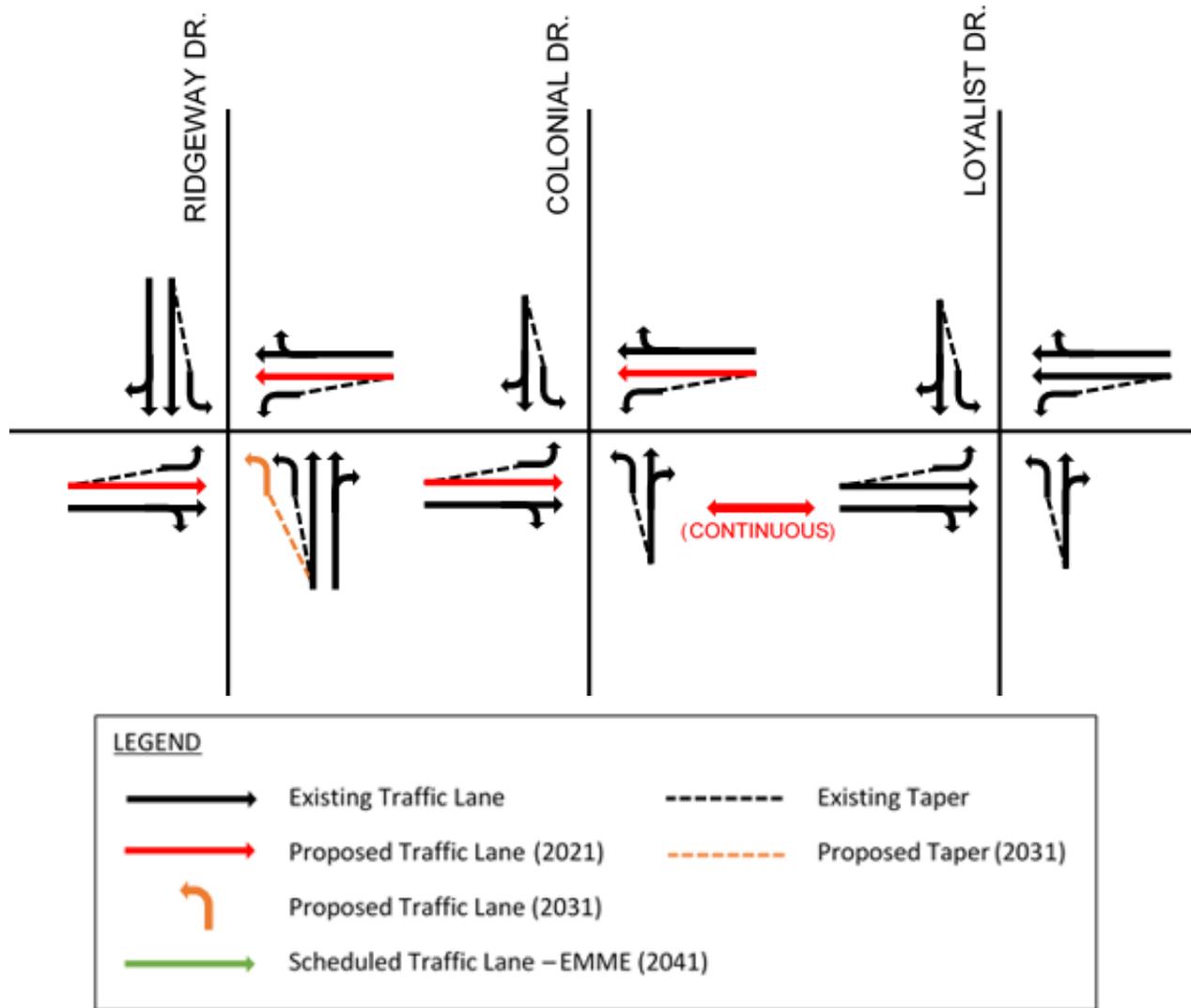
#### 6.1.5. Intersections

Burnhamthorpe Road West between Ninth Line (west City limit) and Loyalist Drive includes three intersections, all of which are signalized:

- Burnhamthorpe Road/Ridgeway Drive
- Burnhamthorpe Road/Colonial Drive
- Burnhamthorpe Road/Loyalist Drive

At the west end of the study area, the intersection of Ninth Line and Burnhamthorpe Road (William Halton Parkway) is planned for a roundabout as part of a separate Halton Region project.

The recommended intersection configurations are illustrated in Figure 33, and Section 2.2.6 provides the future intersection recommendations from the Traffic Report (Appendix A).



*Figure 33: Recommended Intersection Configurations (2031)*

A summary of the recommended improvements for each intersection are discussed below and shown on the design plates in Appendix N:

### **Burnhamthorpe Road/Ridgeway Drive**

As discussed in Section 2.2.6, by 2031 the intersection of Ridgeway Drive and Burnhamthorpe Road is expected to reach capacity in the PM peak hour. These operational issues cannot be addressed with signal timing improvements alone. In order to accommodate the projected traffic volumes, improvements to the intersection of Ridgeway Drive and Burnhamthorpe Road would be required.

The recommended plan includes the following elements at the Burnhamthorpe Road/Ridgeway Drive intersection:

- Additional northbound left-turn lane (double left)
- Additional eastbound through lane
- Exclusive westbound right-turn lane
- Additional westbound through lane

### **Burnhamthorpe Road/Colonial Drive**

The recommended plan includes the following elements at the Burnhamthorpe Road/Colonial Drive intersection:

- Additional eastbound through lane
- Additional westbound through lane

### **Burnhamthorpe Road/Loyalist Drive**

No geometric changes to the Burnhamthorpe Road/Loyalist Drive intersection are required as two through lanes eastbound and westbound are already provided.

## **6.2. Highway 403 Crossing**

As discussed in Section 5.4, in consultation with MTO the recommended cross-section for the structure over Highway 403 was confirmed to include the following:

- A 0.3 m limited widening of the structure (in conjunction with the parapet wall replacement)
- A new parapet wall on the north side with a bicycle height railing
- A new 3.17 m raised multi-use trail on the north side
- 0.5 m painted buffer on the north side
- 3.5 m travel lanes
- 1.6 m raised sidewalk on the south side
- 0.7 m shoulder on the south side

The recommended cross-section for the Highway 403 structure is illustrated in Figure 31 in Section 6.1.3.

All of the elements provided in the recommended cross-section meet or surpass the minimum requirements outlined in the MTO Bikeway Design Manual and Canadian Highway Bridge Design Code. In order to meet the desired widths, full reconstruction of the Highway 403 structure would be required at a significant cost. A 0.3 metre limited widening of the structure will be undertaken in conjunction with the parapet wall replacement on the north side in order to provide adequate width for the multi-use trail. MTO confirmed that the 0.7 metre shoulder on the south side and 0.5 metre painted buffer on the north side are acceptable given that this is a constrained corridor. The travel lane widths are consistent with the recommended typical cross-section for Burnhamthorpe Road to the east.

As discussed above, as part of a separate Halton Region project, a roundabout is planned for the intersection of Burnhamthorpe Road and Ninth Line (William Halton Parkway). The roundabout plans were received from Halton Region and reviewed as part of the study. The future curb lines of the roundabout align with the proposed curb lines of the recommended plan.

### 6.2.1. Structural Review

A structural review of the recommended cross-section was completed by Doug Dixon and Associates (DDA). A copy of the Structural Review Memo can be found in Appendix O. The following provides a summary of DDA's assessment of the impacts associated with the recommended cross-section and the modifications to the Highway 403 bridge.

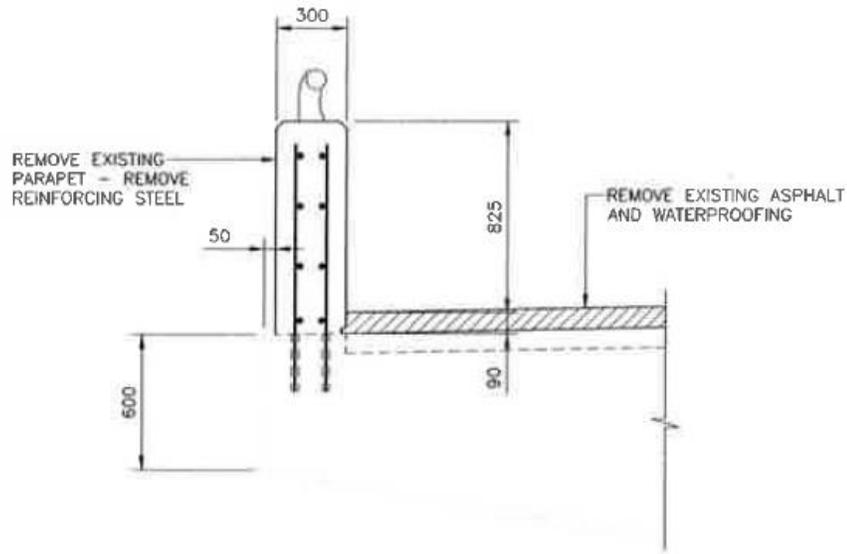
The additional loading associated with the recommended cross-section and the 0.3 metre widening is estimated to be 3.7% of the rehabilitated mass (18.6 kN/m total additional dead load) which is not anticipated to result in any issues related to serviceability or ultimate performance of the bridge. This percentage (3.7%) is well within general tolerance for estimating loads and is adequately provided for in the load factors provided to the dead and live loads that would have been used in the 2012 evaluation at the time of the most recent rehabilitation to the structure. No impact to the structural integrity of the voided, post tensioned deck is anticipated.

The bridge bearings were also replaced during the 2012 rehabilitation when the bridge was converted to a semi-integral configuration. The new bearings are 600 mm x 500 mm x 80 mm elastomeric laminated. Using the calculated uniformly distributed load for the proposed multi-use trail of 18.6 kN/m, provides an additional reaction of approximately 200 kN to be carried by only the most northerly bearings. This is a conservative approximation of the increased reaction in the north bearing.

The Serviceability Limit State (SLS) capacity of this size of bridge is 1350 kN. Adding the additional 200 kN to the MRC calculated reactions (2012 rehabilitation) of 1145 kN provides a conservative upper limit estimate of the total dead load reaction equal to the SLS capacity of 1350 kN. Based on the structural review, no issues were found relating to the existing bearings ability to carry the dead load if the multi-use pathway is added.

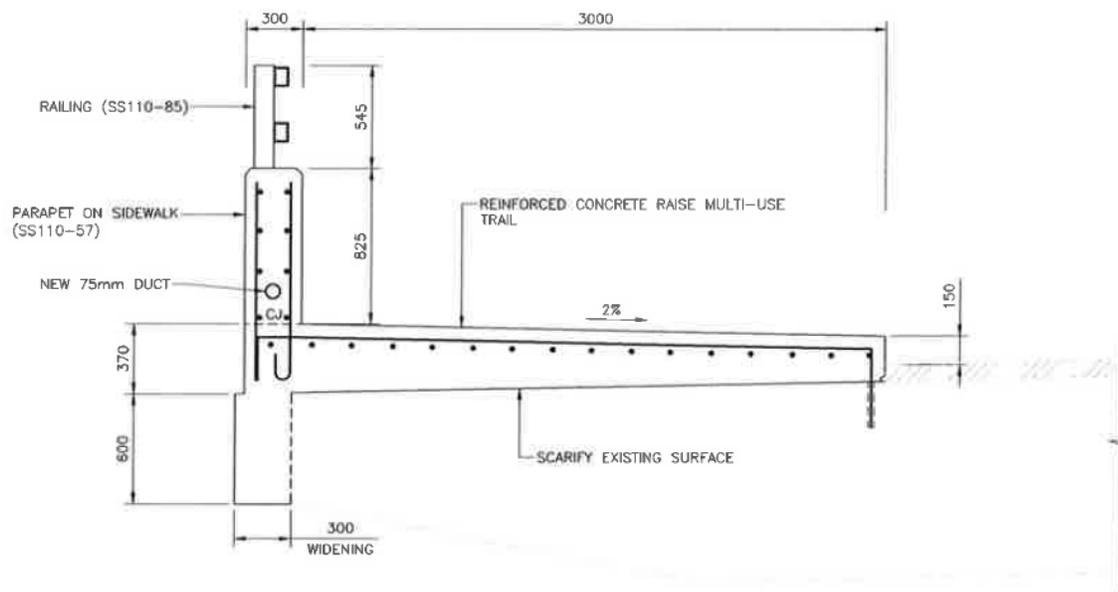
To maintain a parapet wall that complies with the current Test Level (TL) and has been crash tested, the approach recommended is to remove the existing north parapet. The method of removing the existing parapet wall will be determined at the time of detailed design, however, saw cutting may be the most cost effective.

The 0.3 metre widening of the deck would be completed next, followed by the construction of the new raised multi-use trail. The existing north parapet wall and the rehabilitated section are illustrated in Figure 34 and Figure 35, respectively.



**EXISTING SECTION**

Figure 34: Existing North Parapet Section (not to scale)



**REHABILITATED SECTION**

Figure 35: Rehabilitated North Parapet Section (not to scale)

To avoid transverse and longitudinal stressing tensions (over the pier) as well as tendon anchorages, ground penetrating radar or other similar testing methods would be used to identify possible conflict locations before the dowels are installed. As required, the location of the dowels can be adjusted nominally to avoid any interference.

A new parapet wall would be constructed on the sidewalk to meet the requirements of SS110-57. A metal railing on top of the parapet to meet the requirements for a bicycle height barrier would be installed. This could be the standard railing SS110-85.

The existing sign board must be mounted on the north parapet over the southbound lane of Highway 403 would need to be removed, salvaged, temporarily installed on ground mounted supports during construction and reinstated at the conclusion of the work.

Additional structural details and calculations are provided in the structural review memo (Appendix O). A complete evaluation and assessment of the existing bridge will be completed during detailed design. This will include serviceability and ultimate limit states for shear and bending in the superstructure, a review of the capacity of the existing bearings in load as well as the transverse bending in the deck over the piers.

### 6.3. Geotechnical

A Preliminary Geotechnical Investigation was completed for the study area to explore the subsurface conditions within the project limits and based on the data obtained, to provide preliminary geotechnical recommendations for road widening, pavement design, and management options for soil that may be removed during construction. A copy of the Preliminary Geotechnical Investigation report can be found in Appendix P.

Thurber Engineering Ltd. (Thurber) carried out the investigation on April 9, 2018. The field work was comprised of 22 boreholes advanced at the approximate locations shown on the borehole location plan in Appendix P. Pavement cores of the existing asphalt pavement were recovered from eight of the borehole locations for visual examination and confirmation of pavement thickness.

Based on the results of the investigation, the preliminary recommendations for the pavement rehabilitation of Burnhamthorpe Road include full depth reclamation (pulverizing) of the existing asphalt with the underlying granular material, followed by grading and compacting the pulverized material, and placement of new Granular Base and Hot Mix Asphalt (HMA). Due to the thickness of the existing asphalt and limitations on the maximum depth of pulverization (400 mm), milling of the existing asphalt in advance of pulverization is recommended. After milling, the remaining pavement should be pulverized to a depth of 400 mm so that the blended material contains a maximum of 50 percent of asphalt coated aggregate, as permitted by OPSS.MUNI 330. The pulverized material should be graded and compacted (as required), prior to the placement of new granular base material. The recommended asphalt lift types and thicknesses shall consist of:

40 mm	HL1
50 mm	HDBC
50 mm	HDBC
200 mm	Granular 'A' Base

In all pavement widening areas (beyond existing shoulder rounding or curb and gutters), the surficial topsoil should be removed with the underlying subgrade graded as required. The preliminary recommended pavement structure for widening of Burnhamthorpe Road shall consist of:

40 mm	HL1
50 mm	HDBC
50 mm	HDBC
200 mm	Granular 'A' Base
400 mm	Granular 'B' Type I Subbase

As per City of Mississauga standards (Standard No. 2220.010), the thickness of the granular subbase layer should be increased by 150 mm when placed within 15 m of an intersection.

In all pavement widening areas, any surficial topsoil should be stripped to expose the underlying soils. The underlying subgrade soils should be removed and graded as required to accommodate the new pavement platform. The exposed top of subgrade should be graded to a 3 percent crossfall toward the subdrains installed at the outer pavement edge.

As per City of Mississauga standards, the top 1.0 m of the subgrade shall be compacted to a minimum of 98 percent of Standard Proctor Maximum Dry Density (SPMDD), within 2 percent of optimum moisture content (OMC). The exposed subgrade should be compacted and proof-rolled with a heavy roller and examined to identify areas of unstable subgrade. Any soft/wet areas identified should be sub-excavated and replaced with approved material.

## 6.4. Drainage and Stormwater Management

The proposed widening of Burnhamthorpe Road West will include a grassed boulevard ranging in width from 4.5 m on one side of the road and 7.5 m on the other side of the road, a 3.0 m multi-use trail, 0.5 m curb and gutter, a four-lane urban roadway and a grassed ditch. Burnhamthorpe Road will be widened evenly on both sides, maintaining the existing road centerline. Curbs and storm sewers will be used for Burnhamthorpe Road for directing the surface runoff to appropriate outlets. An opportunity exists to utilize LID methods to treat some of the surface runoff before collection by the storm sewer system. Grassed swales, bio-swales and tree planters will be investigated at detailed design. Based on a ROW of 35.0 m, the roadway cross-section will have an approximate proposed imperviousness of 61.4%, which is equivalent to a 0.7 runoff coefficient. This is an increase in impervious area of approximately 25.7% from existing conditions.

### 6.4.1. Rainfall Distribution and Data

City of Mississauga IDF rainfall data was used for the 1:10 year storm event to conduct a detailed hydraulic assessment to evaluate the impact of widening Burnhamthorpe Road West from a two lane semi-rural cross section to a four-lane urban cross section. It was determined that the hydraulic impact for the four lane widening will have negligible impacts on the existing roadway drainage system capacity when compared to existing conditions and design criteria.

### 6.4.2. Proposed Minor Storm Sewer System

The minor system for the proposed conditions will be designed to convey the 1:10 year flow as per City of Mississauga's design standards. The proposed storm sewer system is illustrated on the Proposed Drainage Mosaic found in the Stormwater Management Report (Appendix G), and the proposed storm sewer design sheets are presented in Appendix G. At the east and west limits, the existing storm sewer system will be utilized. The assessment confirms that the existing sewers on

Burnhamthorpe Road were designed adequately for the 10-year design storm event. In general, outlets for the proposed minor system will remain the same as the existing conditions.

The water quality controls proposed for the different sections of Burnhamthorpe Road are described below by outlet:

- **Outlet 1 (Highway 403):** Burnhamthorpe Road West from Ninth Line to approximately 175 m west of Ridgeway Drive, will consist of an urban cross section. The north and south side of the Burnhamthorpe, outside the curb lines, will contribute runoff from the embankments via ditching to Joshua's Creek tributary.
- **Outlet 2 (Ridgeway Drive North):** Burnhamthorpe Road West from approximately 175 m west of Ridgeway Drive to Ridgeway Drive, will discharge to an existing 675 mm diameter storm sewer in Ridgeway Drive on the south side of Burnhamthorpe. Existing Outlet 2, which discharges to Ridgeway Drive on the north side of Burnhamthorpe will be removed.
- **Outlet 3 (Ridgeway Drive):** Burnhamthorpe Road West from approximately 175 m west of Ridgeway Drive to Ridgeway Drive, will consist of an urban cross section which drains the right-of-way to a proposed storm sewer. This storm sewer will connect to an existing 675 mm diameter storm sewer in Ridgeway Drive south of the intersection of Burnhamthorpe Road and Ridgeway Drive. This existing storm sewer eventually discharges into the Laird Road Stormwater Management Facility where quantity and quality controls are in place.
- **Outlet 4 (Trunk Sewer at Bangor Road):** Burnhamthorpe Road West from Ridgeway Drive to Loyalist Drive, will consist of an urban cross section. On the north side of Burnhamthorpe Road, the existing catchbasins will be relocated to the proposed curb line. On the south side of Burnhamthorpe Road, curb cuts are proposed which will allow runoff to flow through an appropriate LID feature to a system of ditch inlets that drain to the existing storm sewer in Burnhamthorpe Road ranging in size from 375 mm to 675 mm diameter. The roadway drainage storm sewer connects to the 2100 mm diameter trunk sewer running north / south at Bangor Road. The trunk sewer eventually discharges into the Collegeway Stormwater Management Facility where quantity, erosion and quality controls are in place.

Generally, the existing storm sewer will be utilized as part of the proposed system. However, it is anticipated that modifications such as relocating catch basin inlets and sewer leads will be required to accommodate the widening. A section of new storm sewer will be required from approximately 175 m west of Ridgeway Drive to Ridgeway Drive to Outlet 3.

The existing storm sewers have sufficient capacity to handle the additional flows due to the increased impervious areas.

### 6.4.3. Proposed Major Drainage System

The proposed major drainage system will be provided by overland flow within Burnhamthorpe's road right-of-way. Generally, the drainage system will remain unchanged, and there are no major changes to the major system drainage patterns as part of the future improvements.

### 6.4.4. Proposed Stormwater Management System

The existing storm sewers discharge to two separate stormwater management facilities which have been retrofitted to meet current design standards as identified by the City of Mississauga and Credit Valley Conservation design criteria. As such, the existing SWM ponds provide Burnhamthorpe Road with a basic level of water quality, quantity and erosion control. The

proposed strategy for managing the impacted study area will be to enhance the water quality treatment by implementing a multi-component approach.

An evaluation of stormwater management alternatives were considered as part of the stormwater management strategy. The alternative solutions included permeable pavement, curb extension bioretention, traditional SWM facilities, Oil Grit Separators, Enhanced Grass Swale, and underground storage facilities. The evaluation considered relative cost, construction feasibility, and stormwater objectives.

It was concluded, in combination with the existing ponds, that pre-treatment with an Oil Grit Separators (OGS) for Outlet 3 and enhanced grass swales at Outlet 4 would provide the most feasible and effective treatment train approach to achieve the stormwater management objectives.

## Water Quality Control

The water quality controls proposed for the different sections of Burnhamthorpe Road are described below by outlet:

- **Outlet 1 (Highway 403):** For this section, which drains to the west, the impact on the water quality is negligible and no specific Best Management Practice (BMP) is proposed at this location as runoff flows through an existing grass swale providing some quality control.
- **Outlet 3 (Ridgeway Drive):** For this section, which drains south on Ridgeway Drive, runoff is ultimately discharged to the existing Laird Road SWM facility which provides “Basic” (Level 3) quality control (60% TSS Removal). In order to increase the level of treatment to “Enhanced” (Level 1) quality control (80% TSS Removal) the preferred solution is to implement an OGS unit in a treatment train approach. An Hydroworks HydroStorm 5 or equivalent would be suitable to provide “Enhanced” (Level 1) quality control (80% TSS Removal) for Outlet 3.
- **Outlet 4 (Trunk Sewer at Bangor Road):** For this section, which drains to Bangor Road, runoff is ultimately discharged to the existing Collegeway SWM Pond which provided “Basic” (Level 3) quality control (60% TSS Removal). In order to increase the level of treatment to “Enhanced” (Level 1) quality control (80% TSS Removal) the preferred solution is to implement an enhanced grassed swale. This will provide “Enhanced” (Level 1) quality control (80% TSS Removal) as per the Credit Valley Conservation Authority SWM Criteria, for the increased impervious area within Outlet 4.

## Water Quantity Control

The proposed water quantity controls for the different sections of Burnhamthorpe Road are described below by outlet:

- **Outlet 1 (Highway 403):** For this section, which drains to the west, the impact on the water quantity is negligible and no specific quantity controls are proposed at this location.
- **Outlet 3 (Ridgeway Drive):** For this section, which drains to the sewer at Ridgeway Drive, no specific quantity control is proposed at this location because it ultimately discharges to the existing Laird SWM Facility. The existing minor storm sewer system has been adequately sized for the 10-year proposed flows.
- **Outlet 4 (Trunk Sewer at Bangor Road):** For this section, which drains to the trunk sewer at Bangor Road, no specific quantity control is proposed at this location because it ultimately discharges to the existing Collegeway SWM Facility. The existing minor storm sewer system has been adequately sized for the 10-year proposed flows.

## 6.5. Natural Environment

The recommended plan includes the development of a multi-use path on the north side of the road and improved landscaping features as discussed in Section 6. Potential impacts to natural heritage features were evaluated and are discussed in Section 6.5.1 and 6.5.2. Where potential adverse impacts were identified, mitigation measures have been proposed (Section 7).

Road development and associated construction phases (site preparation, road construction, and post-construction maintenance) are activities that have the potential to negatively impact an area's natural heritage features. Specifically, impacts include: direct habitat loss within the area where the natural cover is replaced by newly developed roads, loss of connection between habitats (fragmentation), disturbance and stress to adjacent vegetation communities decreasing habitat quality on adjacent lands, and disturbance and stress to local wildlife population via increased human presence and traffic as well as noise and release of air pollutants.

Vegetation removal and grading activities associated with road construction works can also potentially impact watercourses and/or receiving water bodies via the displacement and subsequent unwanted deposition of soil and sediment particles into such features. Soil and sediment particle transport media may include gravity (steep slopes), air or water (E.g. rainfall events). Deposition of particulate matter into water bodies can decrease water quality and, if applicable, associated aquatic habitat quality via increases in turbidity (Total Suspended Solids; TSS) and subsequent increases in water temperature, associated decreases in dissolved oxygen, and inability of solar radiation to reach submergent aquatic macrophytes which can lead to die off.

In addition, construction activities increase risk of soil and groundwater contamination resultant from potential leaks from industrial construction equipment present on undeveloped lands in the Study Area throughout the duration of the construction period. Specifically, common effluents and leaked products include petroleum products (PHCs and BTEX), however polycyclic aromatic hydrocarbons (PAHs), volatile organic hydrocarbons (VOCs) and heavy metals, can also be released into the environment and subsequently leach into the receiving water bodies which can have adverse toxicological impacts on ecological receptors.

Additional long-term impacts, may include altered local site hydrology resultant from changes in drainage features or the introduction - or alteration - of culverts and / or subsurface sewer infrastructure. Impacts could include altered water table depth and hydrogeologic conditions which could result in the conversion of terrestrial and wetland features to different community structures and associated habitat. This effect could have profound impacts on local wildlife populations, should these alterations affect the landscape to a significant level.

### 6.5.1. Potential Impacts to Designated Areas

After large rainfall events, site drainage along Burnhamthorpe Road West, particularly at the west end of the Study Area, at the south-east corner of Burnhamthorpe Road West and Highway 403 may move south along the drainage path to the Provincially Significant Wetland located approximately 220 metres south of the road.

### 6.5.2. Potential Impacts to Species at Risk

The results of the Natural Environment Assessment have determined there are potential SAR birds and herpetofauna which may occur in the greater Study Area. Specifically, the results of the assessment have identified potential Henslow's Sparrow (*Ammodramus henslowii*), and Eastern Milksnake (*Lampropeltis triangulum*) habitat associated with the adjacent undeveloped lands west of Ninth Line.

Project undertakings are not planned on lands west of Ninth Line, however, increased disturbance/stress caused by construction noise and increased human presence, traffic, and release of air pollutants could reduce bird breeding success if occurring during the peak breeding season.

### 6.5.3. Recommendations for the Study Area

Based on the above, limited impacts to the natural heritage features in the study corridor are anticipated. Erosion and sediment control measures will be implemented during construction to minimize risk of soil deposition. Mitigation measures for potential adverse impacts are discussed in Section 7.

## 6.6. Landscape

As discussed in Section 3.4, the existing trees within the study area provide good screening of the adjacent properties, and they should maintain this function as they are located outside of any work required for this project. All trees within the study area are located behind the existing sidewalks along Burnhamthorpe Road West and will not be impacted as a result of the widening to four lanes. Adjacent to window streets, there are deciduous trees behind the fence that are not included in the tree inventory. These trees, as well as all others inventoried for this project, are to remain with no expected impacts as a result of this project.

Where there is sufficient boulevard space, additional street tree plantings will be provided to enhance the screening effect while improving urban tree canopy cover and aesthetic appeal. Additional plantings are also proposed behind the fence of the window streets to improve privacy.

## 6.7. Illumination

Two illumination plans (Plan A and Plan B) are proposed for consideration. The Plan A approach would keep as much of the existing luminaires and poles as possible. In this case, fewer new LED luminaires will be replaced, and less construction work will be required for upgrading the lighting system. Plan B would replace existing luminaires. The following describes the proposed upgrades based on the existing condition.

### 6.7.1. Plan A

On the north side of the Burnhamthorpe Road from Loyalist Drive to Ridgeway Drive, all the luminaires mounted on the hydro pole will remain the same. On the south side of the Burnhamthorpe Road, new lighting standards will be required. The existing free-standing lighting standards 80m east of the Ridgeway Drive intersection and 160m east of the intersection will be removed. The new lighting standards on the south will be staggered distributed according to the hydro pole location on the north side.

### 6.7.2. Plan B

For the Plan B, the proposed lighting standards will have the same poles, arms, mounting height, and the same location as Plan A. The existing LED luminaires removed in Plan B will be salvaged to the City, and new LED luminaires will be installed. The existing arms could be reused, and the existing lighting poles will be reused is the same as Plan A.

### 6.7.3. Summary

The advantage of Plan A is maximizing the utilization of the existing luminaires, so it is cost-effective for construction. The new LED luminaires are more energy efficient. By using the existing LED luminaires, the total wattage consumption for the study area is much higher than the Plan B. The advantage of the Plan B is the power consumption. The City would need to replace all the LED luminaires in the study area. All of the existing LED luminaires will be salvaged to the City.

During detailed design the City will determine the most appropriate procedure to follow. Additional details are included in the Illumination Report in Appendix Q.

### 6.8. Noise

An Environmental Noise Assessment was conducted for the Burnhamthorpe Road West corridor to assess the future “build” and “no-build” sound levels from road traffic noise sources in the area. These predictions were used to assess potential impacts according to the applicable guidelines and specify mitigation measures, where required. The Environmental Noise Assessment Report is available in Appendix R.

The results of the assessment conclude the following:

- The results show that changes in sound levels resulting from the proposed project are expected to be no higher than approximately 1 to 2 dBA.
- No investigation of noise mitigation was undertaken because there were no changes in sound levels greater than the criteria set out in the Protocol.
- Construction noise impacts are temporary in nature but will be noticeable at times at residential Noise Sensitive Area (NSAs). Methods to minimize construction noise impacts should be included in the Construction Code of Practice.
- If construction is required outside the times specified in the City of Mississauga Noise Control Bylaw 306-79, an exemption to the bylaw is required.
- Should the final horizontal or vertical alignment of the undertaking change significantly during detailed design, the noise levels and possible impacts should be confirmed.

### 6.9. Air Quality

An Air Quality assessment was conducted to assess the local air quality impacts due to the widening of Burnhamthorpe Road West for existing conditions (2017) and future build conditions (2042). The study also includes an assessment of total greenhouse emissions due to the project and an overview of construction impacts. The Air Quality Assessment Report is available in Appendix S.

The assessment concluded the following:

- The maximum combined concentrations for the future build scenario were all below their respective MOECC guidelines or CAAQS, with the exception of annual PM<sub>2.5</sub>, 24-hr PM<sub>10</sub>, 24-hr TSP and annual benzene. Note that for each of these contaminants, background concentrations alone exceeded the guideline.
- Frequency Analysis determined that there were no additional days on which exceedances of PM<sub>10</sub> or TSP occurred between the 2017 Existing and 2041 Future Build scenarios. For both PM<sub>10</sub> and TSP, exceedances of the guideline occurred less than 1% of the time.
- Overall, maximum predicted concentrations are similar between the 2017 Existing and 2041 Future Build scenarios, with little or no increase occurring as a result of the project.
- Mitigation measures are not warranted, due to the small number of days which are expected to exceed the guideline.

- Total GHG emissions were predicted to decrease in the study area. Overall, there was a 15% decrease in total GHG emissions predicted between the Existing and Future Build scenarios.

## 6.10. Utilities

As detailed in Section 3.8, there are a number of existing utilities located along the corridor including aerial hydro, telephone, cable, storm sewer and future watermain. A Utility Plan outlining the existing utilities is included as Appendix H. The plan reflects the information received to date and requires confirmation during detailed design in consultation with the respective utility agencies.

Potential areas of conflict have been identified based on the preliminary utility information. At the intersections of Burnhamthorpe Road & Ridgeway Drive and Burnhamthorpe Road & Colonial Drive, the existing signal poles will be removed and relocated to suit the intersection widening. Illumination poles in conflict on the south side will also be removed and relocated as discussed in Section 6.7.

## 6.11. Property Requirements

Given that the City has secured a 35 metre right-of-way along the study corridor, the recommended plan can be implemented without additional property requirements.

## 6.12. Construction Staging

The construction of Burnhamthorpe Road is proposed to be completed in three stages. The construction staging from existing conditions to complete widening is illustrated in Figure 36.

In Stage 1, 1.0 metre of temporary pavement will be constructed on the north shoulder of Burnhamthorpe Road allowing for traffic to shift to the north.

In Stage 2, traffic is shifted to allow for a concrete barrier separation from traffic. In the work zone, the new eastbound lanes would be constructed. Two temporary lanes (one eastbound and one westbound) will be provided utilizing the paved shoulder and the existing westbound lane. The new eastbound lane will then be constructed.

In Stage 3, traffic will be shifted to the south, utilizing the newly constructed eastbound lane and the new westbound lanes will be constructed.

It should be noted that construction staging could be reversed to construct the temporary pavement on the south shoulder and shifting traffic to the south in Stage 1. Staging could continue in reverse order with the new westbound lanes being constructed in Stage 2 and the new eastbound lanes being constructed in Stage 3.

The construction staging plan will be reviewed during detailed design and a detailed staging plan will be developed at that time.

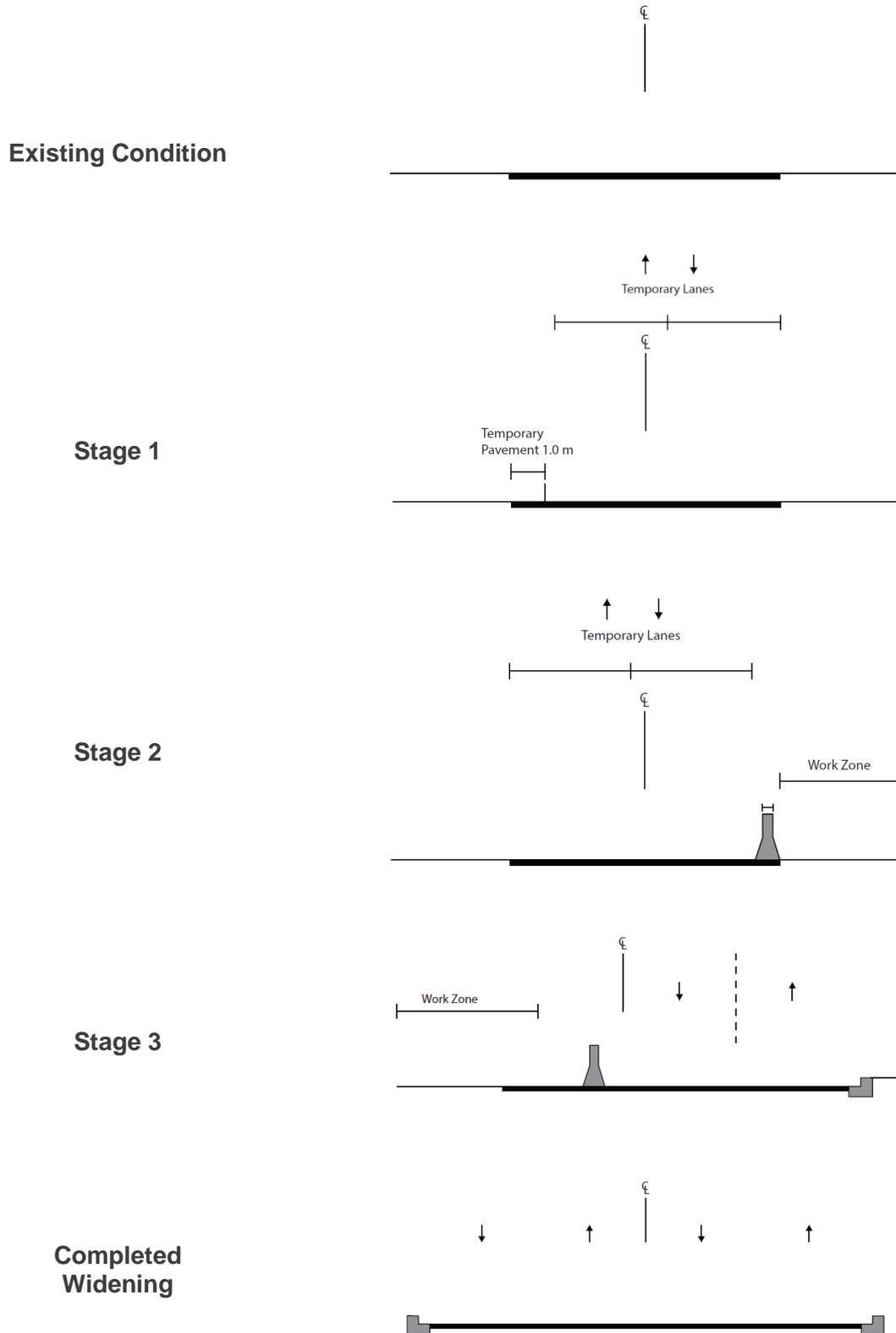


Figure 36: Construction Staging

### **6.13. Preliminary Cost Estimate**

The estimated capital cost associated with the proposed improvements including engineering, construction, and other project costs is approximately \$12,000,000.

It should be noted that this cost estimate does not include property costs or the costs associated with the modifications to the Highway 403 bridge. A detailed cost estimate for the structure will be completed during detailed design following the structural review.

## 7. Mitigation and Commitments to Further Work

In consultation with agencies, the preliminary preferred design has mitigated negative impacts to the environment where possible. Where impacts cannot be entirely avoided, mitigation measures and commitments for detailed design and construction have been developed to minimize or avoid impacts (Table 21).

*Table 21: Mitigation and Commitments to Further Work*

<b>Natural Environment – Designated Areas</b>
<ol style="list-style-type: none"> <li>1. An Erosion and Sediment Control Plan (ESCP) should be developed and implemented to minimize the risk of soil deposition into the ditches located at the west end of the Study Area (between Ridgeway Drive and Highway 403) during all phases of the Project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized and runoff water is clear.</li> <li>2. The ESCP should include:                     <ul style="list-style-type: none"> <li>• Installation of erosion and sediment control measures before construction activities commence to prevent soil deposition into nearby receiving waterbodies</li> <li>• Any construction activities and staging areas will be isolated from watercourses or wetland areas and conducted “in the dry”.</li> <li>• Waste material should be contained and stabilized above the high-water mark. Alternatively, waste materials should be removed off-site</li> <li>• Inspection and maintenance of erosion and sediment control measures and structures should take place during the course of construction.</li> <li>• Erosion and sediment control measures and structures should be repaired, if damage occurs.</li> <li>• Non-biodegradable erosion and sediment control materials should be removed once the site is stabilized.</li> <li>• Site isolation measures for containing stockpiled material should be implemented.</li> </ul> </li> <li>3. All equipment operating near the watercourses shall be properly maintained in order to avoid contaminant leakage.</li> <li>4. A response plan should be developed that will be implemented immediately in the event of a sediment release or spill of a deleterious substance.</li> <li>5. An emergency spill response kit, including the appropriate absorbency materials, will be on site at all times and in the event that a spill occurs. Proper containment clean up and reporting, in accordance with provincial requirements, is required.</li> <li>6. All necessary precautions must be taken to prevent the accumulation of litter and construction debris within any natural areas outside of the construction limits.</li> <li>7. Upon project completion, all construction materials must be removed off-site.</li> </ol>
<b>Natural Environment – Species at Risk</b>
<ol style="list-style-type: none"> <li>8. It is recommended that construction activities near Burnhamthorpe Road &amp; Ninth Line occur outside of the breeding bird season, if possible, to reduce potential impacts to SAR that could occur near the proposed Project construction areas.</li> <li>9. Should construction activities be planned during the breeding bird season and several years from the date of this report, it is recommended that follow up breeding bird surveys be conducted at such a time.</li> <li>10. The MNRF must be contacted in the case that any rare species are identified during preconstruction or throughout the construction phases.</li> </ol>
<b>Natural Environment – Permitting</b>
<ol style="list-style-type: none"> <li>11. Obtain storm sewer permits from the Ministry of Environment, Conservation and Parks during detailed design.</li> </ol>

12. Review permitting requirements at the detailed design phase to ensure the Project has remained within the regulatory framework, as applicable at such a time.
13. If construction dewatering is anticipated, a Permit to Take Water (PTTW) or Environmental Activity Sector Registration (EASR) may be required for water taking/pumping exceeding 50,000 litres per day. Guideline documents for Permit to Take Water or EASR registration can be found directly from the MECP website. If the construction includes the discharge of any collected water from the dewatering activities into a surface watercourse, or a stormwater sewer that directly discharges into a surface watercourse, appropriate treatment and control/ mitigation measures shall be prepared to ensure that the proposed discharge will not result in any undesirable impact on the receiving waters.

### Archaeology

14. The study corridor does not contain archaeological potential and does not require further assessment.
15. Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the Ontario Heritage Act.

### Environmental Site Assessment

16. Phase Two ESA involving an investigation of the shallow soil conditions is recommended to address the APECs identified on the Phase One Property that may impact the planned construction activities associated with the widening of Burnhamthorpe Road West.
17. Phase Two ESA may be coordinated with the geotechnical investigation for the proposed road widening to obtain soil samples within the planned excavation depths for chemical analysis to address the identified APECs. If impacted soils and/or groundwater are encountered within the proposed boreholes, further investigation involving additional soil sampling as well as groundwater sampling and testing may be required.
18. Although de-icing activities were not identified as a PCA since exceedances of the applicable site condition standards for EC and SAR under O. Reg. 153/04 may be exempt, it is recommended that certain soil samples be analyzed for these parameters if the off-site management and re-use of the soils is anticipated during construction.

### Highway 403 Structure/ Ministry of Transportation

19. The cross-section for the Highway 403 structure will be confirmed during detailed design in consultation with MTO.
20. Illumination requirements in the vicinity of the structure will be confirmed in consultation with MTO during detailed design.
21. All permits/approvals will be obtained from MTO prior to construction.
22. A detailed structural review will be conducted during detailed design to confirm the structural stability of the bridge with the recommended modifications to the structure. This structural review will include bearing checks, ultimate limit states

stress checks, shape factor checks, compressive deformation checks and rotational capacity checks.

### **Intersections**

23. The westbound left-turn lane storage at Ridgeway Drive and Burnhamthorpe Road will be reviewed at detailed design to determine if 100 metres of storage can be provided without impact to the existing hydro poles at this location.

### **Noise and Vibration**

24. Where possible construction shall be carried out during the daytime. If construction activities are required outside of these hours, the Contractor shall try and minimize the amount of noise being generated.
25. If construction is required outside the times specified in the City of Mississauga Noise Control Bylaw 306-79, an exemption to the bylaw is required.
26. There shall be explicit indication that Contractors are expected to comply with all applicable requirements of the contract.
27. All equipment will be properly maintained to limit noise emissions. As such, all construction equipment shall be operated with effective muffling devices that are in good working order.
28. The Contract documents shall contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to be in effect.
29. In the presence of persistent noise complaints, all construction equipment shall be verified to comply with MOECC NPC-115 guidelines.
30. In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of the various alternatives.
31. Should the final horizontal or vertical alignment of the undertaking change significantly during detailed design, the noise levels and possible impacts must be confirmed.

### **Air Quality**

32. Environment Canada "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" practices shall be followed during construction of the roadway to reduce any air quality impacts that may occur.

### **Streetscape Plan and Tree Management**

33. A detailed planting and landscaping plan will be developed during detailed design.

### **Drainage and Stormwater Management**

34. During detailed design the LID should be designed to retain 5 mm of runoff from an area equivalent to the new impervious area, if feasible.
35. Further investigation of the drainage system down Ridgeway Drive is required at detailed design to verify the flow route within the existing storm sewer as well as the level of water quality protection provided by the Laird Road SWM Facility.

36. A CCTV inspection of all existing storm sewer systems that the Burnhamthorpe Road storm sewers will utilize will be undertaken at detailed design to verify the condition of the existing storm sewers.
37. At detailed design the proposed drainage boundary for Outlet 1 shall be confirmed in consultation with Conservation Halton.
38. There is a minor loss in drainage to Joshua's Creek under proposed conditions. At detailed design, justification for this drainage area shall be provided to Conservation Halton.

#### **Geotechnical**

39. Excess soil may be disposed of off-site as waste at a licensed facility (i.e. landfill and/or treatment facilities) with an Environmental Compliance Approval (ECA) to receive this material, pending approval of receiving site authorities. The
40. Additional testing will be required during the detailed design investigation to confirm the preliminary recommendations regarding management of excess excavated soils.
41. Materials testing and inspection by qualified personnel shall be provided during construction.

#### **Utilities/Municipal Services/Construction**

42. Alectra has no issue with the MUT being less than 0.5m from the existing poles however, if the poles are required to be replaced in the future, Alectra would like to have no conflict with the proposal with the City Standards and Permits PUCC committee.
43. The design at the Colonial Drive and Burnhamthorpe Road W intersection has an existing pole in a proposed sidewalk. In further detail design, the City will either adjust the sidewalk to avoid the pole or Alectra will have to replace the pole and bring it up to current standards.

#### **Construction Monitoring**

44. Mitigation measures shall be implemented and maintained through on-site inspections by the city of Mississauga staff who will ensure that the natural, social and economic environments are not impacted by the construction activities and/or that impacts are minimized. The inspection staff will also ensure that items such as sedimentation controls and appropriate signage are maintained throughout construction.
45. Appropriate signage shall be implemented to identify detour routes at the time of temporary roadway/sidewalk closure.





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