Region of Peel

Mississauga Rd./Old Main St., Bush St., Olde Base Line Rd. and Winston Churchill Blvd. Class EA: Environmental Study Report

Peel Region, ON

June 2014

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Project # 6776

EXECUTIVE SUMMARY

Introduction and History

The Regional Municipality of Peel has completed a Schedule 'C' Class Environmental Assessment (EA) Study for proposed improvements to Winston Churchill Blvd. from Olde Base Line Rd. to Bush St.; Olde Base Line Rd. from Winston Churchill Blvd. to Mississauga Rd.; Mississauga Rd./Old Main St. from Olde Base Line Rd. to Bush St.; and Bush St. from Mississauga Rd./Old Main St. to Winston Churchill Blvd. The study area falls within the Town of Caledon, borders the Town of Erin, and includes the Village of Belfountain.

The study area roads were identified in the Region's *1994 Road Needs Study*, and *1995 Road Needs Study Update* as requiring immediate improvements. An Environmental Study Report (ESR) initiated in 1996 identified structural deficiencies, missing shoulders, and unsafe driving conditions, with many sections of the study area not meeting design standards for grades and/or minimum stopping sight distance. The 1996 EA was not completed and no improvements to the study area were implemented.

In June 2009, the Region began an EA to review road safety, sightlines, drainage, parking and pedestrian and cycling needs along Mississauga Rd./Old Main St. from Olde Base Line Rd. to Bush St. and Bush St. from Mississauga Rd./Old Main St. to Winston Churchill Blvd. Based on the feedback received for the Mississauga Rd./Bush St. EA, the study limits were expanded in 2012 to include Olde Base Line Rd. from Mississauga Rd. to Winston Churchill Blvd., and Winston Churchill Blvd. from Olde Base Line Rd. to Bush St.

Several planning policies, guidelines and initiatives were reviewed to guide the study team in the development of this EA.

- The Region of Peel's ***Active Transportation Plan***, 2012, provides a framework to increase the share of walking/cycling trips and create a pedestrian and cycling friendly environment. It identifies all roads in the study area as cycling facilities in the proposed long-term Regional cycling network.
- The Region of Peel's ***Road Characterization Study (RCS)***, 2013, provides guidance on the development of roadway cross-section elements by road character category, to ensure all road users are accommodated. Winston Churchill Blvd., Olde Base Line Rd., and the majority of Mississauga Rd./Old Main St. and Bush St. are classified as Rural Roads (and are to include a vehicle zone (travel lane), paved and unpaved shoulders, and a wide ditch). The remainder of Old Main St. and Bush St. (Belfountain Village) are classified as a Rural Main Street (include vehicle zone, separate bicycle and pedestrian zones, splash strip and green zone, with optional parking depending on the available right-of-way).
- The Region of Peel's ***Strategic Goods Movement Network Study (SGMNS)***, 2013, identified potential truck priority routes for goods movement throughout Peel Region. Winston Churchill Blvd. and Olde Base Line Rd. within the study area are identified as potential primary truck routes. However, further assessment including an infrastructure analysis is required before either of these roads can be designated as a truck route, as the existing road geometry and pavement might not be suitable for truck traffic.

What was this EA about?

This EA study was about addressing the existing problems on the study area roads which included:

- Deficient pavement conditions;
- Deficient road drainage;
- Deficient sightlines; and
- Safety for all road users.

What did this EA conclude?

Investigations undertaken as part of this EA study confirmed that there is **no need for additional travel lanes** on any of the subject roads. The study identified the need to:

- Reduce collisions and improve safety, particularly where there are steep grades, sharp curves, vertical crests, and driveways
- Address deficient sightlines
- Address poor pavement and drainage
- Address excessive speeds
- Accommodate cyclists and pedestrians
- Improve traffic signage
- Address parking congestion

Planning solutions developed during the early phases of the study to address the problems and opportunities included both operational and physical improvements compared against the do nothing alternative. A combination of physical and operational improvements specific to the varying needs of each corridor was carried forward as the recommended solution for further analysis and evaluation. For each corridor, the technically preferred design was identified by the project team based on an evaluation of the impacts of the proposed improvements based on technical merits and impacts on the cultural, natural, social, and economic environments. The technically preferred design for each corridor was refined based on public and stakeholder input, and resulted in the recommended designs summarized in this report.

What did this EA demonstrate?

Despite the SGMNS recommendations, the proposed road improvements were not established to accommodate high volumes or heavy trucks (see Figure A), and existing truck restrictions in the study area are proposed to remain as per existing conditions.

This area is not designated for significant future growth, therefore the volumes will remain relatively constant. There is no need to construct the pavement to handle significant volumes of truck traffic.

Current EA Design

1. Pavement Structure

100mm (4in.) Asphalt

150mm (6in.) Granular A

400mm (16in.) Granular B

650mm (26in.) TOTAL THICKNESS

Typical Pavement Design for High Truck Volume Regional Roads

e.g. Mayfield Road from Chinguacousy Road to Heart Lake Road

220mm (9in.) Asphalt

150mm (6in.) Granular A

830mm (33in.) Granular B

1200mm (48in.) TOTAL THICKNESS

Current EA Design

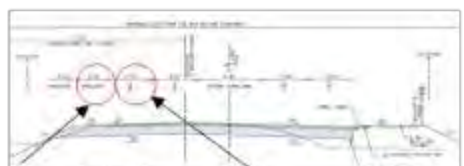
2. Lane Widths

3.5m lane width

2.2m paved shoulder / rounding

The paved shoulders will allow for safe movement of cyclists, pull over for emergency parking, and oversized agricultural equipment.

Typical Lane Widths for High Truck Volume Regional Roads



2.5m paved shoulder

3.75m lane width

The 3.75m lane widths permit wide truck dimensions.

Current EA Design

3. Speed

Proposed posted speeds

Proposed 60 km/h for Winston Churchill Boulevard

Proposed 50 km/h for Olde Base Line Road

Typical Posted Speed for High Truck Volume Regional Roads

e.g. Mayfield Road, Airport Road, and, Highway 50

Figure A: Design for Olde Base Line Rd and Winston Churchill Blvd vs. typical high truck volume roads in the Region of Peel

Summary of Public Consultation

A comprehensive and proactive consultation program was undertaken to encourage agency and resident participation and receive feedback throughout the study. The consultation program consisted of a project website, direct mailed notices and newsletters for all agencies, public and stakeholders with an interest in the project, and the formation of a Community Working Group (CWG), a group of interested residents and community stakeholders with varied interests to represent differing views in the community. Major consultation events included a Public Open House, two Public Information Centres (PICs), and three CWG meetings.

Public Open House (October 30, 2012)

- Purpose: to introduce the project and expanded study area, discuss the EA process, and to learn about transportation issues and valued community characteristics.
- Key messages from the public included: need to maintain the rural character of the area, preserve historic fences and features, address speeding, and develop solutions that balance the interests of all road users.

PIC #1 (May 9, 2013)

- Purpose: to present the purpose of the EA study, an overview of identified problems in the study area, the draft problem statement and principles for generating alternative solutions, proposed alternative operational and physical improvements that could be considered, and the proposed draft evaluation criteria.
- The SGMNS was also introduced to the public, as it was endorsed by Council on May 9, 2013. This led to public concern that the current EA study was being conducted to provide road improvements to accommodate heavy trucks, which was not the case. As previously discussed, the proposed pavement structure, cross-section and posted speed are being designed to accommodate the existing mix and volume of traffic.
- Key messages from the public included: reducing speed limits and improving sightlines, minimizing profile adjustments to maintain the rural character of the area, minimizing property impacts, and accommodating cyclists and pedestrians.

PIC #2 (November 20, 2013)

- Purpose: to present the alternative design concepts and recommended designs.
- In general there was support for the recommended designs, which were guided by public, agency and CWG participation, and consist of:
  - Reduced speed limits in some sections
  - Profile adjustments at select locations to improve sightlines and meet design standards, while minimizing impacts to adjacent lands and features
  - Two lane cross-section, as per existing conditions, while accommodating all road users
  - Paved shoulders for cyclists and pedestrians throughout, and a sidewalk in the Village
  - Pavement rehabilitation/reconstruction as required to accommodate existing mix and volume of traffic, with existing truck restrictions proposed to remain

Following PIC #2, the proposed designs were revised based on feedback received from the public. The recommended designs are summarized in this report.

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1. INTRODUCTION AND BACKGROUND

1.1 Introduction

The Regional Municipality of Peel has completed a Schedule 'C' Class Environmental Assessment (EA) Study for the Regional Road corridor comprised of Winston Churchill Boulevard, Olde Base Line Road, Bush Street, Mississauga Road / Old Main Street, in the vicinity of the village of Belfountain in Caledon, Ontario. This Class EA Study was undertaken using a Context Sensitive Solutions Approach to provide a comprehensive and environmentally sound transportation and road infrastructure improvement plan for the Regional Road corridor.

This Environmental Study Report (ESR) documents the study background; existing and future conditions within the study area; need and justification for the project; the planning, design and consultation process leading to the preferred alternative; identified impacts and mitigation as a result of the proposed design; and potential issues to be reviewed and confirmed during detailed design.

1.2 Study Area

The limits of the study area for the Regional Road corridor are illustrated in **Figure 1** and include:

- Winston Churchill Boulevard (Regional Road 19, Wellington County Road 25) from Olde Base Line Road to Bush Street;
- Olde Base Line Road (Regional Road 12) from Mississauga Road to Winston Churchill Boulevard;
- Mississauga Road / Old Main Street (Regional Road 1) from Olde Base Line Road to Bush Street; and
- Bush Street (Regional Road 11) from Mississauga Road / Old Main Street to Winston Churchill Boulevard.

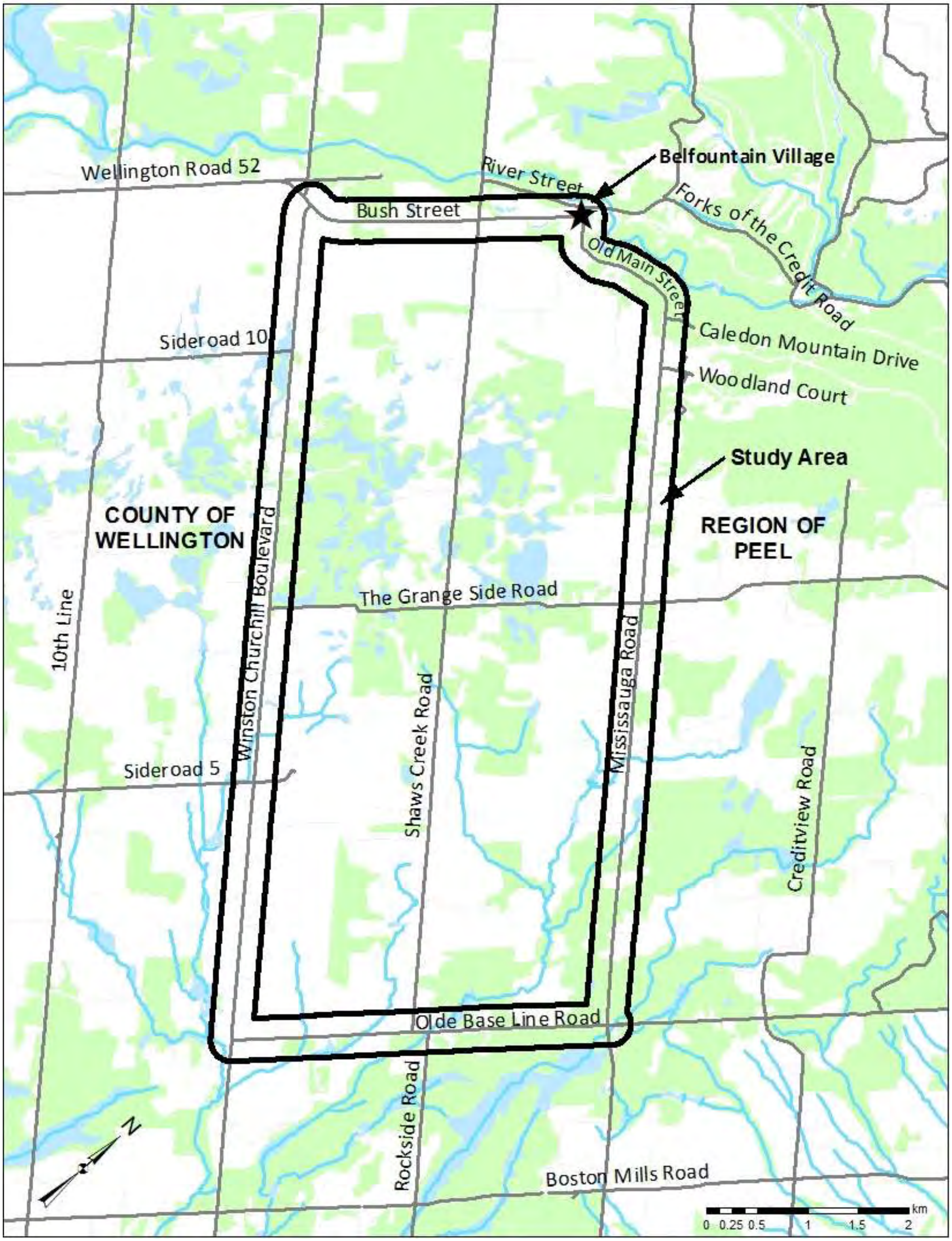


Figure 1: Study Area

1.3 Regional and Municipal Jurisdiction/Ownership

The majority of the roads in the study area fall under the Region of Peel's jurisdiction. The only exception is Winston Churchill Boulevard (Regional Road 19, Wellington County Road 25), which marks the boundary between the Town of Caledon (Peel Region) and the Town of Erin (Wellington County). In this case, the road jurisdiction is shared:

- Between south of Olde Base Line Road and Bush Street, the Region of Peel manages the roadway (including maintenance and improvements) and Wellington County is responsible for 50% of the costs; and
- North of Bush Street, Wellington County manages the roadway and Peel Region is responsible for 50% of the costs.

The jurisdiction and classification of roads in the study area are summarized in **Table 1**. This table also includes several local residential or collector roads that are not being considered for improvements as part of this EA, but intersect the roads in the study area.

Table 1: Roadway Jurisdiction and Class

Road	# of Lanes	Jurisdiction	Classification
Mississauga Road / Old Main Street (Regional Road 1)	2	Peel	Major Road
Bush Street (Regional Road 11)	2	Peel	Major Road
Winston Churchill Boulevard (Regional Road 19, Wellington County Road 25)	2	Peel/ Wellington	Major Road
Olde Base Line Road (Regional Road 12)	2	Peel	Major Road
The Grange Side Road	2	Caledon	Collector
Woodland Court	2	Caledon	Local Residential
Caledon Mountain Drive	2	Caledon	Local Residential
Shaws Creek Road	2	Caledon	Collector
Rockside Road	2	Caledon	Collector
Sideroad 10	2 (unpaved)	Town of Erin	Local
Sideroad 5	2 (unpaved)	Town of Erin	Local

1.4 Project Background

The study area roads that make up the Regional Road corridor were identified in the Region of Peel's *1994 Road Needs Study,* and *1995 Road Needs Study Update* as requiring immediate improvements. A study was undertaken starting in 1996, culminating in the January 1998 Environmental Study Report: *Regional Road Improvements in the Belfountain Area, Town of Caledon,* which was not filed. This study identified structural deficiencies, missing shoulders, and unsafe driving conditions with many sections of the study area not meeting design standards for grades and/or minimum stopping sight distance, resulting in poor visibility. No improvements to the study area were implemented based on the recommendations from the 1998 Environmental Study Report, and a new study was required to review and identify any proposed improvements.

In June 2009, the Region began a Schedule 'C' Municipal Class Environmental Assessment (EA) for improvements to Mississauga Road from Olde Base Line Road to Bush Street, and to Bush Street from Mississauga Road to Winston Churchill Boulevard. Based on the feedback received for the Mississauga Road/Bush Street EA, the Region expanded the study area to include Olde Base Line Road from Mississauga Road to Winston Churchill Boulevard, and Winston Churchill Boulevard from Olde Base Line Road to Bush Street. HDR was retained in Spring 2012 by the Region of Peel to complete the Class EA Study for the expanded study area as per the guidelines of the Municipal Engineers Association *Municipal Class Environmental Assessment* (October 2000, as amended in 2007 and 2011).

1.5 Key Project Milestones

The original EA study was initiated in June 2009, and the study area was expanded in Spring 2012. The key project milestones were as follows:

June 2009	Start Mississauga Road / Bush Street EA
April 8, 2010	Public Information Centre (PIC) #1 for Mississauga Road / Bush Street EA
June 29, 2010	Focus Group Meeting for Mississauga Road / Bush Street EA
Spring 2012	Expanded Study Area EA awarded to HDR Corporation
August 2012	Notice of Study Commencement for Expanded Study Area
August 23, 2012	Technical Advisory Committee (TAC) Meeting #1
October 23, 2012	Community Working Group (CWG) Meeting #1
October 30, 2012	Public Open House for Expanded Study Area
March 25, 2013	Technical Advisory Committee Meeting #2
April 4, 2013	Community Working Group Meeting #2
May 9, 2013	Public Information Centre #1
October 8, 2013	Technical Advisory Committee Meeting #3
October 16, 2013	Community Working Group Meeting #3
November 20, 2013	Public Information Centre #2
May 2014	Notice of Completion
May – July 2014	Environmental Study Report (ESR) filing for 30 day review period

1.6 Project Team and Agency Participation

The Project Team consisted of staff from:

Regional Municipality of Peel:

Gino Dela Cruz	Project Manager
Asha Saddi	Technical Analyst
Steve Ganesh	Manager, Infrastructure Programming & Studies

Consulting Team:

Tyrone Gan	Project Manager - HDR
Ravi Bhim	Traffic Engineering and Safety Lead - HDR
Veronica Restrepo	Project Coordinator & Transportation Planning - HDR
Carol Kong	Transportation Planning Technical Support - HDR
Anthony Reitmeier	Drainage Lead - HDR
Christine Hawryluk	Drainage Technical Support - HDR
Jeanette Manning	Preliminary Design - HDR
Larry Lamontagne	Preliminary Design - HDR
Paul Ritchie	Stage 1 Archaeology Assessment - ASI
Lindsay Popert	Cultural Heritage Assessment - ASI
Bill Feng	Culvert Condition Assessment - Coffey Geotechnics
Bill Feng	Geotechnical and Pavement Assessment - Coffey Geotechnics
Brad Benson	Hydrogeological Assessment - Coffey Geotechnics
Sue Cumming	Public Consultation - Cumming+Company
Al Murray	Topographic Survey - Murray Layout
Ryan Archer	Natural Environment Assessment - NRSI
John Parish	Geomorphology Assessment - Parish Geomorphics

Technical Advisory Committee (TAC) Members:

Solmaz Zia – Peel Region
Mina Zare – Peel Region
Sean Carrick – Peel Region
Margie Chung – Peel Region
Gayle Gorman – Peel Region
Len Gardiner – Peel Region
Shahrzad Borjian – Peel Region
Bob Nieuwenhuysen – Peel Region
Sean Ballaro – Peel Region
Hillary Calavitta – Peel Region
Thomas Lee – Peel Region
Lori-Ann Thomsen – Peel Region
Sharon Williams – Peel Region
Eric Chan – Peel Region
Damian Jamroz – Peel Region
Mark Crawford – Peel Region
Aimee Powell – Peel Region
Joe Avsec – Peel Region
Gary Kocialek – Peel Region
David Currie – Peel Region
Chris King – Peel Region
William Toy – Peel Region
Nathan Sinka – Peel Region
Christina Ayre – Hydro One
Mark Eby – County of Wellington

Kant Chawla – Town of Caledon
Ryan Grodecki – Town of Caledon
John Hasselbacher – Town of Caledon
Nancy Mott – Niagara Escarpment Commission (NEC)
Liam Marray – Credit Valley Conservation (CVC)
Jakub Kilis – Credit Valley Conservation (CVC)
Heather Lynn – Credit Valley Conservation (CVC)
Mark Heaton – Ministry of Natural Resources (MNR)
Amanda Graham – Ministry of the Environment (MOE)

1.7 Environmental Assessment Process

1.7.1 Municipal Class Environmental Assessment (EA) Process

The Environmental Assessment Act of Ontario (EAA) provides for the protection, conservation, and management of the environment in Ontario. The EAA applies to municipalities and to activities including municipal road projects. Activities with common characteristics and common potential effects may be assessed as part of a "class", and are therefore approved subject to compliance with the pre-approved Class EA process.

The Municipal Class EA is an approved Class EA process that applies to municipal infrastructure projects including roads, water, and wastewater. This process provides a comprehensive planning approach to consider several alternative solutions and evaluate their impact on a set of criteria (e.g. technical, environmental, social, cost) and determine any mitigating measures to arrive at a preferred alternative for addressing the problem (or opportunity). The process involves consultation of technical agencies and public at the various project stages.

This EA was undertaken and prepared in accordance with the guidelines of the Municipal Engineers Association ***Municipal Class Environmental Assessment*** (October 2000, as amended in 2007 and 2011). The EA was conducted in compliance with a **Schedule "C"** project. A Schedule "C" project involves either the construction of new facilities or major expansions of existing facilities. For the existing facilities, this could include road widening, adjustments, and operational improvements. The study has completed the first four phases of the five-phase Class EA Process.

Figure 2 illustrates the sequence of activities within the approved Class EA process leading to project implementation. The phases for this study are described below:

- **Phase 1** – Identify the problem (deficiency) or opportunity.
- **Phase 2** – Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input.

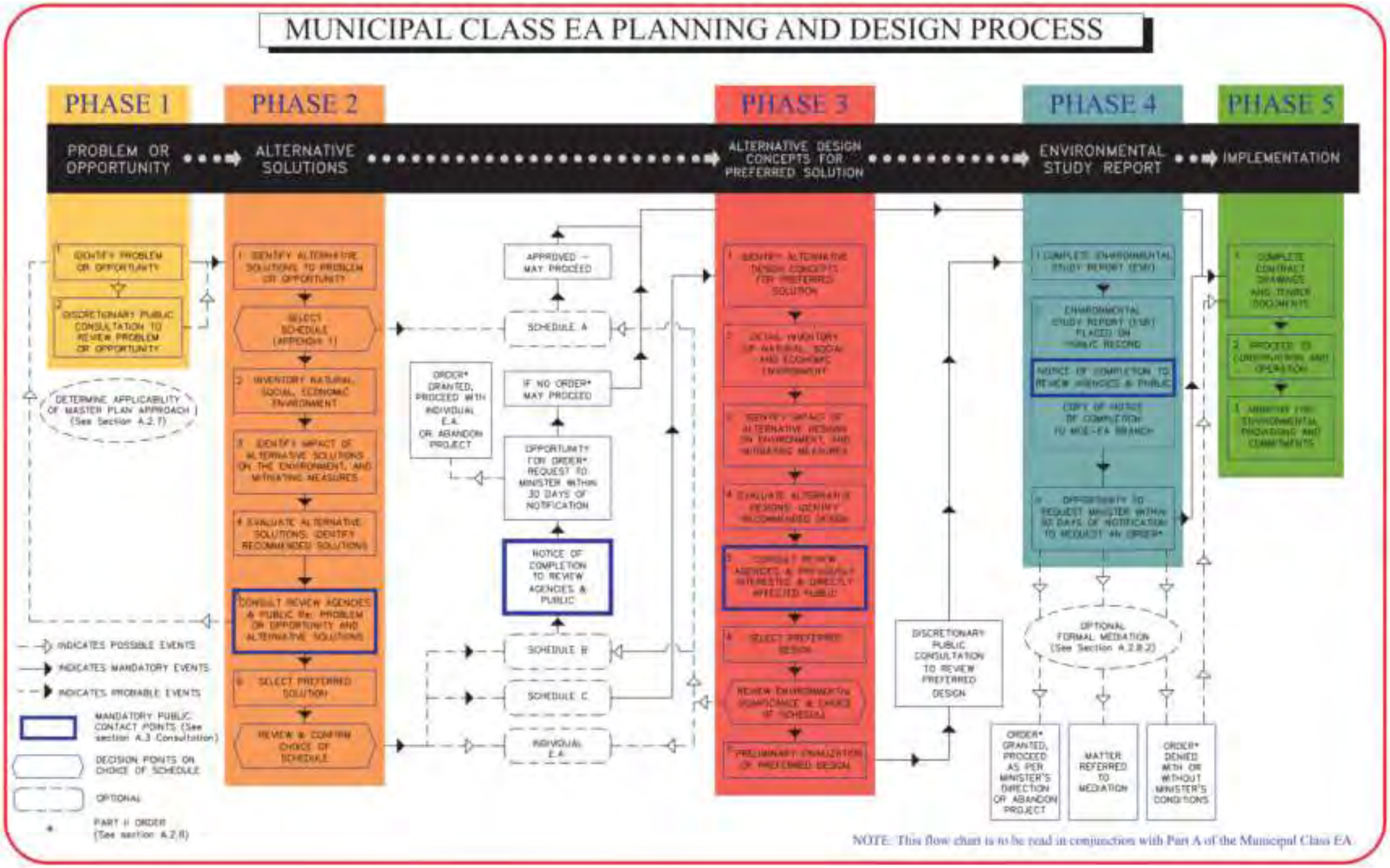


Figure 2: Municipal Class Environmental Assessment Planning and Design Process

- **Phase 3** – Examine alternative methods of implementing the preferred solution, based on the existing environment, public and review agency input, anticipated environmental effects, and methods of minimizing negative effects and maximizing positive effects.
- **Phase 4** – Document in an Environmental Study Report (ESR) a summary of the rationale, the planning, design, and consultation process of the project. Place the ESR on public record for a minimum 30 calendar days for review, and notify completion of the ESR and provision for Part II Order requests.

Phase 5, which involves detailed design, preparation of contract drawings and tender documents, construction, operation, and monitoring, is not part of this study. The ESR provides information on the study background, problem statement, alternative solutions, alternative designs, and the public consultation process.

After the ESR is finalized, it is filed and placed on public record for a minimum of 30 calendar days for review by the public and review agencies. At the time the report is filed, a Notice of Completion of the Environmental Study Report will be advertised, to advise the public and other stakeholders where the Environmental Study Report may be seen and reviewed, and how to submit public comments. The Notice will also advise the public and other stakeholders of their right to request a Part II Order, and how and when such a request must be submitted.

Under the Environmental Assessment Act, members of the public, interest groups, agencies, and other stakeholders may submit a written request to the Minister of the Environment to require the proponent (Peel Region) to comply with Part II of the Environmental Assessment Act (referred to as a Part II Order) before proceeding with the proposed undertaking. Part II of the Act addresses Individual Environmental Assessments.

The request for a Part II Order must also be copied to the proponent at the same time it is submitted to the Minister. Written requests for a Part II Order must be submitted to the Minister within the minimum 30 calendar day review period. The Minister or delegate then reviews the Environmental Assessment Report to ensure that the Class EA process has been followed. The proponent and the requestor have an opportunity to discuss and resolve the issues. Once the proponent has satisfied the requestor’s concerns a requestor should promptly withdraw a Part II Order request.

If the proponent and requestor are unable to resolve the concerns, the Minister or delegate will make a decision on a Part II Order:

1. Refer the matter to mediation before making a decision under the provisions of subsection 16(6) of the Environmental Assessment Act
2. Deny the request for an order and inform the proponent and requestor of the decision and rationale.
3. Deny the request for an order but impose conditions.
4. Require the proponent to comply with Part II of the Environmental Assessment Act which requires the preparation of a term of reference and an individual environmental assessment.

The Minister's decision on a Part II Order request is final.

1.7.2 Canadian Environmental Assessment Act (CEAA)

Under the *Canadian Environmental Assessment Act, 2012 (CEAA 2012)*, a federal environmental assessment study may be required to the physical activities that constitute a "designated project", under the project list identified in the *Regulations Amending the Regulations Designating Physical Activities, 2013*. This project list ensures that federal environmental assessments are focused on the major projects with the greatest potential for significant adverse environmental impacts to matters of federal jurisdiction.

The Mississauga Rd. / Old Main St., Bush St., Olde Base Line Rd. and Winston Churchill Blvd. EA study does not constitute a "designated project" and therefore does not require an environmental assessment under the CEAA, 2012. However, the Minister of the Environment may order an assessment for any project not included in the project list, where there may be adverse environmental effects related to federal jurisdiction.

1.8 Regional, Local and Provincial Planning Context

Several planning policies, guidelines and initiatives were reviewed to guide the study team in the development of the EA. Relevant excerpts from these documents as they relate to this EA study are provided in the following sections.

1.8.1 2014 Provincial Policy Statement

The 2014 Provincial Policy Statement (PPS) is issued under Section 3 of the Planning Act and came into effect on April 30, 2014, replacing the 2005 PPS. It provides policy direction on matters of Provincial interest related to land use planning and development. The PPS provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. The PPS promotes the use of active transportation and provides for connectivity among transportation modes. The PPS states that natural features and areas shall be protected for the long term, and development and site alteration shall not be permitted in significant wetlands or woodlands, significant wildlife habitat or fish habitat, significant areas of natural and scientific interest, or habitat of endangered species and threatened species, except in accordance with provincial and federal requirements. The PPS also states that significant built heritage resources and significant cultural heritage landscapes shall be conserved. Planning decisions are required to be consistent with the PPS. This EA follows a multi-modal, context sensitive approach, and aims to balance the interests and meet the needs of all road users, while minimizing negative impacts to the natural and cultural environment.

1.8.2 Greenbelt Plan 2005

The Greenbelt is a cornerstone of Ontario's Greater Golden Horseshoe Growth Plan which is an overreaching strategy that will provide clarity and certainty about urban structure, where and how future growth should be accommodated, and what must be protected for current and future generations.

The *Greenbelt Plan,* 2005 (GBP) identifies environmentally and agriculturally protected lands within the Golden Horseshoe where urbanization should not occur, in order to provide permanent protection to the agricultural land base and the ecological features and function occurring on this landscape.

The GBP includes lands within, and builds upon the ecological protections provided by, the Niagara Escarpment Plan (NEP) and the Oak Ridges Moraine Conservation Plan (ORMCP). It also complements and supports other provincial level initiates such as the Parkway Belt West Plan and the Rouge North Management Plan.

In particular the Greenbelt Plan:
- Protects against the loss and fragmentation of the agricultural land base and supports agriculture as the predominant land use
- Gives permanent protection to the natural heritage and water resource systems that sustain ecological and human health and that form the environmental framework around which major urbanization in south-central Ontario will be organized
- Provides for a diverse range of economic and social activities associated with rural communities, agriculture, tourism, recreation and resource uses

The goal of the GBP is to enhance our urban and rural areas and overall quality of life by promoting the following matters within the Protected Countryside:
- Agricultural Protection
- Environmental Protection
- Culture, Recreation and Tourism
- Settlement Areas
- Infrastructure and Natural Resources

Section 4.2.1 of the ***Greenbelt Plan*** outlines the general policies for infrastructure projects within the *Protected Countryside* designation of the GBP. The Protected Countryside is made up of an Agricultural System and a Natural System, together with a series of settlement areas. These policies must be met with any new and / or expanded infrastructure within the *Protected Countryside*.

The study area falls within the boundaries of the Greenbelt Plan, as shown in **Figure 3**. The study area has been designated as *Protected Countryside*, with portions of the study area also belonging to the Niagara Escarpment Plan Area.

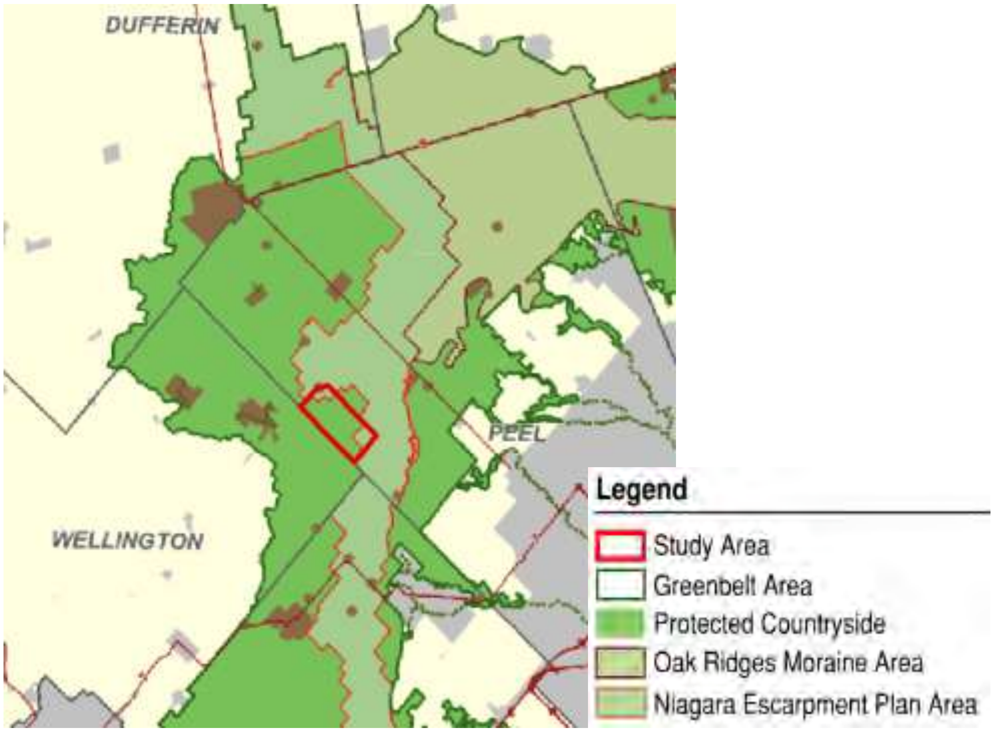


Figure 3: Greenbelt Plan and Niagara Escarpment Plan

1.8.3 Niagara Escarpment Plan

The Niagara Escarpment includes a variety of topographic features and land uses extending 725 kilometres from Queenston on the Niagara River to the islands off Tobermory on the Bruce Peninsula. The particular combination of geological and ecological features along the Niagara Escarpment results in a landscape unequalled in Canada. It is also a source of some of southern Ontario’s prime rivers and streams and one of the province’s principal outdoor recreation areas.

Human impact on this environment is reflected in a variety of ways:

- The Escarpment area is the site of a large mineral aggregate extraction industry
- Demand for permanent and seasonal residences in many areas is intense
- Farming ranges from the cultivation of tender fruit and specialty crops in the Niagara Peninsula to the raising of beef cattle in Bruce County
- The proximity to Ontario’s largest population centres makes the Escarpment a popular tourist destination
- Many archaeological sites and historical homes and buildings reflect, in a richly picturesque and valuable way, the development of the current landscape and economy of the area.

The Niagara Escarpment Planning and Development Act established a planning process to ensure that the area would be protected. From this emerged the Niagara Escarpment Plan, which serves as a framework of objectives and policies to strike a balance between development, preservation and the enjoyment of this important resource.

On February 8, 1990, the Bureau of the United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and Biosphere (MAB) program approved the designation of the Niagara Escarpment as a Biosphere Reserve.

The Greenbelt Act, 2005 authorized the preparation of the Greenbelt Plan that was approved in February, 2005 (see **Section 1.8.2**). The Greenbelt Plan identifies where urbanization should not occur in order to provide permanent protection of the agricultural land base and the ecological features and functions occurring in the Greenbelt Plan Area. That Area includes all of the Niagara Escarpment Plan Area as well as the Oak Ridges Moraine Conservation Plan Area and the Protected Countryside. The policies of the Niagara Escarpment Plan are the policies of the Greenbelt Plan for the Niagara Escarpment Plan Area.

The purpose of this Plan is to provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment.

The objectives of the Niagara Escarpment Plan are:

- To protect unique ecologic and historic areas
- To maintain and enhance the quality and character of natural streams and water supplies
- To provide adequate opportunities for outdoor recreation
- To maintain and enhance the open landscape character of the Niagara Escarpment in so far as possible, by such means as compatible farming or forestry and by preserving the natural scenery
- To ensure that all new development is compatible with the purpose of the Plan
- To provide for adequate public access to the Niagara Escarpment
- To support municipalities within the Niagara Escarpment Plan Area in their exercise of the planning functions conferred upon them by the *Planning Act*

The Plan is Canada's first, large scale environmental land use plan. It balances protection, conservation and sustainable development to ensure that the Escarpment will remain substantially as a natural environment for future generations.

As shown in **Figure 3**, parts of the study area fall within the Niagara Escarpment Plan Area, specifically segments of Olde Base Line Road, Mississauga Road/Old Main Street, and Bush Street. The Niagara Escarpment Plan area is divided into various designated land areas – the areas within the study area are classified as *Escarpment Natural Area*, *Escarpment Protection Area*, *Escarpment Rural Area*, and *Minor Urban Centre*. Sections 1.3, 1.4, and 1.5 of the Plan further specify permitted uses within Escarpment Natural Area, Escarpment Protection Area, and Escarpment Rural Area, respectively, subject to Part 2 of the Plan. Excerpts of Part 2 of the Plan relevant to the study area are highlighted in the following paragraphs.

As per section 2.6 of the Plan, changes to the natural drainage must be avoided and development is to be located outside of wetlands. The limits of the wetland will be determined by the conservation authority. Development adjacent to wetlands will only be permitted if it does not result in the loss of wetland functions, subsequent demand for future development that will negatively affect wetland function, conflict with site specific wetland management practices, or loss of contiguous wetland area. A developmental setback from the wetland is to be determined in association with the conservation authority. Furthermore, water resources must be maintained in a clean and healthy manner that will not affect fish resources.

Section 2.6 of the Plan also states that new development adjacent to fish resources must demonstrate:

- Net gain/no net loss of productive capacity of fish habitat;
- Maintenance of minimum baseflow of watercourses;
- Maintenance of existing watercourses in a healthy, natural state;
- Maintenance of vegetative buffers in accordance with the sensitivity of the fishery resource and development criteria; and
- Best available construction and management practices shall be used to protect water quality and quantity, both during and after construction. Treatment of surface run-off to maintain water quality and hydrological characteristics in receiving watercourses shall meet the standards established by the Ministry of Environment and Natural Resources.

As per section 2.7 of the Plan, new development within wooded areas must minimize disturbance of treed areas and must have a site plan and specific management details regarding the protection of existing trees.

Section 2.8 of the Plan specifies that new development will not be permitted within the regulated habitat of endangered (regulated) species, and development must maintain wildlife corridors and linkages with adjacent areas. Wildlife habitat must be enhanced wherever possible. Parts of the study area have been identified by the Ministry of Natural Resources as regulated Jefferson Salamander habitat.

Section 2.12 of the Plan states that:

- Existing heritage features, areas and properties should be retained and reused. To determine whether such actions are feasible, consideration shall be given to both economic and social benefits and costs.
- New development including reconstruction and alterations should be in harmony with the area’s character and the existing heritage features and building(s).
- Where development will destroy or significantly alter cultural landscapes or heritage features, actions should be taken to salvage information on the features being lost. Such actions could include archaeological salvage and excavation, and the recording of buildings or structures through measured drawings or photogrammetry or their physical removal to a different location.

Section 2.14 of the Plan specifies that development should be directed outside of provincially and regionally significant Life Science ANSIs. Minor encroachments will be considered in relation to:

- Specific features for which the ANSI was identified;
- Protection, natural heritage appreciation, scientific study or educational values and their maintenance, and;
- Whether appropriate mitigative measures can be applied to protect ANSI values.

As per Section 2.15 of the Plan, all new and reconstructed transportation and utility facilities shall be designed and located to minimize the impact on the Escarpment environment and be consistent with the objectives of this Plan. This includes minimizing blasting, grading and tree removal where possible through realignment and utilization of devices such as curbs and gutters, retaining walls and tree wells, and using native species of vegetation blended into the surrounding landscape for site rehabilitation.

Should the Plan policies not be met, for example where development is proposed within wetland areas or in the habitat of provincially endangered species, an amendment to the Plan would be required. It is noted that amendments, if required, would be sought at the detailed design stage, and the Niagara Escarpment Commission cannot indicate the outcome of the amendment application until the formal amendment process has been undertaken. In addition, NEP amendments can be a lengthy process and may be subject to appeal, which could potentially lead to an Environmental Review Tribunal hearing. In the case of regulated endangered species habitat, even if an NEP amendment is approved, an Overall Benefit Permit under Section 17(2)(c) of the Endangered Species Act would still be required from the Ontario Ministry of Natural Resources.

The EA team will consider minimizing potential impacts, particularly at locations within the Niagara Escarpment Plan Area, with input from the Niagara Escarpment Commission throughout the study.

1.8.4 Endangered Species Act, 2007

Species designated as Threatened or Endangered in Ontario automatically receive legal protection under the *Endangered Species Act,* and their habitats (i.e., areas essential for breeding, rearing, feeding, hibernation and migration) are also protected under the Act. The *Endangered Species Act* (Subsection 9(1)) states that:

"No person shall,

> *(a) kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species;*
>
> *(b) possess, transport, collect, buy, sell, lease, trade or offer to buy, sell, lease or trade,*

(i) a living or dead member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species,

(ii) any part of a living or dead member of a species referred to in subclause (i),

(iii) anything derived from a living or dead member of a species referred to in subclause (i); or

(c) sell, lease, trade or offer to sell, lease or trade anything that the person represents to be a thing described in subclause (b) (i), (ii) or (iii).

Clause 10(1)(a) of the *Endangered Species Act* states that:

"No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threatened species"

In order to balance social and economic considerations with protection and recovery goals, the *Endangered Species Act* also enables the Minister of Natural Resources to issue permits or enter into agreements with proponents in order to authorize activities that would otherwise be prohibited by subsections 9(1) or 10(1) of the Act, provided the legal requirements of the Act are met.

The *Endangered Species Act* is of relevance to this EA given the existence of occurrence records for multiple Species at Risk (SAR) within or in the vicinity (within 10 x 10 kilometer area) of the study area. The primary species at risk for this study area is the Jefferson Salamander.

1.8.5 Region of Peel Official Plan

The Regional Official Plan (ROP) is a long-term plan used to assist the Region in managing growth and development. The main purpose of the Plan is to:

- Provide Regional Council with a long-term regional strategic policy framework for guiding growth and development in Peel while having regard for protecting the environment, managing the renewable and non-renewable resources, and outlining a regional structure that manages this growth within Peel in the most effective and efficient manner
- Interpret and apply the intent of Provincial legislation and polices within a Regional context using the authority delegated or assigned to the Region from the Government of Ontario
- Provide a long-term regional strategic policy framework for the more specific objectives and land use policies contained in the area municipal official plans which must conform to this Plan
- Recognize the duality in Peel Region between the urban nature of the Cities of Brampton and Mississauga and the primary rural nature of the Town of Caledon
- Recognize the need for effective environmental protection and management measures to ensure environmental sustainability

- Recognize the importance of protecting and enriching the natural and cultural heritage of Peel Region
- Provide for the health and safety of those living and working in Peel
- Maintain and enhance the fiscal sustainability of the Region

The ROP was adopted by Council on July 11, 1996 and approved with modifications by the Minister of Municipal Affairs and Housing on October 22, 1996. As required by the Planning Act, a municipality will revise its Official Plan every five years to ensure that it conforms to provincial plans, takes into account matters of provincial interest, and is consistent with policy statements issued under the Act.

The Region of Peel recently completed the Peel Regional Official Plan Review (February 2013 Draft) to bring its Official Plan policies into conformity with provincial requirements.

The ROP identifies all roads in the study area as Major Roads (ROP Schedule E) with mid-block right-of-way requirements of 30 metres on all areas except the Belfountain Village, where 20 metres are required (ROP Schedule F). The plan also identifies the study area as being part of the Niagara Escarpment Plan Area and Greenbelt Plan Area.

1.8.6 County of Wellington Official Plan

The County of Wellington Official Plan, last revised in February 2011, is a legal document intended to give direction over the next 20 years to the physical development of the County, its local municipalities and to the long term protection of County resources. All land use and servicing decisions must conform to the policies of this Plan.

The County Official Plan lays out how land in the County should be used. It deals mainly with issues such as:

- Where new housing, industry, offices and shops will be located
- What services like roads, water, sewers and parks will be needed
- When, and in what order, parts of the community will grow
- How and when important resources will be protected

It is expected that the policies of this Plan will be the basis on which County and local councils and other government agencies make decisions on land use planning matters. Public and private initiatives will be required to conform to County policy.

Wellington County Council commits itself to ensuring that existing and future residents have access to an adequate supply and variety of jobs, homes, shopping, services, leisure activities, educational opportunities, and cultural facilities, and that the people of the County enjoy clean air, clean water, healthy communities, natural heritage, cultural heritage, public health, and public safety.

Through this Plan, County Council outlines a long-term vision for Wellington County's communities and resources. The Plan provides policies to attain a long-term vision that includes planning concepts such as:
- Sustainable development
- Land stewardship
- Healthy communities

The County of Wellington Official Plan identifies the portion of the study area within the Town of Erin as Secondary Agricultural land, with Greenlands south of Bush Street and Mineral Aggregate Areas north and south of Bush Street.

1.8.7 Town of Caledon Official Plan

The Town of Caledon Official Plan is a statement of principles, goals, objectives and policies intended to guide future land use, physical development and change, and the effects on the social, economic, and natural environment within the Town of Caledon.

The Plan provides the detailed local basis upon which the Town and the Region will provide services within the municipality. It contains policies which govern land use in the Town and which provide the basis for preparing zoning and other by-laws.

The Plan will provide direction to Council, committees appointed by Council, Municipal Departments, and other boards and commissions having jurisdiction in the Town of Caledon, and will also serve as a guide to local citizens and businesses. The policies of the Plan are designed to promote public input and involvement in the future of the Town and to maintain and enhance the quality of life for the residents of Caledon. The area affected by the Plan includes all lands within the boundaries of the Town of Caledon.

The Plan outlines general policies related to:
- Ecosystem Planning and Management
- Cultural Heritage Conservation
- Fiscal and Economic Management
- Housing
- Population and Employment
- Town Structure and Land Use

Schedule A (Land Use Plan) designates the majority of the study area as Rural Area, with Belfountain Village designated as Estate Residential / Settlement Area and parts of Bush Street (between Winston Churchill Boulevard and Shaws Creek), Winston Churchill Boulevard (south of Bush Street), Mississauga Road (south of Caledon Mountain Drive), and Olde Base Line Road (east of Winston Churchill Boulevard) designated as Agricultural Area.

Schedule J (Long Range Road Network) designates Winston Churchill Boulevard, Olde Base Line Road, Bush Street and Mississauga Road within the study area as medium capacity arterials, and Old Main Street as a low capacity arterial.

1.8.8 Peel Region Long Range Transportation Plan

The Peel Long Range Transportation Plan (LRTP), last updated in 2012, identifies major transportation challenges that the Region of Peel expects to face over the next several decades, as well as appropriate policies, strategies and planned road improvements to address these challenges.

Some of the challenges identified in the LRTP include:
- Increasingly congested roads due to high population growth
- Innovative solutions to facilitate the movement of goods, not just people, so that the Region's economic competitiveness is not compromised
- Sustainable planning and protection of the environment to ensure a liveable future

The Region realizes that the construction of new roads, while necessary for people and goods movement, will not be enough to meet projected future travel demand. Other strategies, such as transportation demand management (TDM) and intelligent transportation systems (ITS) are necessary in order to address the challenges that await Peel in the upcoming years. In addition, because transportation is interconnected with health, quality of life, social equity and the environment, road improvements cannot be the sole answer to Peel's congested roads. Other modes, such as walking and cycling, should be promoted as viable transportation options to those who live and work in Peel.

Road improvements could strengthen the goods movement network and provide temporary relief or car congestion, but more importantly, they could reserve the space the Region may need in the future for other purposes such as active transportation infrastructure and streetscaping. In order for the Region to maintain the high quality of life enjoyed by its residents, it must shift away from a culture of auto-oriented development to one of sustainable development, and ensure its transportation system is safe and convenient for everyone to use.

Key Components of the LRTP include:
- Transportation Vision, Goals, Objectives and Policies, which provide a framework for developing and coordinating future actions and programs to improve transportation in Peel Region
- Regional road improvements required by 2021 and 2031
- Regional strategies, studies and action plans in goods movement, transportation demand management, and other sustainability initiatives
- Implementation and Performance Measurement Plan

No road widening is identified within the study area as part of the LRTP, and no heavy trucks are to be allowed on any of the study area roads.

1.8.9 Region of Peel Road Characterization Study

The Region of Peel's Road Characterization Study (RCS) was completed in 2013. It provides design guidelines for future Regional roadways that respect multiple transportation modes and ensure that the Regional arterial transportation network considers all road users, transportation options, health impacts, and local context. Through this study, the Region has placed a higher priority on meeting the transportation demands using other modes and incorporating the needs of emerging communities, while maintaining traffic functionality and beginning to address health issues by facilitating more active design. Assigning a Road Character to a road allows for the road to be designed in a way that is more context sensitive and balances the need for mobility with that of land access.

The study was informed by key documents that included current local, regional, and provincial policies, and official plans that provide guidance on how to direct growth, development, and intensification. Extensive stakeholder engagement was a vital part of the process, which helped develop a context sensitive solutions approach.

The RCS characterizes Winston Churchill Boulevard, Olde Base Line Road, the majority of Mississauga Road / Old Main Street, and the majority of Bush Street within the study area as *Rural Roads*, with the remainder of Old Main Street and Bush Street (Belfountain Village) as a *Rural Main Street*. The RCS provides guidelines for the cross-section elements to be included in each road character category. Rural roads consist of a vehicle zone (travel lane), paved and unpaved shoulders, and a wide ditch. Rural Main Streets consist of a vehicle zone, separate bicycle and pedestrian zones (bike lanes and sidewalks), splash strip and green zone, with optional parking depending on the available right-of-way.

1.8.10 Caledon Transportation Needs Study Update

The 2009 Caledon Transportation Needs Study Update is a joint study between the Town of Caledon and the Region of Peel to assess and identify the potential transportation improvements needed to accommodate future travel demand within the Town. This study is an update of the Caledon Transportation Needs Study completed in 2004, and aims to provide:

- A system of roads to service existing and future land use patterns in Caledon, and
- Safe, effective ways to move people and goods in and through the Town of Caledon.

The Transportation Needs Study Update takes into account a number of changes that have occurred since 2004, including:

- The most current Highway 427 Extension plan
- Provincial growth guidelines that predict 108,000 people living in Caledon by 2031
- Metrolinx direction for the Greater Toronto and Hamilton Area, which include improved public transit services to communities such as Caledon
- Several other new transportation studies that will have future implications on Caledon

Some of the issues that are addressed in the study include:

- Overall transportation infrastructure and services needed to support the existing and projected population and employment growth to the year 2031
- Inter-regional travel demands, including traffic composition and volumes, and travel patterns
- The role and function of the existing and future road network
- The protection of transportation corridors to meet the existing and future needs
- The need for public/private transit service, as warranted by economic feasibility and service demand

Findings from the 2009 study show that roads in Caledon have to accommodate an unusually high proportion of through trips, and Peel's road capacity (the maximum amount of traffic a road can support using all available lanes) will be surpassed by 2021 and 2031.

The 2009 study indicates Peel's goals to:

- Manage truck traffic, in cooperation with the Ministry of Transportation, to ensure Peel's transportation network can handle future growth
- Work with neighbouring municipalities and regions to create a combined, continuous, reliable transportation system across municipal boundaries
- Explore other options such as public transit system services and travel demand management

The Transportation Needs Study Update designates Winston Churchill Boulevard, Olde Base Line Road, Bush Street and Mississauga Road within the study area as collector roads, and Old Main Street as a low capacity arterial. The Study Update also identifies the intersections of Winston Churchill Boulevard / Olde Base Line Road and Mississauga Road / Olde Base Line Road as requiring improvements in the medium term (by 2021).

1.8.11 Region of Peel Active Transportation Study

On February 9, 2012, Peel Regional Council approved Peel Region's first Active Transportation Plan. The Plan is completed in collaboration with area municipal staff, and with input from internal and external stakeholders including the general public.

The Plan provides a framework for how the Region will increase the share of walking and cycling trips, linking with transit, and creating a pedestrian and cycling friendly environment. The Plan sets out policies that direct the practices of the Region to support more walking and cycling, recommends active transportation improvements to the existing cycling and pedestrian networks, and recommends strategies/programs to shift travel behaviour.

The vision for active transportation in the Region of Peel is to create a place where walking and cycling are safe, convenient, appealing and accessible options for all citizens. The Plan aims to meet the following objectives:

- Set out policies that direct the practices of the Region to support more walking and cycling

- Recommend active transportation infrastructure improvements along Regional roads that support the area municipal plans and fill in gaps in the network
- Establish partnerships with key stakeholders such as Peel Health, Smart Commute, Peel district school boards to develop programs to help shift travel behaviour of target audiences to travel by active transportation, such as providing education in promoting benefit of active transportation, safety and skill straining

The Plan is a long term strategy that consists of three implementation phases. The first two phases (1-5 years and 6-20 years) form a recommended 20-year implementation plan (up to 2031). The third phase forms the longer term strategy (2031+). The Plan has an implementation strategy that includes estimated financial investment that tie into the Region's capital plan, tools for performance monitoring and evaluation, and a design guide for infrastructure design.

The Plan (Map 10A, shown in **Figure 4**) identifies Mississauga Road / Old Main Street, Bush Street, Winston Churchill Boulevard, and Olde Base Line Road as cycling facilities in the proposed long-term Regional cycling network. The Plan recommends providing paved shoulders on all rural Regional roads (roadways with paved shoulders), where feasible and appropriate, to improve the safety of all road users. Paved shoulders on rural roads provide cyclists with a space outside the general purpose travel lane, along with many benefits such as erosion control, extending the pavement service life, reducing run-off the road collisions, serving as refuge for disabled vehicles, and accommodating emergency vehicles.

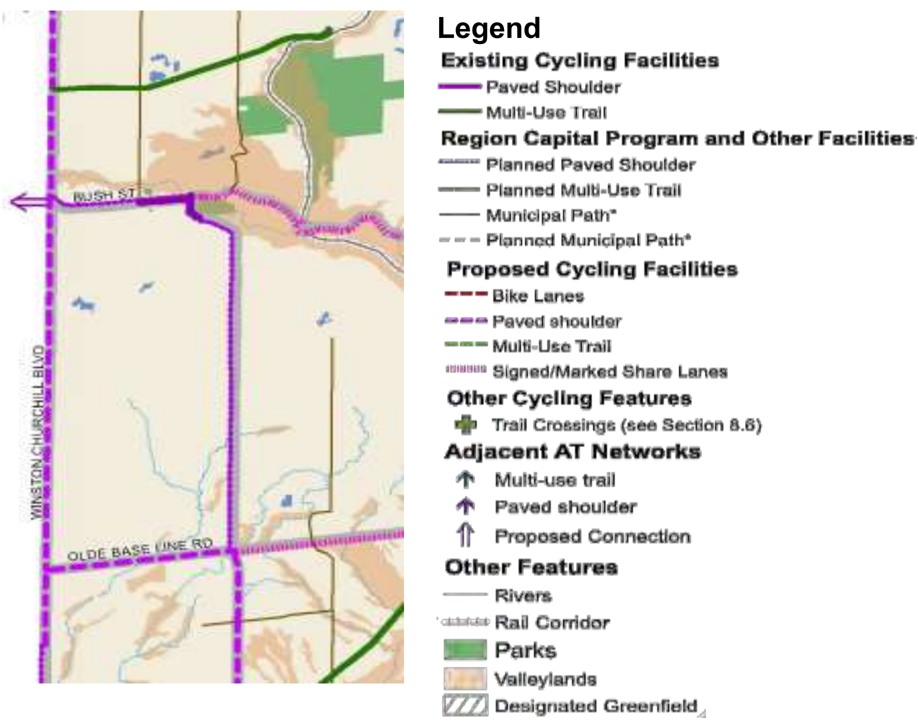


Figure 4: Caledon Proposed Long-Term Regional Cycling Network (Map 10A)

No designated pedestrian facilities are identified within the study area as part of the proposed long-term Regional pedestrian network.

1.8.12 Wellington County Active Transportation Master Plan

Wellington County, in association with the seven local area municipalities and Wellington-Dufferin-Guelph, have committed to developing and implementing a county-wide Active Transportation Plan. The plan is a long-term strategy to create a pedestrian and cycling supportive environment that will encourage both utilitarian and recreational travel by walking and cycling while promoting the importance of active lifestyles for residents and tourists.

Wellington County's Active Transportation Master Plan will assist the County and local municipalities in meeting their community planning and transportation objectives for the future. It will provide guidance as future transportation infrastructure improvements are considered. Perhaps the most important, the implementation of the County's Active Transportation Master Plan will contribute towards meeting the County and local municipal strategic goals of fostering a healthy and more sustainable community that will benefit all residents as well as the local economy and environment for all to enjoy.

An important part of the plan is an Active Transportation Network that will provide residents and visitors with on-road and off-road trails and active transportation corridors connecting the County's communities. An equally important part of the plan is the promotion of Active Transportation. Promotion includes education and encouragement initiatives to raise awareness of the numerous health, environmental and economic benefits of Active Transportation, all of which are needed to bring about a "cultural shift" and get residents to make incremental changes in the way they move about Wellington County as part of their everyday life.

Key study objectives for the development of the Active Transportation Plan included:

- Examining the current status of active transportation and trails in the County
- Recommending a network of active transportation routes throughout the County and connecting to neighbouring municipalities
- Providing recommendations regarding Official Plan policy
- Illustrating and describing guidelines and standards for the construction of active transportation facilities
- Recommending education and promotion programs related to active transportation
- Identifying costs and priorities as part of a phased action plan

Wellington County and the local area municipalities acknowledge the importance of future investment in active transportation facilities and opportunities. The Wellington County Official Plan and Five Year Trails Plan are two current documents that support the development of active transportation activities and initiatives. Both documents emphasize the provision and development of pedestrian and cycling facilities and initiatives. In addition, several of the local area municipalities have developed policies that make reference to improving the pedestrian and cyclist environment.

Wellington County's Active Transportation Master Plan identifies Winston Churchill Boulevard as a proposed signed cyclist route south of Bush Street, and paved shoulders are proposed north of Bush Street.

1.8.13 #CycleON: Ontario's Cycling Strategy

Cycling in Ontario is recognized, respected, and valued as a core mode of transportation that provides individuals and communities with health, economic, environmental, social and other benefits. #CycleON: Ontario's Cycling Strategy is a 20 year plan developed through public consultation and stakeholder input, designed to promote cycling across the province as a viable mode of transportation and improve the safety of people who cycle across the province. The strategy promotes healthy, active and prosperous communities, improved cycling infrastructure, safer highways and streets, awareness and behavioural shift to encourage more people to cycle more often, and improved cycling-related tourism experiences to promote Ontario as a premier cycling tourism destination. The strategy encourages the implementation of Complete Streets policies and cycling/active transportation plans.

This EA follows a multi-modal, context sensitive approach, and aims to balance the interests and meet the needs of all road users, including cyclists.

1.8.14 Keeping Ontario's Roads Safe Act

Keeping Ontario's Roads Safe Act is a proposed legislative and supporting regulatory amendment to the Highway Traffic Act with the goal of improving safety for all road users. The following paragraphs outline the proposed legislation amendments as they relate to pedestrian and cyclist safety.

Currently at school crossings and pedestrian crossovers, drivers must yield only half of the roadway to pedestrians who are crossing. If passed, the proposed legislation would improve pedestrian safety by:

- Requiring drivers to yield the whole roadway to pedestrians at school crossings and pedestrian crossovers
- Amending the Highway Traffic Act to allow for new pedestrian crossing devices on low-speed and low-volume roads as requested by municipalities

The proposed legislation would respond to municipal requests, stakeholder input and recommendations from the Office of the Chief Coroner for Ontario to promote cycling as active transportation and improve cyclist safety by:

- Allowing cyclists to use the paved shoulders on unrestricted provincial highways to promote safer opportunities to cycle

- Supporting cycling in urban areas by allowing municipalities to create contra-flow bicycle lanes to provide more direct routes and connectivity for cyclists
- Increasing the fine range for convictions of dooring of cyclists from $60 - $500 to $300 - $1,000 and raising the demerit points from two to three
- Requiring all drivers to maintain a distance of one metre when passing cyclists
- Increasing the maximum fine from $20 to a set fine amount that falls in the range of $60 - $500 for not using required bicycle lights and other reflectors/reflective material; and permit the use of flashing red lights as a safety feature on bicycles

This EA follows a multi-modal, context sensitive approach, and aims to balance the interests and meet the needs of all road users, including cyclists and pedestrians.

1.8.15 Region of Peel Strategic Goods Movement Network Study

The Region of Peel's Strategic Goods Movement Network Study (SGMNS) was completed in 2013. The SGMNS identified potential truck priority routes for goods movement to develop a hierarchical truck route network throughout Peel Region. The goal of the SGMNS is to improve, prioritize and preserve goods movement corridors through the Region. The network was developed by the Peel Region Goods Movement Task Force, with participation from government partners and private sector stakeholders.

Winston Churchill Boulevard and Olde Base Line Road within the study area are identified in the SGMNS as potential primary truck routes. However, further assessment including an infrastructure analysis is required before either of these roads can be designated as a truck route, as the existing road geometry might not be suitable for trucks, and the existing sub-base is identified as not suitable for truck traffic.

1.8.16 Related Studies

1.8.16.1 Regional Road Improvements in the Belfountain Area, Town of Caledon – Environmental Study Report January 1998

A study was undertaken starting in 1996 to review potential road improvements to address structural pavement deficiencies and unsafe driving conditions for the following roads:

- Winston Churchill Boulevard (Regional Road 19, Wellington County Road 25) from Bush Street to Olde Base Line Road;
- Mississauga Road (Regional Road 1) from Bush Street to Olde Base Line Road;
- Bush Street (Regional Road 11) from Winston Churchill Boulevard to Mississauga Road; and
- Olde Base Line Road (Regional Road 12) from Winston Churchill Boulevard to Mississauga Road.

The project recommended structural and geometric improvements to the existing roads within the study area, and culminated in the January 1998 Environmental Study Report: *Regional Road Improvements in the Belfountain Area, Town of Caledon*. This project stopped before the ESR was filed.

1.8.16.2 Winston Churchill Boulevard (RR 19) Class EA Study from 1200 metres south of Ballinafad Road to Olde Base Line Road

The Region of Peel undertook an Environmental Assessment Study for Winston Churchill Boulevard from 1200 metres south of Ballinafad Road to Olde Base Line Road, immediately adjacent to the Mississauga Rd./ Old Main St., Bush St., Olde Base Line Rd. and Winston Churchill Blvd. EA study area. This EA identified deficient pavement conditions, inadequate paved shoulders, and substandard drainage conditions. Improvements were recommended as part of the EA, including recommendations for the Winston Churchill Boulevard and Olde Base Line Road intersection. The preferred alternative consists of the reconstruction of Winston Churchill Boulevard to a two-lane road with paved shoulders, with vertical and horizontal alignment modifications chosen to minimize environmental and property impacts. Modified rural and urban cross-sections were selected at various locations to address localized issues. The EA process and recommendations were summarized in the March 2010 ESR titled *Winston Churchill Boulevard (RR 19) / Wellington Road 25 Improvements from 1200 metres south of Ballinafad Road to Olde Base Line Road (RR 12) Class Environmental Assessment Study*. This ESR was approved and the project is currently in the detailed design phase.

2. PUBLIC AND STAKEHOLDER CONSULTATION PROCESS

In accordance with the Municipal Class EA process, three mandatory points of contact with the public and review agencies are required for the EA study to:

- Review the project and selection of the preferred solution towards the end of Phase 2 and obtain comment and input;
- Review alternatives to assist in the selection of the preferred design for the chosen solution and obtain comment and input; and
- Announce the completion of the Environmental Study Report and placement of the ESR on public record for a minimum 30-day review period.

2.1 Public Consultation

For this EA study, a comprehensive public consultation program was conducted. This included additional points of contact throughout the study and establishing a Community Working Group (CWG), a non-voting group of interested residents and community stakeholders, with the goals of:

- Bringing together a broad group of people with varied interests to represent the views of the community; and
- Providing input to help the study team develop a solution for the study area that balances everyone's needs and is technically and financially sound

Since the EA limits were expanded in 2012, public consultation activities included:

- Notice of Study Commencement for expanded study area, including invitation to join the Community Working Group
- One (1) Public Open House
- Two (2) Public Information Centres
- Three (3) Community Working Group Meetings
- Three (3) Technical Advisory Committee Meetings
- Two (2) Newsletters
- Project Website via the following link: http://peelregion.ca/pw/transportation/environ-assess/mississauga-road-bush.htm
- Notice of Study Completion and ESR Filing

Notices and newsletters were sent to all those in close proximity to the project limits and those who had expressed interest in the 2009 study or throughout the duration of the current study.

All communication material related to public consultation activities is included in **Appendix A.1**.

2.1.1 Summary of Public Consultation Events

2.1.1.1 Community Working Group Meeting #1

The first Community Working Group (CWG) meeting was held on October 23, 2012 at the Belfountain Community Centre. This was an orientation session for the CWG, where the project was introduced and the following were discussed:

- CWG role, mandate and responsibilities
- Transportation issues and needs of the study area
- Transportation vision for the corridors
- October 30th Open House Outreach

Meeting notes are included in **Appendix A.1**.

2.1.1.2 Public Open House

A Public Open House was held on October 30, 2012, to introduce the expanded study area, discuss the EA process, and to learn about transportation issues and valued community characteristics. Over 100 attendees were at the Open House held from 6:30 p.m. to 9:00 p.m. at the Belfountain Public School.

Notice for the Open House was provided through the following:

- Mailing of notices to property owners fronting / backing along the study area corridors
- Region of Peel web site
- Local newspaper advertisement:
  - Erin Advocate on October 17, 2012
  - Caledon Enterprise/Caledon Citizen on October 18, 2012
  - Georgetown Independent/Acton Free Press on October 18, 2012
  - Bolton Caledon on October 18, 2012
  - Wellington Advertiser on October 18, 2012
- Posting on the community board at the local Community Centre and copies of the notice made available at the Higher Ground Coffee Shop.

Key messages heard include:

- Maintain the rural character and countryside scenic quality
- Preserve historic fences and features throughout the area
- Preserve / enhance natural environment
- Develop solutions that balance interests of all residents in the area
- Address poor conditions of the roadway pavement
- Improve pedestrian safety
- Minimize impact of increase in traffic volumes
- Address excessive speeds being experienced along Mississauga, Winston Churchill Roads and Olde Base Line Road
- Address issues arising from trucks that travel too fast, creating noise and unsafe conditions

- Accommodate cyclists outside the travelling lane of traffic
- Address issues with motorcycle traffic and speeding
- Improve poor sightlines in some locations
- Address parking congestion in Belfountain being experienced on weekends

More details about the Open House, including the notice and consultation summary report, can be found in **Appendix A.1**.

2.1.1.3 Community Working Group Meeting #2

The second Community Working Group (CWG) meeting was held on April 4, 2013 at the Belfountain Community Centre. The purpose of this meeting was to:

- Provide a project update
  - What has been done to date
  - What the study team has heard
- Provide a summary of technical work
- Share Draft Problem Statement, Guiding Principles, Preliminary Alternative Solutions, Preliminary Evaluation Criteria
- Discuss Next Steps in the project, including PIC #1
- Receive input from CWG members

Meeting notes are included in **Appendix A.1**.

2.1.1.4 Public Information Centre #1

The first Public Information Centre (PIC) was held on May 9, 2013 at the Belfountain Public School from 6:30 to 9:00 p.m. Over 70 people attended. This Public Information Centre presented the purpose of the EA, an overview of identified problems and results of the needs assessment, including traffic analysis and safety considerations, the draft problem statement and principles for generating alternative solutions, proposed alternative operational and physical improvements that could be considered, and the proposed draft evaluation criteria.

Notice for the May 9, 2013 Public Information Centre was provided through the following:

- Mailing of notices to property owners fronting / backing along the study area corridors and all those who showed interest at previous consultation events
- Project Study Website
- Local newspaper advertisement:
  - Erin Advocate on April 24, May 1 and May 8, 2013
  - Caledon Enterprise/Caledon Citizen on April 25 and May 2, 2013
  - George Town Independent/Acton Free Press on April 25 and May 2, 2013
  - Wellington Advertiser on April 25 and May 2, 2013

Key messages heard include:

- In developing operational and physical improvements, priority should be placed on maintaining the profile of the roads in the area

- Only resurface and rehabilitate – do not take out the curves or hills of the study area. Residents prefer to see rehabilitation instead of reconstruction
- Assess issue of truck usage on these roads relative to community impacts. Residents object to the creation of Truck Priority Routes along Winston Churchill Boulevard and Olde Base Line Road
- Address speeding without making roads smoother and level which residents are concerned could make cars go faster and exacerbate existing speeding concerns
- Reduce posted speeds and increase enforcement on roads to reduce safety concerns.
- Assess the need for the Region of Peel to design and construct the roads to meet Regional safety standards
- Review approaches for improvements to pavement condition
- Improve sightlines by trimming back trees and overgrowth
- Implement site specific improvements to address problem areas
- Review potential property impacts affecting driveways, fences and vegetation
- Minimize impact from future growth north of the community
- Develop a realistic approach for accommodating pedestrians in the Village and for cyclists on major roads
- De-clutter signs

More details about PIC #1, including the notice and consultation summary report, can be found in **Appendix A.1**.

2.1.1.5 Community Working Group Meeting #3

The third and last Community Working Group (CWG) meeting was held on October 16, 2013 at the Belfountain Community Centre. The purpose of this meeting was to:

- Provide a project update
  - What has been done to date
  - What the study team has heard
- Present:
  - Alternative design concepts developed by the study team, including typical cross-sections and vertical profiles
  - Evaluation of alternative design concepts
  - Preliminary recommended design concept
- Discuss Next Steps in the project, including PIC #2
- Receive input from CWG members

Meeting notes are included in **Appendix A.1**.

2.1.1.6 Public Information Centre #2

The second Public Information Centre (PIC) was held on November 20, 2013 at the Caledon Country Club from 4:30 to 8:30 p.m. Over 105 people attended. This Public Information Centre presented the alternative design concepts and recommended designs. The input received was reviewed to refine the designs and to determine the final recommendations. The

PIC was organized as an open house with the opportunity for people to view plans and to discuss their input with the Project Team. The format of the PIC was designed to maximize the opportunity for each property owner and stakeholder to review the designs for each section of the road on large plan and profile drawings.

Notice for the November 20, 2013 Public Information Centre was provided through the following:

- Mailing of notices to property owners fronting / backing along the study area corridors and all those who showed interest at previous consultation events
- Project Study Website
- Local newspaper advertisement:
  - Erin Advocate on November 6 and November 13, 2013
  - Caledon Enterprise on November 7 and 14, 2013
  - George Town Independent on November 7 and 14, 2013
  - Wellington Advertiser on November 8 and 15, 2013

Key messages heard include:

- Reassess issue of truck usage on these roads relative to community impact. Residents continue to object to the designation of Truck Priority Routes on Winston Churchill Boulevard and Olde Base Line Road
- Reduce posted speeds and increase enforcement on roads to reduce safety concerns.
- In the final design, minimize road profile changes
- In developing the final recommendations, priority should be placed on ensuring the protection of historic fences, mature trees, natural vegetation, cedar rail and other features that define the unique character of this area
- Reassess design for the Village of Belfountain to maintain a rural streetscape and minimize impact to heritage features, hydro poles and front yards from proposed sidewalks and road width
- Sidewalk consideration along roadways received mixed reviews
- Cycling on paved shoulders and cycling infrastructure received mixed reviews
- Review potential property impacts affecting driveways, fences and vegetation in final design and work with homeowners to minimize impact and disruptions
- Implement site specific improvements to address problem areas
- Address condition of Winston Churchill Boulevard south of Olde Base Line Road

The comments provided on the large plan and profile drawings, and responses from the project team, are summarized in **Table 2**.

Table 2: Summary of Comments Provided on Plan and Profile Drawings at PIC #2

Station	Comment	Response
Mississauga Road / Old Main Street		
20+300	Review warrants for all-way stop at Mississauga Road/Olde Base Line Road intersection	Intersection does not meet warrant for all-way stop control based on the minimum volume warrant (arterial and major roads), and the collision warrant
22+450	Additional culvert at driveway on east side	Comment noted; however, outcome of proposed design is not affected by this culvert (approx. 25 m beyond existing ROW)
23+060	Please grade from heritage stone wall to mountable curb. Very important that wall has good drainage and will help re: maintenance. Move culvert south in line with stone arch in wall.	Culvert has been relocated to align with stone arch in wall. Grading does not impact stone wall.
23+340	Consider reducing the slope on The Grange Side Road approach to the intersection (school bus has slid onto Mississauga Road).	Design will pave to curb return, but grading on The Grange Side Road is outside of current scope
23+500	Lay some fiber optic cable for high speed internet service	Comment noted; however not in current scope
23+700	Allow for natural gas	Comment noted; however not in current scope
24+520	Existing rock cut or hill on both sides	Noted on plans
24+575	Save tree	Reviewed options; however tree removals are required to accommodate design
24+600 to 25+000	Will there be passing lanes on this uphill section?	Passing lanes are not proposed as they would require road widening and are not required based on low volumes
24+900	Land for potential acquisition is valued Concern over property – consider curb	Design has been revised (rural cross-section was replaced with semi-rural cross-section) to avoid property acquisition at this location
24+960	Like shoulder for bike lanes	Comment noted
25+680	Please do not impact the fence	Revised design does not indicate impacts to the fence
25+800	Please do not widen the road – no sidewalk	Paved shoulders (not sidewalks) are proposed at this location. Any pavement widening is being minimized and kept within the Regional ROW.
26+100	Speeding issue – add sign warning of pedestrians	Comment noted – enforcement required

Station	Comment	Response
26+260 to 26+430	Prefer retain narrow shoulders and no sidewalks	Comment noted; however design recommends sidewalk on the west side to connect to south side of Bush
26+400	Property boundaries not accurate to title – off by 7+ft	Property boundaries were provided by the Region. Outcome of proposed design is not affected by property lines at this location.
26+430	Sidewalks? Place to park if walkways? Emergency?	Current design provides parking and sidewalk. Vehicles can pull over onto parking area in an emergency.
Bush Street		
12+120	Retain parking	Design revised to include parking on Old Main Street immediately north of Bush Street
12+110	Investigate for sidewalk passage	Design revised to connect sidewalk on Bush Street and Old Main Street through sidewalk passage
12+010	Culvert replaced 7-8 years ago	Comment noted – existing culvert is undersized
11+360 to 12+100	Some residents support sidewalks, others strongly oppose them	Comments noted. Design recommends sidewalk on the south side of Bush to connect to west side of Old Main Street
11+300	Speeding problem	Proposed reduction of speed limit west of Shaws Creek – enforcement required
11+100	Please don't damage all the new evergreen trees (planted fall 2013 along old fence line)	Current design avoids impacts to fence and trees
11+100	Like that the road is being shifted to the south where it used to be – lots of room!	Comment noted
11+000	Replace our mailbox if moved back to the south	To be reviewed during detailed design
10+990	Don't feel this (driveway) culvert is required	Based on proposed drainage section, a culvert will be required for roadside ditch
10+240	Trim vegetation	Comment noted; to be reviewed
10+100	Remove dangerous cement curb (at south jog of WCB intersection)	Current design replaces curb with shoulder and ditch
10+060	Dangerous intersection (north jog of WCB intersection)	Design recommends reducing posted speed limit through the intersection
Winston Churchill Boulevard		
44+960	Consider stop sign at 10th Side Road as speed control measure	Intersection does not meet warrant for all-way stop control based on the minimum volume warrant (arterial and major roads), and the collision warrant

Station	Comment	Response
44+480	Too close to pond	Design has been revised (rural cross-section was replaced with semi-rural cross-section) to minimize impacts to pond and vegetation at this location
44+300	Protect trees; provide buffer	Comment noted
43+740	Beautiful trees	Design has been revised (rural cross-section was replaced with semi-rural cross-section) to minimize tree removals at this location
43+400	Resident noted drainage low area	Comment noted. Design has been revised (rural cross-section was replaced with semi-rural cross-section) to minimize impacts to adjacent areas
43+140	Stop sign would slow traffic down	Intersection does not meet warrant for all-way stop control based on the minimum volume warrant (arterial and major roads), and the collision warrant
41+870	Consider stop sign at 5th Side Road as a means to reduce speed	Intersection does not meet warrant for all-way stop control based on the minimum volume warrant (arterial and major roads), and the collision warrant
41+320	Ditch requirement through wetland?	Design has been revised (rural cross-section was replaced with semi-rural cross-section) to minimize impacts to adjacent areas
40+000	What will happen to this area (OBL south of WCB)? – potholes, rough grading	Improvements to this section of road completed through separate study – ESR completed and detailed design currently underway
Between 10th Side Road and The Grange Side Road	Likely turtle overwintering pond	Comment noted; to be reviewed along with NRSI's recommendations
Olde Base Line Road		
30+600	Driveway goes up. If profile lowered, driveway more leveled – who is responsible for grading?	Region would be responsible for regarding impacted driveways, as required
30+640 to 30+820	Noise concern	Proposed reduction in posted speed limit will reduce noise level
30+820	Suggest a deeper rock cut to lower top of knob to avoid (reduce) filling the bottom	Design must be sensitive to grade changes at driveways
31+000 to 31+160	Stone wall under wooden fence	Comment noted
32+280	Can hear trucks	Comment noted – increase in traffic volumes / change in mix of traffic not proposed and existing truck restrictions to remain

Station	Comment	Response
General comments		
WCB and OBL	Is it worth investment to have wide shoulders when there are few cyclists?	Goal of the study is to accommodate all road users

More details about PIC #2, including the notice and consultation summary report, can be found in **Appendix A.1**.

2.2 Agency Consultation

As part of the Environmental Assessment process, technical staff from multiple Peel Region divisions and partner agencies were invited to attend three Technical Advisory Committee (TAC) meetings, which were held on August 23, 2012; March 25, 2013; and October 8, 2013. These representatives reviewed and provided input on all aspects of the study process, including: the problem and opportunity statement, evaluation criteria, development and evaluation of alternatives, and the preferred alternatives for the roads within the study area.

The TAC included representatives from the following agencies as listed in **Section 1.6**:

- Region of Peel
- County of Wellington
- Town of Caledon
- Ministry of the Environment
- Ministry of Natural Resources
- Niagara Escarpment Commission
- Credit Valley Conservation
- Hydro One

In addition to the TAC meetings, the agency consultation process included correspondence and additional meetings with the Ministry of Natural Resources, Niagara Escarpment Commission, and Credit Valley Conservation Authority. Additional Federal Government Agencies, Provincial Government Agencies, Utility Agencies and Community Groups were also contacted via study notices and newsletters throughout the study. These agencies included:

- Canadian Environmental Protection Agency
- Environment Canada, Ontario Region
- Fisheries and Oceans Canada
- Parks Canada, Historic Site & Monument Board
- Health Canada, Ontario Region
- Canadian Transport Agency
- Transport Canada, Ontario Region
- Ministry of the Environment
- Ministry of Natural Resources
- Ministry of Agriculture & Environmental Land Use Policy
- Ministry of Agricultural, Food and Rural Affairs
- Ministry of Tourism, Culture & Sport
- Ministry of Municipal Affairs and Housing
- Ministry of Public Infrastructure and Renewal, Places to Grow
- Ministry of Transportation
- Credit Valley Conservation Authority
- Niagara Escarpment Commission
- County of Wellington
- Town of Caledon
- Peel District School Board
- Dufferin-Peel Catholic District School Board
- Infrastructure Ontario (formerly the Ontario Realty Corporation)

- GO Transit
- Ontario Provincial Police
- Town of Caledon Fire Department
- Region of Peel Ambulance Services
- Hydro One Inc.
- Hydro One Telecom
- Telus Communications
- Bell Canada
- Ontario Power Generation
- Enbridge Gas Distribution Inc.
- BLINK Communications Inc.
- Rogers Communications
- Rogers Cable System Inc.
- Trans Canada Pipeline
- Trans-Northern Pipelines Inc
- FCI Broadband
- Canadian Pacific Railway
- MTS – Allstream

The TAC and agency consultation was an ongoing process during the development and evaluation of options, where comments and concerns were incorporated or acknowledged throughout the study. Continual interaction between the study team and the TAC and other agencies shaped the development and evaluation of design options for the study.

Agency-specific correspondence is included in **Appendix A.2**.

2.3 First Nations Consultation

The First Nations consultation program for the EA study involved the following representatives and agencies who may have an interest in the study:

- Chief Laurie Carr, Hiawatha First Nation
- Chief Tracy Gauthier, Mississaugas of Scugog Island
- Chief M. Bryan LaForme, Mississaugas of New Credit First Nation
- Chief Roland Monague, Beausoleil First Nation
- Chief Sharon Stinson Henry, Chippewas of Mnjikaning First Nation (Rama)
- K.A. Sandy-McKenzie, Chippewas of Rama
- Chief Phyllis Williams, Curve Lake First Nation
- Ryan McBride, Credit River Metis Council
- Patricia Chrisjohn, Peel Aboriginal Network
- Allan Dokis, Anishinabek Nation/Union of Ontario Indians
- Rolanda Elijah, Association of Iroquois and Allied Indians
- Kate Cave, Six Nations Council
- Jake Linklater, Saugeen Ojibway Nation
- Janice Taylor, Chippewas of Georgina Island
- Denise Graham, Alderville First Nation
- Kathy Brant, Mississaugas of Scugog Island First Nation
- Métis Consultation Unit, Métis Nation of Ontario
- Chiefs of Ontario
- Consultation and Accommodation Unit, Aboriginal Affairs and Northern Development Canada

All representatives were included in the mailing list for the project, and were contacted via all study notices and newsletters throughout the study.

Alderville First Nation and Curve Lake First Nation acknowledged receipt of correspondence and indicated at the time of writing that they are not aware of any issues the Mississauga Road / Old Main Street, Bush Street, Olde Base Line Road and Winston Churchill Boulevard project would cause that would be of concern with respect to Traditional, Aboriginal and Treaty rights. Chippewas of Rama First Nation acknowledged receipt of correspondence which was forwarded to the Barrister and Solicitor Coordinator for the Williams Treaty First Nations. No response was received from the other First Nations representatives regarding any of the notices or newsletters sent throughout the study.

This correspondence can be found in **Appendix A.3**.

3. EXISTING CONDITIONS

3.1 Land Use Designations

The Town of Caledon's Official Land Use Plan designates the majority of the study area as *Rural Area*, with Belfountain Village designated as *Estate Residential / Settlement Area* and parts of Bush Street (between Winston Churchill Boulevard and Shaws Creek), Winston Churchill Boulevard (south of Bush Street), Mississauga Road (south of Caledon Mountain Drive), and Olde Base Line Road (east of Winston Churchill Boulevard) designated as *Agricultural Area*.

The Wellington County Official Plan designates the Majority of Winston Churchill Boulevard as *Secondary Agricultural Area*, with *Greenlands* south of Bush Street and *Mineral Aggregate Areas* north and south of Bush Street.

Several locations throughout the study area, such as the intersection of Mississauga Road and Olde Base Line Road, Mississauga Road / Old Main Street north of Caledon Mountain Drive, and Winston Churchill Boulevard north of The Grange Side Road, have also been classified as *Environmental Policy Areas (including Environmentally Sensitive Areas* and *Areas of Natural and Scientific Interest).* The northeast and southeast quadrants of the study area also fall under the Niagara Escarpment Plan Area, and are classified as *Escarpment Natural Area*, *Escarpment Protection Area*, *Escarpment Rural Area*, and *Minor Urban Centre*.

3.2 Natural Environment

Natural Resource Solutions Inc. (NRSI) conducted a Natural Heritage Assessment for the entire study area in 2012-2013, to complement the study conducted for Mississauga Road and Bush Street by Dillon Consulting in 2010. The sections below summarize existing natural environment conditions, and the full report can be found in **Appendix B**.

3.2.1 Designated Natural Areas

Designated Natural Areas are illustrated in **Figure 5** and are described in the following sub-sections.

3.2.1.1 Provincially Significant Wetlands

Portions of two Provincially Significant Wetland (PSW) complexes occur within the study area: the Eramosa River-Blue Spring Creek PSW Complex and the Caledon Mountain PSW Complex.

The Eramosa River-Blue Spring Creek PSW is located adjacent to Winston Churchill Boulevard and north of The Grange Side Road.

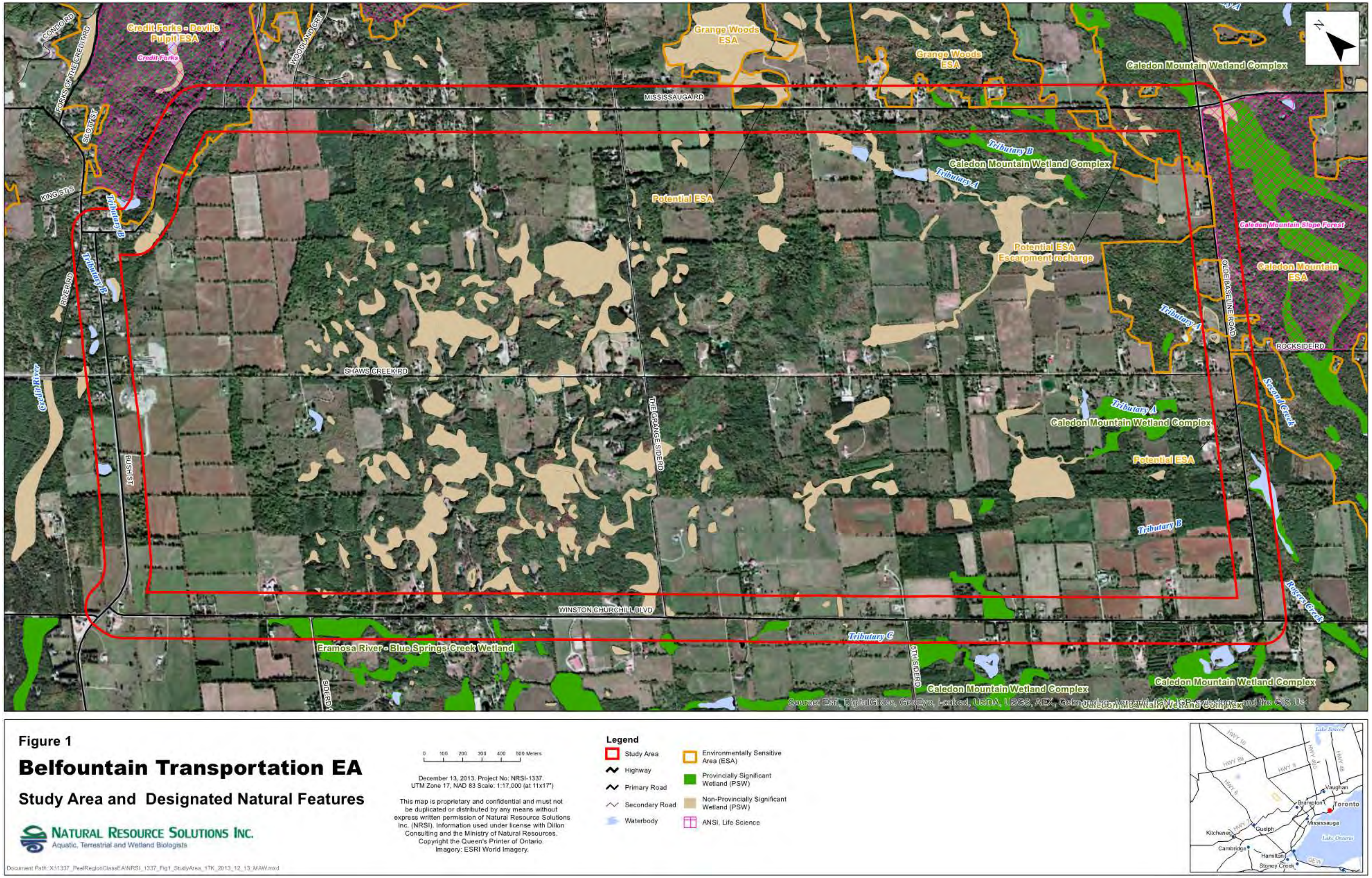


Figure 5: Designated Natural Features

The Caledon Mountain PSW is comprised of 7 smaller wetlands, being predominantly swamp, and a lesser extent marsh. The PSW is important for white-tailed deer as well as for fish spawning and rearing, particularly for brook trout The PSW lies within the south end of the study, along Winston Churchill Boulevard, Olde Base Line Road, and Mississauga Road.

3.2.1.2 Life Science Areas of Natural and Scientific Interest

Two Life Science Areas of Natural and Scientific Interest (ANSIs) occur within the study area: the Caledon Mountain Slope Forest ANSI and the Credit Forks ANSI.

Caledon Mountain Slope Forest ANSI is a large tract of primarily deciduous forest, harbouring locally significant lands for mammals, predominantly white-tailed deer. The ANSI offers habitat for sizeable populations of amphibians, predominantly salamanders. The Caledon Mountain Slope Forest ANSI is located within the Caledon Mountain ESA (described in the following section), and within the southeastern end of the study area, adjacent to Olde Base Line Road.

The Credit Forks ANSI is comprised of 46 individual wetlands, and supports locally significant habitat for white-tailed deer, herpetofauna (specifically common snapping turtle), and supports potential waterfowl breeding and staging habitats. The ANSI is located in the northeastern portion of the study area, along Mississauga Road / Old Main Street.

3.2.1.3 Environmentally Significant or Sensitive Areas

Three Environmentally Significant or Sensitive Areas (ESAs) occur within the study area: the Grange Woods ESA, Caledon Mountain ESA, and the Credit Forks – Devil’s Pulpit ESA.

The Grange Woods ESA is comprised of 7 individual wetlands, largely comprised of swamp and to a lesser extent marsh habitat. Hydrologically, the Grange Woods ESA is connected by surface water to adjacent wetlands, up to 0.5 kilometres away. The ESA provides valuable habitat to the flora and fauna of the region, and is locally significant as winter cover for wildlife, specifically white-tailed deer. The Grange Woods ESA is located along the eastern section of the study area, specifically along Mississauga Road, south of The Grange Side Road.

The Caledon Mountain ESA is within the Niagara Escarpment Plan Area and is also part of the Region of Peel Core Greenlands System. The Caledon Mountain ESA abuts the southern end of the study area, along Olde Base Line Road.

The Credit Forks – Devil’s Pulpit ESA, located on the Niagara Escarpment, provides some of the most extensive and complimentary views of the escarpment. The Credit Forks – Devil’s Pulpit ESA is a major outlier valley feature, displaying rugged talus slopes. It is one of the most important regions for fish spawning and nursery habitat in the region, and supports a wide diversity of fish species. The Credit Forks – Devil’s Pulpit ESA is located peripherally on the extreme northeastern portion of the study area, along Mississauga Road / Old Main Street and the Credit River.

3.2.1.4 Credit Valley Conservation Natural Area Inventory Regions

Three sites identified within the Credit Valley Conservation's (CVC's) Natural Areas Inventory (NAI) fall within the study area: Tenth Line – 5 Sideroad South, Winston Churchill – Ballinafad, and Mississauga Road-Grange Central.

The Tenth Line – 5 Sideroad South NAI site consists of 140 ha of rolling topography, mixed with open grassland and interior forest habitats. The property is currently entirely private. This property has a diverse set of vegetation communities and is similarly diverse in regards to the flora and fauna found within the property. Several Species at Risk (SAR) have been confirmed to be present throughout this site, including butternut, barn swallow, Canada warbler, hooded warbler, bobolink, eastern meadowlark, and western chorus frog.

The Winston Churchill – Ballinafad NAI site consists of 717 ha and is regarded as an exceptional property with high quality natural areas. Ownership is primarily private. This property is regarded as particularly (ecologically) diverse, due to its size, location and distinct elevational properties (being along the Niagara Escarpment). A total of seven SAR have been confirmed present on this site: American hart's-tongue fern, butternut, barn swallow, Canada warbler, bobolink, eastern meadowlark, and western chorus frog. Numerous regionally rare plant and bird species have also been observed throughout the property.

The Mississauga Road-Grange Central NAI site is the second largest of the three NAI regions in the study area vicinity, at 263 ha. This natural area is predominantly swamp and deciduous forest, with scattered mixed and coniferous forest. SAR found on site include: butternut, Canada warbler, hooded warbler, and monarch.

3.2.2 Terrestrial Environment

Fifteen natural vegetation community types were identified by CVC, and field-verified by NRSI, consisting of deciduous, coniferous and mixed forest, conifer plantation, swamp, marsh, wet meadow, cultural meadow and savannah, and open aquatic. The study area also contained intensively-farmed and non-intensively-farmed agricultural fields, rural and urban development. A total of 22 land-use types (including developed areas) were identified in total.

A total of 58 species of vascular flora were identified during the roadside evaluation of natural features within the study area. Approximately 16% of all inventoried species are considered non-native species.

Based on background information review, seven provincially rare plant species are known historically from the study area vicinity. One of these is the federally and provincially endangered butternut. Seven individuals of this species were observed, but all outside of the road right-of-way (as per the Dillon investigation conducted in 2010). No additional butternuts were observed during vegetation inventories completed by NRSI within the study area.

Several plant species designated as regionally significant have been observed in the study area vicinity based on the results of previous inventories, including raw data provided to NRSI by CVC. Two plant species designated as rare in Peel Region were observed during NRSI vegetation inventories within the study area: white spruce and red pine. Each of these species was observed within plantation or residential settings and is not naturally occurring specimens. The observed individuals therefore were not considered significant.

3.2.3 Wildlife

Wildlife habitat and species observed within the study area are described in the following sub-sections. These are also illustrated in **Figure 6**.

3.2.3.1 Birds

A total of 136 bird species were reported from the Ontario Breeding Bird Atlas (OBBA) squares covering the study area. Of these, 60 species were documented by NRSI biologists within the study area. Three species (American robin, European starling, and Eastern towhee) showed evidence of confirmed breeding in the immediate vicinity (carrying food). Twenty-seven other species showed evidence for probable breeding.

Based on a review of background information sources, 10 federally and/or provincially significant bird species are known from the study area vicinity. The study area contains suitable habitat (considering the exclusion of interior forest habitat within the study area) for seven of these species: barn swallow, bobolink, chimney swift, hooded warbler, eastern meadowlark, golden-winged warbler, Henslow's sparrow, and short-eared owl. Of these, barn swallow, bobolink, chimney swift and eastern meadowlark were observed within the study area.

One other significant bird species, eastern wood-pewee, was observed within the study area. Eastern wood-pewee is designated as a species of Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) but is not currently afforded protection under the federal Species at Risk Act; the species is not listed on the Species at Risk in Ontario list.

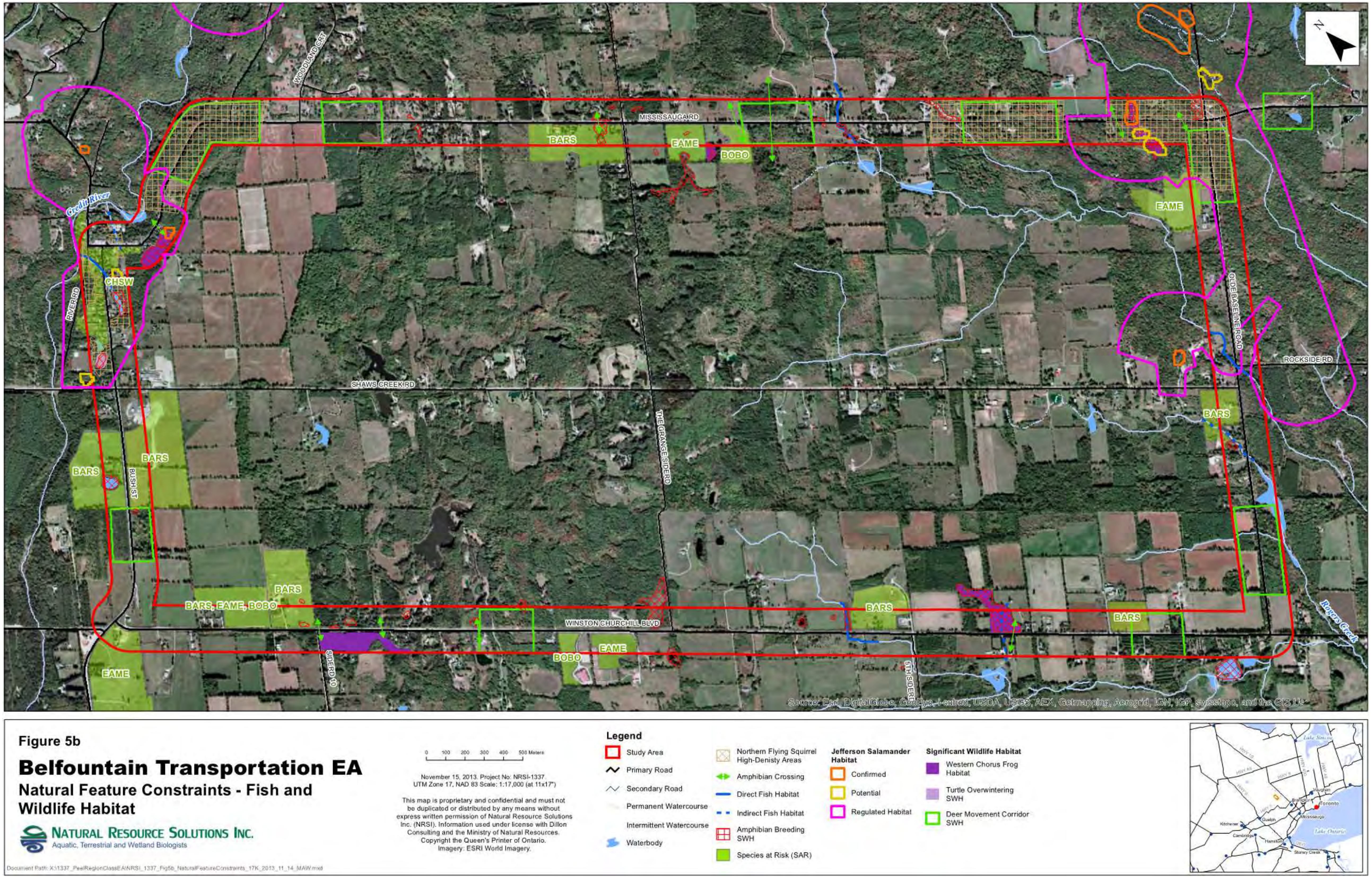


Figure 6: Wildlife Habitat and Aquatic Environment

3.2.3.2 Herpetofauna

A total of 28 species of herpetofauna are reported from the vicinity of the study area (within 10 x 10 kilometers). NRSI biologists recorded one species (green frog) within the study area through incidental observation. An individual of this species was heard vocalizing near one breeding bird survey station. Breeding habitat for this species is likely to exist within open water pond (OAO) to the west of this breeding bird survey station.

3.2.3.3 Mammals

A total of 19 mammal species are known to occur in the vicinity of the study area (within 10 x 10 kilometers). NRSI biologists observed one species (eastern chipmunk) within the study area. Northern flying squirrel is known to occur within forested areas within the northeast and southeast corners of the study area, specifically along Bush Street and Mississauga Road north and south of Belfountain, and along Mississauga Road near Olde Base Line Road. The study area incorporates part of an important regional movement corridor for white-tailed deer.

Two provincially significant mammal species, little brown myotis and northern myotis are known to occur in the vicinity of the study area. Both of these species are designated Endangered in Ontario and nationally by COSEWIC, although they are not currently afforded protection by the federal Species at Risk Act. Suitable habitat for little brown myotis and northern myotis occurs within the forest and woodland communities of the study area, which they may use for maternity colony habitat, roosting, etc.

There have been anecdotal reports of cougar (provincially Endangered) in the study area vicinity. Suitable habitat for cougar may also occur in the relatively large forested areas within and surrounding the study area. This species requires large territories of at least 100 squared kilometers. The presence of cougar in southern Ontario has not been confirmed.

3.2.3.4 Butterflies and Odonata

Thirty-six odonate species are known to occur in the vicinity of the study area (within 10 x 10 kilometers). Odonate data provided by CVC included a total of 14 odonate species, with an overall total of 50 odonate species reported from the vicinity of the study area. This included the species of conservation concern amber-winged spreadwing, lilypad clubtail, arrowhead spiketail and harpoon clubtail. NRSI biologists did not observe any odonate species during 2012 or 2013 field surveys.

The Butterflies of Canada reports 65 species of butterfly within the 10 x 10 kilometre squares overlapping the study area. CVC reported one additional butterfly species known from the study area for an overall total of 66 species of butterfly known from the vicinity of the study area. NRSI biologists did not observe any butterfly species during 2012 or 2013 field surveys.

3.2.4 Aquatic Environment

3.2.4.1 Fish Community

West Credit River Subwatershed
The west branch of the Credit River within the area of Belfountain is considered to be a coldwater fishery. The documented fish community within the west branch of the river includes a variety of species that exhibit varied life history requirements and trophic statuses. Sensitive cool/coldwater species have also been identified within the west branch of the Credit River. These species include brook trout, rainbow trout, stocked Atlantic salmon, brown trout, and mottled sculpin. Redside dace, which is listed as Endangered under the Endangered Species Act, has also been observed as occurring within 1 kilometre of the study area within the west branch of the Credit River; however, this species is not known to occur in the portion of the watercourses in the study area. No other SAR fish or mussels were identified as occurring within the study area. Brook trout are also found within the unnamed Tributary A to the West Credit River. Additional species information was not available for this tributary and no information was provided for Tributary B.

Cheltenham to Glen Williams Subwatershed
Both Rogers Creek and Second Creek are considered coldwater fisheries. The fish community is better documented within Rogers Creek than Second Creek but both have sensitive cool/coldwater species, including brook trout and rainbow trout. No significant species are known from these watercourses.

3.2.4.2 Surface Water Drainage & Aquatic Habitat Characterization

A total of 43 crossing locations were assessed within the study area. Of the 43 locations, the majority were small corrugated steel pipe (CSP) culverts connecting the roadside ditches or low lying areas on both sides of the roads. Of these crossings, eleven are considered to be watercourses. Features not considered watercourses include drainage ditches and equalization culverts. Equalization culverts are culverts that are used to balance the elevation of water on both sides of a road crossing, and also convey surface water; these are confined systems with no positive drainage on either side of the culvert. One equalization culvert was identified in the study area, located along Winston Churchill Boulevard south of Sideroad 10. The aquatic features that have been determined to be direct or indirect fish habitat are shown in **Figure 6**.

3.2.4.3 Residential Ponds

Approximately eight residential ponds were documented during the previous study (Dillon Consulting 2010) as occurring close to the study area along Bush Street and Mississauga Road. Distances of these ponds to the roads ranged from 8 to 50 metres. Due to lack of property access, these ponds were not fully assessed as part of this study. However, they are likely to provide direct fish habitat. Based on the hydrogeology of the area and the potential for groundwater upwelling, these ponds may provide coldwater conditions.

3.2.5 Species at Risk

Based on the results of previous studies completed within the study area, and NRSI field work completed in 2012 and 2013, six species regulated under Ontario's *Endangered Species Act* (i.e., designated as provincially Endangered or Threatened) are known to occur within the study area:

- Barn Swallow
- Eastern Meadowlark
- Bobolink
- Chimney Swift
- Butternut
- Jefferson Salamander

As provincially Threatened and Endangered species, these species, including their regulated or general habitats, are protected under the *Endangered Species Act*. Activities that may potentially impact these species and their general habitats must be registered with the OMNR, with provision of mitigation and monitoring plans to the satisfaction of the OMNR, as described in Ontario Regulation 242/08 (OMNR 2013). Potential impact to Jefferson salamander and its regulated habitat will require a permit under Section 17(2)(c) of the *Endangered Species Act* demonstrating a strategy to achieve overall benefit to the species, in consultation with the OMNR.

Policies for the protection of habitat for provincially Threatened and Endangered species have also been established in the Provincial Policy Statement, upper and lower-tier Official Plans, Greenbelt Plan and Niagara Escarpment Plan. However, these policies are to be applied in the context of the EA process such that, while all efforts will be made to respect these policies, they will be considered in light of other design considerations during selection of the preferred alternative design. Furthermore, where direct impact to habitat for Endangered or Threatened species is anticipated, an amendment to the Niagara Escarpment Plan may be required as described in **Section 1.8.3**.

3.2.5.1 Jefferson Salamander

The OMNR has defined regulated habitat for Jefferson salamander that applies to Peel Region. Jefferson salamander regulated habitat has been defined in Ontario Regulation 242/08 as follows:

i. a wetland, pond or vernal or other temporary pool that is being used by a Jefferson salamander or Jefferson dominated polyploid or was used by a Jefferson salamander or Jefferson dominated polyploid at any time during the previous five years,

ii. an area that is within 300 metres of a wetland, pond or vernal or other temporary pool described in subparagraph i and that provides suitable foraging, dispersal, migration or hibernation conditions for Jefferson salamanders or Jefferson dominated polyploids,

iii. a wetland, pond or vernal or other temporary pool that,

   a) would provide suitable breeding conditions for Jefferson salamanders or Jefferson dominated polyploids;

b) is within one kilometre of an area described in subparagraph i; and
c) is connected to the area described in subparagraph i by an area described in subparagraph iv; and

iv. an area that provides suitable conditions for Jefferson salamanders or Jefferson dominated polyploids to disperse and is within one kilometre of an area described in subparagraph i.

The habitat regulation for Jefferson salamander also includes migration routes between suitable habitats including crossings of roads and associated features (such as gravel shoulders). Jefferson salamander regulated habitat has been identified and mapped within the study area and surrounding vicinity by the OMNR, and is shown on **Figure 6**. Approximately 3,830 metres of study area roads coincide with mapped Jefferson salamander regulated habitat. Seven culverts occur in Jefferson Salamander regulated habitat within the study area. Specifically, regulated habitat features located within the study area include confirmed breeding ponds, potential breeding ponds (i.e., suitable habitat), and areas within 300 metres of these features including corridors of suitable habitat that provide dispersal and migration opportunities. All areas of regulated habitat are subject to the policies of the *Endangered Species Act* as described in **Section 1.8.4**. Regulated habitat within the study area includes known Jefferson salamander road crossing locations; specifically, on Mississauga Road north of Olde Base Line Road and on Old Main Street through Belfountain Village.

3.2.5.2 Barn Swallow, Bobolink and Eastern Meadowlark

Several individuals of foraging barn swallows, and breeding bobolink and eastern meadowlark were observed within multiple agricultural fields located within the study area as shown on **Figure 6**. Bobolink and eastern meadowlark are grassland bird species that have increasingly relied on modified cultural landscapes (e.g., old fields, meadows, hay fields) as native grassland habitats have largely been lost through agricultural and other land uses. These species were observed within fields considered “low intensity agriculture” within the study area. Barn swallows may forage over high or low intensity agricultural fields, preferentially close to a water source. These species and their general habitats are protected under the *Endangered Species Act*.

3.2.5.3 Chimney Swift

Provincially Threatened Chimney swifts are known to nest, and were observed by NRSI biologists, within areas of Belfountain Village. Nesting/roosting habitat for the chimney swift is therefore subject to the protection policies of the *Endangered Species Act*.

3.2.5.4 Butternut

Seven individuals of the provincially Endangered butternut were inventoried within the study area in 2010 (Dillon) and are shown on **Figure 6**. No other butternuts were observed during 2011 (Dillon) or 2012-2013 (NRSI) site visits elsewhere within the study area. Policies governing the protection of butternuts under the *Endangered Species Act* are described in

Ontario Regulation 242/08. Prior to any potential impact to butternuts, a Butternut Health Assessment must be completed by a certified assessor, with a report submitted to the OMNR, to determine each tree's status as a Category 1, 2 or 3 tree (see Ontario Regulation 242/08 for policies associated with each butternut tree category). Butternut Health Assessments have not been completed to date on known butternut trees within the study area. Any butternuts that may be potentially impacted by the proposed development will require a Butternut Health Assessment to determine its status under Ontario Regulation 242/08 of the *Endangered Species Act*. This work is anticipated to occur during the Detailed Design stage of development.

3.3 Cultural Heritage Resources

3.3.1 Archaeology Resources Assessment

Stage 1 Archaeological Assessments were conducted by Archaeological Services Inc. for Mississauga Road / Old Main Street and Bush Street in 2010, and for Winston Churchill Boulevard and Olde Base Line Road in 2012. These assessments are included in **Appendix C.1**.

The Stage 1 Archaeological Assessment determined that six archaeological sites have been registered within 1 kilometre of the study area, five of which are located within 50 metres of the study area. A review of the geography and history of the area also suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources.

Based on the results of the property inspection, it was determined that the Mississauga Road, Old Main Street, and Bush Street ROWs have been subject to extensive and deep land alterations. Portions of the study corridor, adjacent to the ROW, can also be characterized as low and wet or as exhibiting excessive slope. However, several areas beyond the disturbed ROW have remained relatively undisturbed and exhibit archaeological site potential. Although the majority of the Winston Churchill Boulevard and Olde Base Line Road street ROWs have also been previously disturbed by road construction, parcels beyond the ROWs retain archaeological potential.

In light of these results, ASI made the following recommendations:

1. Archaeological potential exists in the study area. These lands require a Stage 2 Property Assessment, which will be conducted by test pit survey and/or pedestrian survey. A test pit survey includes the systematic excavation of small test pits by hand at 5 metre intervals and can only be conducted when ploughing for pedestrian survey is not feasible.
2. The existing road ROWs in the study area do not retain archaeological site potential due to previous ground disturbances. Additional archaeological assessment is therefore not required along this portion of the study corridor.
3. Parts of the study area do not retain archaeological potential due to permanently wet conditions and steeply sloping lands. These lands do not require further archaeological assessment.

The Stage 2 Archaeological Assessment for areas where archaeological potential has been identified, as mentioned, is to be completed prior to or during detailed design.

3.3.2 Built Heritage Resources and Cultural Landscapes Assessment

Cultural Heritage Assessments were conducted by Archaeological Services Inc. for Mississauga Road / Old Main Street and Bush Street in 2010, and for Winston Churchill Boulevard and Olde Base Line Road in 2012-2013. These assessments are included in **Appendix C.2**.

Proposed road improvements can have a variety of impacts on built heritage resources and cultural heritage landscapes. These include the loss or displacement of resources through removal or demolition, and the disruption of resources by introducing physical, visual, audible or atmospheric elements that are not in keeping with the resources and/or their setting.

Based upon the results of historical research for Mississauga Road / Old Main Street and Bush Street, it was revealed that the study corridor features a historically surveyed thoroughfare in an agricultural area and early settlement that date back to the early- to mid-nineteenth century. The field review confirmed that this area retains a number of nineteenth and twentieth century cultural heritage resources, both within the historic settlement of Belfountain and along Mississauga Road / Old Main Street and Bush Street.

1. Road improvements should be planned to avoid identified cultural heritage resources. Construction activities should be planned so as to ensure that associated vibration impacts do not adversely impact resources set in close proximity to road right-of-ways.
2. Wherever possible, historic roadscapes and agricultural landscapes should be maintained through the use of landscaping with historic plant materials for berms or vegetative screens, and hedge rows should be preserved where extant.

Based upon the results of background data collection and field review, eight cultural heritage resources were identified along the Olde Base Line Road and Winston Churchill Boulevard study corridor. Based on the results of the assessment the following is recommended:

1. In accordance with Section 3.2. of the Town of Caledon's *Official Plan* (in particular, Section 3.2.3.4.1) road improvement activities should be suitably planned so that identified cultural heritage landscapes are appropriately conserved.
2. Road improvement activities should be suitably planned to avoid impacts to cultural heritage resources and associated character-defining heritage attributes:
   a) Proposed road improvements have the potential to directly impact the following character-defining attributes: remnant tree-lines along edges of current ROW; and stone and cedar rail fences located along edges of the current ROW.
      i) Potential mitigation recommendations are for road improvement alternatives to be suitably designed in a manner that does not negatively impact identified attributes through full or partial removal, alteration, or obstruction.

b) Proposed road improvements have the potential to directly impact character-defining attributes:
   i) Potential mitigation recommendations for road improvement alternatives are to be suitably designed in a manner that does not negatively impact defining characteristics associated with each roadscape, such as:
      (1) Fully avoiding or minimizing negative impacts to adjacent fence and tree lines; and
      (2) Maintaining current roadway widths and profiles.

Should future work require an expansion of the current study corridor and/or an additional study area, a qualified heritage consultant should be contacted in order to confirm impacts of the undertakings on potential cultural heritage resources.

3.4 Utilities and Services

The following utilities were contacted for information regarding their plant and facilities along the right-of-way for each of the study area corridors:

- Peel Region Water and wastewater
- Ontario One Call
  - Hydro One Telecom
  - Union Gas
  - Bell Canada
  - Enbridge Gas
  - Hydro One
  - Rogers

The following sections describe the specific utilities identified for each of the roads in the study area. This information is preliminary and is to be confirmed during detailed design.

3.4.1 Winston Churchill Boulevard

South of the intersection of Winston Churchill Boulevard and Olde Base Line Road, *Bell Canada* has 2 underground plants, running on the east and west sides of the corridor. Poles and aerial lines run on the east side from approximately 300 metres north of Olde Base Line Road to approx. 130 metres south of The Grange Side Road, where they become underground plants and continue north towards Bush Street. At approx. 1 kilometre north of The Grange Side Road, an underground plant also runs north along the west side. Both continue north to the intersection of Bush Street, where the easterly plant travels east along Bush and the westerly plant continues northerly and then follows Bush Street west.

Hydro One Telecom fiber cable is not located in this area.

Peel Region has confirmed this area is clear of *Regional water and sewer facilities*.

Rogers Cable notified HDR of the proposed installation of an antenna on the east side of Winston Churchill Boulevard south of Bush Street, approx. 400 metres east of the right-of-way limits.

Union Gas appears to have no facilities in this area.

No additional information was received from the other utility agencies that were contacted.

3.4.2 Olde Base Line Road

Bell Canada has existing aerial lines running on poles along the south side of Olde Base Line Road from Winston Churchill Boulevard to Mississauga Road. From just west of the intersection of Mississauga Road and Olde Base Line Road, the aerial lines appear to continue as an underground plant running easterly on the south side of the right of way. *Bell Canada* also appears to run underground plants northerly along Shaws Creek Road and southerly along Rockside Road, with both plants connecting with Olde Base Line Road.

Hydro One Telecom fiber cable is not located in this area.

Peel Region has confirmed this area is clear of *Regional water and sewer facilities*.

Union Gas appears to have a facility on the south-east quadrant of the Olde Base Line Road and Rockside Road intersection; however, the nature of this plant is unclear at this time and should be confirmed during detailed design.

No additional information was received from the other utility agencies that were contacted.

3.4.3 Mississauga Road / Old Main Street

Bell Canada has existing aerial lines running along poles on the east side of Mississauga Road from Olde Base Line Road to approx. 700 metres south of The Grange Side Road. At this point, the aerial lines become underground plants that intersect with and end at, underground plants running easterly and westerly along the north side of The Grange Side Road. North of this intersection, the lines become aerial again, following the line of poles on the west side of Mississauga Road. At the intersection of Caledon Mountain Drive, the lines become underground plants that run north for approx. 150 metres on the east/north side. Poles and aerial lines are present along the north/east side of Old Main Street within the village.

Hydro One Telecom fiber cable is not located in this area.

Peel Region has confirmed this area is clear of *Regional water and sewer facilities*.

Union Gas appears to have no facilities in this area.

No additional information was received from the other utility agencies that were contacted.

3.4.4 Bush Street

Bell Canada has an existing underground plant starting at the west jog of the Winston Churchill Boulevard intersection, approximately 4.5 metres south of the northerly property limits, crossing to the south side approximately 230 metres east of the east jog of the intersection. A plant is also located along the south side of Bush Street, approx. 3.5 metres north of the south property limit. At the intersection of Bush Street and Shaws Creek Road, *Bell Canada* underground plants exist along both the north and south sides, with the plant on the south side ending at Shaws Creek Road and the one on the north side continuing approx. 45 metres east of the Shaws Creek intersection. At this point, it appears to become an aerial line on the north side, with poles ending at Old Main Street.

Hydro One Telecom fiber cable is present in this area, starting on the north-east quadrant of the Bush Street / Shaws Creek Road intersection, crossing to the south-east corner of this intersection where it then continues south to the Belfountain Elementary School site.

Peel Region has confirmed this area is clear of *Regional water and sewer facilities*.

Rogers Cable notified HDR of the proposed installation of an antenna on the east side of Winston Churchill Boulevard south of Bush Street, approx. 400 metres east of the right-of-way limits.

Union Gas appears to have a facility on the north-west quadrant of the intersection of Bush Street and Shaws Creek Road; however, the nature of this plant is unclear at this time and should be confirmed during detailed design.

No additional information was received from the other utility agencies that were contacted.

3.5 Residential Servicing

Several properties front onto the study area roads within the study limits. These properties are not serviced by municipal watermains or sanitary sewers, but rather private wells for water supply and septic systems for sanitary sewage disposal. The locations of the tile fields and wells should be confirmed during detailed design.

4. NEEDS ASSESSMENT

The Needs Assessment section documents the existing conditions of the regional road network. Problems and opportunities related to the transportation network are identified in this section, and will be considered in the development and evaluation of alternatives.

4.1 Road Network

4.1.1 Description of the Road Network

The total length of the Regional Road corridor study area is approximately 17.4 kilometres. A summary of the cross-sectional elements for each of the Regional Roads is provided in **Table 3**. Vehicle zones throughout this report refer to general purpose travel lanes, and the two terms are interchangeable. Additional descriptions for each of the roads within the road network follow.

Table 3: Summary of Road Cross Section Dimensions

Road	Region of Peel Official Plan Designated Right-of-Way Requirements	Existing Right-of Way	Vehicle Zone in each direction	Partially Paved Shoulder in each direction	Drainage Zone in each direction
Mississauga Road & Old Main Street	30 m	20-28 m (Mostly 20 m)	3.3-3.5 m	0.5- 2.3 m (0-2.3 m paved)	4.2-10.2 m
Belfountain Village (Parts of Old Main Street and Bush Street)	20 m	10-20 m (Mostly 20 m)	3.2-3.7 m	0.5-2.7 m (0.2-2.0 m paved)	0-6.3 m
Bush Street	30 m	20-45 m (Mostly 30 m)	3.2-3.8 m	1.3-3.5 m (0.2-1.5 m paved)	2.7-18.0 m
Winston Churchill Boulevard	30 m	20-28 m (Mostly 20-23 m)	3.1-3.6 m	1.2-3.0 m (0-1.0 m paved)	3.4-9.7 m
Olde Base Line	30 m	20-33 m (Mostly 20-25 m)	3.4-3.5 m	0.4-0.8 m (0 m paved)	5.7-12.7 m

Notes:
Regional Official Plan Designated ROW on Old Main Street of 20 metres from Bush Street to 300 metres south of Bush Street.
Regional Official Plan Designated ROW on Bush Street of 20 metres from Old Main Street to 200 metres east of Shaws Creek Road.

Winston Churchill Boulevard (Peel Regional Road 19, Wellington County Road 25) between Bush Street and Olde Base Line Road is a two-lane rural, north-south major road that is approximately 6.0 kilometres in length. Winston Churchill Boulevard serves as the geographical boundary between the Town of Caledon (Region of Peel, located on the east side of Winston Churchill Boulevard, and encompasses the majority of the study area. The

Town of Erin in the Wellington County is located to the west of Winston Churchill Boulevard.

Adjacent land uses along the roadway include numerous private residences and farms, with driveways and accesses on Winston Churchill Boulevard. The vertical alignment of the road is a rolling profile with some moderate crests and sags. Winston Churchill Boulevard marks the boundary between Caledon (Peel Region) and the Town of Erin (Wellington County). The posted speed limit varies between 60 km/h and 70 km/h.

The existing cross-section of Winston Churchill Boulevard consists of two 3.1-3.6 metre travel lanes (vehicle zones) with partially paved shoulders ranging between 1.2-3.0 metres (of which 0-1.0 metre is paved). The existing right-of-way is predominantly 20-23 metres, but ranges between 20 to 28 metres. The range of dimensions for the different cross-sectional elements along the corridor is shown in **Figure 7** and summarized in **Table 3**.

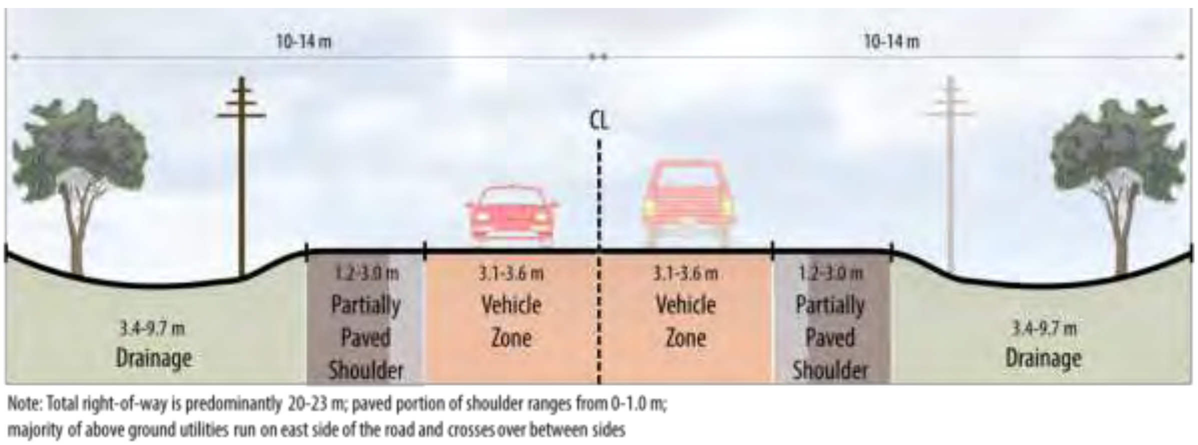
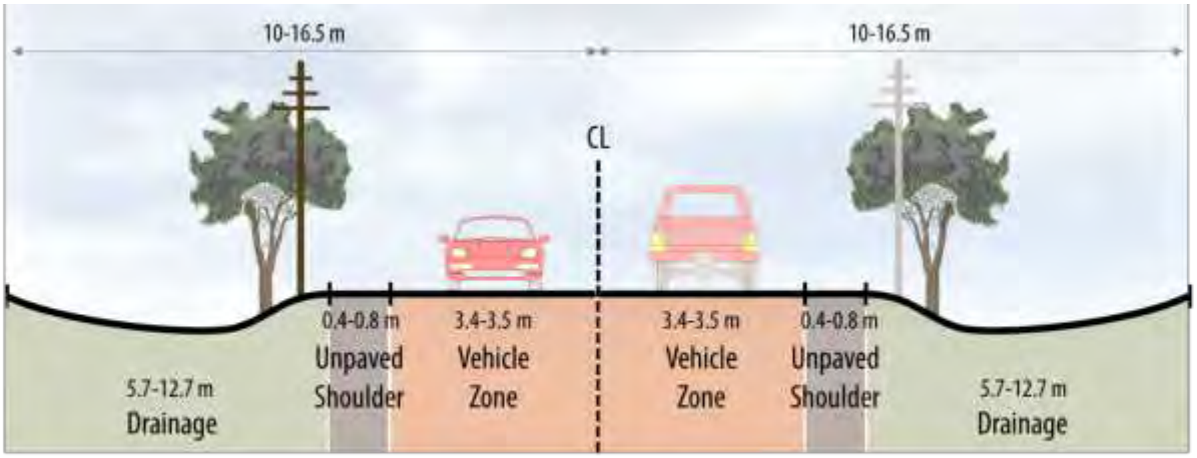


Figure 7: Winston Churchill Boulevard Existing Cross Section

Olde Base Line Road (Regional Road 12) between Winston Churchill Boulevard and Mississauga Road is a two-lane rural, east-west major road, approximately 2.8 kilometres in length. Adjacent land uses along the roadway consists mainly of undeveloped land, with some private residences and farms that have direct access to the road. The vertical alignment of the roadway consists of sharp crests and sag curves. The posted speed limit is 60 km/h. Olde Base Line Road has offset intersections with Shaws Creek Road and Rockside Road.

The existing cross-section of Olde Base Line Road consists of two 3.4-3.5 metres wide travel lanes (vehicle zones) with unpaved shoulders ranging between 0.4-0.8 metres. The range of dimensions for the different cross-sectional elements along the corridor is shown in **Figure 8** and summarized in **Table 3**.



Note: Total right-of-way is predominantly 20-25 m; no paved portion of shoulder exists; majority of above ground utilities run on one side of the road and cross over between sides

Figure 8: Olde Base Line Road Existing Cross Section

Mississauga Road (Regional Road 1), between Olde Base Line Road and Caledon Mountain Drive is a two-lane rural north-south major road approximately 5.4 kilometres in length. There are numerous vertical curves along the alignment of the roadway, resulting in a rolling vertical alignment. The adjacent land uses of this area include numerous private residences and farms with unpaved driveway accesses; the cemetery grounds of Melville White Church on the west side of the road, approximately 1.6 kilometres north of Olde Base Line Road; and the Blair-Belfountain Community Cemetery, on the east side of the road, approximately 4.8 kilometres north of Olde Base Line Road. The posted speed limit varies between 60 km/h to 70 km/h.

The existing cross-section of Mississauga Road consists of two 3.3-3.5 metre travel lanes (vehicle zones) with partially paved shoulders ranging between 0.5-2.3 metres in width (of which 0-2.3 metres is paved). The existing right-of-way varies between 20-28 metres, and is predominantly 20 metres throughout the corridor. The range of dimensions for the different cross-sectional elements along the corridor is shown in **Figure 9** and summarized in **Table 3**.

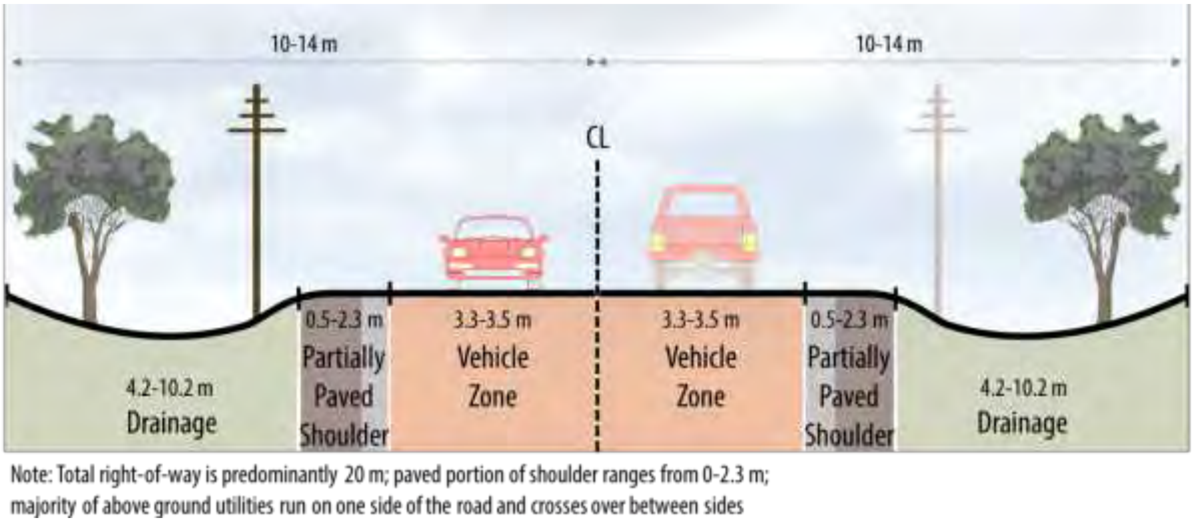


Figure 9: Mississauga Road Existing Cross Section

Old Main Street (Regional Road 1), a continuation of Mississauga Road north of Caledon Mountain Drive to Bush Street, is a major road approximately 1.1 kilometres in length. It has a rural two-lane cross section south of Belfountain, and has urban characteristics in the village of Belfountain. The vertical alignment of the roadway generally descends towards the north, with a 5% downgrade towards Bush Street. The horizontal alignment has several relatively sharp horizontal curves. The adjacent land uses of this area include private residences and community buildings, with various driveways with direct access onto Old Main Street. The posted speed limit varies between 40 km/h and 50 km/h.

In the village of Belfountain, which includes a portion of Bush Street (Regional Road 11), the existing cross-section consists of two 3.2-3.7 metre travel lanes (vehicle zones) with partially paved shoulders ranging between 0.5-2.7 metres (of which 0.2-2.0 metres is paved). The existing right-of-way within the village (on both Old Main Street and Bush Street) varies between 10-20 metres, and is predominantly 20 metres. The range of dimensions for the different cross-sectional elements along the corridor is shown in **Figure 10** and summarized in **Table 3**.

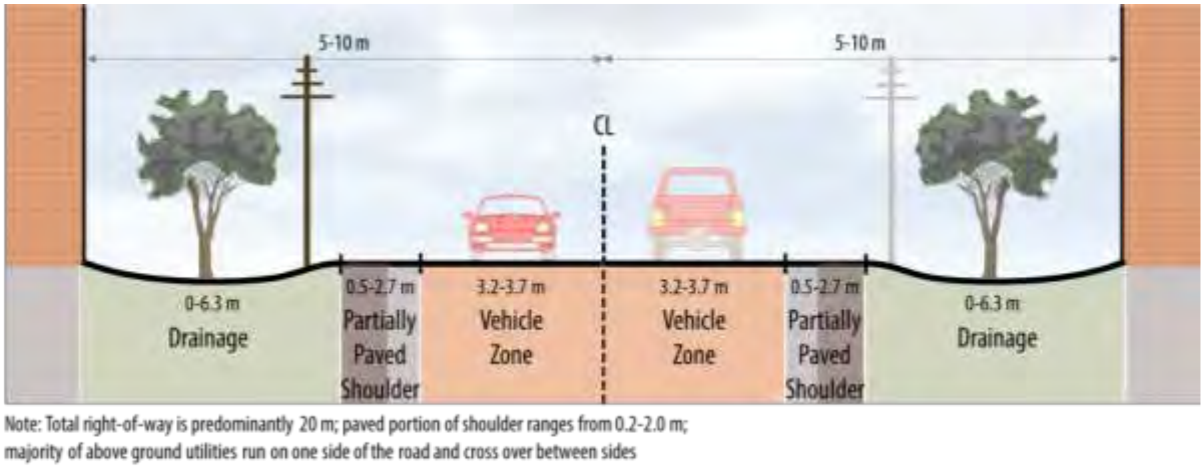


Figure 10: Belfountain Village Existing Cross Section (Old Main Street and Bush Street)

Bush Street (Regional Road 11) between Old Main Street and Winston Churchill Boulevard is a two-lane, east-west major road, approximately 2.1 kilometres in length. In the village of Belfountain, it has urban characteristics at a 40 km/h speed limit, with numerous driveways for homes and businesses. West of the community, Bush Street has a rural cross-section. The vertical alignment of Bush Street rises with a 9-10% grade from the east as it approaches Shaws Creek Road, with a sharp vertical crest east of the Shaws Creek Road intersection. West of Shaws Creek Road, the vertical alignment is relatively flat with some moderate crests and sags. West of the community of Belfountain, the posted speed limit varies between 40 km/h and 80 km/h.

The existing cross-section of Bush Street outside the community of Belfountain consists of two 3.2-3.8 metre travel lanes (vehicle zones) with partially paved shoulders ranging between 1.3-3.5 metres (of which 0.2-1.5 metres is paved). The right-of-way along Bush Street, west of Belfountain Village to Shaws Creek Road is predominantly 20 metres, but ranges between 20-25 metres. In the section of Bush Street from Shaws Creek Road to Winston Churchill Boulevard, the right-of-way is predominantly 30 metres, but ranges from 30-45 metres. The range of dimensions for the different cross-sectional elements along the corridor is shown in **Figure 11** and summarized in **Table 3**.

Bush Street intersects Winston Churchill Boulevard at two off-set intersections located on the reverse curve on Bush Street. The north leg of Winston Churchill Boulevard is offset approximately 80 metres west of the south leg.

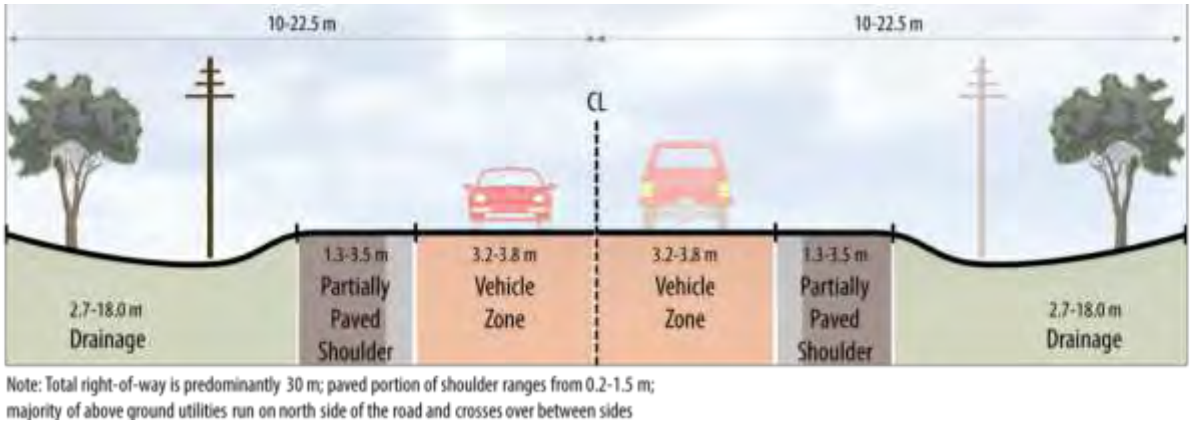


Figure 11: Bush Street Existing Cross Section

Some of the roads intersecting the corridors being assessed are briefly described as follows:

Woodland Court and **Caledon Mountain Drive** are two-lane local residential roads under the jurisdiction of the Town of Caledon with posted speed limits of 50 km/h.

The Grange Side Road, **Shaws Creek Road** and **Rockside Road** are two-lane collector roads under the jurisdiction of the Town of Caledon. The posted speed limit for each is 60 km/h.

Sideroad 10 is an unpaved, two-lane local road under the jurisdiction of the Town of Erin in Wellington County, with no posted speed limit.

Sideroad 5 is a two-lane local road under the jurisdiction of the Town of Erin in Wellington County. The speed limit is 60 km/h.

4.1.2 Intersections

The existing intersection controls and configurations within the study area are shown in **Figure 12**. In general, the majority of the intersections are controlled by two-way stop signs on the minor roadway approach. All-Way-Stop-Control (AWSC) is used at a few of the intersections within the study area. In addition, a four-way flashing red beacon is installed at the intersection of Bush Street and Shaws Creek Road, and a four-way flashing red/amber beacon is installed at the intersection of Mississauga Road and Olde Base Line Road. The four-way flashing beacon at Mississauga Road and Olde Base Line Road has the amber flashing beacon for traffic on Mississauga Road and red flashing beacon for traffic on Olde Base Line Road.

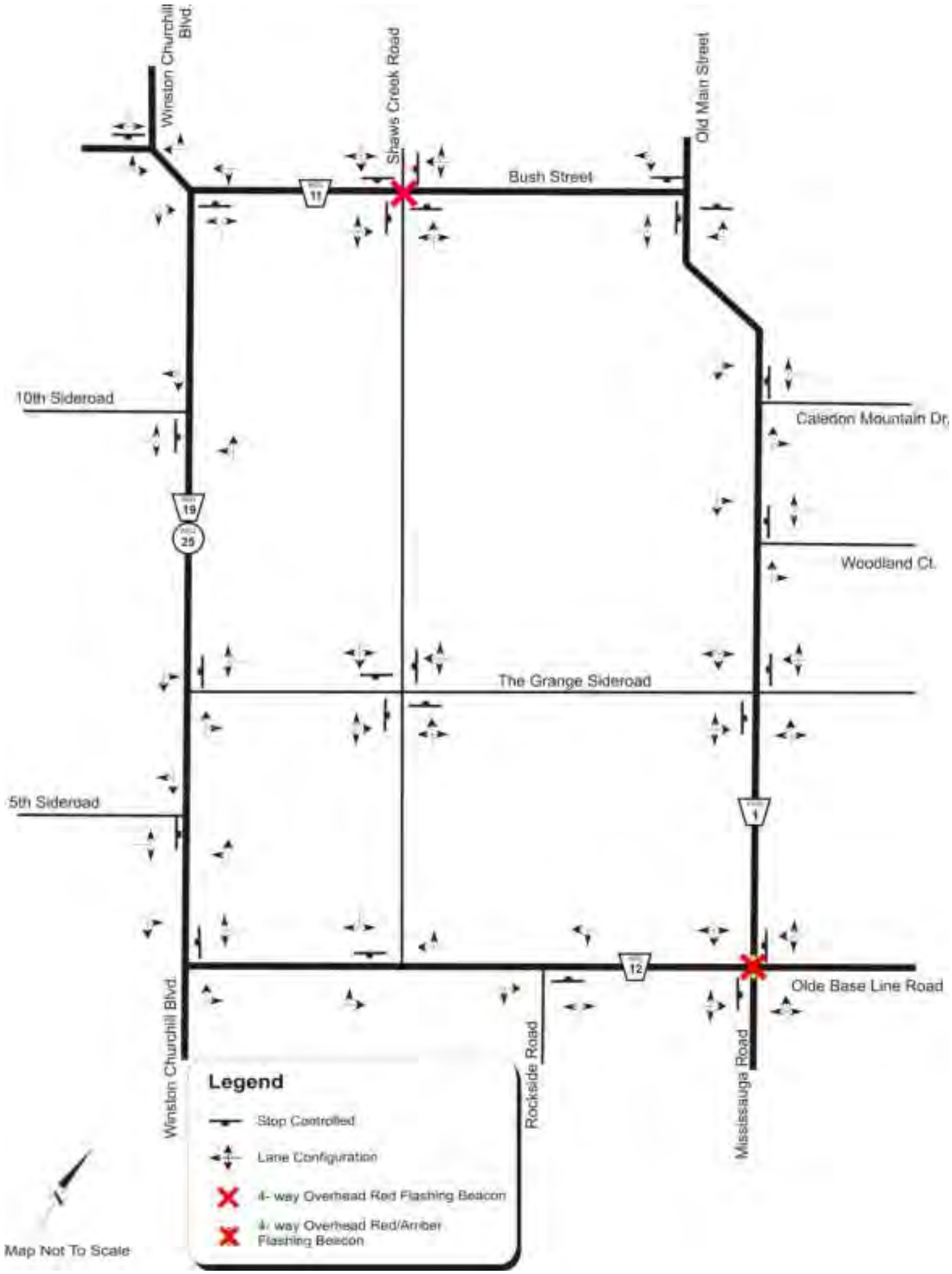


Figure 12: Existing Intersection Configurations

4.1.3 Existing Signage

A detailed sign inventory was carried out in March 2013 along the major roads within the study area. Numerous signs were observed throughout the study area including warning, regulatory and guidance signage. The approximate locations of all signs identified during the field investigation are summarized in **Figure 13.**

There are several instances where a concentration of signs can be observed along the Regional Road corridors. Higher concentrations of signage were typically found at locations where the built form or the natural land form creates hazards. Typically, this concentration was observed at major intersections, developed / residential areas, and areas with poor visibility resulting from either horizontal or vertical curvature in the roadway geometry.

The highest signage concentration occurs within the village of Belfountain. This is expected since the village has several sharp bends in the roadway, and residential homes and businesses located very close to the road. Bush Street and Old Main Street through Belfountain also have the lowest posted speed limit in the study area, at 40 km/h.

On the northbound approach of Old Main Street into Belfountain existing speed limits are reduced in three intervals, from 70 km/h to 60 km/h, then to 50 km/h, and finally to 40 km/h. On the eastbound approach on Bush Street, existing speed limits are reduced in two intervals, from 80 km/h to 50 km/h, and then to 40 km/h. The additional posted speed reductions on the approaches to the community further contribute to the higher concentration of signage within this area especially combined with “speed change ahead” warning signs.

A detailed signage inventory including plans of the type and location of the signage is provided in **Appendix D**.

Figure 13: Existing Signage Map Overview

4.1.4 Vehicular Speeds

Speed surveys were conducted in November 2012 to evaluate the existing operating speeds on the study area roads in relation to the posted speed limits (data provided by Peel Region). The existing posted speed limits within the study area, the location of the speed surveys and the 85th percentile speeds are summarized in **Figure 14**. Detailed speed survey analysis sheets are provided in **Appendix E**.

4.1.4.1 Mississauga Road / Old Main Street

The posted speed limits on Mississauga Road / Old Main Street are as follows:
- 70 km/h on Mississauga Road from Olde Base Line Road to The Grange Side Road;
- 60 km/h on Mississauga Road from The Grange Side Road to Caledon Mountain Drive;
- 50 km/h on Old Main Street from Caledon Mountain Drive to 500 metres south of Bush Street; and
- 40 km/h on Old Main Street from 500 metres south of Bush Street to Bush Street.

On Mississauga Road / Old Main Street between Bush Street and Olde Base Line Road, operating speeds were surveyed at three locations:
- Between Olde Base Line Road and The Grange Side Road the posted speed limit is 70 km/h. The sample size at this location was too small to calculate the 85th percentile speed.
- Between The Grange Side Road and Woodland Court the 85th percentile speed was 88 km/h in the southbound direction and 90 km/h in the northbound direction, which is significantly (30 km/h) over the posted speed limit of 60 km/h.
- South of Bush Street the 85th percentile speed measured ranged between 58-60 km/h and is approximately 20 km/h greater than the posted speed limit of 40 km/h.

4.1.4.2 Bush Street

The posted speed limits on Bush Street are as follows:
- 40 km/h from Old Main Street to 150 metres east of Shaws Creek Road;
- 50 km/h from 150 metres east of Shaws Creek Road to 100 metres west of Shaws Creek Road; and
- 80 km/h from 100 metres west of Shaws Creek Road to Winston Churchill Boulevard.

On Bush Street between Winston Churchill Boulevard and Old Main Street, operating speeds were surveyed at two locations:
- Between Winston Churchill Boulevard and Shaws Creek Road the posted speed limit is 80 km/h. The sample size at this location was too small to calculate the 85th percentile speed.
- West of Old Main Street (located within the community of Belfountain) the 85th percentile speed measured ranged between 65-66 km/h and is approximately 25 km/h greater than the posted speed limit of 40 km/h.

Figure 14: Posted Speed Limits and 85th Percentile Speeds within Study Area

4.1.4.3 Winston Churchill Boulevard

The posted speed limits on Winston Churchill Boulevard are as follows:
- 60 km/h from Bush Street to Sideroad 10; and
- 70 km/h from Sideroad 10 to Olde Base Line Road.

On Winston Churchill Boulevard between Bush Street and Olde Base Line Road, operating speeds were surveyed at three locations:
- Between Bush Street and The Grange Side Road, the 85th percentile speed was 92 - 93 km/h compared with the 70 km/h posted speed limit.
- Between The Grange Side Road and 5th Sideroad, the surveyed 85th percentile speeds were 99 km/h southbound and 89 km/h northbound, significantly higher than the 70 km/h posted speed limit.
- Between 5th Sideroad and Olde Base Line Road, the surveyed 85th percentile speeds were 91-96 km/h, compared with the 70 km/h posted speed limit.

At all three locations the 85th percentile speed measured ranged between 89-96 km/h and are approximately 20-25 km/h greater than the posted speed limit.

4.1.4.4 Olde Base Line Road

The posted speed limit on Olde Base Line Road is 60 km/h between Winston Churchill Boulevard and Mississauga Road.

On Olde Base Line Road, operating speeds were surveyed at three locations:
- Between Winston Churchill Boulevard and Shaws Creek Road, the surveyed 85th percentile speeds were 84-85 km/h, much higher than the 60 km/h posted speed limit.
- Between Shaws Creek Road and Rockside Road, the surveyed 85th percentile speed was 84 km/h, compared with the 60 km/h posted speed limit.
- Between Rockside Road and Mississauga Road, the surveyed 85th percentile speeds were 85-89 km/h, much higher than the 60 km/h posted speed limit.

The 85th percentile speed measured at these locations ranged between 84-89 km/h and is approximately 25 km/h greater than the posted speed limit.

4.1.4.5 Speed Summary

Drivers tend to drive at the speed that they feel comfortable with, taking into account the perceived risks, particularly in relation to hidden driveways and poor sight lines. However in some locations, where there are driveways and limited sight distances due to the alignment of the road, the surveyed speeds are excessively high. In general, operating 85th percentile speeds are consistently higher than posted speeds along all roads reviewed.

Of particular note are segments of Winston Churchill Boulevard, Mississauga Road, Bush Street through the community of Belfountain, and Olde Base Line Road where the 85th percentile speeds are more than 20 km/h over the posted speed limits. The operating speeds observed on these corridors will be considered in subsequent design phases of the study, and speed reductions could be recommended as part of the proposed designs.

4.1.5 Pavement Markings

Along the four major roadway corridors, centerline and edgeline pavement markings were generally in fair to good condition when reviewed during the October 2012 field visit. At many of the intersections within the study area, stop bar pavement markings were generally worn and faded, as shown in **Figure 15** and **Figure 16**. Pedestrian crossing pavement markings observed at the T-intersection of Old Main Street and Bush Street within the community of Belfountain were somewhat faded.

Figure 15: Faded Stop Bar Pavement Marking at Intersection of Mississauga Road and Olde Base Line Road

Figure 16: Faded Stop Bar Pavement Marking at Intersection of Bush Street and Shaws Creek Road

Mississauga Road and Old Main Street, between Olde Base Line Road and Bush Street, is marked with a single yellow solid centerline pavement marking and white solid edgeline pavement markings to denote the travel lanes. These lane markings are generally in fair to good condition. Transverse ‘SLOW’ pavement markings on Mississauga Road appeared to be painted on top of faded markings, which were not always clearly visible, as shown in **Figure 17**.

Bush Street, between Mississauga Road and Shaws Creek Road, is marked with a single yellow solid centerline pavement marking and white solid edgeline pavement markings to denote the travel lanes. These lane markings are generally in fair to good condition. Passing in the eastbound direction is permitted for a 350 metre long section from approximately 275 metres east of Winston Churchill Boulevard to approximately 600 metres west of Shaws Creek Road, denoted with a broken yellow line in the eastbound direction only, as shown in **Figure 18**. Passing in the westbound direction is also permitted for a 300 metre long section from approximately 300 metres west of Shaws Creek Road to approximately 600 metres west of Shaws Creek Road.

Winston Churchill Boulevard, between Bush Street and Olde Base Line Road, is marked with a single yellow solid centerline pavement marking and white solid edgeline pavement markings to denote the travel lanes. These lane markings are generally in fair to good condition.

Olde Base Line Road, between Winston Churchill Boulevard and Mississauga Road, is marked with a single yellow solid centerline pavement marking and white solid edgeline pavement markings to denote the travel lanes. These lane markings are generally in fair to good condition.

In general, pavement markings along the roadways are in conformance with design standards and are generally in fair to good condition. There are a few instances where faded pavement markings were observed.

Figure 17: 'SLOW' Pavement Marking Painted on Previously Faded Marking

Figure 18: Passing on Bush Street Permitted in the Eastbound Direction

4.1.6 Illumination

Illumination of the study area was assessed through a field review in October 2012 during the daylight hours to record the existing street lighting. It was noted that aside from street lighting in the community of Belfountain along Old Main Street and Bush Street, street lighting was present at several intersections. The existing street lighting (by segment and intersection) is summarized in **Figure 19**. Consideration of existing street lighting will be incorporated in the illumination design in future phases of the study.

Figure 19: Existing Illumination

4.1.7 Guide Rail

A preliminary inventory of existing guide rail within the study area was developed from a field investigation conducted on October 2012. The inventory outlines the approximate location, type, and condition of each guide rail. Fifteen sections of guide rail were observed within the study area, comprised of either 3-cable or steel beam, or a combination of the two. In general, it appears that the guide rail is in good condition, with minor rusting. Hazard markers, indicating the start and end of the guide rail, were not present at all locations for steel-beam guide rail and some locations consisted of posts only, without the cable.

The preliminary guide rail inventory is provided in **Appendix F**. The deficiencies of existing guide rail are to be considered in subsequent design phases.

4.1.8 Roadway Geometrics

The following sections review the geometric elements of the roadways in the study area to review for conformance to the TAC design standards. The stations used along the corridors were developed by HDR for this analysis as no existing stations were provided in the base survey plan.

4.1.8.1 Horizontal Alignment

Horizontal curves within the study area are shown in **Figure 20**, with the posted speed limits, existing radii, and minimum radii based on TAC Geometric Design Guide for Canadian Roads summarized in **Table 4**. Values highlighted in green meet the requirements of these standards, whereas values highlighted in red do not and are considered deficient.

Deficient horizontal curves within the study area are summarized at the following locations:
- Old Main Street north of Caledon Mountain Drive
- Old Main Street south of Bush Street
- Bush Street east of Winston Churchill Boulevard
- Winston Churchill Boulevard south of Bush Street

Table 4: Horizontal Curve Review

Road (location)	Design Speed (km/h)	Existing Radius (m)	Minimum Radius, as per TAC (m)	Minimum Available Sight Distance (m)	Minimum Required for Stopping Sight Distance, as per TAC (m)
Mississauga Road (at Olde Base Line Road)	80	1170	250	237	115-140
Old Main Street (north of Caledon Mountain Drive)	60	100	130	68	75-85
Old Main Street (south of Bush Street)	50	50	90	45	60-65
Bush Street (east of Winston Churchill Boulevard)	90	255	340	151	130-171
Winston Churchill Boulevard (south of Bush Street)	70	120	190	80	95-110

Notes:
1. As per Geometric Design Guide for Canadian Roads, TAC, Table 2.1.2.6
2. As per Geometric Design Guide for Canadian Roads, TAC, Table 1.2.5.3,

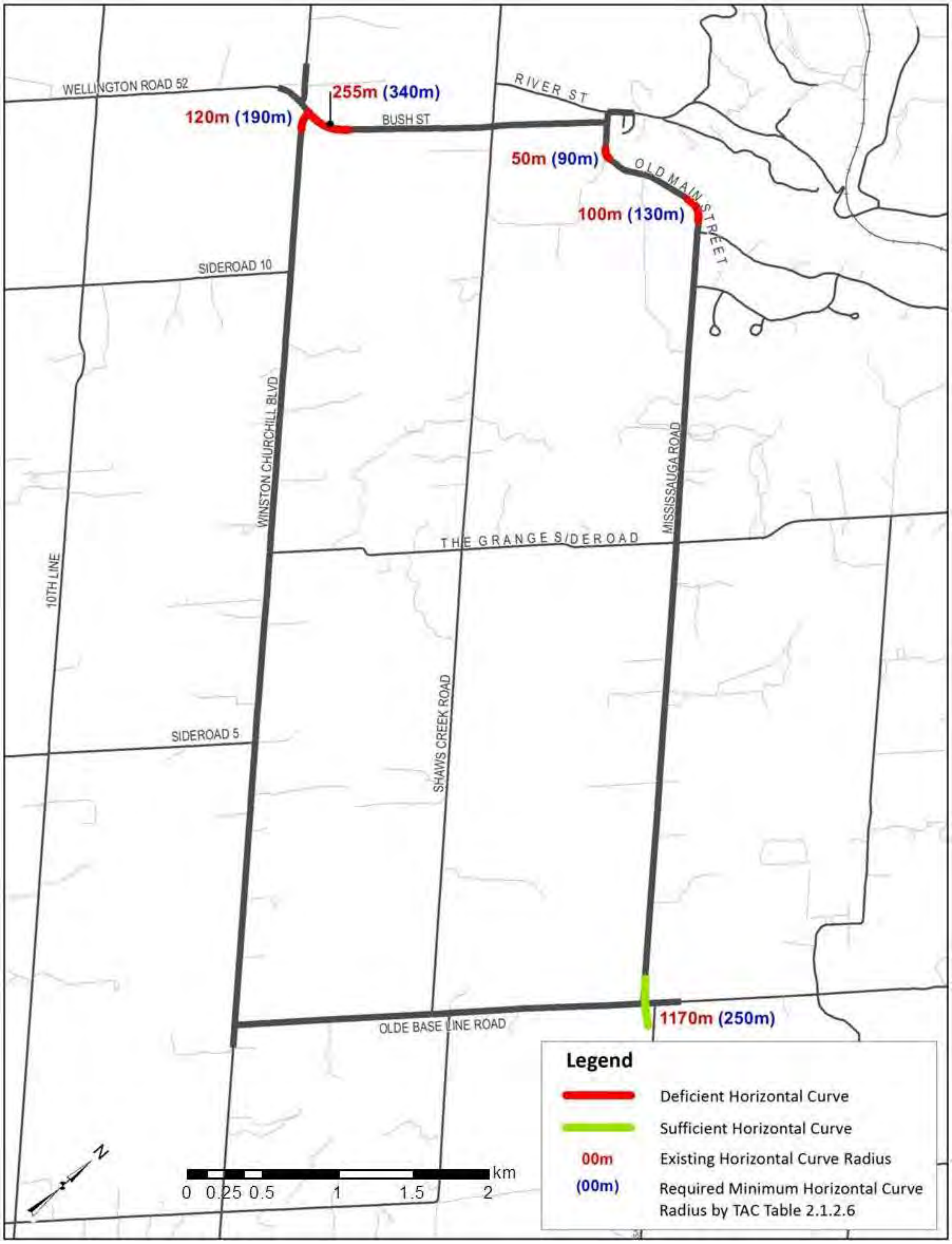


Figure 20: Horizontal Curve Review

4.1.8.2 Vertical Alignment

A review of vertical curves along the main roadways within the study area were also reviewed for conformance to the TAC design standards in terms of stopping sight distance and maximum grades. The minimum required stopping sight distance of vehicles was determined using TAC geometric design guidelines, measured from road corridor using a driver eye height of 1.05 metres and an object height of 0.38 metres, corresponding to design speeds of 10 km/h above the posted speeds. A summary of the findings on stopping sight distance and maximum grades are illustrated in **Figure 21** and **Figure 22** respectively. Detailed analysis of the vertical curve radius and the maximum grade for each curve is provided in **Appendix G**.

The analysis indicates that there are numerous vertical crest and sag curves on the major roads, where stopping sight distance is substandard for the posted speed limits. Many locations exist where the available sight distance is only one-third to half of the required stopping sight distances. Compounding to these deficiencies is the fact that many of the substandard crest curves also have driveways.

With respect to vertical alignment grades, the analysis highlights locations where the grade is equal to or exceeds 8%, which is the maximum grade for a rural arterial based on TAC standards. There are several locations on Olde Base Line Road and Mississauga Road where grades approach 10%.

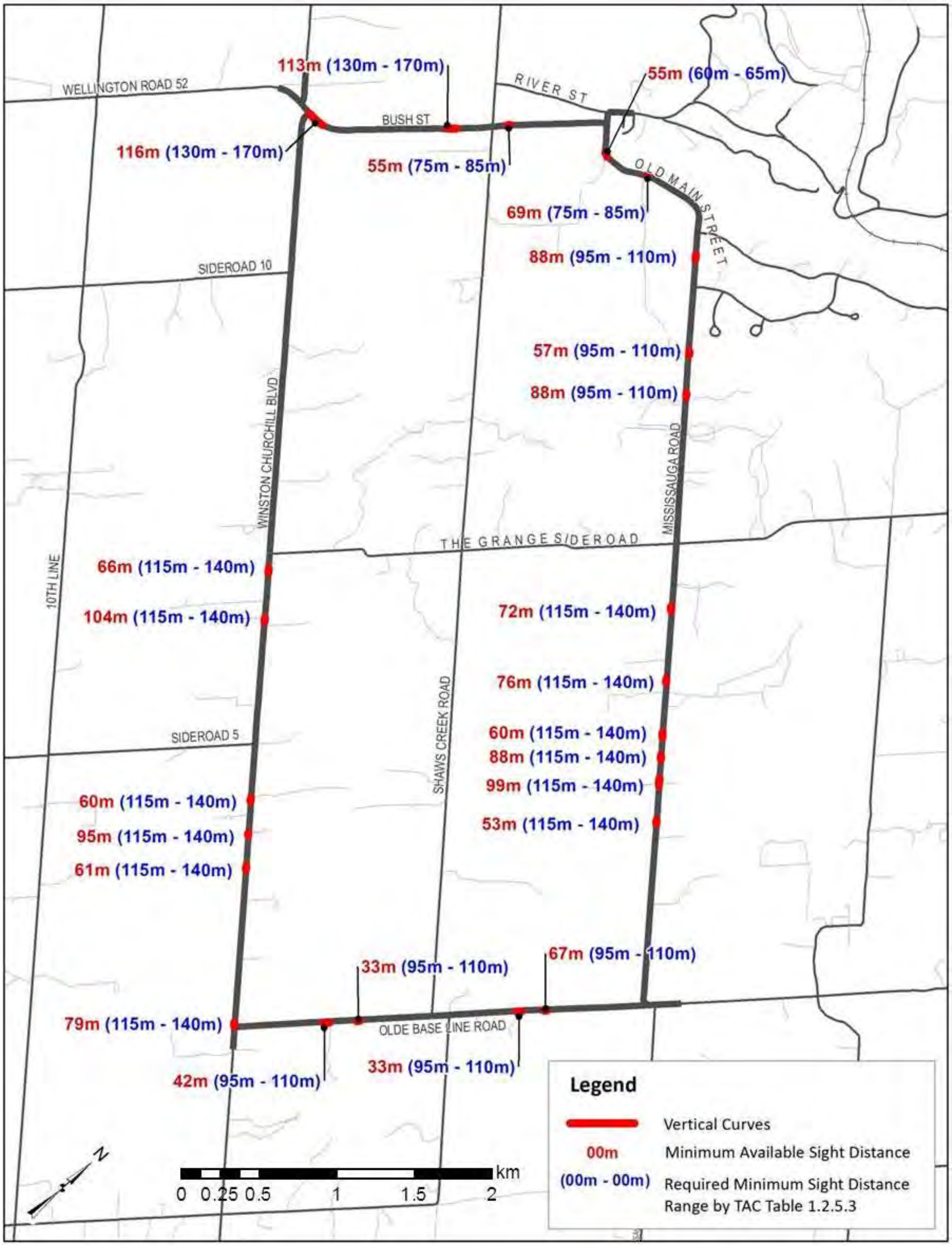


Figure 21: Vertical Curve and Stopping Sight Distance Review

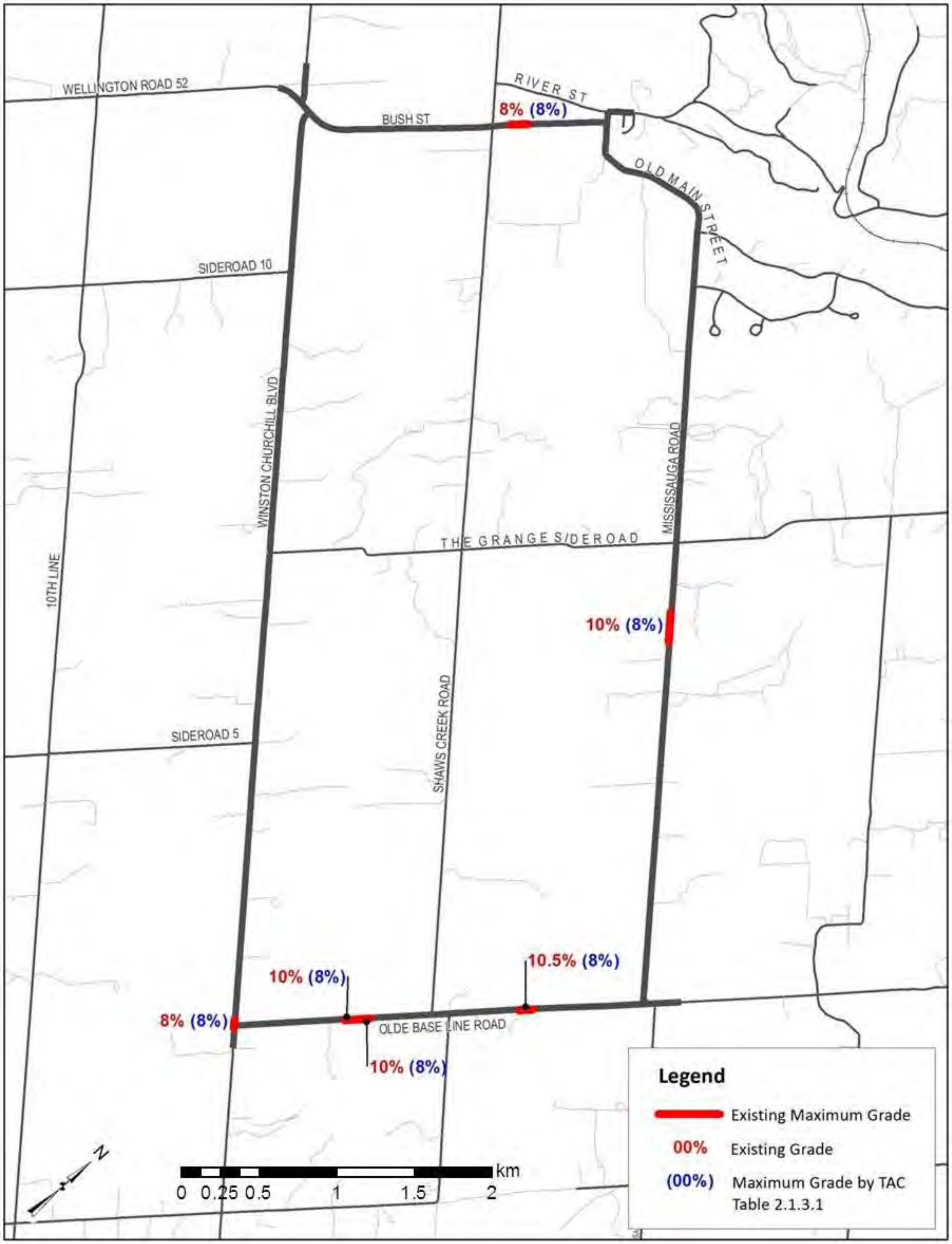


Figure 22: Maximum Gradient Review

4.1.8.3 Cross-Section Elements

The typical cross-sections, as described in **Section 4.1.1**, for the roadways in the study area were compared to TAC design standards for minimum lane and shoulder widths for the various design speeds and traffic volumes. Existing lane widths generally conform to TAC standards of a minimum 3.3-3.7 metre lane width. In some locations existing shoulder widths are narrower than the minimum recommended by TAC.

4.1.8.4 Driveways

There are a total of two hundred and two (202) existing private driveways, entrances, and intersection along the major corridors within the study area. The majority of these driveways and entrances are unpaved residential driveways. The highest concentration of driveways is in the community of Belfountain, where numerous commercial and residential driveways exist along Bush Street and Old Main Street. A summary of the number of driveways, including intersections, is provided in **Table 5**.

Table 5: Summary of Driveways and Intersections within Study Area

Road	Section	# of Driveways (*including intersections)
Mississauga Road	Olde Base Line Road* to The Grange Side Road	25
Mississauga Road	The Grange Side Road* to Caledon Mountain Drive	32
Old Main Street	Caledon Mountain Drive* to Bush Street*	27
Bush Street	Old Main Street* to Shaws Creek Road	30
Bush Street	Shaws Creek Road* to Winston Churchill Boulevard*	9
Winston Churchill Boulevard	Bush Street* to The Grange Side Road	33
Winston Churchill Boulevard	The Grange Side Road* to Olde Base Line Road*	31
Olde Base Line Road	Winston Churchill Boulevard* to Shaws Creek Road	6
Olde Base Line Road	Shaws Creek Road* to Mississauga Road*	9

4.1.8.5 Intersection Geometrics

All of the intersections along the study area roadways were reviewed for the intersecting angles between connecting roadways. The existing angles are summarized in **Table 6**. The review shows that all intersections are within acceptable design standards of 70^o to 90^o (as per TAC) for intersecting angles. In general, a 90^o angle is the preferred design because it maximizes sight distances for drivers. Intersection angles less than 70^o and greater than 100^o are not desirable.

Table 6: Existing Intersecting Angles at Intersections

Intersection	Existing Intersection Angle	TAC Design Standard	Condition
Bush Street and Winston Churchill Boulevard	87°	Less than 70° or Greater than 100°	OK
Bush Street and Shaws Creek Road	99°		OK
Bush Street and Old Main Street	85°		OK
Old Main Street and Caledon Mountain Drive	90°		OK
Mississauga Road and The Grange Side Road	97°		OK
Mississauga Road and Olde Base Line Road	90°		OK
Olde Base Line Road and Shaws Creek Road	90°		OK
Olde Base Line Road and Rockside Road	90°		OK
Olde Base Line Road and Winston Churchill Boulevard	87°		OK
Winston Churchill Boulevard and Wellington Road 50	96°		OK
Winston Churchill Boulevard and The Grange Side Road	82°		OK

4.2 Traffic Operations

4.2.1 Historic Traffic Growth

Annual Average Daily Traffic (AADT) from the Region of Peel traffic count database was collected from 1996 to 2011 counts as per the locations shown in **Figure 23**.

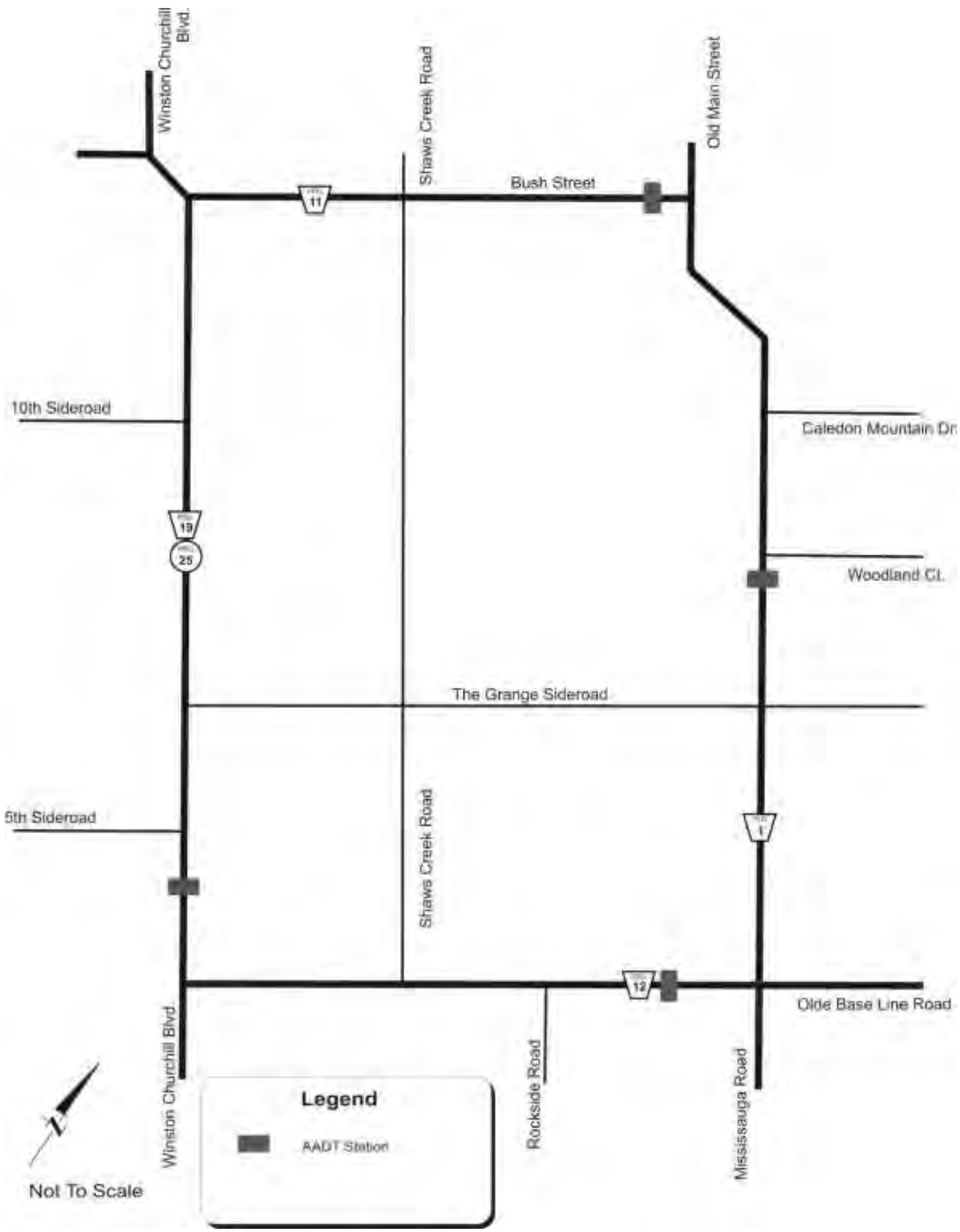


Figure 23: AADT Count Locations

4.2.1.1 Mississauga Road

Between 1996 and 2008, traffic volumes on Mississauga Road varied between 3,600 and 4,900 vehicles per day. Between 2009 and 2011, that volume dropped to 2,800 - 3,000 vehicles per day. It can be surmised that while there was only minor growth during the late 1990s and early 2000s, there has been a rerouting of traffic in recent years to Winston Churchill Boulevard. The annual traffic trend for Mississauga Road is illustrated in **Figure 24**.

4.2.1.2 Winston Churchill Boulevard

Between 1996 and 2008, traffic volumes on Winston Churchill Boulevard were generally 600 to 900 vehicles per day with no clear trend upward or downward. However, between 2009 and 2011, the volume rose to around 2,200 to 2,500 vehicles per day. It can be surmised that there has been a rerouting of traffic from Mississauga Road to Winston Churchill Boulevard in recent years. The historic traffic trend for Winston Churchill Boulevard is shown in **Figure 24**.

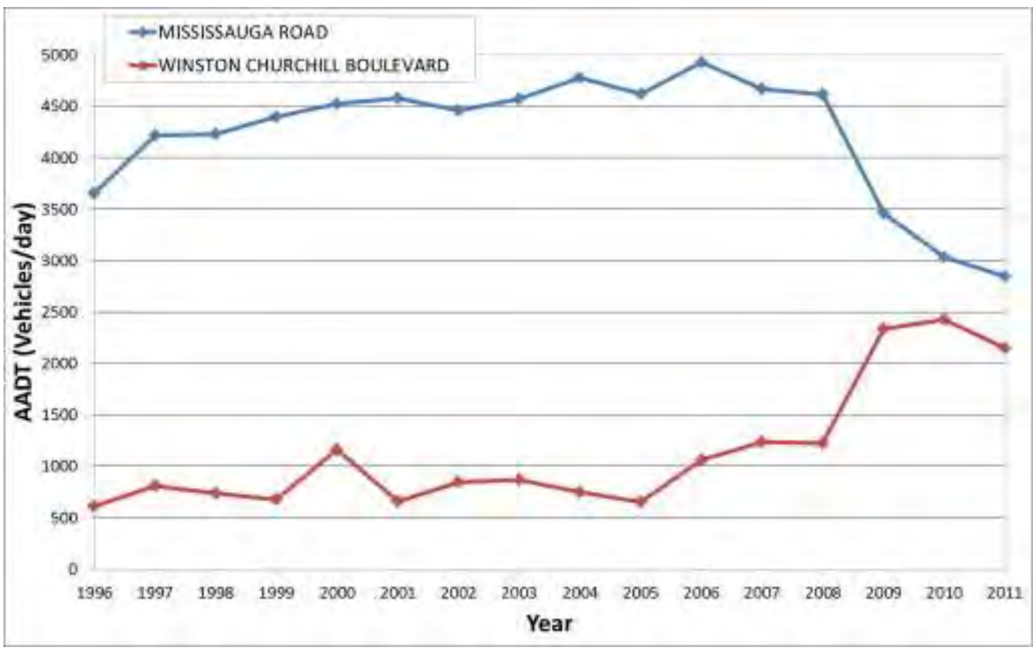


Figure 24: Mississauga Road and Winston Churchill Boulevard Traffic Trends

4.2.1.3 Bush Street

Between 1996 and 2008, traffic volumes on Bush Street were generally around 4,000 vehicles per day (although there were several intervening years where volumes dropped to around 3,000 vehicles per day). Similar to Mississauga Road, between 2009 and 2011, the volume dropped to around 2,300 - 2,600 vehicles per day. This is in contrast to the traffic trends for Olde Base Line Road, as noted in the following section. Bush Street traffic trends are illustrated in **Figure 25**.

4.2.1.4 Olde Base Line Road

Between 1996 and 2008, traffic volumes on Olde Base Line Road varied between 1,000 and 1,600 vehicles per day with no clear upward or downward trend. However, between 2009 and 2011, the volumes rose to around 2,200 - 2,300 vehicles per day. It can be surmised that there has been a rerouting of traffic from Bush Street to Olde Base Line Road in recent years. The traffic trends for Olde Base Line Road are illustrated in **Figure 25**.

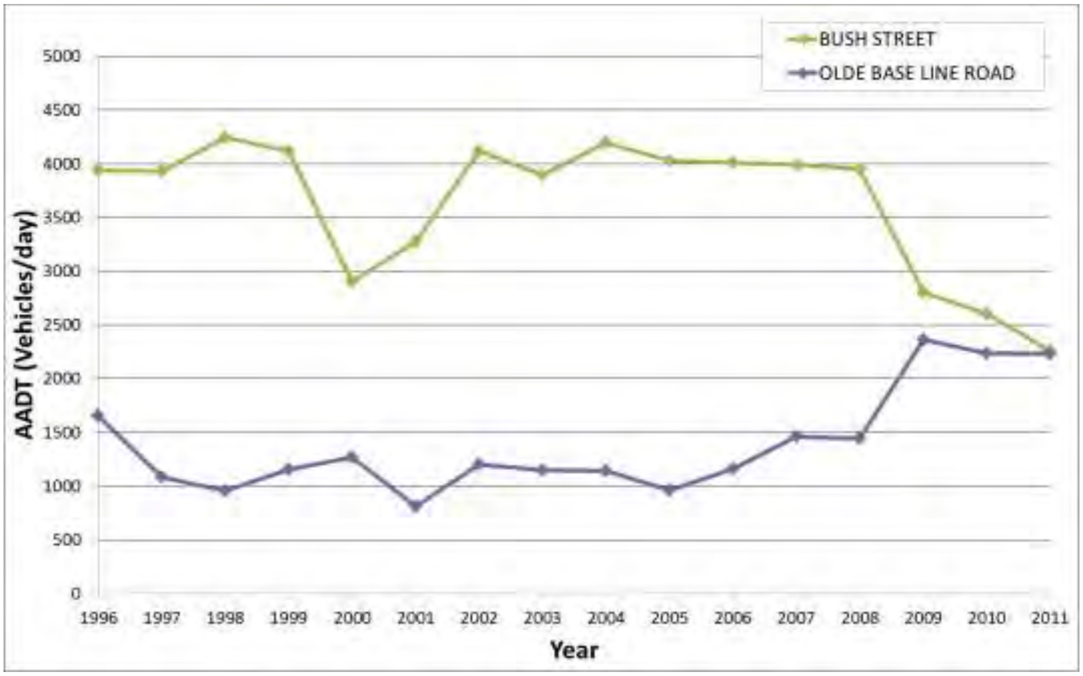


Figure 25: Bush Street and Olde Base Line Road Traffic Trends

4.2.1.5 Summary of Traffic Trends

In examining the traffic volumes between the years of 1996 and 2011, Mississauga Road and Bush Street experienced an overall decline in AADT while Winston Churchill Boulevard and Olde Base Line Road experienced an overall increase in traffic. Total traffic (combined for all roads in the study area) has remained relatively stable between 1996 and 2011 as seen in **Table 7**.

Table 7: Traffic Trends in the Study Area

Road	1996 Daily Traffic	2003 Daily Traffic	2011 Daily Traffic	Change from 1996 to 2011
Mississauga Road / Old Main Street	3,700	4,100	2,900	(800)
Winston Churchill	600	900	2,100	+1,500
Bush Street	3,900	3,900	2,300	(1,600)
Olde Base Line Road	1,600	1,100	2,200	+600
TOTAL	**9,800**	**10,000**	**9,500**	**(300)**

4.2.2 Daily and Seasonal Patterns

To examine seasonal traffic patterns, reference was made to the closest MTO highway to the study area and MTO's Annual AADT Report[1]. The closest roadway is Highway 10 at Forks of the Credit Road. A review of the most recent AADT at this location showed that summer average daily traffic (SADT), which includes weekdays and weekends, is approximately the same as summer average weekday traffic (SAWDT). It also shows that summer daily traffic (SADT and SAWDT) is approximately 10% greater than average daily traffic over the year (AADT). A historical plot of AADT, SADT, Summer Weekday Average Daily Traffic (SWADT) and Winter Average Daily Traffic (WADT) is provided in **Figure 26**.

This data confirms that traffic in the general study area peaks in the summer, and that summer weekday traffic daily volumes are similar to summer weekend daily traffic.

[1] Ministry of Transportation, Ontario: *Traffic Volumes (AADT Only) King's Highways/ Secondary highways and Tertiary Road*. 2009

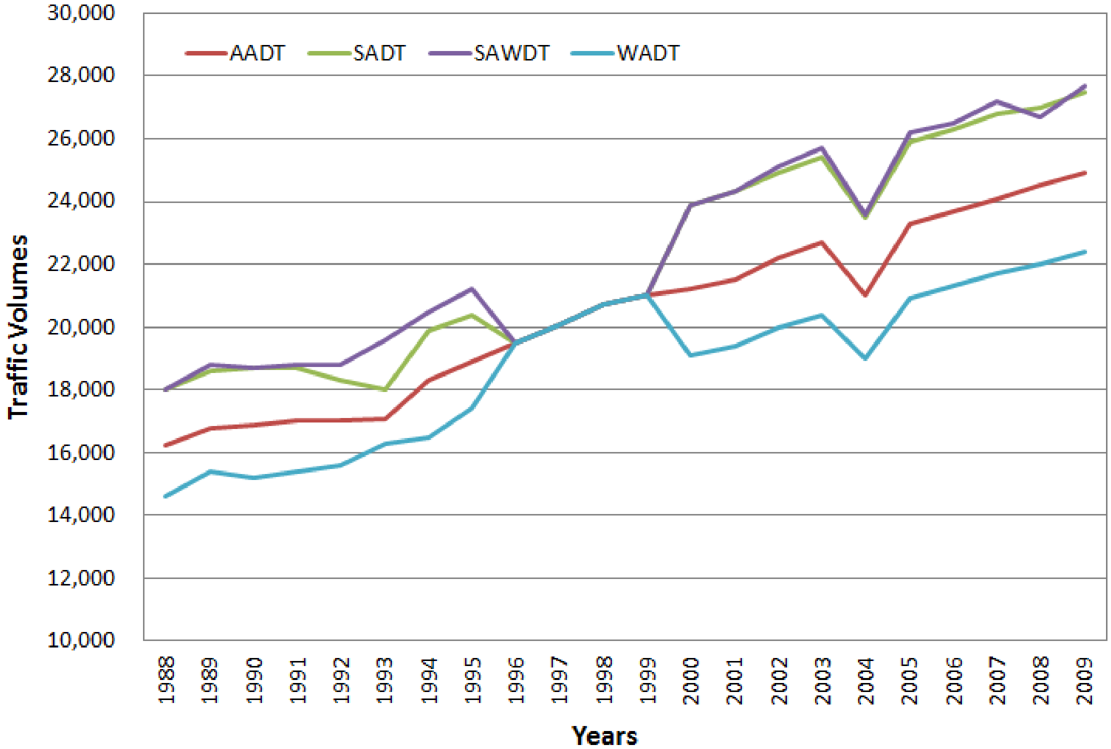


Figure 26: Yearly Traffic Trends on Highway 10 at Forks of the Credit Road

4.2.3 Peak Hour Volumes

To assess the performance of the study area intersections during peak traffic periods, the existing weekday AM and PM peak hour traffic volumes were obtained from the Region of Peel for the study intersections. In recognition of weekend tourist traffic in the village of Belfountain, summer Saturday mid-day peak hour volumes were obtained from the Region for the intersection of Mississauga Road / Old Main Street and Bush Street. The sources and dates of the traffic counts are summarized in **Table 8**. The existing weekday peak hour traffic volumes are illustrated in **Figure 27**. In addition, truck turning volumes are summarized in **Figure 28**.

As traffic counts were obtained in the summer, no adjustments were required for seasonal variation as per discussion in **Section 4.2.2**, which showed that counts in this study area are expected to be highest during summer months.

Table 8: Traffic Data Sources

Location	Data Source	Count Date
Winston Churchill Boulevard and Olde Base Line Road	MG8 ENG	July 18, 2012
Winston Churchill Boulevard and 5th Sideroad	MG8 ENG	July 18, 2012
Winston Churchill Boulevard and The Grange Side Road	MG8 ENG	July 17, 2012
Winston Churchill Boulevard and Bush Street	MG8 ENG	July 17, 2012
Olde Base Line Road and Shaws Creek Road	MG8 ENG	July 18, 2012
Olde Base Line Road and Rockside Road	MG8 ENG	July 19, 2012
Mississauga Road and Olde Base Line Road	MG8 ENG	July 19, 2012
Mississauga Road and The Grange Side Road	MG8 ENG	July 24, 2012
Mississauga Road and Woodland Court	MG8 ENG	July 24, 2012
Mississauga Road and Caledon Mountain Drive	MG8 ENG	July 25, 2012
Mississauga Road and Bush Street	MG8 ENG	July 26, 2012 Saturday, July 28, 2012

Source: Region of Peel

Figure 27: Existing Weekday AM and PM Peak Hour Traffic Volumes

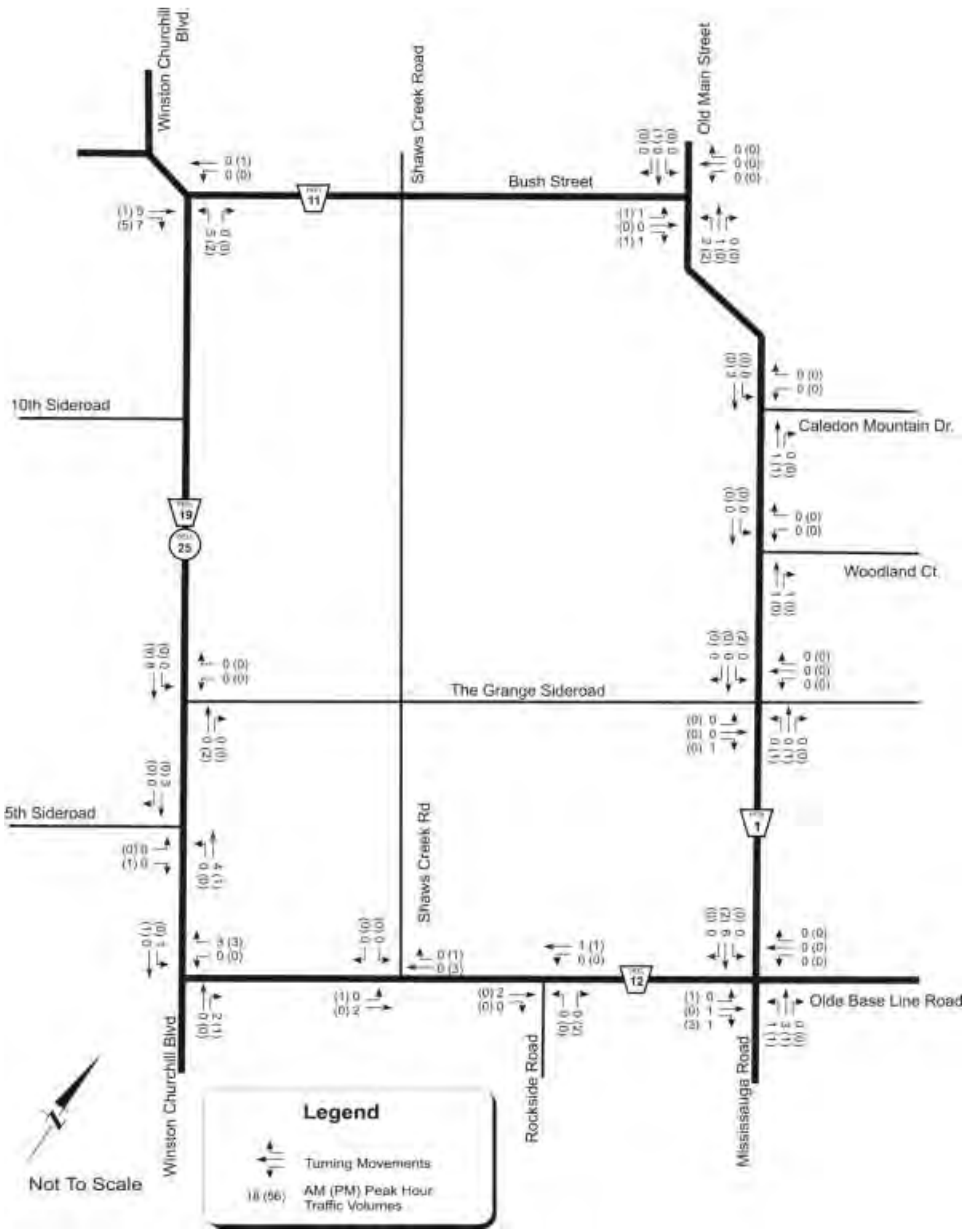


Figure 28: Existing Weekday AM and PM Truck Volumes

4.2.4 Intersection Operational Analysis

4.2.4.1 Methodology

Analysis of the intersection operations was conducted using Synchro 8, Traffic Signal Coordination Software, which employs methodology from the *Highway Capacity Manual* published by the Transportation Research Board National Research Council. Synchro 8 can analyze both signalized and unsignalized intersections in a road corridor or network taking into account the spacing, interaction, queues and operations between intersections. The unsignalized intersection analysis carried out for this study considers two separate measures of performance:

- Capacity, which is based on a volume to capacity (v/c) ratio; and
- Level of service (LOS), which is determined by the computed or measured control delay, and is defined for each *critical movement*. LOS is not defined for the intersection as a whole.

A v/c ratio of less than 0.90 represents free flow conditions in which little delay is experienced. Between 0.90 and 1.00, as the link reaches capacity, a moderate to high amount of delay is experienced. Above 1.00, the link is at capacity and major delays and queuing occur consistently during the peak periods.

LOS ranges from A to F, with A representing the best operating conditions and F representing the worst operating conditions, and is defined as follows for unsignalized intersections:

- LOS A: average vehicle control delay ≤ 10 seconds (acceptable)
- LOS B: 10-15 second delay (acceptable)
- LOS C: 15-25 second delay (acceptable)
- LOS D: 25-35 second delay (somewhat undesirable)
- LOS E: 35-50 second delay (undesirable)
- LOS F: delay ≥ 50 seconds (unacceptable)

4.2.4.2 Existing Intersection Operations

The existing traffic operations for the study intersections were analyzed based on the existing traffic volumes for the weekday AM and PM peak hours as shown in **Figure 27**, and the existing intersection configurations as shown in **Figure 12**. The existing traffic operations for the critical turning movements at all unsignalized intersections are summarized in **Table 9**. Detailed Synchro calculations are provided in **Appendix H**.

The analysis shows that the intersections currently have more than sufficient capacity to accommodate typical weekday peak period traffic, as reflected in the low volume / capacity (v/c) ratios. In addition, traffic delays are relatively low, as reflected in the Level of Service (LOS) results ranging between LOS A and B.

Table 9: Existing Traffic Conditions Intersection Operations

Intersection & Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
	LOS	v/c	Control Delay (s)	LOS	v/c	Control Delay (s)
Winston Churchill Boulevard & Olde Base Line Road						
Westbound left and right	A	0.04	9.3	A	0.17	9.5
Northbound through and right	A	0.02	0.0	A	0.04	0.0
Southbound left and through	A	0.10	6.2	A	0.04	5.6
Winston Churchill Boulevard & 5th Sideroad						
Eastbound left and right	A	0.05	9.3	A	0.03	9.0
Northbound left and through	A	0.00	1.1	A	0.03	2.2
Southbound through and right	A	0.09	0.0	A	0.04	0.0
Winston Churchill Boulevard & The Grange Side Road						
Westbound left and right	A	0.01	9.0	A	0.02	9.3
Northbound through and right	A	0.03	0.0	A	0.09	0.0
Southbound left and through	A	0.00	0.3	A	0.00	0.8
Winston Churchill Boulevard & Bush Street						
Eastbound through and right	A	0.14	0.0	A	0.00	0.1
Westbound left and through	A	0.00	0.3	A	0.00	0.0
Northbound left and right	B	0.09	10.2	B	0.20	10.8
Olde Base Line Road & Shaws Creek Road						
Eastbound left and through	A	0.00	0.1	A	0.00	0.4
Westbound through and right	A	0.03	0.0	A	0.10	0.0
Southbound left and right	A	0.01	9.5	A	0.01	9.7
Olde Base Line Road & Rockside Road						
Eastbound through and right	A	0.11	0.0	A	0.04	0.0
Westbound left and through	A	0.00	0.2	A	0.00	0.2
Northbound left and right	A	0.01	9.3	A	0.00	9.6
Mississauga Road & Olde Base Line Road						
Eastbound left, through, and right	B	0.25	11.3	B	0.10	11.3
Westbound left, through, and right	B	0.06	11.6	B	0.14	13.1
Northbound left, through, and right	A	0.01	1.7	A	0.07	3.0
Southbound left, through, and right	A	0.01	0.6	A	0.01	1.2
Mississauga Road & The Grange Side Road						
Eastbound left, through, and right	A	0.02	9.4	A	0.02	9.7
Westbound left, through, and right	B	0.02	10.2	B	0.02	10.6
Northbound left, through, and right	A	0.00	0.2	A	0.01	0.4
Southbound left, through, and right	A	0.00	0.2	A	0.00	0.6
Mississauga Road & Woodland Court						
Westbound left and right	A	0.01	9.6	B	0.01	10.1
Northbound through and right	A	0.02	0.0	A	0.14	0.0
Southbound left and through	A	0.00	0.0	A	0.00	0.2
Mississauga Road & Caledon Mountain Drive						
Westbound left and right	A	0.00	9.0	A	0.01	9.9
Northbound through and right	A	0.03	0.0	A	0.12	0.0
Southbound left and through	A	0.00	0.0	A	0.00	0.4

Intersection & Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
	LOS	v/c	Control Delay (s)	LOS	v/c	Control Delay (s)
Mississauga Road & Bush Street						
Eastbound left, through, and right	A	0.14	7.2	A	0.08	7.4
Westbound left, through, and right	A	0.01	7.2	A	0.01	7.5
Northbound left, through, and right	A	0.05	7.7	A	0.25	8.7
Southbound left, through, and right	A	0.07	7.5	A	0.05	7.3

LOS – level of service, v/c – volume to capacity ratio

4.2.4.3 Saturday Mid-Day Peak Hour

In recognition of weekend tourist traffic in the village of Belfountain, a comparison of the Saturday mid-day peak hour volumes and the weekday AM and PM peak hour volumes at the intersection of Mississauga Road and Bush Street found that the Saturday mid-day peak hour volumes (observed on July 28, 2012) are lower than the weekday peak hour volumes. Since the intersection operates satisfactorily during the weekday peak hours, it can be concluded that it operates better during the Saturday mid-day peak hours based on the observed traffic counts.

While it is understood that there will be Holiday Weekends when traffic volumes are much higher, these peak demands happen only several times per year. It is not standard industry practice to design for these peak events.

4.2.5 Midblock Capacity

Another method of examining capacity is to compare traffic demands with midblock capacities. Existing midblock levels of service are summarized in **Figure 29**, comparing the existing weekday peak hour volumes with road capacities, and the resulting volume/capacity ratios. Volume/capacity ratios under 0.85 generally represent situations where there is sufficient capacity on the road. As shown in **Figure 29**, the major roads in the study area have more than sufficient capacity to accommodate vehicular traffic during typical weekday peak periods.

The analysis of existing traffic conditions shows that the study area road network is operating with acceptable levels of services and with more than sufficient capacity.

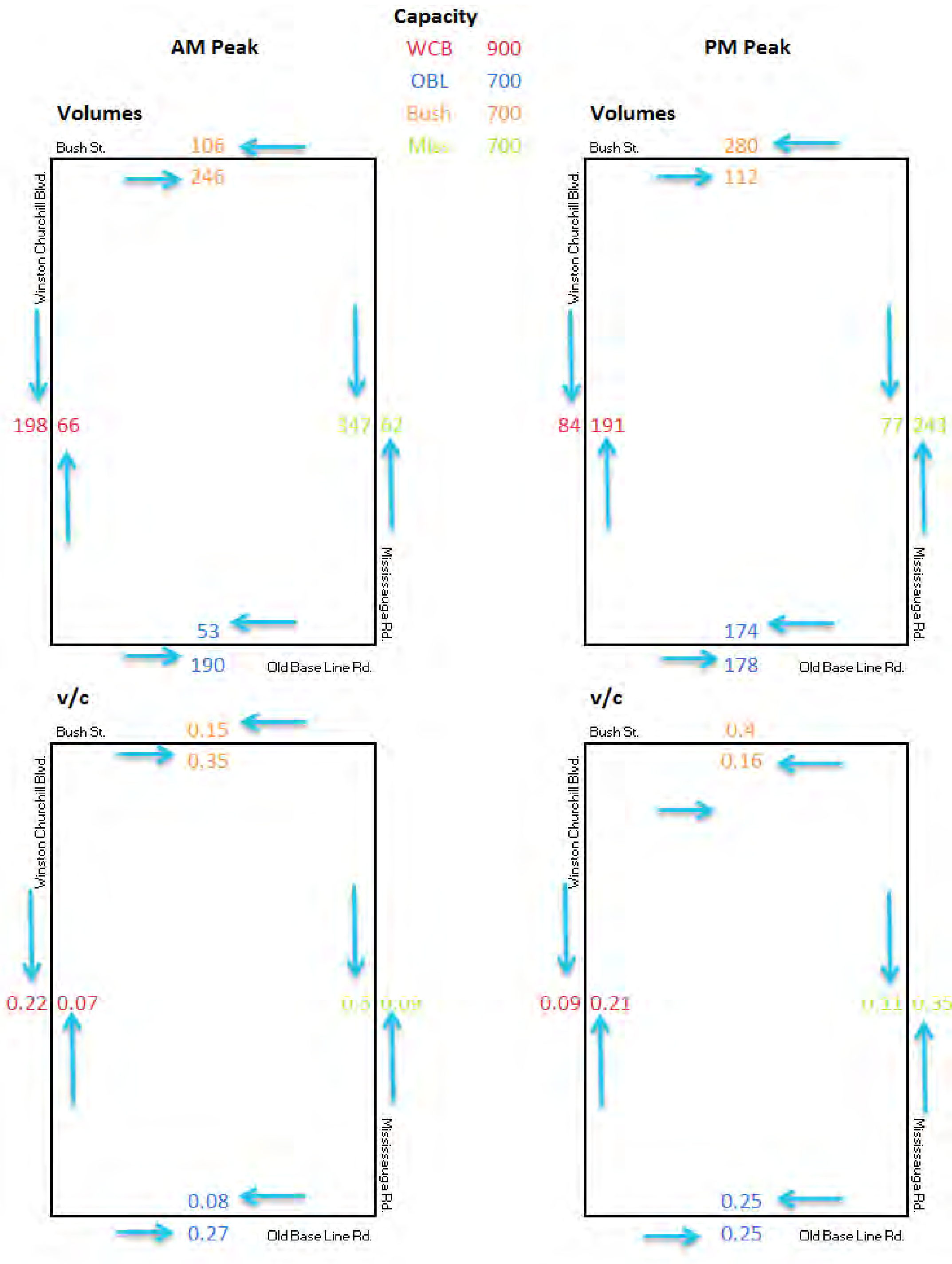


Figure 29: Midblock Roadway Capacity

4.2.6 Future Traffic Growth

To determine the future road improvement needs, traffic volumes were estimated for the horizon years of 2021 and 2031 at the study area intersections. The previous section has shown that, although traffic trends on individual roads have changed over the years, overall traffic in the study area has been relatively stable.

Forecasts of future traffic for the study area roads are based on a traffic growth rate of 1% per year for the east-west roads (Bush Street, The Grange Side Road, and Olde Base Line Road). For the north-south roads (Mississauga Road / Old Main Street and Winston Churchill Boulevard), a 2% growth rate for the short term (0 to 5 years), 1% for the medium term (5 to 10 years), and 1% for the long term (10 to 20 years) was used. The growth rates were provided by the Region of Peel and are based on historic traffic counts (ATR and AADT) over the past 10 years as well as general travel patterns derived from the Region's Travel Demand Forecasting Model. These growth rates are higher than recent trends in the study area.

The 2011/2012 traffic counts were factored by these growth rates to forecast traffic for the 2021 and 2031 horizon years. The projected traffic volumes for 2021 are shown in **Figure 30**, while projected 2031 traffic volumes are shown in **Figure 31**.

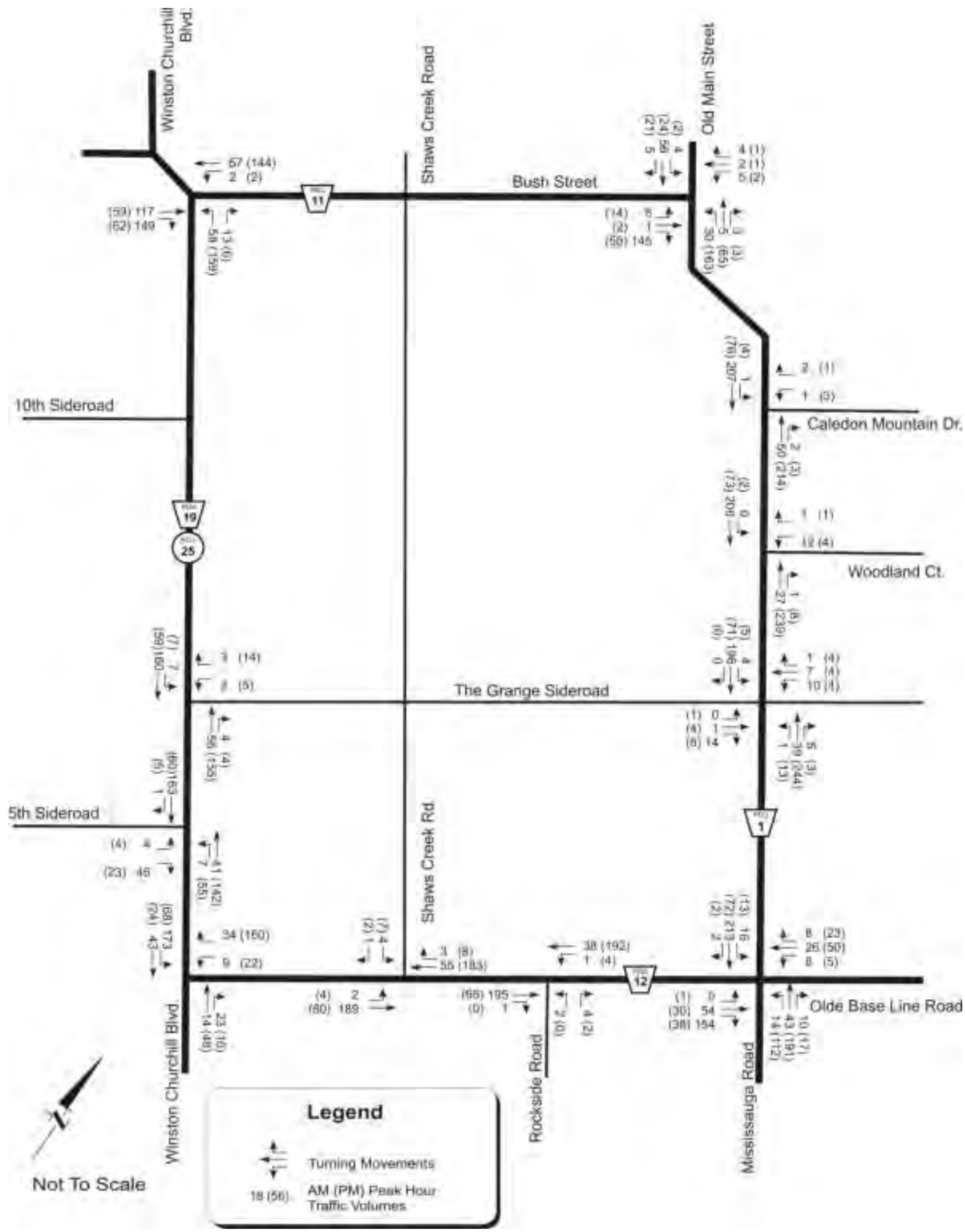


Figure 30: 2021 Traffic Volumes

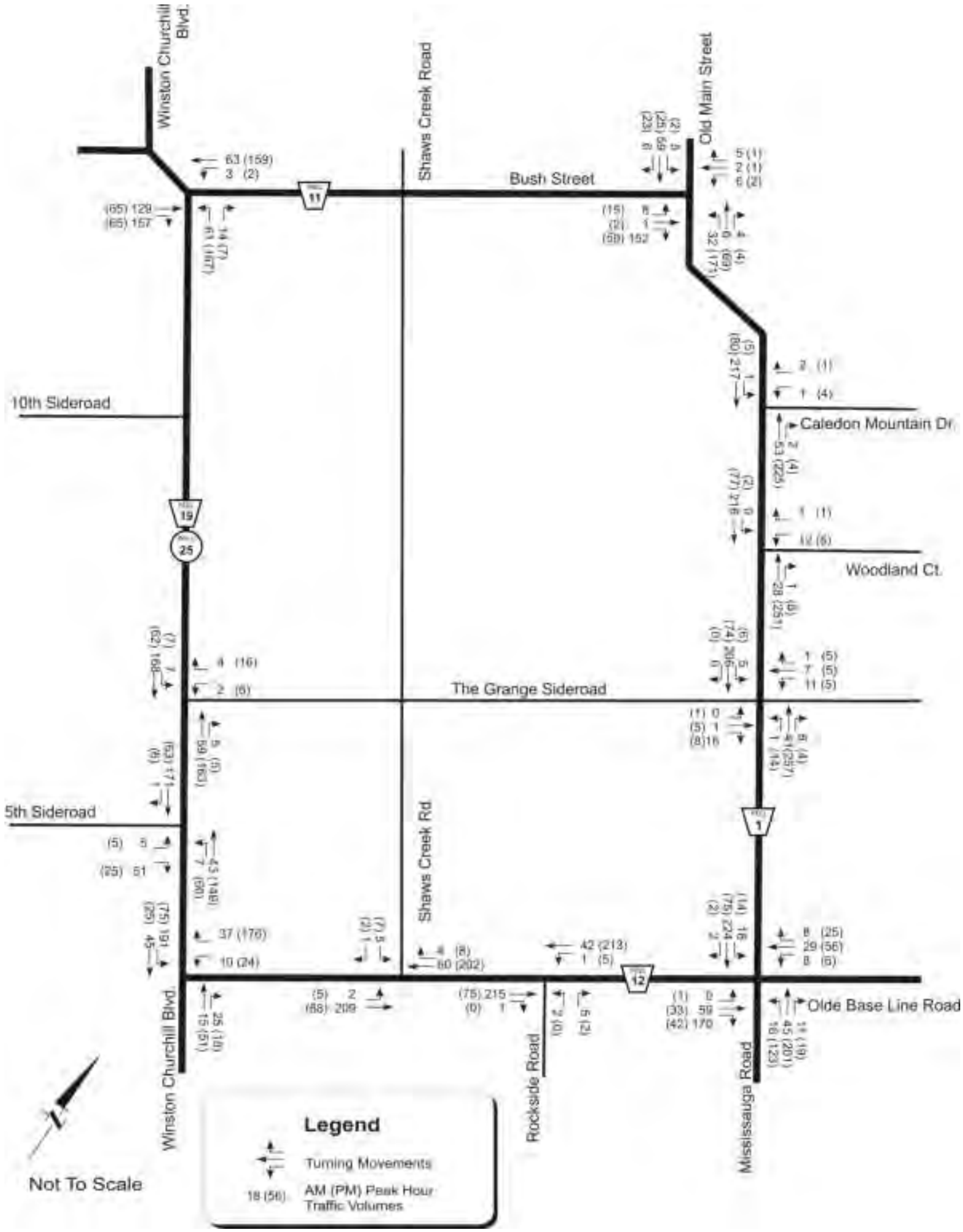


Figure 31: 2031 Traffic Volumes

4.2.6.1 2021 Traffic Conditions Intersection Operations

The future 2021 traffic operations for the study area intersections were analyzed based on the 2021 forecasted traffic volumes as shown in **Figure 30**, and the existing intersection configurations as shown in **Figure 12**. The 2021 traffic operations are summarized in **Table 10**. Detailed calculations are provided in **Appendix I**.

Table 10: 2021 Traffic Conditions Intersection Operations

Intersection & Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
	LOS	v/c	Control Delay (s)	LOS	v/c	Control Delay (s)
Winston Churchill Boulevard & Olde Base Line Road						
Westbound left and right	A	0.05	9.4	A	0.19	9.6
Northbound through and right	A	0.02	0.0	A	0.04	0.0
Southbound left and through	A	0.11	6.2	A	0.04	5.6
Winston Churchill Boulevard & 5th Sideroad						
Eastbound left and right	A	0.06	9.4	A	0.03	9.0
Northbound left and through	A	0.00	1.1	A	0.04	2.3
Southbound through and right	A	0.10	0.0	A	0.04	0.0
Winston Churchill Boulevard & The Grange Side Road						
Westbound left and right	A	0.01	9.1	A	0.02	9.3
Northbound through and right	A	0.04	0.0	A	0.09	0.0
Southbound left and through	A	0.00	0.3	A	0.00	0.8
Winston Churchill Boulevard & Bush Street						
Eastbound through and right	A	0.16	0.0	A	0.07	0.0
Westbound left and through	A	0.00	0.3	A	0.00	0.1
Northbound left and right	B	0.10	10.4	B	0.22	11.1
Olde Base Line Road & Shaws Creek Road						
Eastbound left and through	A	0.00	0.0	A	0.00	0.4
Westbound through and right	A	0.03	0.0	A	0.11	0.0
Southbound left and right	A	0.01	9.6	A	0.01	9.9
Olde Base Line Road & Rockside Road						
Eastbound through and right	A	0.12	0.0	A	0.04	0.0
Westbound left and through	A	0.00	0.2	A	0.00	0.2
Northbound left and right	A	0.01	9.4	A	0.00	9.6
Mississauga Road & Olde Base Line Road						
Eastbound left, through, and right	B	0.28	11.7	B	0.11	11.7
Westbound left, through, and right	B	0.07	11.9	B	0.16	13.7
Northbound left, through, and right	A	0.01	1.7	A	0.07	3.0
Southbound left, through, and right	A	0.01	0.6	A	0.01	1.2

Intersection & Movement	Weekday AM Peak Hour LOS	Weekday AM Peak Hour v/c	Weekday AM Peak Hour Control Delay (s)	Weekday PM Peak Hour LOS	Weekday PM Peak Hour v/c	Weekday PM Peak Hour Control Delay (s)
Mississauga Road & The Grange Side Road						
Eastbound left, through, and right	A	0.02	9.5	A	0.02	9.7
Westbound left, through, and right	B	0.03	10.4	B	0.02	10.8
Northbound left, through, and right	A	0.00	0.2	A	0.01	0.4
Southbound left, through, and right	A	0.00	0.2	A	0.00	0.6
Mississauga Road & Woodland Court						
Westbound left and right	A	0.02	9.7	B	0.01	10.2
Northbound through and right	A	0.02	0.0	A	0.15	0.0
Southbound left and through	A	0.00	0.0	A	0.00	0.2
Mississauga Road & Caledon Mountain Drive						
Westbound left and right	A	0.00	9.0	B	0.01	10.0
Northbound through and right	A	0.03	0.0	A	0.13	0.0
Southbound left and through	A	0.00	0.0	A	0.00	0.4
Mississauga Road & Bush Street						
Eastbound left, through, and right	A	0.15	7.3	A	0.08	7.5
Westbound left, through, and right	A	0.01	7.2	A	0.01	7.6
Northbound left, through, and right	A	0.05	7.8	A	0.27	8.9
Southbound left, through, and right	A	0.08	7.6	A	0.05	7.3

LOS – level of service, v/c – volume to capacity ratio;

Under 2021 future traffic conditions, all turning movements at all study area intersections are expected to operate with an overall level of service ‘B’ or better during the weekday AM and PM peak hours.

4.2.6.2 2031 Traffic Conditions Intersection Operations

The future 2031 traffic operations for the study area intersections were analyzed based on the 2031 forecasted traffic volumes as shown in **Figure 31**, and the existing intersection configurations as shown in **Figure 12**. The 2031 traffic operations are summarized in **Table 11**. Detailed calculations are provided in **Appendix J**.

Table 11: 2031 Traffic Conditions Intersection Operations

Intersection & Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
	LOS	v/c	Control Delay (s)	LOS	v/c	Control Delay (s)
Winston Churchill Boulevard & Olde Base Line Road						
Westbound left and right	A	0.06	9.6	A	0.21	9.7
Northbound through and right	A	0.02	0.0	A	0.04	0.0
Southbound left and through	A	0.12	6.3	A	0.05	5.7
Winston Churchill Boulevard & 5th Sideroad						
Eastbound left and right	A	0.06	9.4	A	0.03	9.1
Northbound left and through	A	0.00	1.1	A	0.04	2.4
Southbound through and right	A	0.10	0.0	A	0.04	0.0
Winston Churchill Boulevard & The Grange Side Road						
Westbound left and right	A	0.01	9.0	A	0.03	9.4
Northbound through and right	A	0.04	0.0	A	0.10	0.0
Southbound left and through	A	0.00	0.3	A	0.00	0.8
Winston Churchill Boulevard & Bush Street						
Eastbound through and rights	A	0.17	0.0	A	0.08	0.0
Westbound left and through	A	0.00	0.4	A	0.00	0.2
Northbound left and right	B	0.10	10.6	B	0.24	11.4
Olde Base Line Road & Shaws Creek Road						
Eastbound left and through	A	0.00	0.1	A	0.00	0.5
Westbound through and right	A	0.04	0.0	A	0.12	0.0
Southbound left and right	A	0.01	9.8	B	0.01	10.1
Olde Base Line Road & Rockside Road						
Eastbound through and right	A	0.13	0.0	A	0.04	0.0
Westbound left and through	A	0.00	0.2	A	0.00	0.2
Northbound left and right	A	0.01	9.5	A	0.00	9.7
Mississauga Road & Olde Base Line Road						
Eastbound left, through, and right	B	0.31	12.2	B	0.13	12.1
Westbound left, through, and right	B	0.08	12.3	B	0.19	14.6
Northbound left, through, and right	A	0.01	1.8	A	0.08	3.2
Southbound left, through, and right	A	0.01	0.6	A	0.01	1.3
Mississauga Road & The Grange Side Road						
Eastbound left, through, and right	A	0.02	9.6	A	0.02	10.0
Westbound left, through, and right	B	0.03	10.6	B	0.02	11.0
Northbound left, through, and right	A	0.00	0.2	A	0.01	0.5
Southbound left, through, and right	A	0.00	0.2	A	0.01	0.7
Mississauga Road & Woodland Court						
Westbound Left and Right	A	0.02	9.8	B	0.01	10.3
Northbound through and right	A	0.02	0.0	A	0.15	0.0
Southbound Left and Through	A	0.00	0.0	A	0.00	0.2

Intersection & Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
	LOS	v/c	Control Delay (s)	LOS	v/c	Control Delay (s)
Mississauga Road & Caledon Mountain Drive						
Westbound Left and Right	A	0.00	9.0	B	0.01	10.2
Northbound through and right	A	0.03	0.0	A	0.13	0.0
Southbound Left and Through	A	0.00	0.0	A	0.00	0.5
Mississauga Road & Bush Street						
Eastbound left, through, and right	A	0.16	7.3	A	0.09	7.6
Westbound left, through, and right	A	0.02	7.2	A	0.01	7.6
Northbound left, through, and right	A	0.05	7.8	A	0.29	9.0
Southbound left, through, and right	A	0.08	7.6	A	0.06	7.3

LOS – level of service, v/c – volume to capacity ratio

Under 2031 future traffic conditions, all turning movements at all study area intersections will operate with an overall level of service ‘B’ or better during both the weekday AM and PM peak hours.

4.2.7 Traffic Signal Warrants

Signal warrant analysis was undertaken based on the methodology for projected traffic provided in Ontario Traffic Manual Book 12 Traffic for all intersections within the study area. Based on the assessment, traffic signals are not warranted at any of the intersections within the study area. All study intersections operate satisfactorily under existing traffic conditions, as well as under 2031 future traffic conditions, and the need for traffic signals is not required. Detailed results of the traffic signal warrant analysis is provided in **Appendix K**.

4.2.8 All-Way Stop Control Warrants

All-way stop control warrant analysis was undertaken based on methodology provided in Ontario Traffic Manual Book 5 Regulatory Signs for the intersections within the study area, with the exception of Bush Street & Shaws Creek Road, and Bush Street & Old Main Street, which are all-way stop controlled under existing conditions.

Based on the minimum volume warrant for arterial and major roads and/or minor roads, and the collision warrant, all-way stop control is not warranted at any of the intersections that were analyzed. Detailed results of the all-way stop control warrant analysis is provided in **Appendix L**.

4.2.9 Left Turn Lane Warrants

For all intersections within the four corridors surrounding the study area, a left turn lane warrant based on the TAC design standard was carried out. This warrant is based on design speed, turning and opposing existing design hour volumes.

The results show that no left turn lanes are warranted at any of the intersections because of the low turning volumes observed from the counts. Details on the left-turn warrant analysis are provided in **Appendix M**.

4.2.10 Roundabouts

The Region of Peel identified the intersections of Mississauga Road at Olde Base Line Road, Winston Churchill Boulevard at Olde Base Line Road, and Winston Churchill Boulevard at Bush Street as potential locations for roundabouts, and also identified the intersection of Old Main Street at Bush Street as a potential location for a mini-circle.

Roundabouts are an alternate traffic control option to improve both intersection operations and safety. They have been proven to reduce the severity of collisions, as vehicles drive at lower speeds, left-turns are eliminated through one-way travel, and the number of conflict points is reduced. The more-severe angle and turning movement collisions are reduced, although a potential increase of typically less-severe sideswipe and rear end collision types may occur.

A mini-circle operates similarly to a modern roundabout but is much smaller and is typically used where space is limited. Mini-circles are not as common in Ontario as modern roundabouts and therefore the use of them by residents and visitors may have initial impacts associated with an introduction of the circle.

The identified roundabout locations were analyzed using Peel Region's 'Roundabout Screening Tool' to determine suitability and feasibility. Roundabout operations for existing and future weekday AM and PM peak hour traffic volumes were also assessed using ARCADY 8 roundabout software. Default parameters for single lane roundabouts with single lane entries and exits were used in the analysis (half width – 3.5 m, entry width – 4.5 m, effective flare length – 30 m, entry radius – 20 m, internal circle diameter – 40 m, and entry angle – 20^{o}). As mini-circles differ from modern roundabouts and do not impact the surrounding area as much, the 'Roundabout Screening Tool' was not assessed for the mini-circle. Operations of the mini-circle for existing and future weekday AM and PM peak hour traffic volumes were assessed using default mini-circle parameters in the ARCADY 8 software. Detailed analysis using the 'Roundabout Screening Tool' is provided in **Appendix N**, and ARCADY 8 results are summarized in **Table 12** and **Table 13**.

At the intersection of Winston Churchill Boulevard at Bush Street, three different alternatives were identified, as shown in **Figure 32**:

- Option 1 – a 3-leg roundabout at the east junction of the intersection
- Option 2 – two 3-leg roundabouts side to side (at both east and west junctions)
- Option 3 – a 4-leg roundabout with realigned approaches of Winston Churchill Boulevard and Bush Street

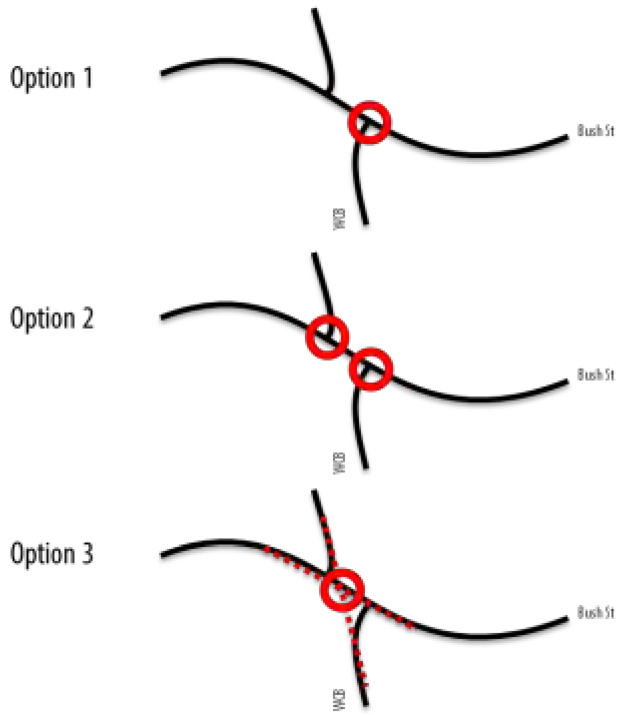


Figure 32: Roundabout Alternatives for Winston Churchill Boulevard at Bush Street

Table 12: Existing and Future AM Peak Hour Roundabout Operations

Intersection and Approach	Existing			2021			2031		
	LOS	v/c	D	LOS	v/c	D	LOS	v/c	D
Mississauga Road at Olde Base Line Road	**A**		**3.33**	**A**		**3.40**	**A**		**3.47**
East	A	0.03	2.88	A	0.03	2.89	A	0.04	2.91
North	A	0.17	3.30	A	0.18	3.36	A	0.19	3.41
West	A	0.16	3.59	A	0.18	3.69	A	0.19	3.81
South	A	0.05	2.92	A	0.05	2.94	A	0.06	2.96
Winston Churchill Boulevard at Olde Base Line Road	**A**		**3.22**	**A**		**3.27**	**A**		**3.33**
East	A	0.03	2.84	A	0.04	2.85	A	0.04	2.86
North	A	0.16	3.33	A	0.18	3.39	A	0.19	3.46
South	A	0.03	3.01	A	0.03	3.04	A	0.04	3.08

Intersection and Approach	Existing			2021			2031		
	LOS	v/c	D	LOS	v/c	D	LOS	v/c	D
Winston Churchill Boulevard at Bush Street Option 1	**A**		**3.23**	**A**		**3.29**	**A**		**3.34**
East	A	0.04	2.96	A	0.05	2.98	A	0.05	2.97
West	A	0.20	3.35	A	0.22	3.42	A	0.23	3.49
South	A	0.06	3.02	A	0.06	3.05	A	0.06	3.08
Winston Churchill Boulevard at Bush Street Option 2 (at East Junction)	**A**		**3.23**	**A**		**3.29**	**A**		**3.36**
East	A	0.04	2.96	A	0.05	2.98	A	0.05	2.97
West	A	0.20	3.35	A	0.22	3.43	A	0.24	3.51
South	A	0.06	3.02	A	0.06	3.05	A	0.06	3.08
Winston Churchill Boulevard at Bush Street Option 2 (at West Junction)	**A**		**3.16**	**A**		**3.21**	**A**		**3.25**
East	A	0.09	3.03	A	0.09	3.06	A	0.09	3.05
North	A	0.09	3.16	A	0.10	3.20	A	0.10	3.22
West	A	0.14	3.25	A	0.15	3.31	A	0.17	3.38
Winston Churchill Boulevard at Bush Street Option 3	**A**		**3.15**	**A**		**3.20**	**A**		**3.25**
East	A	0.04	2.87	A	0.05	2.89	A	0.05	2.91
North	A	0.08	3.14	A	0.09	3.17	A	0.10	3.22
West	A	0.13	3.31	A	0.14	3.37	A	0.16	3.45
South	A	0.05	3.01	A	0.06	3.04	A	0.06	3.07
Old Main Street at Bush Street (Mini-Circle)	**A**		**5.10**	**A**		**5.19**	**A**		**5.24**
East	A	0.01	4.38	A	0.01	4.39	A	0.02	4.41
North	A	0.08	4.72	A	0.09	4.76	A	0.09	4.80
West	A	0.05	5.47	A	0.21	5.59	A	0.22	5.68
South	A	0.19	4.49	A	0.05	4.50	A	0.05	4.53

LOS – Level of service; v/c – volume to capacity ratio; D – delay in seconds

Table 13: Existing and Future PM Peak Hour Roundabout Operations

Intersection and Approach	Existing			2021			2031		
	LOS	v/c	D	LOS	v/c	D	LOS	v/c	D
Mississauga Road at Olde Base Line Road	**A**		**3.37**	**A**		**3.44**	**A**		**3.51**
East	A	0.06	3.31	A	0.07	3.37	A	0.08	3.44
North	A	0.07	3.23	A	0.07	3.27	A	0.08	3.31
West	A	0.05	2.93	A	0.05	2.95	A	0.06	2.97
South	A	0.22	3.51	A	0.24	3.61	A	0.26	3.70
Winston Churchill Boulevard at Olde Base Line Road	**A**		**3.12**	**A**		**3.16**	**A**		**3.21**
East	A	0.14	0.14	A	0.15	3.29	A	0.17	3.36
North	A	0.07	0.07	A	0.08	2.98	A	0.08	3.01
South	A	0.05	0.05	A	0.05	3.07	A	0.06	3.09
Winston Churchill Boulevard at Bush Street Option 1	**A**		**3.23**	**A**		**3.27**	**A**		**3.32**
East	A	0.12	3.32	A	0.13	3.38	A	0.14	3.45
West	A	0.09	3.01	A	0.10	3.03	A	0.11	3.06
South	A	0.13	3.31	A	0.14	3.35	A	0.15	3.39
Winston Churchill Boulevard at Bush Street Option 2 (at East Junction)	**A**		**3.23**	**A**		**3.27**	**A**		**3.32**
East	A	0.12	3.32	A	0.13	3.38	A	0.14	3.45
West	A	0.09	3.01	A	0.10	3.03	A	0.11	3.06
South	A	0.13	3.31	A	0.14	3.35	A	0.15	3.40
Winston Churchill Boulevard at Bush Street Option 2 (at West Junction)	**A**		**3.39**	**A**		**3.46**	**A**		**3.53**
East	A	0.23	3.55	A	0.25	3.64	A	0.27	3.75
North	A	0.04	3.12	A	0.04	3.16	A	0.04	3.20
West	A	0.07	2.99	A	0.08	3.02	A	0.09	3.05
Winston Churchill Boulevard at Bush Street Option 3	**A**		**3.21**	**A**		**3.25**	**A**		**3.32**
East	A	0.11	3.30	A	0.12	3.36	A	0.13	3.44
North	A	0.04	3.11	A	0.04	3.14	A	0.04	3.19
West	A	0.07	2.97	A	0.07	3.00	A	0.08	3.03
South	A	0.12	3.30	A	0.13	3.34	A	0.15	3.41
Old Main Street at Bush Street (Mini-Circle)	**A**		**5.59**	**A**		**5.72**	**A**		**5.84**
East	A	0.00	0.00	A	0.00	0.00	A	0.00	0.00
North	A	0.06	5.03	A	0.07	5.09	A	0.07	5.15
West	A	0.09	4.73	A	0.09	4.77	A	0.10	4.80
South	A	0.28	5.97	A	0.30	6.15	A	0.32	6.30

LOS – Level of service; v/c – volume to capacity ratio; D – delay in seconds

Based on the screening tool analysis, a roundabout is not feasible at the intersection of Winston Churchill Boulevard and Olde Base Line Road due to minor traffic volumes, topography at and surrounding the intersections, property constraints, and the estimated construction costs.

Single lane roundabouts with an Internal Circle Diameter (ICD) of 40 metres can be considered as an alternative to reduce collisions and improve visibility for drivers at two potential locations; Mississauga Road at Olde Base Line Road, and Winston Churchill Boulevard at Bush Street. At the intersection of Winston Churchill Boulevard and Bush Street, Option 1 (a 3-leg roundabout at the east intersection junction) was considered the most suitable option, due to property impacts and high construction costs for the realignment in Options 2 and 3. Single-lane roundabouts at these two study area intersections would operate satisfactorily during existing and future traffic conditions.

A mini-circle at Old Main Street at Bush Street would operate satisfactorily under existing and future traffic conditions. Impacts to adjacent properties and features, and accommodation of cyclists and pedestrians through the mini-circle would need to be considered.

Should the option of a roundabout or mini-circle be further considered at any of these locations, a feasibility analysis is required, considering safety impacts, property, grading, implementation cost, and annual maintenance costs. More details about options considered for the different intersections in the study area can be found in **Section 11**.

4.3 Pedestrian Network

There are no sidewalks or other formal off-road pedestrian facilities along the study area roads. Pedestrian activity is centred in the community of Belfountain, where the majority of commercial establishments and residences in the area are located. Pedestrians currently use the partially paved shoulders of the roads, where available. At the intersection of Mississauga Road / Old Main Street and Bush Street, pedestrian crosswalk pavement markings are provided at all three legs of the intersection, as shown in **Figure 33**.

Belfountain Elementary School, a public school with student enrollment from Kindergarten to Grade 6, is located on Shaws Creek Road just south of Bush Street. School zone signs are located along Bush Street, both east and west of Shaws Creek Road, warning drivers to watch out for pedestrians at these locations. The Eureka Kids School, a private preschool, is located on Winston Churchill Boulevard, approximately 400 metres south of Sideroad 5. There is no pedestrian signage at this location.

Figure 33: Pedestrian Crosswalk Pavement Markings, at Intersection of Old Main Street and Bush Street

Student Transportation of Peel Region was contacted for information on school bus service for Peel Region and school bus routes traveling in the study area. Students are picked up and dropped off on the side of the road, and must cross the street depending on the direction of travel, while both directions of moving traffic are stopped. Within the study area, five (5) ‘School bus stop ahead’ signs (Wc-26) are located at as follows:

- Northbound on Mississauga Road, north of The Grange Side Road
- Southbound on Mississauga Road, south of Woodland Court
- Eastbound on Bush Street, west of Shaws Creek Road
- Westbound on Bush Street, east of Winston Churchill Boulevard
- Eastbound on Olde Base Line Road, west of Shaws Creek Road

Outside of the study area in Wellington County, Erin District High School (enrollment from Grades 9-12) and Erin Public School (an elementary school with student enrollment from Kindergarten to Grade 8) are located at 9th Line/Wellington Road 124 and Dundas Street East. Wellington-Dufferin Student Transportation Services was contacted for information on school bus service for Wellington County. One school bus route runs northbound in the morning on Winston Churchill Boulevard from Olde Base Line Road to 10th Sideroad, serving four residences, and runs in the southbound direction in the afternoon. Students are picked up and dropped off on the side of the road, and must cross the street depending on the direction of travel, while both directions of moving traffic are stopped.

No public transit service is provided along the study area corridors.

4.4 Cycling Network

There are no exclusive cycling facilities on the study area roads, and cyclists must ride directly on the roadway or on partially paved shoulders, where available. Multiple “Share the Road” and supplementary tab signage exists in several areas within the study area, reminding drivers to be cautious and to watch out for cyclists or other users on the roadway.

Olde Base Line Road is identified as a signed bicycle route through the Walk and Roll Peel trails map, from McLaughlin Road to Mississauga Road, immediately east of the study area. Signed bicycle routes indicate that cyclists and automobiles must share the roadway. “Share the Road” signs also exist on Olde Base Line Road between Mississauga Road and Winston Churchill Boulevard.

The Walk and Roll Peel trails map also identifies a signed bicycle route on Mississauga Road/Old Main Street from Olde Base Line Road to Bush Street and on Bush Street from Mississauga Road / Old Main Street to Shaws Creek Road. Some “Share the Road” signage exists in the vicinity of the community of Belfountain, along with paved shoulders for a stretch of roadway approximately 1.2 kilometres long.

Unpaved and partially paved shoulders exist on Bush Street from Shaws Creek Road to Winston Churchill Boulevard, and on Winston Churchill Boulevard from Bush Street to Olde Base Line Road, with no signage on either of these roads.

The Region’s Active Transportation Plan (Map 10A, see **Figure 34**) recommends Mississauga Road / Old Main Street, Bush Street, Winston Churchill Boulevard, and Olde Base Line Road as cycling facilities in the proposed long-term Regional cycling network. The Plan recommends providing paved shoulders on all rural Regional roads (roadways with paved shoulders), where feasible and appropriate, to improve the safety of all road users. The benefits of paved shoulders include erosion control, extending the pavement service life; reducing run-off-the road collisions; serving as refuge for disabled vehicles; and providing cyclists with space outside the general purpose travel lane.

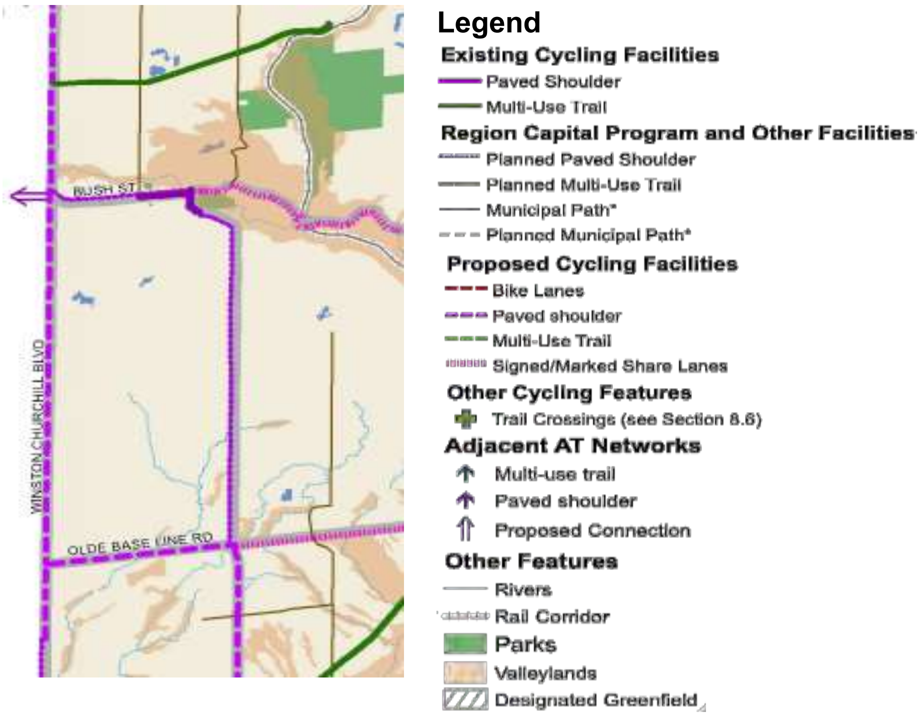


Figure 34: Caledon Proposed Long-Term Regional Cycling Network

Existing bicycle usage along the study roadways, based on data from July 2012, is shown **Figure 35** along with existing “Share the Road” signage. Mississauga Road / Old Main Street and Bush Street have the highest bicycle volumes. Based on different conditions of the roads and the Region’s Active Transportation Plan, different types of cycling facilities and appropriate signage will be evaluated for each of the study area roads in **Section 6** through **Section 10**.

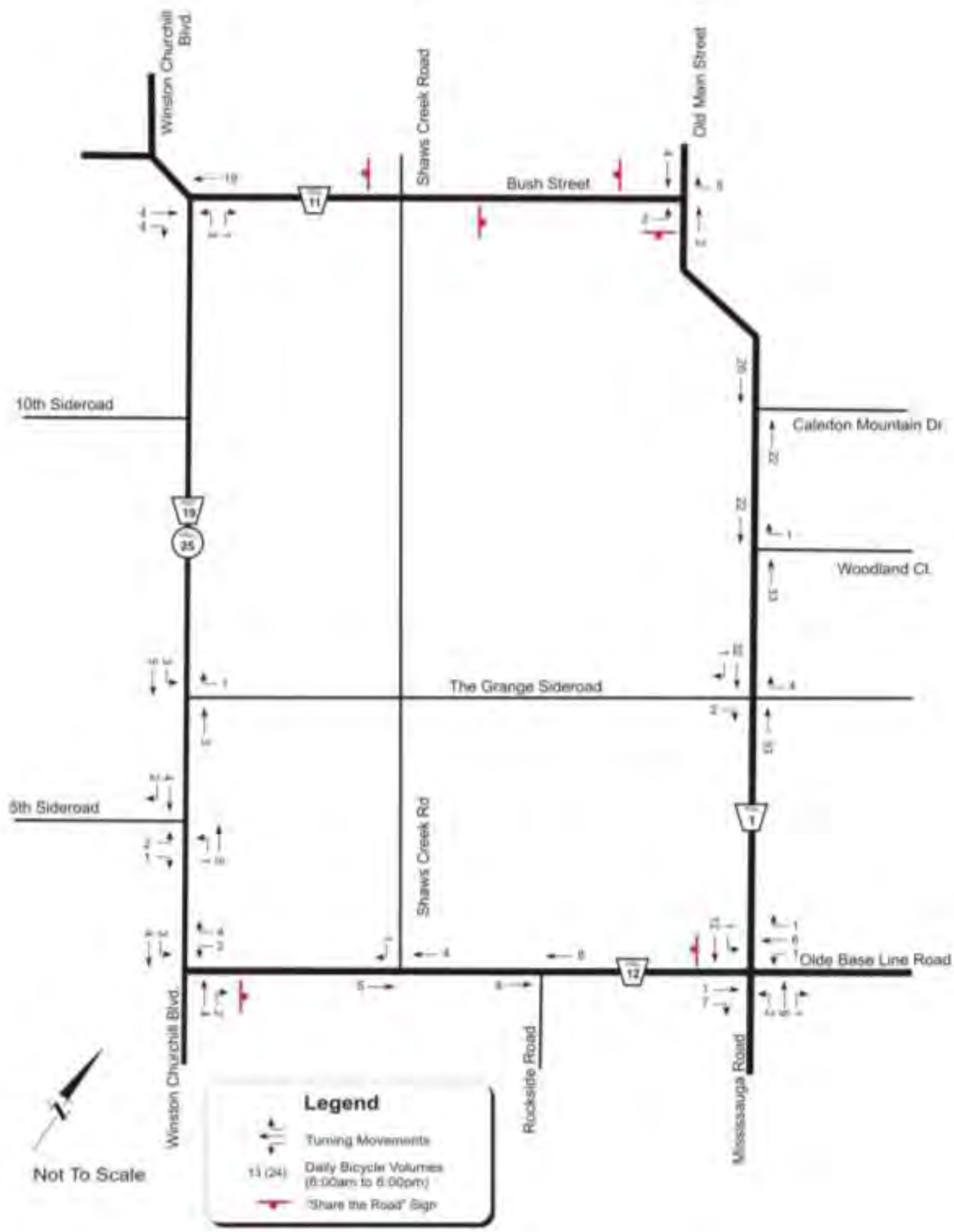


Figure 35: Existing Daily Cyclist Volumes

4.5 Safety

4.5.1 Safety Review Methodology

The safety review includes an office investigation of existing conditions, collision analysis, and a field investigation to assess traffic operations and safety concerns of the study area.

The site visit was conducted on Wednesday October 2, 2012 between 10:00 am to 6:00 pm. The 26 intersections and midblock segments of the regional road corridors in the study area have been numbered for the safety review as follows and are illustrated in **Figure 36**:

1. Mississauga Road at Olde Base Line Road
2. Mississauga Road between Olde Base Line Road and The Grange Side Road
3. Mississauga Road at The Grange Side Road
4. Mississauga Road between The Grange Side Road and Woodland Court
5. Mississauga Road at Woodland Court
6. Mississauga Road between Woodland Court and Caledon Mountain Drive
7. Mississauga Road at Caledon Mountain Drive
8. Old Main Street between Caledon Mountain Drive and Bush Street
9. Old Main Street at Bush Street
10. Bush Street between Old Main Street and Shaws Creek Road
11. Bush Street at Shaws Creek Road
12. Bush Street between Shaws Creek Road and Winston Churchill Boulevard
13. Bush Street at Winston Churchill Boulevard *
14. Winston Churchill Boulevard between Bush Street and Sideroad 10
15. Winston Churchill Boulevard at Sideroad 10
16. Winston Churchill Boulevard between Sideroad 10 and The Grange Side Road
17. Winston Churchill Boulevard at The Grange Side Road
18. Winston Churchill Boulevard between The Grange Side Road and Sideroad 5
19. Winston Churchill Boulevard at Sideroad 5
20. Winston Churchill Boulevard between Sideroad 5 and Olde Base Line Road
21. Winston Churchill Boulevard at Olde Base Line Road
22. Olde Base Line Road between Winston Churchill Boulevard and Shaws Creek Road
23. Olde Base Line Road at Shaws Creek Road
24. Olde Base Line Road between Shaws Creek Road and Rockside Road
25. Olde Base Line Road at Rockside Road
26. Olde Base Line Road between Rockside Road and Mississauga Road.

*Note: Collision data was only received for the eastern jog of this intersection, and collisions occurring at the western jog of this intersection were not included in the analysis.

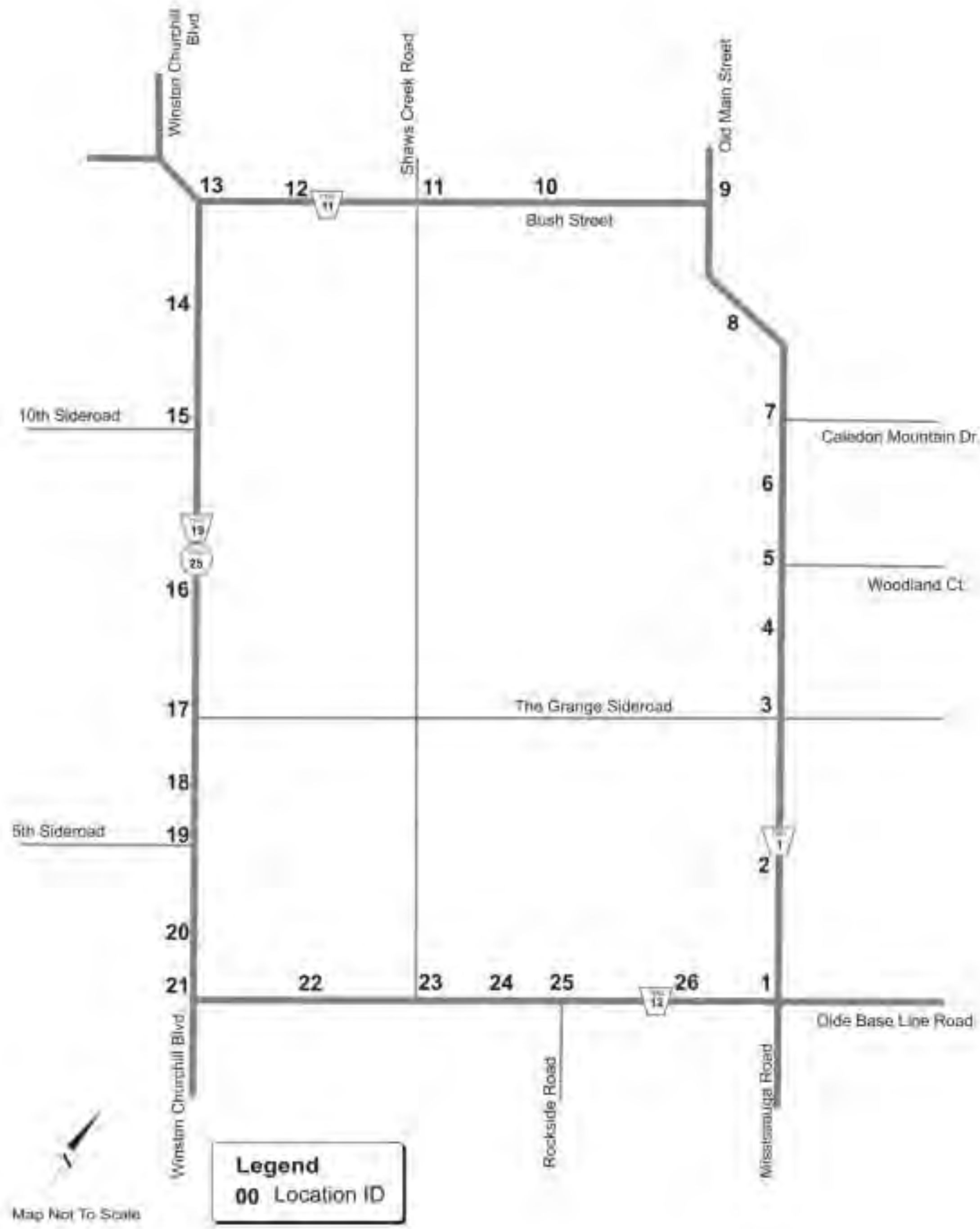


Figure 36: Intersections and Segments within Study Area

4.5.2 Collision Analysis

Collision records for the twenty-six intersections and midblock location within the study area were obtained from the Region of Peel, including collision data spanning a five-year period from January 1, 2006 to December 31, 2010. A total of 68 collisions occurred at 18 of the 26 locations in the study area during the five-year review period.

Collisions were analyzed in terms of year, weekday and month of occurrence, severity, initial impact type, environmental condition, and light condition to identify trends and patterns in the collisions. Detailed collision diagrams are provided in **Appendix O**.

4.5.2.1 Collision Rate

Collision rates were calculated separately for intersections and segments using the following formulas:

$$Segment\ Collision\ Rate = \frac{Number\ of\ Collisions \times 1{,}000{,}000}{AADT \times 365 \times Length \times Years}$$

$$Intersection\ Collision\ Rate = \frac{Number\ of\ Collisions\ \times 1{,}000{,}000}{AADT\ \times 365\ \times Years}$$

Annual Average Daily Traffic (AADT) was estimated by multiplying the sum of the AM and PM peak hour volumes per approach by five. The peak hour volumes were obtained from 2012 turning movement count data provided by the Region of Peel. The segment collision rates are provided in **Table 14** and the intersection collision rates are provided in **Table 15**.

In addition to collision rates, we have also compared results from Regional Safety Study titled, *Development of Safety Performance Functions and Network Screening Final Report* which looked at 587 intersection and 777 segments (non-intersection). These results from the Regional study show where intersections or segments within this study are in comparison to other intersections and segments within the region from a safety perspective. The two parameter extracted from the Regional study are Potential for Safety Improvement (PSI) and PSI Ranking. A higher PSI Ranking indicates a high potential for safety improvement.

The PSI is the outcome from a network screening analysis which is a process for reviewing a roadway network (intersections, segments, ramps) in order to prioritize sites (for improvement) from highest to lowest. A network screening process involves several analytical steps utilizing historical data of the network (primarily collision history). For instance, the segment between Olde Base Line Road and The Grange Side Road has the highest PSI of 3.69 and ranks 160 (highest within our study area sites of 26 locations). From a network screening analysis, this site has the highest potential for safety improvement from the list of 26 sites.

Table 14: Segment Collision Analysis

ID	Segment	AADT	Segment Length (km)	Number of Collisions	Segment Collision Rate	Network Screening	
						PSI	Rank
2	Mississauga Road between Olde Base Line Road & The Grange Side Road	2750	3.0	11	0.73	3.69	160
4	Mississauga Rd between The Grange Side Road & Woodland Court	2660	1.7	6	0.73	3.46	168
6	Mississauga Rd between Woodland Court & Caledon Mountain Dr.	2570	0.4	0	0.00	0.0	683
8	Mississauga Rd between Caledon Mountain Dr. & Bush Street	2625	1.1	3	0.59	0.31	339
10	Bush St between Old Main Street and Shaws Creek Road	2100	0.8	1	0.35	0.0	516
12	Bush St between Shaws Creek Road & Winston Churchill Blvd	1860	1.2	0	0.00	0.0	520
14	Winston Churchill Blvd between Bush St & Sideroad 10	2110	1.1	0	0.00	0.0	702
16	Winston Churchill Blvd between Sideroad 10 & The Grange Side Road	2160	1.8	3	0.42	1.77	232
18	Winston Churchill Blvd between The Grange Side Road & Sideroad 5	2095	1.3	2	0.42	0.0	718
20	Winston Churchill Blvd between Sideroad 5 & Olde Base Line Road	2590	1.9	3	0.34	0.57	303
22,	Olde Base Line Rd between Winston Churchill Blvd & Shaws Creek Road	2370	1.3	7	1.24	0.98	268
24	Olde Base Line Rd between Shaws Creek Road & Rockside Road	2425	0.1	2	4.52	0.13	356
26	Olde Base Line Rd between Rockside Road & Mississauga Rd	2340	1.3	0	0.00	0.0	587

The locations with the highest number of collisions also have the highest collision rates. The highest collision rate corridors are Mississauga Road between Olde Base Line Road and The Grange Side Road, and Olde Base Line Road between Winston Churchill Boulevard and Mississauga Road. The intersection with the highest collision rate is Mississauga Road at Olde Base Line Road.

In terms of PSI ranking, the highest ranked segments for potential safety improvement are Mississauga Road between Olde Base Line Road and Woodland Court, followed by Winston Churchill Boulevard between Sideroad 10 and The Grange Side Road.

Intersections with the highest PSI ranking are Winston Churchill Boulevard at Olde Base Line Road, followed by Olde Base Line Road at Shaws Creek Road, Mississauga Road at Olde Base Line Road, and Mississauga Road at Caledon Mountain Drive.

Although no location in the Study Area ranks in the top 150 locations in Peel Region, this does not preclude the need to consider safety improvements.

Table 15: Intersection Collision Analysis

ID	Intersection	AADT	Number of Collisions	Intersection Collision Rate	Networking Screening	
					PSI	Rank
1	Mississauga Road at Olde Base Line Road	5150	10	1.06	0.76	281
3	Mississauga Road at The Grange Side Road	3000	1	0.18	0.03	325
5	Mississauga Road at Woodland Court	2680	0	0.00	0.0	567
7	Mississauga Road at Caledon Mountain Drive	2670	1	0.21	0.51	293
9	Old Main Street at Bush Street	2940	4	0.75	0.23	316
11	Bush Street at Shaws Creek Road	N/A*	2	N/A*	0.0	539
13	Bush Street at Winston Churchill Boulevard	3860	5	0.71	0.0	518
15	Winston Churchill Boulevard at Sideroad 10	N/A*	0	N/A*	0.0	576
17	Winston Churchill Boulevard at The Grange Side Road	2235	0	0.00	0.15	320
19	Winston Churchill Boulevard at Sideroad 5	2570	1	0.21	N/A	N/A
21	Winston Churchill Boulevard at Olde Base Line Road	2920	4	0.75	3.42	194
23	Olde Base Line Road at Shaws Creek Road	2470	2	0.44	0.89	268
25	Olde Base Line Road at Rockside Road	2355	0	0.00	N/A	N/A

* Note: AADT data was not available for this location

4.5.2.2 Collisions by Year, Day of the Week, and Month

The number of collisions by year and severity is shown in **Table 16** and **Figure 37**. Overall, the number of collisions has increased moderately from year to year. The number of 'Property Damage Only' collisions have increased throughout the five-year review period, while the number of 'Non-Fatal Injury' collisions have remained constant. The reason for the increase in the number of collisions cannot be determined; possible reasons for the increase include random variation and weather.

Table 16: Collisions by Severity and Year (January 2006 to December 2010)

Collision Severity	2006	2007	2008	2009	2010	Total	Percentage
Property Damage Only	11	6	12	17	16	**62**	91.2%
Non-Fatal Injury	1	1	2	1	1	**6**	8.8%
Fatal	**-**	**-**	**-**	**-**	**-**	**-**	-
Total	**12**	**7**	**14**	**18**	**17**	**68**	100%
Percentage	17.6%	10.3%	20.6%	26.5%	25.0%	100%	

Note: '-'indicates that zero (0) collisions occurred

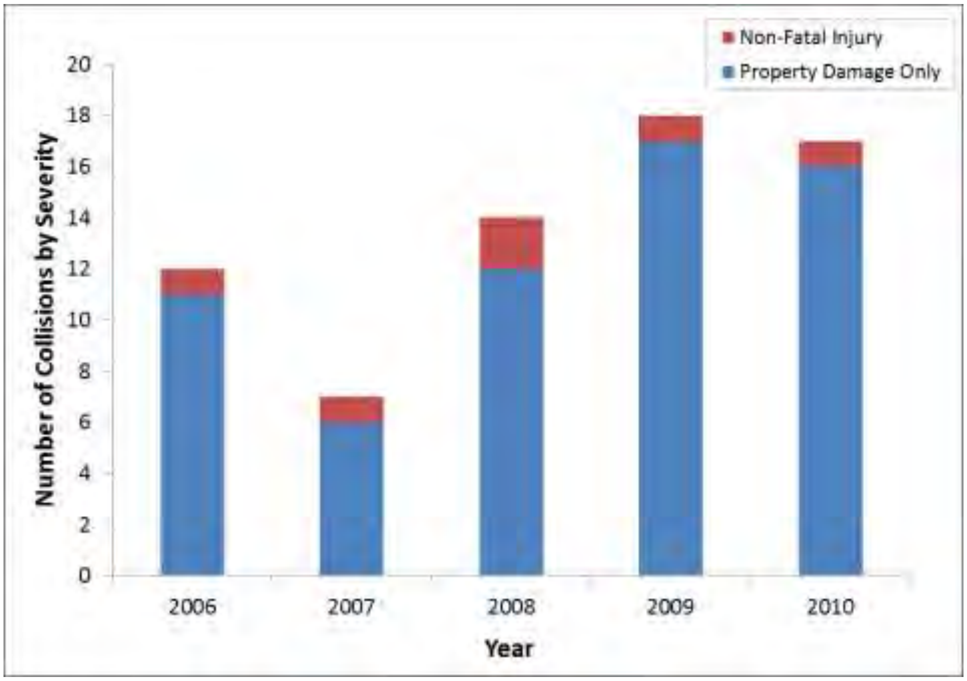


Figure 37: Collision by Severity and Year (January 2006 to December 2010)

The number of collisions by day of the week and severity is provided in **Table 17** and **Figure 38**. The highest number of collisions occur near the end of the week on Thursday, Friday and Saturday. As a tourist destination, the increase in the higher number of weekend collisions might correlate with the higher number of unfamiliar weekend drivers.

Table 17: Collisions by Severity and Weekday (January 2006 to December 2010)

Collision Severity	Sun	Mon	Tues	Wed	Thurs	Fri	Sat	Total	Percentage
Property Damage Only	8	9	8	5	11	10	11	**62**	91.2%
Non-Fatal Injury	1	-	1	1	1	1	1	**6**	8.8%
Fatal	-	-	-	-	-	-	-	**-**	-
Total	**9**	**9**	**9**	**6**	**12**	**11**	**12**	**68**	100%
Percentage	13.2%	13.2%	13.2%	8.8%	17.6%	16.2%	17.6%	100%	

Note: '-' indicates that zero (0) collisions occurred

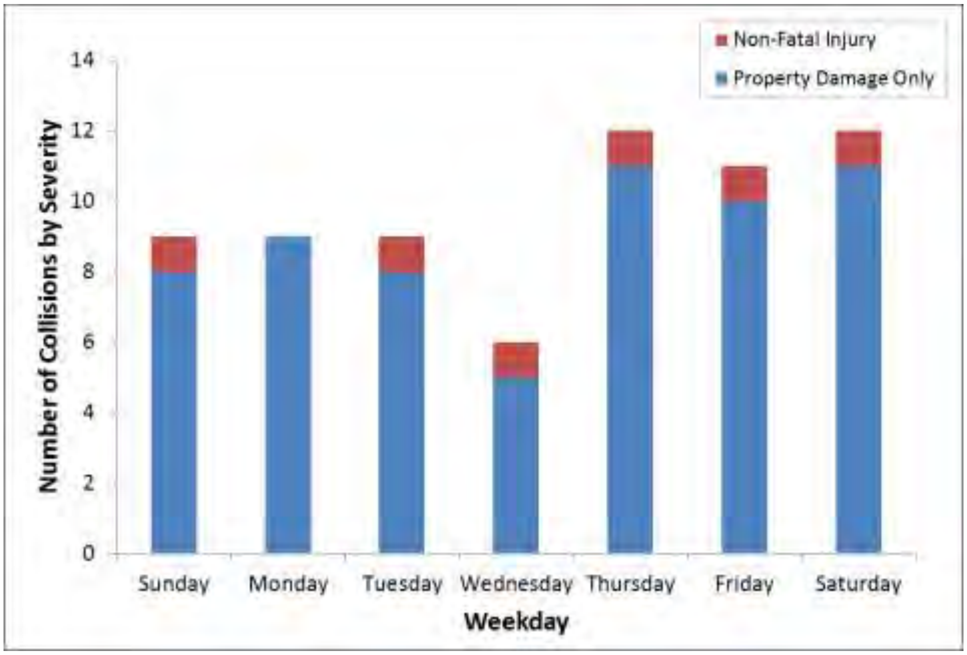


Figure 38: Collision by Severity and Weekday (January 2006 to December 2010)

The number of collisions by month and severity is provided in **Table 18** and **Figure 39**. The highest number of collisions occurs at the beginning and the end of the calendar year, during the winter months. August and September have lower numbers of collisions.

Table 18: Collisions by Severity and Month (January 2006 to December 2010)

Collision Severity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total	%
Property Damage Only	10	7	6	6	5	3	4	1	1	6	7	6	**62**	91.2%
Non-Fatal Injury	-	-	2	2	-	-	1	-	-	-	-	1	**6**	8.8%
Fatal	-	-	-	-	-	-	-	-	-	-	-	-	**-**	-
Total	**10**	**7**	**8**	**8**	**5**	**3**	**5**	**1**	**1**	**6**	**7**	**7**	**68**	100%
Percentage	14.7%	10.3%	11.8%	11.8%	7.4%	4.4%	7.4%	1.5%	1.5%	8.85	10.3%	10.3%	100%	

Note: '-' indicates that zero (0) collisions occurred

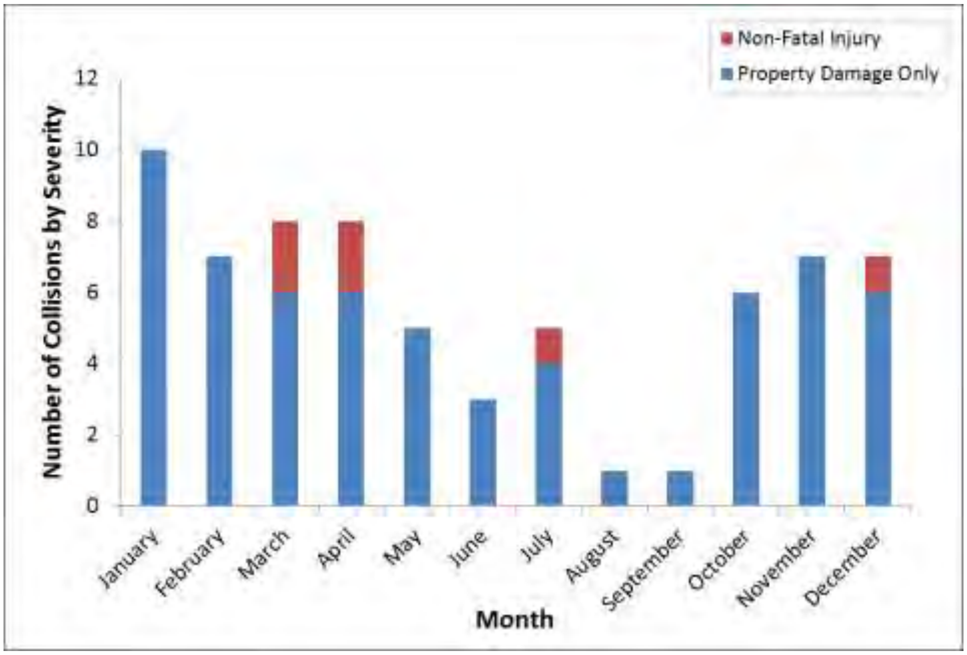


Figure 39: Collisions by Severity and Month (January 2006 to December 2010)

4.5.2.3 Collisions by Severity

The distribution of collisions by severity within the study area is summarized in **Table 19**. The majority of collisions within the study area are 'Property Damage Only' (91%), and the remainder are 'Non-Fatal Injury' collisions (9%). No fatal collisions occurred within the study corridors within the five-year review period. The number of 'Non-Fatal Injury' collisions is not particularly high, and the collisions occurred in an even distribution along the entire study area, indicating that no locations were particularly susceptible to injury collisions.

The collisions are mapped by location and severity in **Figure 40**. The location at which collisions occurred is relatively distributed along the entire corridor, with the exception of two locations in which the highest number of collisions occurred within the review period:

- Mississauga Road at Olde Base Line Road
- Mississauga Road between Olde Base Line Road and The Grange Side Road.

In addition, three other locations had a moderate number of collisions, including:

- Olde Base Line Road between Winston Churchill Boulevard and Shaws Creek Road
- Mississauga Road between The Grange Side Road and Woodland Court
- Bush Street at Winston Churchill Boulevard.

Thirty (30) collisions occurred at intersections in comparison with 38 collisions at midblock segments. Countermeasures which target intersections have the potential to be the most cost-effective treatments.

Table 19: Collisions by Severity and Location within Study Area

	Location	Property Damage Only	Non-Fatal Injury	Fatal	Total	Percentage
1	Mississauga Rd at Olde Base Line Rd	9	1	-	**10**	14.7%
2	Mississauga Rd between Olde Base Line Rd and The Grange Side Road	10	1	-	**11**	16.2%
3	Mississauga Rd at The Grange Side Road	1	-	-	**1**	1.5%
4	Mississauga Rd between The Grange Side Road and Woodland Court	5	1	-	**6**	8.8%
5	Mississauga Rd at Woodland Court	-	-	-	**-**	-
6	Mississauga Rd between Woodland Court and Caledon Mountain Drive	-	-	-	**-**	-
7	Mississauga Rd at Caledon Mountain Drive	1	-	-	**1**	1.5%
8	Old Main St between Caledon Mountain Drive and Bush St	3	-	-	**3**	4.4%
9	Old Main St at Bush St	4	-	-	**4**	5.9%
10	Bush St between Old Main St and Shaws Creek Rd	1	-	-	**1**	1.5%
11	Bush St at Shaws Creek Rd	2	-	-	**2**	2.9%
12	Bush St between Shaws Creek Rd and Winston Churchill Blvd	-	-	-	**-**	-
13	Bush St at Winston Churchill Blvd	4	1	-	**5**	7.4%
14	Winston Churchill Blvd between Bush St and Sideroad 10	-	-	-	**-**	-
15	Winston Churchill Blvd at Sideroad 10	-	-	-	**-**	-
16	Winston Churchill Blvd between Sideroad 10 and The Grange Side Road	2	1	-	**3**	4.4%
17	Winston Churchill Blvd at The Grange Side Road	-	-	-	**-**	-
18	Winston Churchill Blvd between The Grange Side Road and Sideroad 5	2	-	-	**2**	2.9%
19	Winston Churchill Blvd at Sideroad 5	1	-	-	**1**	1.5%
20	Winston Churchill Blvd between Sideroad 5 and Olde Base Line Rd	3	-	-	**3**	4.4%
21	Winston Churchill Blvd at Olde Base Line Rd	3	1	-	**4**	5.9%
22	Olde Base Line Rd between Winston Churchill Blvd and Shaws Creek Rd	7	-	-	**7**	10.3%
23	Olde Base Line Rd at Shaws Creek Rd	2	-	-	**2**	2.9%
24	Olde Base Line Rd between Shaws Creek Rd and Rockside Rd	2	-	-	**2**	2.9%
25	Olde Base Line Rd at Rockside Rd	-	-	-	**-**	-
26	Olde Base Line Rd between Rockside Rd and Mississauga Rd	-	-	-	**-**	-
	Total	**62**	**6**	**-**	**68**	100%
	Percentage	91.2%	8.8%	-	100%	

Note: '-' indicates that zero (0) collisions occurred

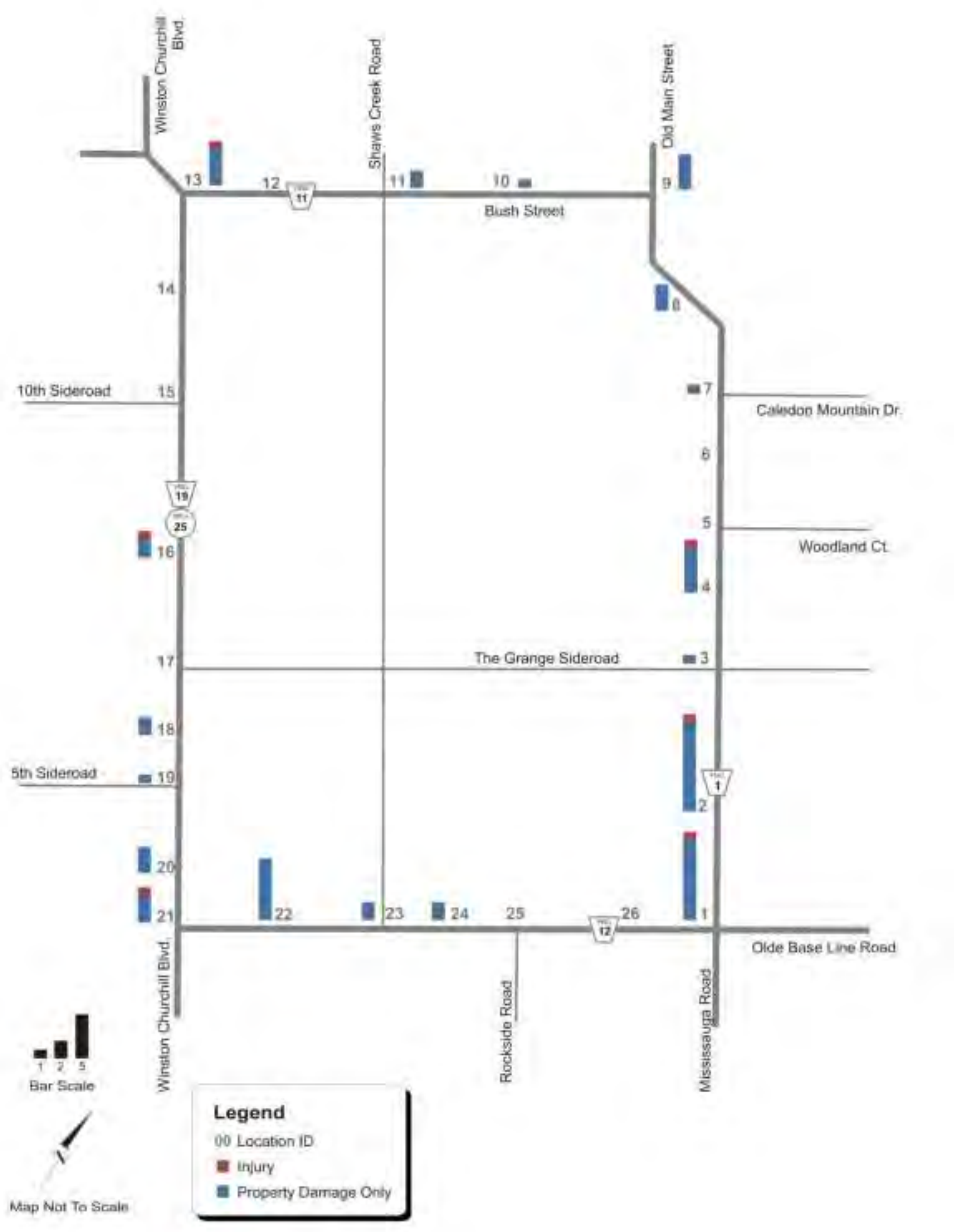


Figure 40: Collisions by Severity (January 2006 to December 2010)

4.5.2.4 Collisions by Initial Impact Type

The distribution of collisions by initial impact type and location is listed in **Table 20**. Animal collisions (37%), accounted for the highest percentage of all collisions, followed by single vehicle collisions at 34%. The remaining 31% of collisions involved a combination of angle (10%), sideswipe (7%), rear end (4%), turning movement (4%), and approaching (3%) collisions. Of all the collisions within the five-year review period, there were no collisions involving pedestrians, and there was one sideswipe collision involving a cyclist. The collisions are mapped by location and impact type in **Figure 41**.

The analysis of initial impact type indicates that the majority of collisions are single vehicle collisions with an animal, particularly wild deer. Additionally, analysis of the collision diagrams show that several single vehicle collisions (5 of 22) were caused by vehicles attempting to avoid colliding with an animal. Including these single vehicle collisions, 44% of the collisions within the study area involved an animal. The number of animal collisions is higher along Olde Base Line Road and Mississauga Road. The high number of animal collisions is correlated with the adjacent land use, including rural farms and undeveloped woodlands.

The second most common impact type of collisions within the corridor involved a single vehicle. Analysis of the collision diagrams show that 12 of 23 single vehicle collisions occurred due to drivers losing control of their vehicles, and colliding with objects such as guide rail, poles, and ditches.

Analysis of the initial impact type also indicates a pattern of collisions occurring at the intersection of Mississauga Road and Olde Base Line Road. This intersection is stop-controlled in the eastbound and westbound directions on Olde Base Line Road. There is a four-way overhead flashing beacon that is flashing red in the stop-controlled eastbound and westbound direction on Olde Base Line Road, and is flashing amber in the northbound and southbound directions on Mississauga Road. At this intersection, there were three angle collisions, three turning movement collisions, and one single vehicle collision which occurred due to avoidance of an angle collision. These collisions occurred due to failure of vehicles to yield to the stop control, or failure of stopped vehicles to see and judge a safe gap between approaching vehicles. As one option, this type of collision pattern could potentially be addressed through the installation of a roundabout as an alternative form of traffic control. This option is further explored in **Section 11**.

Numerous private driveways and entrances are situated in locations with deficient sight distances (which is reviewed in **Section 4.5.4**). Analysis of the collisions diagrams indicated that a total of 5 collisions may have been related to sight distances at these accesses. However, these rear end and side swipe collisions may also have been caused by aggressive driving and poor road surface conditions. Analysis indicates that there is not an overrepresentation of collisions related to driveway and access sight distance.

Table 20: Collisions by Initial Impact Type and Location within Study Area

	Location	Animal	Single Vehicle	Angle	Sideswipe	Rear End	Turning Movement	Approaching	Total	%
1	Mississauga Rd at Olde Base Line Rd	-	4	3	-	-	3	-	**10**	14.7%
2	Mississauga Rd between Olde Base Line Rd and The Grange Side Road	6	2	1	1	-	-	1	**11**	16.2%
3	Mississauga Rd at The Grange Side Road	-	-	-	-	1	-	-	**1**	1.5%
4	Mississauga Rd between The Grange Side Road and Woodland Court	2	4	-	-	-	-	-	**6**	8.8%
5	Mississauga Rd at Woodland Court	-	-	-	-	-	-	-	**-**	-
6	Mississauga Rd between Woodland Court and Caledon Mountain Drive	-	-	-	-	-	-	-	**-**	-
7	Mississauga Rd at Caledon Mountain Drive	-	-	-	1	-	-	-	**1**	1.5%
8	Old Main St between Caledon Mountain Drive and Bush St	-	1	-	1	1	-	-	**3**	4.4%
9	Old Main St at Bush St	-	3	1	-	-	-	-	**4**	5.9%
10	Bush St between Old Main St and Shaws Creek Rd	1	-	-	-	-	-	-	**1**	1.5%
11	Bush St at Shaws Creek Rd	1	-	-	-	1	-	-	**2**	2.9%
12	Bush St between Shaws Creek Rd and Winston Churchill Blvd	-	-	-	-	-	-	-	**-**	-
13	Bush St at Winston Churchill Blvd	1	3	1	-	-	-	-	**5**	7.4%
14	Winston Churchill Blvd between Bush St and Sideroad 10	-	-	-	-	-	-	-	**-**	-
15	Winston Churchill Blvd at Sideroad 10	-	-	-	-	-	-	-	**-**	-
16	Winston Churchill Blvd between Sideroad 10 and The Grange Side Road	2	-	-	-	-	-	1	**3**	4.4%
17	Winston Churchill Blvd at The Grange Side Road	-	-	-	-	-	-	-	**-**	-
18	Winston Churchill Blvd between The Grange Side Road and Sideroad 5	1	1	-	-	-	-	-	**2**	2.9%
19	Winston Churchill Blvd at Sideroad 5	-	-	-	1	-	-	-	**1**	1.5%
20	Winston Churchill Blvd between Sideroad 5 and Olde Base Line Rd	2	1	-	-	-	-	-	**3**	4.4%

	Location	Animal	Single Vehicle	Angle	Sideswipe	Rear End	Turning Movement	Approaching	Total	%
21	Winston Churchill Blvd at Olde Base Line Rd	2	1	1	-	-	-	-	**4**	5.9%
22	Olde Base Line Rd between Winston Churchill Blvd and Shaws Creek Rd	4	2	-	1	-	-	-	**7**	10.3%
23	Olde Base Line Rd at Shaws Creek Rd	1	1	-	-	-	-	-	**2**	2.9%
24	Olde Base Line Rd between Shaws Creek Rd and Rockside Rd	2	-	-	-	-	-	-	**2**	2.9%
25	Olde Base Line Rd at Rockside Rd	-	-	-	-	-	-	-	**-**	-
26	Olde Base Line Rd between Rockside Rd and Mississauga Rd	-	-	-	-	-	-	-	**-**	-
	Total	**25**	**23**	**7**	**5**	**3**	**3**	**2**	**68**	100%
	Percentage	36.8%	33.8%	10.3%	7.4%	4.4%	4.4%	2.9%	100%	

Note: '-' indicates that zero (0) collisions occurred

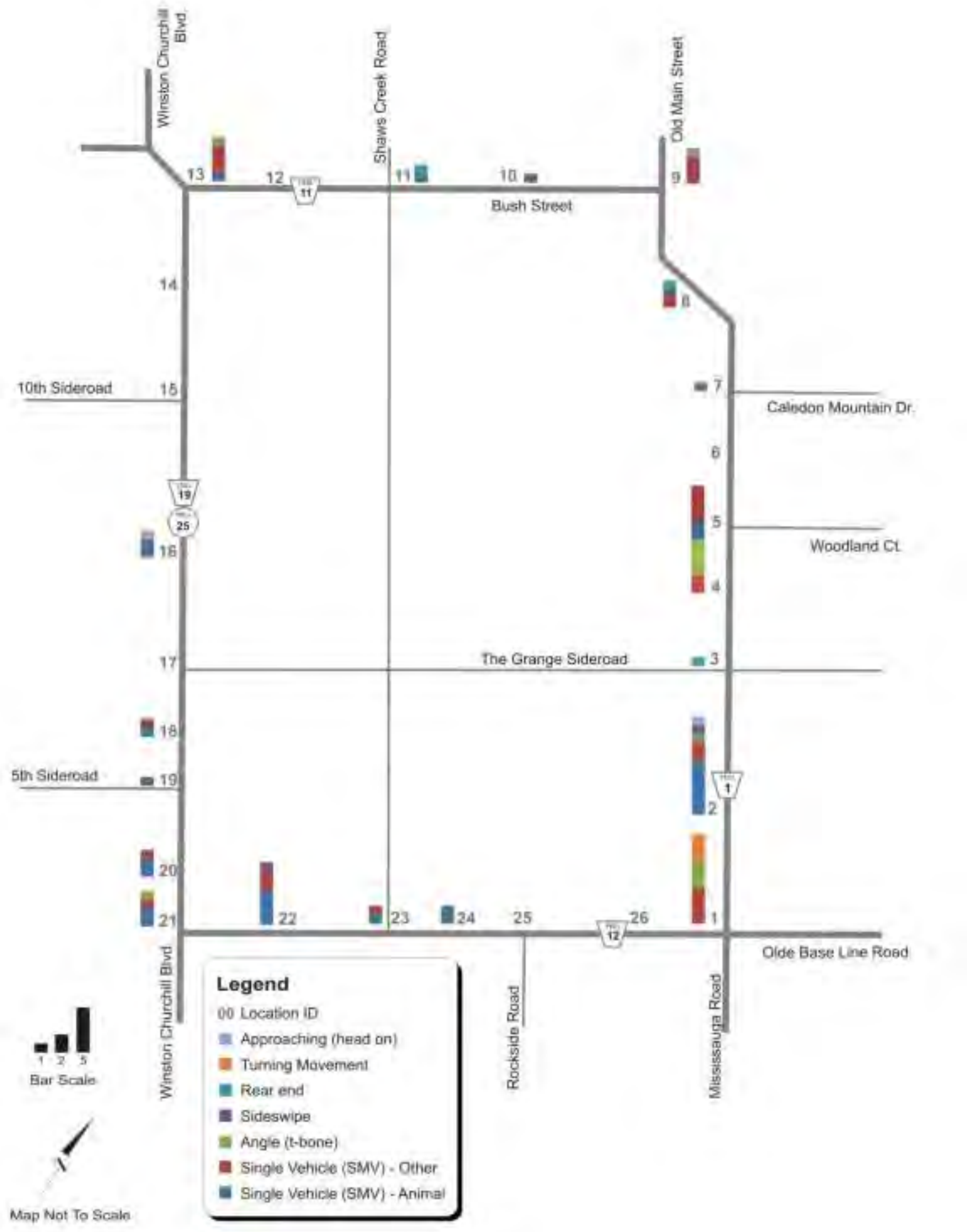


Figure 41: Collisions by Impact Type (January 2006 to December 2010)

4.5.2.5 Collisions by Environmental Conditions

The distribution of collisions by environmental condition and location is provided in **Table 21**. The majority of collisions have occurred under clear conditions (68%), followed by snow (18%), rain (10%), fog/mist/smoke/dust (3%), and freezing rain (1%). This distribution does not indicate a potential for safety improvement based on environmental conditions. Collisions mapped by location and environmental condition are illustrated in **Figure 42**.

Table 21: Collisions by Environmental Condition and Location within Study Area

	Location	Clear	Snow	Rain	Fog, Mist Smoke, Dust	Freezing Rain	Total	%
1	Mississauga Rd at Olde Base Line Rd	9	-	1	-	-	**10**	14.7%
2	Mississauga Rd between Olde Base Line Rd and The Grange Side Road	5	4	1	1	-	**11**	16.2%
3	Mississauga Rd at The Grange Side Road	1	-	-	-	-	**1**	1.5%
4	Mississauga Rd between The Grange Side Road and Woodland Court	3	1	2	-	-	**6**	8.8%
5	Mississauga Rd at Woodland Court	-	-	-	-	-	**-**	-
6	Mississauga Rd between Woodland Court and Caledon Mountain Drive	-	-	-	-	-	**-**	-
7	Mississauga Rd at Caledon Mountain Drive	-	1	-	-	-	**1**	1.5%
8	Old Main St between Caledon Mountain Drive and Bush St	2	1	-	-	-	**3**	4.4%
9	Old Main St at Bush St	2	2	-	-	-	**4**	5.9%
10	Bush St between Old Main St and Shaws Creek Rd	1	-	-	-	-	**1**	1.5%
11	Bush St at Shaws Creek Rd	2	-	-	-	-	**2**	2.9%
12	Bush St between Shaws Creek Rd and Winston Churchill Blvd	-	-	-	-	-	**-**	-
13	Bush St at Winston Churchill Blvd	4	1	-	-	-	**5**	7.4%
14	Winston Churchill Blvd between Bush St and Sideroad 10	-	-	-	-	-	**-**	-
15	Winston Churchill Blvd at Sideroad 10	-	-	-	-	-	**-**	-
16	Winston Churchill Blvd between Sideroad 10 and The Grange Side Road	2	-	1	-	-	**3**	4.4%
17	Winston Churchill Blvd at The Grange Side Road	-	-	-	-	-	**-**	-
18	Winston Churchill Blvd between The Grange Side Road and Sideroad 5	1	-	1	-	-	**2**	2.9%
19	Winston Churchill Blvd at Sideroad 5	-	1	-	-	-	**1**	1.5%
20	Winston Churchill Blvd between Sideroad 5 and Olde Base Line Rd	2	-	1	-	-	**3**	4.4%
21	Winston Churchill Blvd at Olde Base Line Rd	4	-	-	-	-	**4**	5.9%
22	Olde Base Line Rd between Winston Churchill Blvd and Shaws Creek Rd	7	-	-	-	-	**7**	10.3%
23	Olde Base Line Rd at Shaws Creek Rd	1	-	-	-	1	**2**	2.9%
24	Olde Base Line Rd between Shaws Creek Rd and Rockside Rd	-	1	-	1	-	**2**	2.9%

	Location	Clear	Snow	Rain	Fog, Mist Smoke, Dust	Freezing Rain	Total	%
25	Olde Base Line Rd at Rockside Rd	-	-	-	-	-	**-**	-
26	Olde Base Line Rd between Rockside Rd and Mississauga Rd	-	-	-	-	-	**-**	-
	Total	**46**	**12**	**7**	**2**	**1**	**68**	100%
	Percentage	67.6%	17.6 %	10.3 %	2.9%	1.5%	100%	

Note: '-' indicates that zero (0) collisions occurred

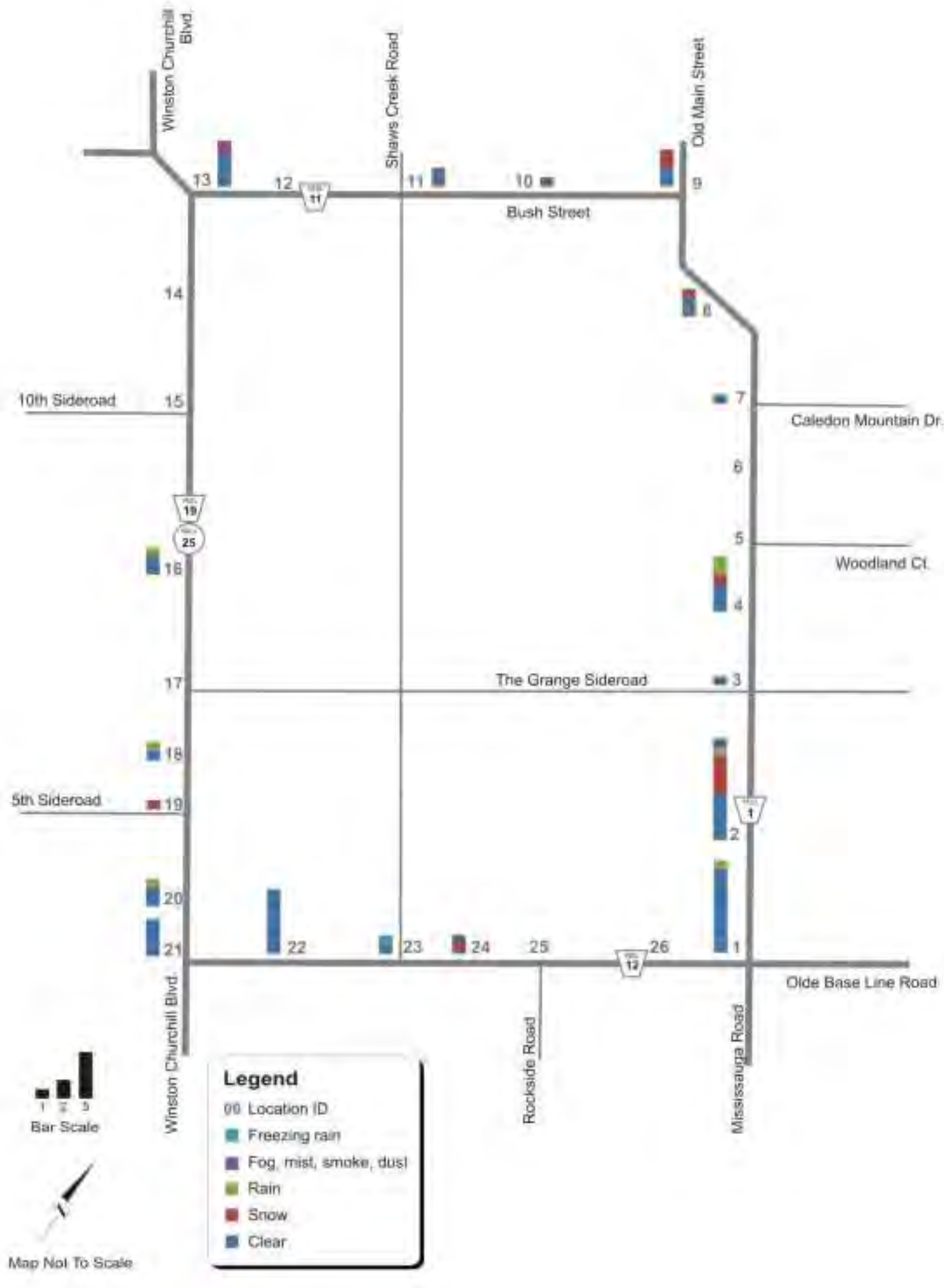


Figure 42: Collisions by Environmental Conditions (January 2006 to December 2010)

4.5.2.6 Collisions by Light Conditions

The distribution of collisions by light condition and location is provided in **Table 22**. Collisions are mapped by location and light condition in **Figure 43**. The majority of collisions have occurred under dark conditions (46%), followed by daylight (41%), dawn (9%), dusk (3%), and artificial dark (2%). The study area is rural, and there is limited street lighting. Although street lights are provided at some locations in the study area, they are provided mainly within the community of Belfountain, in the proximity of Old Main Street and Bush Street and at intersections.

The collision data indicates that a disproportionately high number of collisions occurred under dark and non-daylight conditions. To further investigate the collision pattern, the distribution of collisions by light condition and initial impact type is provided in **Table 23**. The analysis indicates that 22 of 31 total collisions occurring in the dark were animal collisions (71%), and 22 of 25 animal collisions occurred in dark conditions (88%). The high number of non-daylight collisions matches with the occurrence of animal related collisions, and is correlated to the hours in which wild animals are active within the study area, compounded with the reduced visibility for drivers in the dark. If animal collisions are excluded from the analysis of collisions by light condition, the distribution of collisions has the majority of collisions occurring under daylight conditions (65%), followed by dark (21%), dawn (9%), dusk (2%) and artificial dark (2%).

Table 22: Collisions by Light Condition and Location within Study Area

	Location	Dark	Daylight	Dawn	Dusk	Dark, artificial	Total	Percentage
1	Mississauga Rd at Olde Base Line Rd	2	8	-	-	-	**10**	14.7%
2	Mississauga Rd between Olde Base Line Rd and The Grange Side Road	6	2	1	2	-	**11**	16.2%
3	Mississauga Rd at The Grange Side Road	-	1	-	-	-	**1**	1.5%
4	Mississauga Rd between The Grange Side Road and Woodland Court	2	4	-	-	-	**6**	8.8%
5	Mississauga Rd at Woodland Court	-	-	-	-	-	**-**	-
6	Mississauga Rd between Woodland Court and Caledon Mountain Drive	-	-	-	-	-	**-**	-
7	Mississauga Rd at Caledon Mountain Drive	-	-	1	-	-	**1**	1.5%
8	Old Main St between Caledon Mountain Drive and Bush St	1	1	1	-	-	**3**	4.4%
9	Old Main St at Bush St	1	3	-	-	-	**4**	5.9%
10	Bush St between Old Main St and Shaws Creek Rd	1	-	-	-	-	**1**	1.5%
11	Bush St at Shaws Creek Rd	1	-	1	-	-	**2**	2.9%
12	Bush St between Shaws Creek Rd and Winston Churchill Blvd	-	-	-	-	-	**-**	-
13	Bush St at Winston Churchill Blvd	1	3	-	-	1	**5**	7.4%
14	Winston Churchill Blvd between Bush St and Sideroad 10	-	-	-	-	-	**-**	-
15	Winston Churchill Blvd at Sideroad 10	-	-	-	-	-	**-**	-

	Location	Dark	Daylight	Dawn	Dusk	Dark, artificial	Total	Percentage
16	Winston Churchill Blvd between Sideroad 10 and The Grange Side Road	2	-	1	-	-	**3**	4.4%
17	Winston Churchill Blvd at The Grange Side Road	-	-	-	-	-	**-**	-
18	Winston Churchill Blvd between The Grange Side Road and Sideroad 5	1	1	-	-	-	**2**	2.9%
19	Winston Churchill Blvd at Sideroad 5	-	1	-	-	-	**1**	1.5%
20	Winston Churchill Blvd between Sideroad 5 and Olde Base Line Rd	2	1	-	-	-	**3**	4.4%
21	Winston Churchill Blvd at Olde Base Line Rd	4	-	-	-	-	**4**	5.9%
22	Olde Base Line Rd between Winston Churchill Blvd and Shaws Creek Rd	4	2	1	-	-	**7**	10.3%
23	Olde Base Line Rd at Shaws Creek Rd	1	1	-	-	-	**2**	2.9%
24	Olde Base Line Rd between Shaws Creek Rd and Rockside Rd	2	-	-	-	-	**2**	2.9%
25	Olde Base Line Rd at Rockside Rd	-	-	-	-	-	**-**	-
26	Olde Base Line Rd between Rockside Rd and Mississauga Rd	-	-	-	-	-	**-**	-
	Total	**31**	**28**	**6**	**2**	**1**	**68**	100%
	Percentage	45.6%	41.2%	8.8%	2.9%	1.5%	100%	

Note: '-' indicates that zero (0) collisions occurred

Table 23: Collisions by Initial Impact Type and Light Conditions

Collision Initial Impact Type	Dark	Daylight	Dawn	Dusk	Dark, artificial	Total	Percentage
Animal	22	-	2	1	-	**25**	36.8%
Single Vehicle	6	14	1	-	1	**22**	32.4%
Angle	1	6	-	1	-	**8**	11.8%
Sideswipe	-	3	2	-	-	**5**	7.4%
Rear end	-	2	1	-	-	**3**	4.4%
Turning Movement	-	3	-	-	-	**3**	4.4%
Approaching	2	-	-	-	-	**2**	2.9%
Total	**31**	**28**	**6**	**2**	**1**	**68**	100%
Percentage	45.6%	41.2%	8.8%	2.9%	1.5%	100%	

Note: '-' indicates that zero (0) collisions occurred

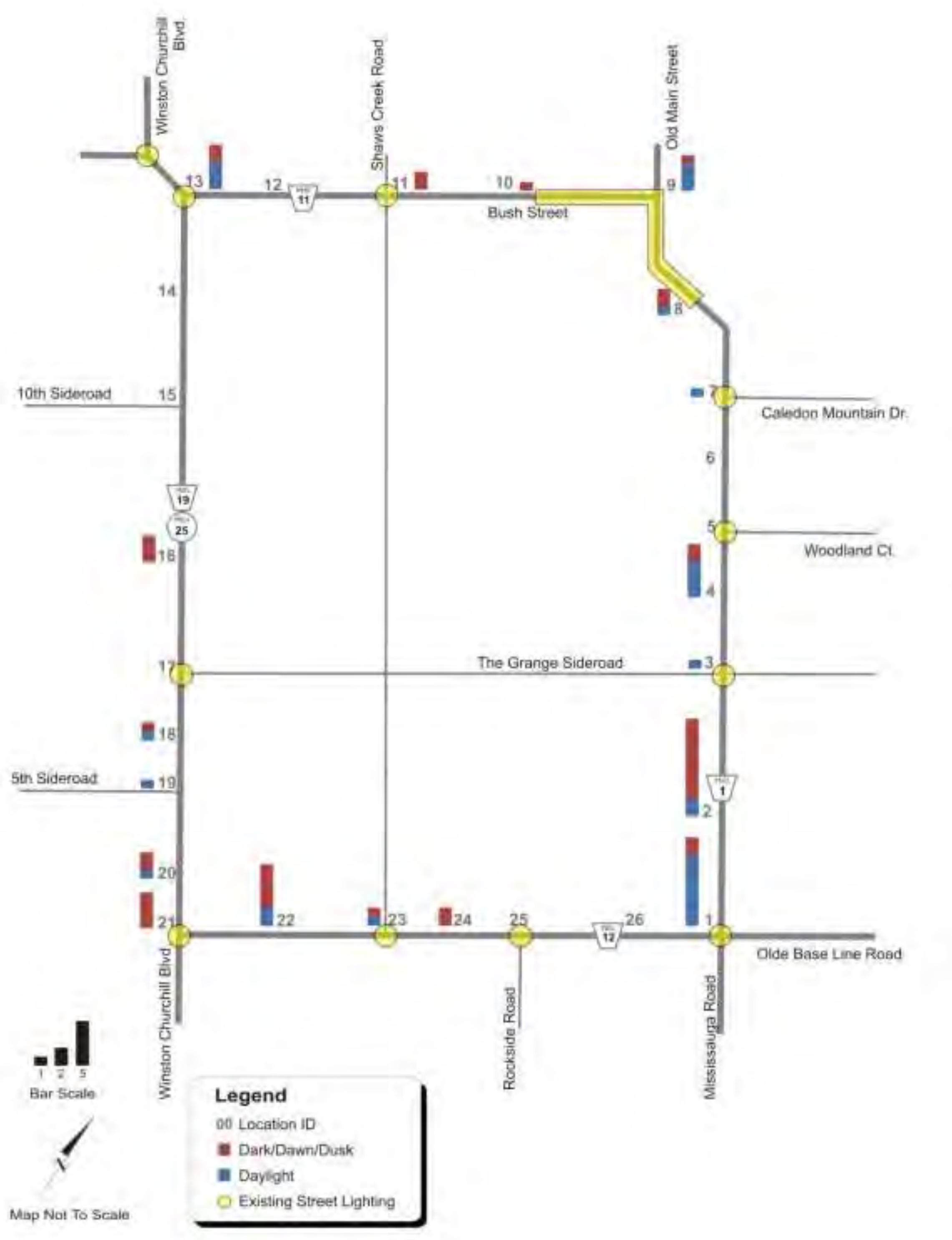


Figure 43: Collisions by Light Conditions (January 2006 to December 2010)

4.5.3 Traffic Control Devices

4.5.3.1 Signage

4.5.3.1.1 Sign Clutter

The Belfountain study area is quite cluttered with signage that could be reduced or removed from a safety point of view. Extra or unnecessary signage can be detrimental by cluttering the visual environment and making it harder for drivers to notice the important signs. In addition, signs can block the view of the road, especially for signs which are close to intersections or driveways. The detailed signage plan outlining concentration of signs is provided in **Appendix D**, with potential signs that could be removed outlined in **Table 24**.

Table 24: Potential Sign Clutter within the Study Area

Sign	Description
	It is likely that the 'no trucks' signs have been installed due to resident complaints. Fifteen of these signs were counted throughout the study area, and it is unclear how effective these signs are.
	The 'Adopt A Regional Road' signs are found throughout the corridor. From a safety point of view these signs could be removed, though the Region should weigh the economic benefits of the 'adopt a road' program versus the additional sign clutter they cause.
	Generally, 'rough road' signs are used on dirt or gravel roads, or roads in serious disrepair. It is suggest that these signs be removed.
	A search on the Transportation Research Information Services (TRIS) database has found no research supporting the safety effectiveness of the Visibility Restricted sign. This warning sign provides very little guidance to drivers as to what the appropriate action should be in response. If the signs are kept, the decimal point level accuracy is unnecessary and the message may be rounded to the nearest kilometre.

Sign	Description
	Road Watch sign next to the Welcome to Caledon sign. The Welcome to Caledon sign contains too much information to be read by anyone traveling. Consider redesigning the sign to contain only the critical information, such as the top row only. The Road Watch sign duplicates the information on the Welcome to Caledon sign and should be moved to a different location.
	The purpose of the *Soft Shoulders* warning sign is to warn drivers about the dangers of getting stuck if they pull off the road. After reconstruction and considering the potential improvement to the shoulders, the 'soft shoulder' signs may be removed.

4.5.3.1.2 Street Name Signs

The street name signs, such as the one at the intersection of Mississauga Road at Olde Base Line Road as shown in **Figure 44**, are small relative to the intersection size and thus difficult to read. Given the number of tourists and unfamiliar drivers in the area, the Region should consider installing oversized street name signs.

Figure 44: Street Name Signage, Too Small to Read

4.5.3.1.3 Animal Crossing Signs

Animal related collisions make up the single largest category of collisions occurring within this corridor (44% of all collisions). A total of five 'Deer Crossing' signs (Wc-11), without 'Night Danger' tabs (WC-12t) were observed along the study corridors, during the October 2012 field review. Another field review was conducted on March 2013 to confirm findings and it was observed there are new (additional) 'Deer Crossing' signs installed along the corridors including the addition of 'Night Danger' tabs. All existing animal warning signage, along with the distribution of animal collisions (represented by blue bars), is shown in **Figure 45**.

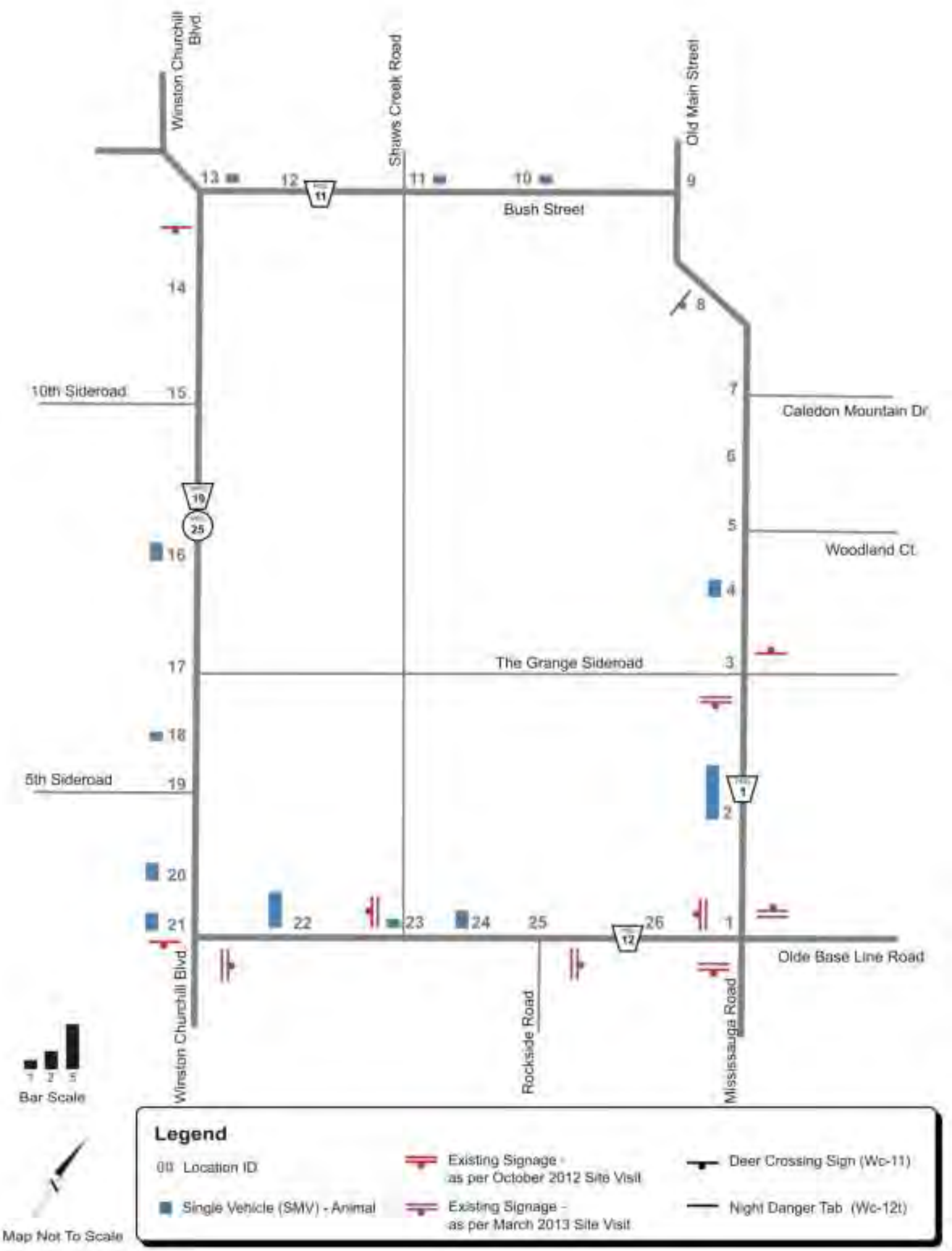


Figure 45: Animal Collisions (January 2006 to December 2010), and Existing 'Deer Crossing' Signs (Wc-11)

4.5.3.2 Pavement Markings

Centerline and edgeline pavement markings were generally in fair to good condition on all four road corridors. No collisions occurred during the five-year review period within the passing zone on Bush Street between Winston Churchill Boulevard and Shaws Creek Road and no recommendations are made to modify the passing zone. Stop bars were worn and faded at various intersections and it is recommended that these pavement markings be refreshed.

4.5.3.3 Street Lighting

The distribution of collisions based on light condition was normal, aside from the high percentage of animal collisions which occurred in dark and non-daylight conditions. No recommendations are made to improve street lighting, as part of the safety review.

4.5.3.4 Pavement Conditions

No recommendations are made to improve pavement conditions as part of the safety review. Geotechnical recommendations should be followed.

4.5.4 Sight Lines

Sight lines were assessed within the study corridor for stopping sight distance along the study roads, along with turning sight distance at intersections and driveways. Sight line deficiencies have been identified for consideration in the development of design options.

4.5.4.1 Sight Lines Along the Study Roads

The study area includes numerous vertical curves, horizontal curves, intersections and over 200 private driveways. The vertical curvature of a roadway and rolling hills contribute to sight distance limitations and single vehicle roadway departure collisions. A study by Miaou[2] estimated that there is a 4% reduction in single vehicle roadway departure collisions for every 1% decrease in vertical grade. The vertical hills may also potentially be contributing to the single vehicle animal collisions since they reduce the driver's visibility of the road surface. Since single vehicle collisions and animal related collisions are the most predominant collision types, there would be an expected reduction in those collisions with the smoothing of the vertical curves. However, vertical curvature in the roadway also acts as natural speed humps. Smoothing the vertical alignment of the roads may cause vehicle speeds to increase, and potentially increase other collision frequencies and severities. Given the high costs involved in reducing vertical curves and the low number of single vehicle roadway departure injury collisions in the study area, smoothing the vertical curves is an

[2] Miaou, S.P. "Development of Adjustment Factors for Single Vehicle Run-off-the-road Accident Rates by Horizontal Curvature and Vertical Grade" Center for Transportation Analysis, Oak Ridge National Laboratory, (1995) http://www.cmfclearinghouse.org/study_detail.cfm?stid=42

option but not necessarily a cost effective countermeasure to improve safety. In addition to considering profile adjustments, it is recommended that 'SLOW' pavement markings and/or speed advisory signs be considered in areas with steep vertical curves and inadequate sight distance.

In **Section 4.1.8.2**, we have identified locations where vertical profiles are deficient in terms of sight distances as per TAC design guidelines. A full list of location is summarized in **Appendix G** and is also illustrated in **Figure 21.** The stopping sight distance for vehicles approaching driveways throughout the study area is discussed in **Section 4.5.4.3**.

4.5.4.2 Intersection Sightlines

Sightlines and sight distances were reviewed at 19 intersection legs within the study area and compared to the TAC geometric design guidelines. The turning sight distance is summarized in **Table 25**. Stopping sight distance was assessed at intersection legs without traffic control. Detailed stopping sight distance, turning sight distance, and decision sight distance analysis is provided in **Appendix P**. Further discussion on the sight distance of select intersections within the study area is provided below.

Table 25: Summary of Turning Sight Distance Standards for Intersections within Study Area

Sight Distance Standard	Meets Standard		Does Not Meet Standard	
	Number of Intersections	Percentage of Intersections	Number of Intersections	Percentage of Intersections
Stopping Sight Distance [1]	8	89%	1	11%
Turning Sight Distance [2]				
Left Meets B-1	12	63%	7	37%
Left Meets B-2b & Cb	11	58%	8	42%
Right Meets B-2b & Cb	11	58%	8	42%
Both Left Meets B-1 and Right Meets B-2b & Cb	6	32%	13	68%
Both Left and Right Meet B2-b & Cb	5	26%	14	74%

Notes:
1. As per Geometric Design Guide for Canadian Roads, TAC, Table 2.1.3.2, K Factors to Provide Minimum Stopping Sight Distance on Crest Vertical Curves, and Table 2.1.3.4, K Factors to Provide Minimum Stopping Sight Distance on Sag Vertical Curves. Controlled intersections were not included in the stopping sight distance analysis.
2. As per Geometric Design Guide for Canadian Roads, TAC, Figure 2.3.3.4, Sight Distance for Turning Movements from Stop

a) Minimum Turning Sight Distance B-1 is the sight distance for a passenger vehicle turning left onto a two-lane roadway across a passenger vehicle approaching from the left.

b) Minimum Turning Sight Distance B-2b is the sight distance for a passenger vehicle to turn left onto a two-lane roadway and attain 85% of the design speed without being overtaken by a vehicle approaching from the right and reducing speed from the design speed to 85% of the design speed.

c) Minimum Turning Sight Distance Cb is the sight distance for a passenger vehicle to turn right onto a two-lane roadway and attain 85% of the design speed without being overtaken by a vehicle approaching from the left and reducing speed from the design speed to 85% of the design speed.

4.5.4.2.1 Mississauga Road and Olde Base Line Road Intersection

The intersection of Mississauga Road and Olde Base Line Road had the highest number of collisions, in which the majority of collision types were angle and turning movement collisions. At this intersection, all 10 collisions that occurred within the five-year review period appear to be candidates for reduction due to the potential speed reductions and elimination of angle and turning movement conflicts. One collision at this intersection was an injury and the others were all property damage only collisions. These collisions occurred due to failure of vehicles to yield at the Stop-controlled intersection, particularly for westbound vehicles from Olde Base Line Road turning left or right on to Mississauga Road, or travelling through the intersection. The high number of collisions can be attributed to high speeds on Mississauga Road and limited visibility for westbound drivers, due to a combination of factors:

- The east leg of Olde Base Line Road is located on the inside of the curve on Mississauga Road, limiting sight distances to the north and south;
- Mississauga Road has a vertical crest south of the intersection,
- Existing guiderails on the corners of the intersection obstruct visibility for drivers turning from Olde Base Line Road, as shown in **Figure 46**; and
- Vegetation at the corners of the intersection also obstructs visibility for drivers turning from Olde Base Line Road.

Figure 46: Sight Line on Olde Base Line Road, Looking South on Mississauga Road

4.5.4.2.2 Winston Churchill Boulevard / Olde Base Line Road Intersection

The alignment of this intersection is not consistent with driver expectation, as drivers travelling south on Winston Churchill Boulevard cannot see the road surface of the intersection, as shown in **Figure 47**. Currently the intersection is at the bottom of a vertical curve. It is recommended for options to improve the visibility of the road surface at the intersection to be investigated in the development and evaluation of alternative design concepts.

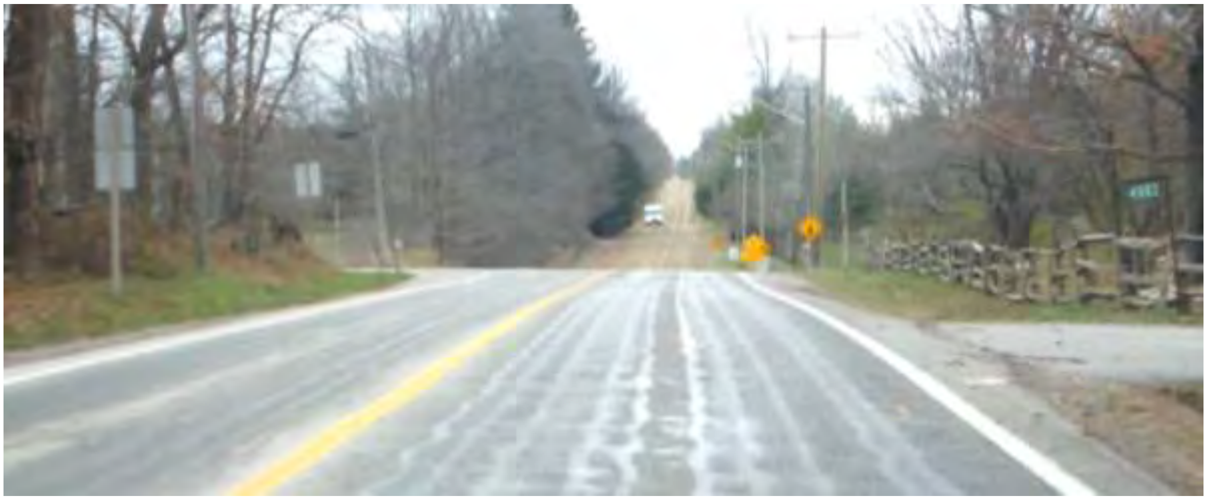


Figure 47: South on Winston Churchill Boulevard Approaching Olde Base Line Road

Westbound drivers turning from Olde Base Line Road to Winston Churchill Boulevard have limited sight distances due to the vegetation on both sides of Olde Base Line Road.

Following the completion of an Environmental Assessment for Winston Churchill Boulevard south of Olde Base Line Road, Peel Region is carrying out a detailed design for this intersection.

4.5.4.2.3 Winston Churchill Boulevard (North) / Bush Street Intersection

Drivers on southbound Winston Churchill Boulevard (north leg) approaching Bush Street have limited visibility to the east, due to the location of the intersection on the inside of the curve on Bush Street, and the vertical crest curve on Bush Street to the east.

4.5.4.2.4 Winston Churchill Boulevard / The Grange Side Road Intersection

There is inadequate sight distance for vehicles making right turns from The Grange Side Road to northbound Winston Churchill Boulevard, due to the vertical crest on Winston Churchill Boulevard south of the intersection.

4.5.4.3 Driveway Sightlines

The minimum required turning sight distance of the driveways was determined using TAC geometric design guidelines, measured from a 2 metre offset from the edge of pavement and using a driver eye height of 1.05 metres, and an object height of 0.38 metres. The calculated available sight distances were compared to TAC geometric standards for all driveways on the four surrounding roadways, corresponding to design speeds of 10 km/h above the posted speeds. As shown in **Table 26**, the majority (67%) of the driveways do not meet TAC standards for minimum required turning sight distance.

The minimum required stopping sight distance of vehicles approaching the driveways was determined using TAC geometric design guidelines, measured from road corridor using a driver eye height of 1.05 metres and an object height of 0.38 metres. The calculated available sight distances were compared to TAC geometric standards for all driveways on the four surrounding roads, corresponding to design speeds of 10 km/h above the posted speeds. As shown in **Table 26**, a minority (12%) of the driveways do not meet TAC standards for minimum required stopping sight distance.

Detailed analysis of the driveway sight distances is provided in **Appendix P**.

Table 26: Summary of Driveway Turning and Stopping Sight Distance Standards within Study Area

Sight Distance Standard	Meets Standards		Does Not Meet Standards	
	Number of Driveways	Percentage of Driveways	Number of Driveways	Percentage of Driveways
Stopping Sight Distance [1]	163	88%	21	12%
Turning Sight Distance [2]				
Left Meets B-1	150	82%	34	18%
Left Meets B-2b & Cb	113	61%	71	39%
Right Meets B-2b & Cb	100	54%	84	46%
Both Left Meets B-1 and Right Meets B-2b & Cb	83	45%	101	55%
Both Left and Right Meet B2-b & Cb	60	33%	124	67%

Notes:
1. As per Geometric Design Guide for Canadian Roads, TAC, Table 2.1.3.2, K Factors to Provide Minimum Stopping Sight Distance on Crest Vertical Curves, and Table 2.1.3.4, K Factors to Provide Minimum Stopping Sight Distance on Sag Vertical Curves
2. As per Geometric Design Guide for Canadian Roads, TAC, Figure 2.3.3.4, Sight Distance for Turning Movements from Stop

a) Minimum Turning Sight Distance B-1 is the sight distance for a passenger vehicle turning left onto a two-lane roadway across a passenger vehicle approaching from the left.
b) Minimum Turning Sight Distance B-2b is the sight distance for a passenger vehicle to turn left onto a two-lane roadway and attain 85% of the design speed without being overtaken by a vehicle approaching from the right and reducing speed from the design speed to 85% of the design speed.
c) Minimum Turning Sight Distance Cb is the sight distance for a passenger vehicle to turn right onto a two-lane roadway and attain 85% of the design speed without being overtaken by a vehicle approaching from the left and reducing speed from the design speed to 85% of the design speed.

4.5.5 Roadside Hazards

Throughout the study area there are numerous roadside hazards which include narrow shoulders combined with trees, ditches, steep slopes, water, culverts, hydro poles, etc. In situations where a roadway departure collision has the potential to be severe due to the hazard, installation of guardrail is a standard countermeasure. When guardrail is installed in areas with narrow shoulders, the guardrail is expected to reduce the occurrence of injury collisions but may possibly increase the number of property damage only collisions.

Installation of new guardrail along an embankment is expected to reduce injury collisions by 47% (CMF Clearinghouse, Elvik, R. and Vaa, T., 2004).

In the five years of collision analysis, from 2006 to 2010, there were five injury collisions. Four of the injury collisions involved vehicles departing the roadway and would be the target collision type for guardrail installation, or 0.8 injury collisions per year. In Ontario, the average societal crash cost for injury collisions is \$82,000 in 2004 dollars (Transport Canada Report TP14800 E, page 4). If the historical collision pattern continues, one would expect 0.8 injury collisions × 20 years × \$82,000 = \$1,312,000 in societal costs due to roadway departure injury collisions. If guardrail were to be installed everywhere, then the expected injury savings would be \$1,312,000 × 0.47 = \$616,640.

The non-urban study area consists of about 30 kilometres of segments (15 kilometres × 2 sides of the road). Installing guardrail along the entire study area would cost 30,000 × \$133 (MTO cost estimate for guardrail per metre) ≈ \$4,000,000. Since the cost of installation is so much higher than the cost of the potential benefit, it does not make sense from a benefit cost analysis to install guardrail everywhere.

An alternative to the installation of guardrail is to improve the side slopes and/or remove hazards such as hydro poles, trees, boulders, etc. Removal of hazards is a much more effective countermeasure compared to the installation of guardrail since the guardrail itself becomes another obstacle for vehicles to hit and thereby potentially increasing the number of property damage only collisions. Removing hazards and improving side slope is even more expensive than installing guardrail.

Therefore, the approach taken in identifying locations for potential guardrail installation was to identify locations with severe hazards where the severity of an injury collision would be higher due to the nature of the hazard. Locations where guardrail installation or hazard removal is recommended are mapped in **Figure 48**. At the preliminary design stage, an evaluation of alternative mitigation methods will be conducted.

Note that these benefit cost calculations are rough estimates intended to provide a ballpark of the expected change in safety.

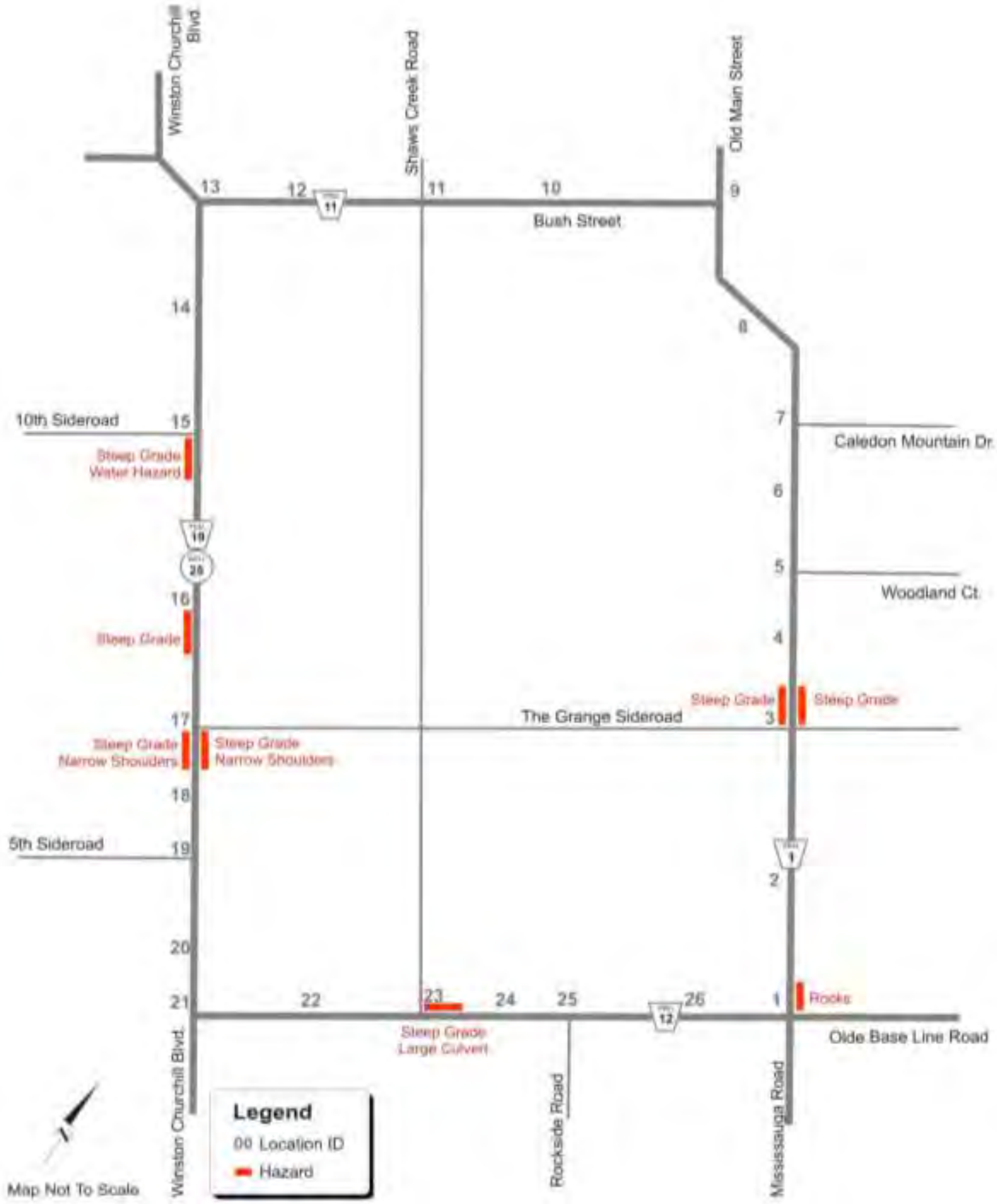


Figure 48: Locations Recommended for Guardrail Installation or Hazard Removal

4.6 Drainage

A visual and surface deterioration survey of all culvert crossings (driveway culverts and centreline culverts) along Mississauga Road/Old Main Street, Bush Street, Winston Churchill Boulevard, and Olde Base Line Road, was conducted by Coffey Geotechnics between September 2012 and June 2013. The results of the centreline culvert condition survey indicated that 5 culvert crossings along Olde Base Line Road required repair and/or flushing and/or re-grading; no culvert crossings required replacement. Along Winston Churchill Boulevard, 2 culvert crossings require replacement due to poor condition, and 14 culvert crossings require repair and/or flushing and/or re-grading. Along Mississauga Road / Old Main Street, 1 culvert crossing requires replacement due to poor condition, and 7 culvert crossings require repair and/or flushing and/or re-grading. Along Bush Street, 1 culvert crossing requires repair and/or flushing and/or re-grading, and no culvert crossings require replacement. More information about the culvert condition survey for all culverts in the study area can be found in **Appendix Q**.

In addition to the culvert condition assessment, a hydrologic and hydraulic assessment was conducted for Mississauga Road / Old Main Street and Bush Street by Dillon Consulting in June 2010, and for Winston Churchill Boulevard and Olde Base Line Road by HDR in January 2014 (revised in May 2014). These assessments determined that replacement / upgrading / modification / repair / flushing of nine culvert crossings will be required on Olde Base Line Road, 16 culvert crossings on Winston Churchill Boulevard, 11 culvert crossings on Mississauga Road / Old Main Street, and 1 culvert crossing on Bush Street. The assessment also recommended that two culvert crossings on Olde Base Line Road are considered for upgrades, and three culvert crossings (two on Winston Churchill Boulevard and one on Olde Base Line Road) are maintained, with no action required. More details can be found in **Appendix R.1** for Mississauga Road / Old Main Street and Bush Street, and in **Appendix R.2** for Winston Churchill Boulevard and Olde Base Line Road.

A preliminary geomorphic desktop assessment of associated watercourse crossings was undertaken by Parish Geomorphic Ltd. for a total of eleven watercourse crossings within the study area, including low-order tributaries of the West Credit River and main branch of the Credit River. This desktop assessment was followed by field investigations of the crossing conditions, within the limits of property access permissions. During the field investigations, indicators of active geomorphic processes were noted, channel dimensions were measured, and a stability index was provided for each study reach. Based on the desktop assessment and field investigation, the majority of the channel bankfull widths are greater than the existing structure openings, suggesting that they are currently undersized. However, it should be noted that the provisional bankfull dimensions were measured immediately upstream and downstream of each culvert. These bankfull widths and depths are local to the crossings and are therefore not representative of each study reach. Bankfull dimensions immediately upstream or downstream of a crossing may be skewed due to in-channel debris and are typically influenced by the crossing structures. Through the completion of the geomorphic crossing assessment, recommendations were made regarding whether the crossing structures are adequate in accommodating the geomorphic form and function of the subject watercourses, and structure sizes were recommended. The geomorphic assessment recommended upgrading ten of the eleven crossings that were assessed. More details on the geomorphic assessment can be found in **Appendix S.**

A hydrogeological investigation was conducted by Coffey Geotechnics for Mississauga Road/Old Main Street, Bush Street, Winston Churchill Boulevard, and Olde Base Line Road. From a hydrogeological perspective, the construction of pavement upgrades is considered unlikely to impact groundwater levels and construction dewatering is not anticipated. It is anticipated that the construction of replacement culverts and/or culvert extensions may involve excavation extending to or below the water table. As a result, there is a potential that localized construction dewatering will be necessary. Construction dewatering rates and the associated zone of groundwater influence should be estimated after the extent of the culvert works has been determined. Based on the relatively localized nature and anticipated short term duration of potential culvert reconstruction, related impacts to the associated watercourses from a temporary interruption of groundwater discharge are not anticipated; however, those conditions should be assessed further when the design for the upgrades has been completed. More details can be found in **Appendix T**.

Additional drainage issues were identified due to shoulder deficiencies and lack of adequate ditching for the collection of storm runoff.

4.7 Geotechnical and Pavement Conditions

A preliminary visual pavement condition survey to review performance and deficiency of the corridor was conducted for Mississauga Road / Old Main Street and Bush Street by Terraprobe in May 2010, and for Winston Churchill Boulevard and Olde Base Line Road by Coffey Geotechnics in December 2012.

The visual surveys indicate that the pavement conditions vary significantly within the study area. Although the pavement history for construction, maintenance and rehabilitation is not known, preliminary geotechnical data shows that the existing structural strength of the pavement may not be able to support future traffic demand. Overall, the structural stability and strength of all the roads within the study area are in poor condition and are expected to continuously deteriorate.

Mississauga Road and Old Main Street, between Olde Base Line Road and Bush Street, consists of Granular A and Granular B Type I in good pavement condition. The main cause of pavement distress is attributed to variable granular thickness along the corridor with ununiformed base and subbase materials. Shoulder granular is also thinner than the granular base/subbase below the roadway which affects the reliability in lateral drainage. Between Olde Base Line and The Grange Side Road, the main pavement distress is wheel tracking rutting, and also exhibits intermittent distresses including slight alligator pavement edge cracking, moderate alligator transverse cracking and longitudinal meander and mid-lane cracking. Between The Grange Side Road and Bush Street, the main pavement distress is moderate pavement edge cracking, with moderate distresses of centre line, transverse and longitudinal meander and mid-lane cracking. Other observations include ponding on shoulder, lack of maintenance and vegetated shoulders within project limits.

Bush Street, between Mississauga Road and Winston Churchill Boulevard, consists of Granular A and Granular B Type I in good pavement condition. The investigation identified moderate distresses which include both centre line and transverse cracking. Pot holes were present between Winston Churchill Boulevard and Shaws Creek Road. The causes of pavement distress are likely associated with deficiency in structural capacity and insufficient strength and stability. The granular thickness of the pavement base and subbase vary along the corridor which may also contribute to pavement distress.

Winston Churchill Boulevard, between Bush Street and Olde Base Line Road, is surfaced with a thin layer of asphalt surface course that is in poor to very poor condition. The main pavement distresses are intermittent medium severity ravelling, frequent medium severity single/multiple unsealed cracking, occasional high severity large area alligator cracking, and extensive medium severity pavement edge break. Deep seated pavement structural failures (deep ruts) are not frequent. Some localized depressions were observed where poor site drainage conditions were identified in the vicinity. Some evidence of frost heave was also observed. Investigations indicate that pavement distresses are potentially associated with pavement structural deficiencies.

The shoulders, which are largely 1.2 to 3.0 metres wide unpaved shoulder on each side of the road, are generally surfaced with a layer of granular material consisting of sand and gravel. The overall condition of the shoulder is fair. No major deterioration as observed in the shoulder except occasional gullies on the outer shoulder which indicate the occurrence of minor soil erosion and some grass growth within the shoulder. Side ditches are generally in need of major maintenance. In some areas, siltation and heavy vegetation were observed, which impede the performance of effective drainage conditions. Occasionally, a faulty longitudinal or horizontal grading created a “bath tub” effect in the local areas.

Olde Base Line Road, between Winston Churchill Boulevard and Mississauga Road, has a fair to poor pavement condition with extensive sections of narrow shoulders. The main pavement distresses include frequent medium-severity cracking, intermittent raveling, and high-severity single and multiple cracking. Local depressions were also observed. Investigations indicate that pavement distresses are potentially associated with temperature related issues, lack of maintenance, narrow/no shoulders, or asphalt aging.

The pavement structure is constructed on near or at-grade with shallow side ditches flanking both sides of the road. Roadside ditches appeared to be partially functional. Tall grass overgrowth was observed in many sections of the drainage ditches.

The shoulders, which are generally 0.6 to 1.2 metres wide unpaved shoulder on each side of the road, are generally unsurfaced. The overall condition of the shoulder is poor to fair.

More details can be found in **Appendix U.1** for Mississauga Road / Old Main Street and Bush Street, and in **Appendix U.2** for Winston Churchill Boulevard and Olde Base Line Road.

4.8 Problem & Opportunity Statement

Based on the identified problems and issues, there is the requirement to address the following needs on the study area roads (Mississauga Road/Old Main Street, Bush Street, Winston Churchill Boulevard and Olde Base Line Road):

- Deficient pavement conditions
- Deficient drainage
- Deficient sightlines
- Safety for all road users, including safety of wildlife
- Pedestrian and cyclist needs

More specifically, the needs assessment has identified the following need to:

- Reduce collisions and improve safety, particularly in areas where there are steep grades, sharp curves, vertical crests, and driveways
- Accommodate pedestrians in areas of high pedestrian activity
- Improve pedestrian safety
- Reduce conflicts between cyclists and motorized vehicles
- Address substandard sightlines for the prevailing traffic speeds
- Address roadside hazards
- Reduce collisions with animals
- Improve traffic signage
- Minimize impact of increase in traffic volumes
- Address excessive speeds – cars, trucks, motorcycles
- Address poor conditions of the roadway pavement and drainage
- Address parking congestion in Belfountain experienced on weekends

The needs assessment has confirmed that there is no need for additional travel lanes in any of the study area roads.

It is recognized that different users may have competing interests and needs.

5. IDENTIFICATION AND EVALUATION OF ALTERNATIVE SOLUTIONS

The Class EA process requires documentation and examination of all reasonable alternatives, or means to address the problem, referred to as alternative solutions.

To assist the project team in generating alternative solutions to address the problem statement the following guiding principles were considered recognizing that different users may have competing interests:

- Maintain the rural character and countryside scenic quality
- Preserve historic fences and heritage / cultural / archaeological features
- Preserve / enhance the natural environment
- Protect the Niagara Escarpment
- Balance interests and meet needs of all road users – motorists, pedestrians, cyclists, farm vehicles, horses, trucks, wildlife
- Provide a context sensitive design
- Enhance local tourism and economic development of the area

As a result the following alternative solutions to the undertaking were considered:

- "Do Nothing" Alternative
- Operational Improvements
- Physical Improvements

Do Nothing

The Do Nothing alternative involves maintaining the status quo, with no consideration for additional measures to address the issues and deficiencies identified for the study area.

Operational Improvements

The operational improvement options considered include:

- Adding or repainting pavement markings, such as edge of travel lane and SLOW markings
- Improving traffic signage e.g. larger street name signs, fixing sign clutter
- Adding animal crossing warning signs where needed
- Lowering speed limits in some locations
- Removing overgrown vegetation at Winston Churchill / Old Base Line intersection to improve visibility, and other locations as necessary
- Bike racks at local businesses
- Landscaping to shelter pedestrians from vehicular traffic
- Seasonal communications and education regarding deer activity
- Enforcement

Physical Improvements

The physical improvement options considered include:

- Road rehabilitation or reconstruction where pavement condition is poor

- Widening shoulders in some locations
- Partially paving shoulders in some locations
- Sidewalks in parts of the Belfountain Village
- Countermeasures for roadside hazards – removing hazards, installing guiderails
- Roundabouts at Mississauga Road / Olde Base Line Road, and Winston Churchill Boulevard at Bush Street and Olde Base Line Road
- Potential changes in horizontal alignment
- Potential changes in road profile to address sightline deficiencies
- Designated wildlife crossing areas

Evaluation

The alternative solutions were evaluated based on the ability of the alternative to address the problem statement.

As discussed in **Section 4.8**, existing conditions consist of steep grades, sharp curves, vertical crests, and multiple driveways, with substandard sightlines, deficient drainage and pavement conditions, a lack of facilities for cyclists and pedestrians, and safety concerns for all road users. Since the Do Nothing option does not address the Problem and Opportunity Statement, this option is not recommended.

Each of the operational improvement options can be considered individually or in combination with other operational or physical improvements. They have been identified as having the potential to address some of the issues and deficiencies identified throughout the study area.

Each of the physical improvement options can be considered individually or in combination with other operational or physical improvements. They have been identified as having the potential to address some of the issues and deficiencies identified throughout the study area.

Recommended Alternative Solution

A combination of operational and physical improvements is recommended. Since conditions differ largely throughout the study area, the number and type of improvements will vary from one location to another. Some improvements will apply throughout the study area, whereas others will be localized in nature, where they best apply.

A combination of physical and operational improvements is further explored in the following sections, where the alternative design concepts for each road are developed, evaluated, and refined. The following sections are organized by road segment:

- **Section 6**: Winston Churchill Boulevard (between Olde Base Line Road and Bush Street)
- **Section 7**: Olde Base Line Road (between Winston Churchill Boulevard and Mississauga Road)
- **Section 8**: Mississauga Road / Old Main Street (between Olde Base Line Road and approximately 580 metres north / west of Caledon Mountain Drive)
- **Section 9**: Belfountain Village (Mississauga Road / Old Main Street between approximately 580 metres north / west of Caledon Mountain Drive and Bush Street, and

Bush Street between approximately 150 metres east of Shaws Creek Road and Mississauga Road / Old Main Street)

- **Section 10**: Bush Street (between Winston Churchill Boulevard and approximately 150 metres east of Shaws Creek Road)

6. WINSTON CHURCHILL BOULEVARD

6.1 Identification and Evaluation of Alternative Design Concepts

This section discusses the different design alternatives considered for Winston Churchill Boulevard between Olde Base Line Road and Bush Street. For intersection options considered at Winston Churchill Boulevard / Olde Base Line Road and Winston Churchill Boulevard / Bush Street, refer to Sections **11.1** and **11.4** respectively.

6.1.1 Winston Churchill Boulevard Cross-Section Options

Alternative cross-section options were considered for each of the roads in the study area. Some options greatly differ from other options in terms of cross-section elements/widths and overall ROW required, while other alternatives consist of modifications to options that were considered earlier in the process to make them a more desirable alternative. Therefore, some cross-section options were screened out earlier in the process and others were only evaluated for the specific road segment where they best apply. All cross-section options considered during this study are included in **Appendix V**. The vehicle zone illustrated in the cross-sections refers to the general purpose travel lane, and the two terms are interchangeable. The most feasible options considered for Winston Churchill Boulevard include:

- **Option 1:** Do Nothing (Existing Rural Conditions): 3.1-3.6 metre wide travel lanes and partially paved shoulders (**Figure 49**)
- **Option 2:** 10 metre Platform Rural Road: 3.5 metre wide travel lane, 1.0 metre wide paved shoulder, and adequate ditches (**Figure 50**)
- **Option 3:** 11.4 metre Platform Rural Road: 3.5 metre wide travel lane, 1.7 metre wide paved shoulder, and adequate ditches (**Figure 51**)
- **Option 4:** 11.4 metre Platform Semi-Rural Road: 3.5 metre wide travel lane, 1.7 metre wide paved shoulders, 0.5 metre mountable curb, and underground infrastructure (**Figure 52**)
- **Option 5:** 10 metre Platform Semi-Rural Road: 3.5 metre wide travel lane, 1.0 metre wide grass boulevard, 0.5 metre mountable curb, and underground infrastructure (**Figure 53**)

Note: Total right-of-way is predominantly 20-23 m; paved portion of shoulder ranges from 0-1.0 m; majority of above ground utilities run on east side of the road and crosses over between sides

Figure 49: Option 1 - Do Nothing – Existing Conditions on Winston Churchill Blvd

Figure 50: Option 2 - 10 m Platform Rural Option Considered for Winston Churchill Blvd

Figure 51: Option 3 -11.4 m Platform Rural Option Considered for Winston Churchill Blvd

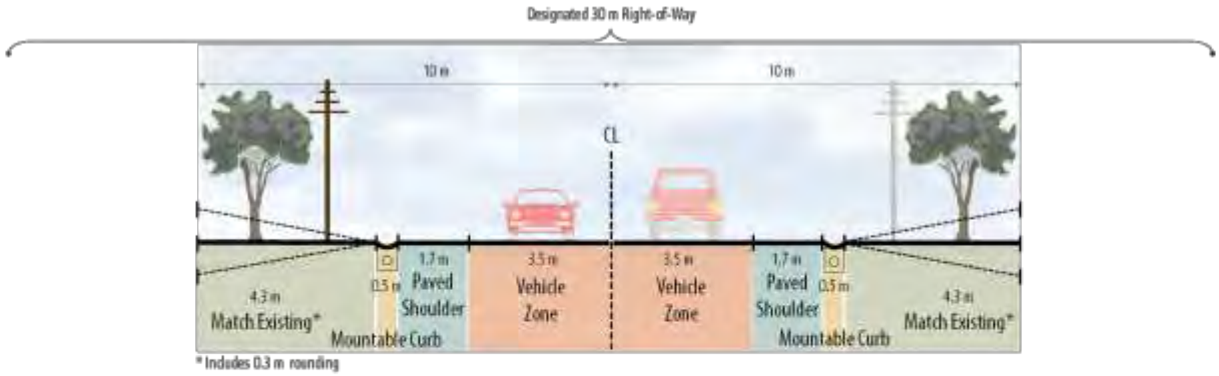


Figure 52: Option 4 - 11.4 m Platform Semi-Rural Option Considered for Winston Churchill Blvd

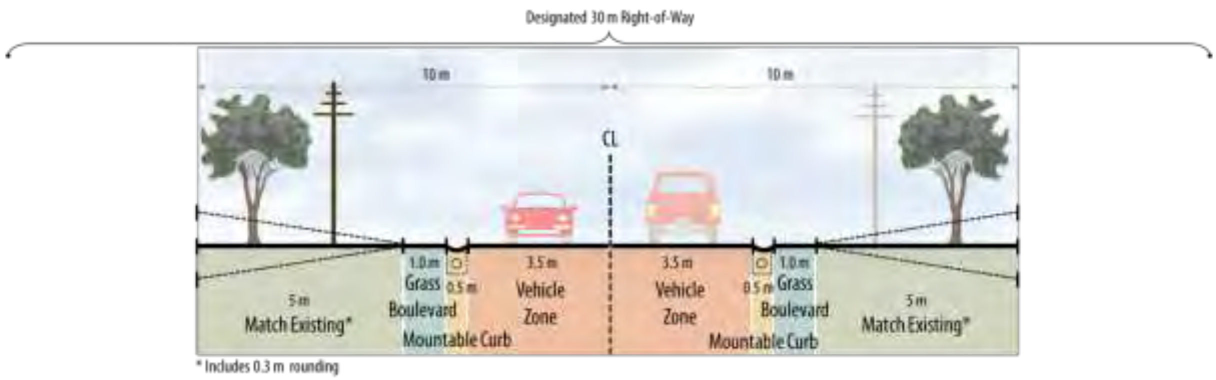


Figure 53: Option 5 - 10 m Platform Semi-Rural Option Considered for Winston Churchill Blvd

The evaluation for the options is shown in **Table 27**.

Table 27: Winston Churchill Boulevard Cross- Section Option Evaluation

EVALUATION CRITERIA	Winston Churchill Boulevard Cross-Section Options					EVALUATION
	Option 1: Do Nothing	**Option 2: 10 m Platform Rural Road**	**Option 3 11.4 m Platform Rural Road**	**Option 4 11.4 m Platform Semi-Rural Road**	**Option 5 10 m Platform Semi-Rural Road**	
Option Description	• 20-28 m ROW, predominantly 20-23 m • 3.1-3.6 m wide travel lane • 1.2-3.0 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Rural Character						
Maintains rural character and countryside scenic quality	• Retains rural character	• Retains rural character	• Retains rural character	• Significant changes to rural character and countryside scenic quality with a more urbanized cross-section	• Significant changes to rural character and countryside scenic quality with a more urbanized cross-section	• Options 1, 2, 3 preferred
Transportation						
Geometric alignment	• N/A	• N/A	• N/A	• N/A	• N/A	• No difference
Traffic operations	• Vehicular capacity limited by all road users sharing 1 travel lane in each direction with partially paved shoulders • Conflicts between motorized vehicles and cyclists/pedestrians	• Partially reduced delays due to provision of separate paved shoulder of sub-standard width • Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder of sub-standard width	• Reduced delays due to provision of separate paved shoulder • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Reduced delays due to provision of separate paved shoulder • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Partially reduced delays due to provision of separate grass boulevard of sub-standard width • Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate grass boulevard of sub-standard width	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of motorists	• One 3.1-3.6 m travel lane in each direction	• One 3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• Options 2, 3, 4, 5 preferred as travel lane width meets design standards
Accommodation of trucks	• 3.1-3.6 m paved travel lane, with partially paved shoulders available, but shared with all road users • Load restriction on Winston Churchill Boulevard	• 3.5 m paved travel lane available • 1.0 m paved shoulder of sub-standard width provides some separation from other road users • Existing load restriction on Winston Churchill Boulevard to remain	• 3.5 m paved travel lane available • 1.7 m paved shoulder provides separation from other road users • Existing load restriction on Winston Churchill Boulevard to remain	• 3.5 m paved travel lane available • 1.7 m paved shoulder provides separation from other road users • Existing load restriction on Winston Churchill Boulevard to remain	• 3.5 m paved travel lane available • 1.0 m grass boulevard of sub-standard width provides some separation from other road users • Existing load restriction on Winston Churchill Boulevard to remain	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of farm vehicles	• 3.1-3.6 m of paved travel lane, with partially paved shoulders available, but shared with all road users	• 4.5 m of pavement available, but shared with all road users • Some separation from other road users through paved shoulder of sub-standard width	• 5.2 m of pavement available, but shared with all road users • Separation from other road users through paved shoulder	• 5.7 m of pavement available, but shared with all road users • Separation from other road users through paved shoulder	• 4.0 m of pavement available, but shared with all road users • Some separation from other road users through grass boulevard of sub-standard width	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of cyclists	• No separate facility to accommodate cyclists • Cyclists share the road or use partially paved shoulders where available	• 1.0 m paved shoulder of sub-standard width available • Cyclists will likely encroach on travel lanes	• 1.7 m paved shoulder available	• 1.7 m paved shoulder available	• 1.0 m grass boulevard of substandard width available • Cyclists may also share the road with all other road users	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3 11.4 m Platform Rural Road	Option 4 11.4 m Platform Semi-Rural Road	Option 5 10 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20-23 m • 3.1-3.6 m wide travel lane • 1.2-3.0 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Accommodation of pedestrians	• No separate facility to accommodate pedestrians • Pedestrians use partially paved shoulders where available • Minimal streetscaping	• 1.0 m paved shoulder of sub-standard width available • Opportunities for streetscaping	• 1.7 m paved shoulder available • Opportunities for streetscaping	• 1.7 m paved shoulder available • Opportunities for streetscaping	• 1.0 m grass boulevard of substandard width available • Opportunities for streetscaping	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of horses	• 3.1-3.6 m of paved travel lane, with partially paved shoulders available, but shared with all road users	• 3.5 m paved travel lane, and 1.0 m paved shoulder of sub-standard width available	• 3.5 m paved travel lane, and 1.7 m paved shoulder available	• 3.5 m paved travel lane, and 1.7 m paved shoulder available	• 3.5 m paved travel lane, and 1.0 m grass boulevard of sub-standard width available	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Safety	• Conflicts between motorized vehicles and cyclists/pedestrians	• Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder of sub-standard width	• Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate grass boulevard of sub-standard width	• Option 3, 4 preferred as they provide a paved shoulder width that meets design standards for cyclists and pedestrians, minimizing conflicts between different road users
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies through adequate ditches	• Designed to address drainage deficiencies through adequate ditches	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Options 2, 3, 4, 5 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction	• Pavement reconstruction	• Options 2, 3, 4, 5 preferred
Socio-Economic Environment						
Residential properties	• No impacts	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and grading; less than Option 3	• Cross-section extends beyond existing ROW in some areas • Potential property acquisition and driveway impacts due to increased roadway platform width and more extensive grading	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3
Farm operations	• No impacts	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and grading; less than Option 3	• Cross-section extends beyond existing ROW in some areas • Potential property acquisition and driveway impacts due to increased roadway platform width and more extensive grading	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3
Businesses	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3 11.4 m Platform Rural Road	Option 4 11.4 m Platform Semi-Rural Road	Option 5 10 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20-23 m • 3.1-3.6 m wide travel lane • 1.2-3.0 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Archaeological resources	• No impacts	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and grading, which may require additional assessment	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to modification of roadway platform and more extensive grading, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3
Built and cultural heritage resources	• No impacts	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and grading, which may require additional assessment	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to modification of roadway platform and more extensive grading, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction; more than Options 2, 3 due semi-rural cross-section elements	• Moderate air, noise, vibration impacts during construction; more than Options 2, 3 due semi-rural cross-section elements	• Option 1 preferred as there are no impacts
Natural Environment						
Terrestrial habitat	• No impacts	• Requires encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities, somewhat less so than Option 3 but more so than Options 4 or 5; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside • Requires tree removals within areas to be graded, somewhat less so than Option 3 but more so than Options 4 or 5 • Requires terrestrial habitat removal in areas to be graded, somewhat less so than Option 3 but more so than Options 4 or 5	• Requires most encroachment among Options into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside • Requires greatest number of tree removals among Options • Requires greatest amount of terrestrial habitat removal	• Requires encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities, somewhat less so than Option 2 or 3 but more so than Option 5; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside • Requires tree removals within areas to be graded, somewhat less so than Options 2 or 3 but more so than Option 5 • Requires terrestrial habitat removal in areas to be graded, somewhat less so than Options 2 or 3 but more so than Option 5	• Requires least amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside • Requires fewest tree removals within areas to be graded • Requires least amount of terrestrial habitat removal in areas to be graded	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 5 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Cross-Section Options					EVALUATION
	Option 1: Do Nothing	**Option 2: 10 m Platform Rural Road**	**Option 3 11.4 m Platform Rural Road**	**Option 4 11.4 m Platform Semi-Rural Road**	**Option 5 10 m Platform Semi-Rural Road**	
Option Description	• 20-28 m ROW, predominantly 20-23 m • 3.1-3.6 m wide travel lane • 1.2-3.0 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Aquatic environment	• No impacts	• 17 culvert crossings, 3 of which (culverts 32, 25, and 41) convey watercourses, others of which support adjacent wetland hydrology; potential for impact to aquatic features if culvert replacements required due to grading requirements • Potential impact to direct fish habitat associated with Trib. C to Rogers Creek (culvert 35), and indirect fish habitat associated with the watercourse at culvert 23	• 17 culvert crossings, 3 of which (culverts 32, 25, and 41) convey watercourses, others of which support adjacent wetland hydrology; greatest potential for impact to aquatic features if culvert replacements required due to more extensive grading requirements • Potential impact to direct fish habitat associated with Trib. C to Rogers Creek (culvert 35), and indirect fish habitat associated with the watercourse at culvert 23	• 17 culvert crossings, 3 of which (culverts 32, 25, and 41) convey watercourses, others of which support adjacent wetland hydrology; potential for impact to aquatic features if culvert replacements required due to grading requirements • Potential impact to direct fish habitat associated with Trib. C to Rogers Creek (culvert 35), and indirect fish habitat associated with the watercourse at culvert 23	• 17 culvert crossings, 3 of which (culverts 32, 25, and 41) convey water courses, others of which support adjacent wetland hydrology; least potential for impact to aquatic features if existing culverts can be maintained • Potential impact to direct fish habitat associated with Trib. C to Rogers Creek (culvert 35), and indirect fish habitat associated with the watercourse at culvert 23	• Option 1 is preferred as it avoids potential impacts to aquatic features and habitat • Otherwise, Options 2 and 5 are preferred as they require minimal increase in platform width, and potentially less requirement for culvert replacement/additional in-water work
Wetlands and watercourses	• No impacts	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain and Eramosa River-Blue Springs Creek PSW complexes • Potential for direct impact to wetlands, including PSWs, through encroachment; somewhat less so than Option 3 but more so than Options 4 or 5 • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Potential for impacts to amphibian breeding SWH due to grading requirements	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain and Eramosa River-Blue Springs Creek PSW complexes • Greatest potential for direct impact to wetlands, including PSWs, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works. • Greatest potential for impacts to amphibian breeding SWH due to more extensive grading requirements	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain and Eramosa River-Blue Springs Creek PSW complexes • Potential for direct impact to wetlands, including PSW, through encroachment; somewhat less so than Options 2 or 3 but more so than Option 5 • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Potential for impacts to amphibian breeding SWH due to grading requirements	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain and Eramosa River-Blue Springs Creek PSW complexes • Least potential for direct impact to wetlands, including PSWs, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Least potential for impacts to amphibian breeding SWH due to grading requirements	• Option 1 is preferred as it avoids impacts to wetlands • Otherwise, Option 5 is preferred due to lesser required encroachment into adjacent wetlands and habitats

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3 11.4 m Platform Rural Road	Option 4 11.4 m Platform Semi-Rural Road	Option 5 10 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20-23 m • 3.1-3.6 m wide travel lane • 1.2-3.0 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Species at risk	• No impacts	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; potential impact due to grading requirements, less so than Option 3 but more so than Options 4 or 5 • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; greatest potential impact among Options due to more extensive grading requirements • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; potential impact due to grading requirements, less so than Options 2 or 3 but more so than Option 5 • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; least potential impact among Options due to grading requirements • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 5 is preferred due to fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Potential impacts to Western Chorus Frog crossing success (road mortality, road crossing deterrence) due to wider paved road platform • Impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern, less so than Option 3 but more so than Options 4 or 5	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands • With Option 4, greatest potential impacts to Western Chorus Frog road mortality and potential road crossing deterrence due to widest paved road platform • Greatest impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands • With Option 3, greatest potential impacts to Western Chorus Frog crossing success (road mortality, road crossing deterrence) due to widest paved road platform • Impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern, less so than Options 2 or 3 but more so than Option 5	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Least potential impacts to Western Chorus Frog road mortality and potential road crossing deterrence due to narrowest paved road surface • Least impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern	• Option 1 is preferred as it avoids impacts to habitat for Western Chorus Frog and potential habitat for species of conservation concern Odonates • Otherwise, Option 5 is preferred due to less required encroachment into habitat for these species

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3 11.4 m Platform Rural Road	Option 4 11.4 m Platform Semi-Rural Road	Option 5 10 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20-23 m • 3.1-3.6 m wide travel lane • 1.2-3.0 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Option 5 but less so than Options 3 or 4	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Options 2 and 5	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands, but less so than Options 2 or 3; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Options 2 and 5	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands, but less so than Options 2 or 3; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Least potential for amphibian mortality or crossing deterrence due to negligible increase in paved surface	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 5 is preferred because a narrower paved surface may increase the likelihood of amphibian crossing success, and because less potential site grading may maintain more suitable amphibian movement habitat along roadsides
Stormwater management	• No impacts	• Increase in surface runoff volumes due to wider platform of impervious surface • Improved roadside drainage system	• With Option 4, greatest increase in surface runoff volumes among Options due to widest platform of impervious surface • Improved roadside drainage system	• With Option 3, greatest increase in surface runoff volumes among Options due to widest platform of impervious surface • Improved roadside drainage system	• Negligible increase in surface runoff volumes among Options due to minor increase impervious surface. • Stormwater runoff will be intercepted by grass boulevards • Improved roadside drainage system	• Option 5 is preferred as it incorporates improved drainage systems over current conditions but features less impervious surface as well as grass boulevards that can intercept road surface runoff
Natural hazards	• No impacts	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Option 1 is preferred as it avoids impacts to regulated watercourses and wetlands
Niagara Escarpment impacts	• No impacts	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No difference
Capital Costs						
Construction costs	• Low construction cost due to minimal construction work required	• Moderate construction cost from modification of roadway platform	• Moderate construction cost from modification of roadway platform	• Highest construction cost from wider paved platform, semi-rural cross-section, and underground infrastructure	• Higher construction cost from semi-rural cross-section and underground infrastructure	• Option 1 results in lowest construction cost

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3 11.4 m Platform Rural Road	Option 4 11.4 m Platform Semi-Rural Road	Option 5 10 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20-23 m • 3.1-3.6 m wide travel lane • 1.2-3.0 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Property acquisition	• No property acquisition required	• No property acquisition anticipated; potential impacts and easements may be required for localized improvements	• Some property acquisition and easements anticipated for localized improvements	• No property acquisition anticipated; potential impacts and easements may be required for localized improvements	• No property acquisition anticipated; potential impacts and easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated • Otherwise, Options 2, 4, 5 preferred
OVERALL						
			• Option 3 preferred where feasible as it retains the rural character of the road, better accommodates and reduces conflicts between all road users through paved shoulders that meet design standards, while reducing property and natural environment impacts	• Option 4 preferred where Option 3 results in significant impacts beyond existing ROW, as it accommodates and reduces conflicts between all road users through paved shoulders that meet design standards, while minimizing property and natural environment impacts		

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, the 11.4 metre platform rural cross-section (Option 3) is preferred for Winston Churchill Boulevard between Olde Base Line Road and Bush Street, where ROW width and constraints allow, and the 11.4 metre platform semi-rural cross-section (Option 4) is preferred where the rural option results in significant impacts beyond the existing ROW.

6.1.2 Winston Churchill Boulevard Profile Options

Profile options were considered based on different design speeds. Generally, lower design speeds allow for the profile to remain closer to existing conditions. Higher design speeds, on the other hand, require more significant profile adjustments and therefore result in greater impacts to adjacent lands and features.

For Winston Churchill Boulevard, profile options were considered for the following speeds:
- **Option 1:** Do Nothing (60-70 km/h existing posted speed)
- **Option 2:** 70 km/h Design Speed (60 km/h Posted Speed)
- **Option 3:** 80 km/h Design Speed (70 km/h Posted Speed)

The evaluation for these options is shown in **Table 28** for the segment between Olde Base Line Road and Sideroad 10 where the current posted speed is 70 km/h and **Table 29** for the segment between Sideroad 10 and Bush Street where the current posted speed is 60 km/h.

Table 28: Winston Churchill Boulevard Profile Option Evaluation – Olde Base Line Road to Sideroad 10

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options – Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 70 km/h posted speed from Olde Base Line Road to Sideroad 10	• 70 km/h design speed from Olde Base Line Road to Sideroad 10 • 60 km/h posted speed from Olde Base Line Road to Sideroad 10	• 80 km/h design speed from Olde Base Line Road to Sideroad 10 • 70 km/h posted speed from Olde Base Line Road to Sideroad 10	
Rural Character				
Maintains rural character and countryside scenic quality	• Retains rural character	• Vertical alignment modifications result in some changes to rural character	• Vertical alignment modifications result in some changes to rural character	• Option 1 preferred
Transportation				
Geometric alignment	• Vertical alignment consists of rolling profile with moderate crests/sags throughout, with 3 sharp crests/sags between 40+900 and 40+100, 41+450 and 41+570, 42+700 and 43+150	• Vertical alignment slightly flattens 3 sharp crests/sags between 40+900 and 40+100, 41+450 and 41+570, 42+700 and 43+150	• Vertical alignment moderately flattens 3 sharp crests/sags between 40+900 and 40+100, 41+450 and 41+570, 42+700 and 43+150	• Options 2, 3 preferred due to smoother vertical alignment
Traffic operations	• Limited and sub-standard visibility due to limited sightlines of rolling vertical alignment • Conflicts between all road users due to poor visibility along vertical profile • Motorists significantly exceed posted speed limits by 20-30 km/h	• Slightly increased travel time due to decrease in posted speed limit, offset by smoother vertical profile • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Requires motorists to reduce speeds below existing speed limit by 10 km/h	• Slightly reduced travel time due to maintaining existing posted speed limit, improved by smoother vertical profile • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Motorists maintain existing posted speed	• Options 2, 3 preferred as visibility is improved to meet design standards, and conflicts are reduced between all road users
Accommodation of motorists	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits • Load restriction on Winston Churchill Boulevard	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits • Existing load restriction on Winston Churchill Boulevard to remain	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits • Existing load restriction on Winston Churchill Boulevard to remain	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, and lowered posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor and reduces conflicts with all other road users

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 70 km/h Posted Speed	**Option 2: 70 km/h Design Speed 60 km/h Posted Speed**	**Option 3: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 70 km/h posted speed from Olde Base Line Road to Sideroad 10	• 70 km/h design speed from Olde Base Line Road to Sideroad 10 • 60 km/h posted speed from Olde Base Line Road to Sideroad 10	• 80 km/h design speed from Olde Base Line Road to Sideroad 10 • 70 km/h posted speed from Olde Base Line Road to Sideroad 10	
Accommodation of cyclists	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of pedestrians	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of horses	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for horses • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Safety	• Vertical alignment provides sufficient visibility for 40-50 km/h design speed at some locations • Posted speed exceeds design speed by 20-30 km/h in some locations • Limited and sub-standard visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and other road users like cyclists and pedestrians	• Vertical alignment provides sufficient visibility for the proposed 60 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and other road users like cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 70 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and other road users like cyclists/pedestrians	• Options 2, 3 preferred as vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies based on cross-section options	• Designed to address drainage deficiencies based on cross-section options	• Options 2, 3 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Options 2, 3 preferred
Socio-Economic Environment				
Residential properties	• No impacts	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be raised by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Farm operations	• No impacts	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be raised by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 70 km/h posted speed from Olde Base Line Road to Sideroad 10	• 70 km/h design speed from Olde Base Line Road to Sideroad 10 • 60 km/h posted speed from Olde Base Line Road to Sideroad 10	• 80 km/h design speed from Olde Base Line Road to Sideroad 10 • 70 km/h posted speed from Olde Base Line Road to Sideroad 10	
Businesses	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts • Potential archaeological impacts if grading extends beyond existing ROW	• Potential archaeological impacts as grading is more likely to extend beyond existing ROW at some locations	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Built and cultural heritage resources	• No impacts	• Potential impacts to built and cultural heritage properties including cedar rail fences on both sides, if grading extends beyond existing ROW	• Anticipated impacts to built and cultural heritage properties including cedar rail fences on both sides, as grading is more likely to extend beyond existing ROW	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Moderate air, noise, vibration impacts during construction; greater than Option 2 due to increased cut and fill construction required • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are minimal impacts • Otherwise Option 2 preferred
Natural Environment				
Terrestrial habitat	• No impacts	• Requires least amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside. • Requires fewest tree removals within areas to be graded. • Requires least amount of terrestrial habitat removal in areas to be graded.	• Requires most encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside. • Requires greatest number of tree removals among Options. • Requires greatest amount of terrestrial habitat removal	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat. • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat.
Aquatic environment	• No impacts	• 15 culvert crossings, 3 of which (culverts 32, 25, and 41) convey watercourses, others of which support adjacent wetland hydrology; least potential for impact to aquatic features if existing culverts can be maintained. • Potential impact to direct fish habitat associated with Trib. C to Rogers Creek (culvert 35), and indirect fish habitat associated with the watercourse at culvert 23.	• 15 culvert crossings, 3 of which (culverts 32, 25, and 41) convey watercourses, others of which support adjacent wetland hydrology; greatest potential for impact to aquatic features if culvert replacements required due to more extensive grading requirements. • Potential impact to direct fish habitat associated with Trib. C to Rogers Creek (culvert 35), and indirect fish habitat associated with the watercourse at culvert 23.	• Option 1 is preferred as it avoids potential impacts to aquatic features and habitat. • Otherwise, Option 2 is preferred due to less potential for requiring culvert replacement/additional in-water work.
Wetlands and watercourses	• No impacts	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain and Eramosa River-Blue Springs Creek PSW complexes. • Least potential for direct impact to wetlands, including PSWs, through encroachment. • Potential impacts to hydrological balance of affected wetlands through grading and drainage works. • Least potential for impacts to amphibian breeding SWH due to grading requirements.	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain and Eramosa River-Blue Springs Creek PSW complexes. • Greatest potential for direct impact to wetlands, including PSWs, through encroachment. • Potential impacts to hydrological balance of affected wetlands through grading and drainage works. • Greatest potential for impacts to amphibian breeding SWH due to grading requirements.	• Option 1 is preferred as it avoids impacts to wetlands. • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent wetlands and habitats.

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options — Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 70 km/h posted speed from Olde Base Line Road to Sideroad 10	• 70 km/h design speed from Olde Base Line Road to Sideroad 10 • 60 km/h posted speed from Olde Base Line Road to Sideroad 10	• 80 km/h design speed from Olde Base Line Road to Sideroad 10 • 70 km/h posted speed from Olde Base Line Road to Sideroad 10	
Species at risk	• No impacts	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; less potential for impact than Option 3 due to grading requirements. • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat.	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; greater potential impact than Option 2 due to grading requirements. • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat.	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat. • Otherwise, Option 2 is preferred due to fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat.
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands. • Least potential for impacts to Western Chorus Frog habitat. • Least impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern.	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands. • Greatest potential for impacts to Western Chorus Frog habitat. • Greatest impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern.	• Option 1 is preferred as it avoids impacts to habitat for Western Chorus Frog, and potential habitat for Odonates species of conservation concern. • Otherwise, Option 2 is preferred due to less required encroachment into habitat for these species.
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction. • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently. • Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; less so than Option 3.	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction. • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently. • Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; more so than Option 2.	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success. • Otherwise, Option 2 is preferred because less potential site grading may maintain more suitable amphibian movement habitat along roadsides.
Stormwater management	• No impacts or improvements	• Improved roadside drainage system	• Improved roadside drainage system	• Options 2 and 3 are preferred as they incorporate improved drainage systems over current conditions.
Natural hazards	• No impacts	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Option 1 is preferred at it avoids potential impacts to regulated watercourses and wetlands.
Niagara Escarpment impacts	• No impacts	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 70 km/h posted speed from Olde Base Line Road to Sideroad 10	• 70 km/h design speed from Olde Base Line Road to Sideroad 10 • 60 km/h posted speed from Olde Base Line Road to Sideroad 10	• 80 km/h design speed from Olde Base Line Road to Sideroad 10 • 70 km/h posted speed from Olde Base Line Road to Sideroad 10	
Capital Costs				
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Highest construction cost due to cut and fill required for profile modifications, greater than Option 2	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition anticipated	• Potential property acquisition anticipated if grading extends beyond existing ROW; potential easements may be required for localized improvements	• Greater potential for property acquisition anticipated as grading might extend further beyond existing ROW; potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL				
		• Option 2 preferred as it meets design standards for the proposed posted speed limit (lower than existing posted speed limit), and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts.		

Legend:

Preferred	Less Preferred	Least Preferred

Table 29: Winston Churchill Boulevard Profile Option Evaluation – Sideroad 10 to Bush Street

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	
Option Description	• 60 km/h posted speed from Sideroad 10 to Bush Street	• 70 km/h design speed from Sideroad 10 to Bush Street • 60 km/h posted speed from Sideroad 10 to Bush Street	• 80 km/h design speed from Sideroad 10 to Bush Street • 70 km/h posted speed from Sideroad 10 to Bush Street	
Rural Character				
Maintains rural character and countryside scenic quality	• Retains rural character	• Vertical alignment modifications result in some changes to rural character	• Vertical alignment modifications result in some changes to rural character	• Option 1 preferred
Transportation				
Geometric alignment	• Vertical alignment consists of rolling profile with a large sag and small crest between 45+750 and 46+000, immediately south of Bush Street	• Vertical alignment slightly flattens rolling profile and the large sag and small crest between 45+750 and 46+000, immediately south of Bush Street	• Vertical alignment moderately flattens rolling profile and the large sag and small crest between 45+750 and 46+000, immediately south of Bush Street	• Options 2, 3 preferred due to smoother vertical alignment
Traffic operations	• Limited and sub-standard visibility due to limited sightlines of rolling vertical alignment • Conflicts between all road users due to poor visibility along vertical profile • Motorists significantly exceed posted speed limits by 20-25 km/h	• Similar travel time due to maintaining existing posted speed limit • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Motorists maintain existing posted speed	• Slightly reduced travel time due to increasing existing posted speed limit, improved by smoother vertical profile • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Motorists increase speeds as posted speed limit is increased by 10 km/h	• Options 2, 3 preferred as visibility is improved to meet design standards, and conflicts are reduced between all road users
Accommodation of motorists	• Rolling profile with moderate crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits • Load restriction on Winston Churchill Boulevard	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits • Existing load restriction on Winston Churchill Boulevard to remain	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits • Existing load restriction on Winston Churchill Boulevard to remain	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor and reduces conflicts with all other road users

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	**Option 2: 70 km/h Design Speed 60 km/h Posted Speed**	**Option 3: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 60 km/h posted speed from Sideroad 10 to Bush Street	• 70 km/h design speed from Sideroad 10 to Bush Street • 60 km/h posted speed from Sideroad 10 to Bush Street	• 80 km/h design speed from Sideroad 10 to Bush Street • 70 km/h posted speed from Sideroad 10 to Bush Street	
Accommodation of cyclists	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of pedestrians	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of horses	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for horses • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Safety	• Vertical alignment provides sufficient visibility for 50-60 km/h design speed at some locations • Posted speed exceeds design speed by 10 km/h in some locations • Limited and sub-standard visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and other road users like cyclists and pedestrians	• Vertical alignment provides sufficient visibility for the proposed 60 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and other road users like cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 70 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and other road users like cyclists/pedestrians	• Options 2, 3 preferred vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies based on cross-section options	• Designed to address drainage deficiencies based on cross-section options	• Options 2, 3 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Options 2, 3 preferred
Socio-Economic Environment				
Residential properties	• No impacts	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be raised by approximately 0.5 m or greater; and 1 driveway, to be lowered by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Farm operations	• No impacts	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential moderate impacts to properties adjacent to crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be raised by approximately 0.5 m or greater; and 1 driveway, to be lowered by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	**Option 2: 70 km/h Design Speed 60 km/h Posted Speed**	**Option 3: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 60 km/h posted speed from Sideroad 10 to Bush Street	• 70 km/h design speed from Sideroad 10 to Bush Street • 60 km/h posted speed from Sideroad 10 to Bush Street	• 80 km/h design speed from Sideroad 10 to Bush Street • 70 km/h posted speed from Sideroad 10 to Bush Street	
Businesses	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts • Potential archaeological impacts if grading extends beyond existing ROW	• Potential archaeological impacts as grading is more likely to extend beyond existing ROW	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Built and cultural heritage resources	• No impacts	• Potential impacts to built heritage properties on both sides, including cedar rail fence and rubble stone wall/fence, if grading extends beyond existing ROW	• Anticipated impacts to built heritage properties on both sides, including cedar rail fence and rubble stone wall/fence, as grading is more likely to extend beyond existing ROW	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Moderate air, noise, vibration impacts during construction; greater than Option 2 due to increased cut and fill construction required • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Natural Environment				
Terrestrial habitat	• No impacts	• Requires least amount of encroachment into adjacent culturally influenced vegetation communities; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside. • Requires fewest tree removals within areas to be graded. • Requires least amount of terrestrial habitat removal in areas to be graded.	• Requires most encroachment into adjacent culturally influenced vegetation communities; occurs within Greenbelt Natural Heritage System and Greenbelt Protected Countryside. • Requires greatest number of tree removals within areas to be graded. • Requires greatest amount of terrestrial habitat removal.	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat. • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat.
Aquatic environment	• No impacts	• 2 culvert crossings, neither of which convey watercourses; no impacts to watercourse features or fish habitat.	• 2 culvert crossings, neither of which convey watercourses; no impacts to watercourse features or fish habitat.	• No difference
Wetlands and watercourses	• No impacts	• A portion of Eramosa River-Blue Springs Creek PSW complex occurs adjacent to the road corridor. • Least potential for direct impact to wetlands, including PSW, through encroachment. • Potential impacts to hydrological balance of affected wetlands through grading and drainage works. • Least potential for impacts to amphibian breeding SWH due to grading requirements.	• A portion of Eramosa River-Blue Springs Creek PSW complex occurs adjacent to the road corridor. • Greatest potential for direct impact to wetlands, including PSW, through encroachment. • Potential impacts to hydrological balance of affected wetlands through grading and drainage works. • Greatest potential for impacts to amphibian breeding SWH due to grading requirements.	• Option 1 is preferred as it avoids impacts to wetlands. • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent wetlands and habitats.
Species at risk	• No impacts	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent trees; habitat may be directly impacted by tree removals; less potential for impact than Option 3 due to grading requirements. • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat.	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent trees; habitat may be directly impacted by tree removals; greater potential impact than Option 2 due to grading requirements. • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat.	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat. • Otherwise, Option 2 is preferred due to fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat.

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	
Option Description	• 60 km/h posted speed from Sideroad 10 to Bush Street	• 70 km/h design speed from Sideroad 10 to Bush Street • 60 km/h posted speed from Sideroad 10 to Bush Street	• 80 km/h design speed from Sideroad 10 to Bush Street • 70 km/h posted speed from Sideroad 10 to Bush Street	
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Least impact to potential habitat (e.g. wetlands) for Odonate species of conservation concern.	• Greatest impact to potential habitat (e.g. wetlands) for Odonate species of conservation concern.	• Option 1 is preferred as it avoids impacts to potential habitat for Odonates species of conservation concern. • Otherwise, Option 2 is preferred due to less required encroachment into habitat for these species.
Wildlife movement corridors	• No impacts	• Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; less so than Option 3.	• Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; more so than Option 2.	• Option 1 is preferred as it avoids potential impact to amphibian road crossing success. • Otherwise, Option 2 is preferred because less potential site grading may maintain more suitable amphibian movement habitat along roadsides.
Stormwater management	• No impacts or improvements	• Improved roadside drainage system	• Improved roadside drainage system	• Options 2 and 3 are preferred as they incorporate improved drainage systems over current conditions.
Natural hazards	• No impacts	• Crosses regulated habitat for wetlands	• Crosses regulated habitat for wetlands	• Option 1 is preferred at it avoids potential impacts to regulated wetlands.
Niagara Escarpment impacts	• No impacts	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No difference
Capital Costs				
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Highest construction cost due to cut and fill required for profile modifications, greater than Option 2	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition anticipated	• Potential property acquisition anticipated if grading extends beyond existing ROW; potential easements may be required for localized improvements	• Greatest potential for property acquisition anticipated as grading might extend further beyond existing ROW; potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL				
		• Option 2 preferred as it meets design standards for the proposed posted speed limit (same as existing posted speed limit), and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts		

Legend:

Preferred	Less Preferred	Least Preferred

Based on the preceding evaluation, a 70 km/h design speed (60 km/h posted speed) profile (Option 2) is preferred for Winston Churchill Boulevard between Olde Base Line Road and Bush Street.

6.2 Winston Churchill Boulevard Preferred Design Concept

The preferred designs were chosen with consideration to environmental impacts, cultural heritage impacts, safety, aesthetics, drainage, entrance access and property impacts, and capital construction and maintenance costs. This section presents the preferred designs that best incorporate these parameters. Consultation with agencies and the public, as discussed in **Section 2**, helped arrive at the preferred designs discussed in this section.

6.2.1 Design Criteria for Winston Churchill Boulevard

The following outlines the design criteria for Winston Churchill Boulevard, based on different design speed options considered. Although a higher (90 km/h) design speed is desired, in order to accommodate all road users while minimizing impacts to the study area features and surrounding landscape, the project-specific design standards are based on a lower (70 km/h) design speed.

	PRESENT CONDITIONS	**PROJECT** DESIGN STANDARDS	DESIGN STANDARDS	**DESIRED** DESIGN STANDARDS	REFERENCE
HIGHWAY CLASSIFICATION	RAU 70/80	RAU 70	RAU 80	RAU 90	
MINIMUM STOPPING SIGHT DISTANCE	N/A	95-110 m	115-140 m	130-170 m	(TAC – page 1.2.5.4 Table 1.2.5.3)
MIN. EQUIV. VERTICAL CURVE (WITH ILLUMINATION)[3]	N/A	16-23 - CREST 10-12 –SAG (Comfort)	24-26 - CREST 12-16 –SAG (Comfort)	32-53 - CREST 15-20 –SAG (Comfort)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MIN. EQUIV. VERTICAL CURVE (WITHOUT ILLUMINATION)[4]	N/A	16-23 - CREST 20-25 –SAG (Headlight Control)	24-26 - CREST 25-32 –SAG (Headlight Control)	32-53- CREST 30-40 –SAG (Headlight Control)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MAXIMUM GRADIENT	N/A	8-10%	8-10%	8-10%	(To reflect prevailing conditions and maintain existing rural character)
MINIMUM CURVATURE	N/A	190 m	250 m	340 m	(TAC – page 2.1.2.13 Table 2.1.2.6)
SUPERELEVATION (ON CURVE)	N/A	6%	6%	6%	(TAC – page 2.1.2.3)
LANE WIDTH	3.1-3.6 m – thru	3.5-3.7 m	3.5-3.7 m	3.5-3.7 m	(TAC – page 2.2.2.1 Table 2.2.2.1)
SHOULDER WIDTH	Varies (1.2-3.0 m)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
SHOULDER WIDTH ON SIGNED BICYCLE ROUTE	Varies (1.2-3.0 m)	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	(OTM BOOK 18 Table 4.2)
DRAINAGE ZONE	Varies (m – m)	8.0 m	8.0 m	8.0 m	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
R.O.W. WIDTH	20 - 28 m				
DESIGN SPEED		70 km/h	80 km/h	90 km/h	
POSTED SPEED	60/70 km/h	60 km/h	70 km/h	80 km/h	

NOTE 1: CROSS-SECTION ELEMENT WIDTHS MAY CHANGE DEPENDING ON AVAILABLE ROW WIDTHS.
NOTE 2: ALTHOUGH HIGHER DESIGN SPEEDS ARE DESIRABLE, THEY MAY NOT BE ACHIEVABLE DUE TO EXISTING TERRAIN AND CONSTRAINTS, AS THEIR RESULTING IMPACTS WOULD BE SIGNIFICANT. THEREFORE, LOWER DESIGN SPEEDS HAVE BEEN SELECTED AS THE PROJECT DESIGN STANDARDS FOR THIS SEGMENT.

[3] Applies only at some locations
[4] Applies for the majority of the study area

6.2.2 Typical Cross Section

Due to the existing topography and constraints along the right-of-way, and to minimize grading impacts to adjacent properties and features, a semi-rural cross-section is proposed for the majority of the Winston Churchill Boulevard corridor, between Stations 40+000 (Olde Base Line Road) and 45+800. This cross-section consists of one 3.5 metre wide travel lane (vehicle zone) in each direction, a 1.7 metre wide paved shoulder to accommodate active transportation, a 0.5 metre mountable curb on each side of the road (illustrated in **Figure 54**), 0.3 metre rounding and a 2:1 slope then match to existing ground on either side of the road. Drainage is addressed through underground infrastructure (refer to **Section 6.2.6** for more details). This cross-section connects to a semi-rural cross-section at Olde Base Line Road.

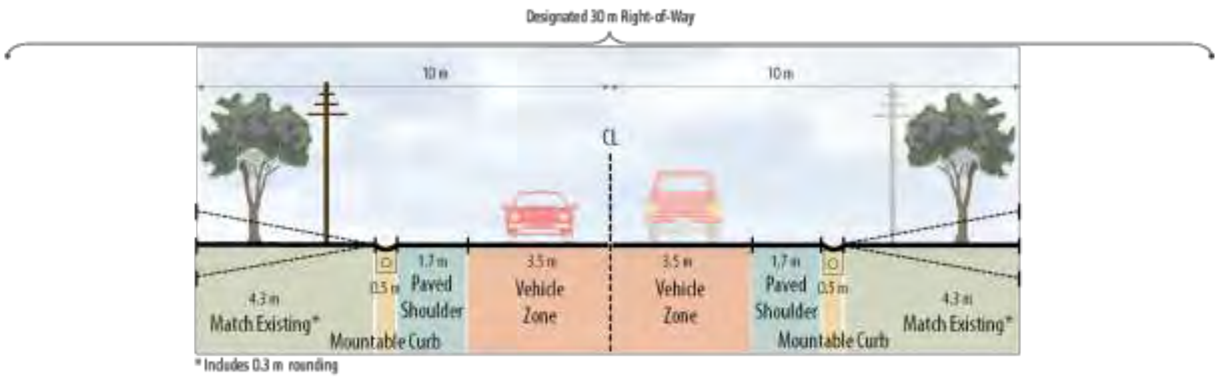


Figure 54: 11.4 m Platform Semi-Rural Cross-Section for Winston Churchill Boulevard

Between Stations 45+800 and 45+940, where there is a steep slope and an existing guiderail on either side of the road, the proposed design will match to existing conditions. The road platform (including one 3.5 metre travel lane or vehicle zone in each direction and 1.7 metre paved shoulder on each side of the road) will fit between the existing guiderails (to be reviewed during detailed design), and drainage will follow existing conditions, with water flowing down the steep slopes on either side of the road. No mountable curb is proposed through this segment.

Between Stations 45+940 and 46+025 (Bush Street intersection), where a wider, less constrained right-of-way is available, a rural cross-section is proposed. This cross-section consists of one 3.5 metre wide travel lane (vehicle zone) in each direction, with a 1.7 metre wide paved shoulder and 0.5 metre rounding on each side of the road (illustrated in **Figure 55**). Drainage is addressed through ditches with 2:1 slopes on either side (refer to **Section 6.2.6** for more details). This cross-section connects to a rural cross-section at Bush Street.

Opportunities to use alternative construction materials throughout the study area for curbs and other roadway elements, to maintain the rural character of the study area, can be reviewed during detailed design. These may include, for example, using dark coloured curbs to blend in with the asphalt and make them less noticeable.

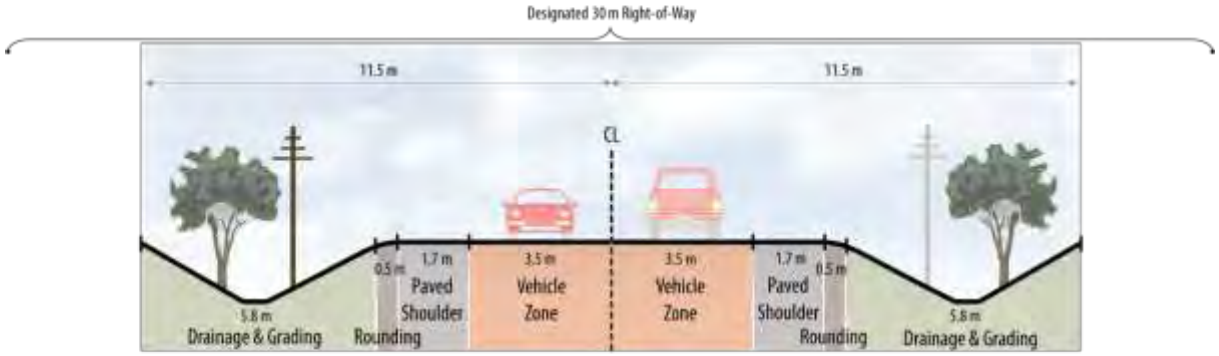


Figure 55: 11.4 m Platform Rural Cross-Section for Winston Churchill Boulevard

Design cross-sections at an interval of 20 metres are included in **Appendix W**.

6.2.3 Horizontal Alignment

The proposed design with a 70 km/h design speed generally follows the existing road centreline with a few exceptions, as follows:

- Shift to the west between Stations 42+840 and 43+270 to centre the roadway within the existing right-of-way and minimize impacts to a heritage stone wall on the east side
- Shift to the east between Stations 43+270 and 44+200 to centre the roadway within the existing right-of-way and avoid property acquisition on the west side
- Shift to the east between Stations 44+500 and 44+975 to minimize impacts to wetland and other sensitive natural features on the west side (results in potential property acquisition on the east side)
- Shift to the west between Stations 44+975 and 45+225 to centre the roadway within the existing right-of-way and minimize property acquisition on the east side
- Shift to the east between Stations 45+425 and 45+700 to centre the roadway within the existing right-of-way and minimize impacts to fences and vegetation on the west side

The proposed horizontal alignment is illustrated on the plates in **Section 6.2.8**.

6.2.4 Vertical Alignment

The proposed vertical alignment accommodates a 70 km/h design speed. This vertical alignment was chosen to match the existing road profile where possible, while improving any existing substandard grades and vertical curves to meet the geometric standards required for the class of the road, as per the design criteria identified in **Section 6.2.1**. The vertical profile also aims to minimize impacts to existing entrances and driveways, and to reduce grading impacts to adjacent properties and features.

Crest and sag curves throughout Winston Churchill Boulevard will have a minimum K value of 16 and 20, respectively, which will satisfy the stopping and comfort requirement for a design speed of 70 km/h. A minimum gradient of 0.5% allows for proper drainage, and a maximum gradient of 8% maintains existing rural character.

The proposed vertical profile and reduction in posted speed limit will provide sufficient stopping sight distance. The effect of grade on stopping sight distance at driveways was also assessed for the proposed vertical profile. In general, sufficient stopping sight distance is provided, or where the resulting stopping sight distance is deficient, conditions are improved compared to the exiting road profile.

The proposed vertical alignment is illustrated on the plates in **Section 6.2.8**.

6.2.5 Geotechnical

As discussed in **Section 4.7**, existing pavement along Winston Churchill Boulevard is in poor to very poor condition. If existing conditions were maintained and there were no changes to the cross-section or profile, then improvements to the general pavement structure shown in **Table 30** would be recommended for Winston Churchill Boulevard.

Table 30: General Pavement Recommendations for Winston Churchill Boulevard Maintaining Existing Profile and Cross-Section

Subsection		New Pavement Structure Average Thickness (mm)		
		Asphalt Concrete	Gran. A (Old)	Gran. B (Old)
1	Sta. 40+000 (Old Base Line Road) to 42+200	110 (40 mm HL-3 and 70 mm HL-8)	390	130
2	Sta. 42+200 to 43+350	100 (40 mm HL-3 and 60 mm HL-8)	365	125
3	Sta. 43+350 to 44+050	110 (40 mm HL-3 and 70 mm HL-8)	300*	0
4	Sta. 44+050 to 44+750	100 (40 mm HL-3 and 60 mm HL-8)	385	340
5	Sta. 44+750 to 45+550	100 (40 mm HL-3 and 60 mm HL-8)	415	600
6	Sta. 45+550 to 45+750	80 (Mill 40 mm pave 40 mm HL-3)	530	890
7	Sta. 45+750 to 46+025 (Bush Street)	50 (50 mm HL-3)	165	1295

* New Gran. A

Depending on the vertical alignment design and the typical cross-section to be applied, the geotechnical design recommendations will vary. The following recommendations are provided:

- Where the vertical alignment is proposed to follow the existing ground profile, the following geotechnical recommendations apply for Winston Churchill Boulevard, as per the previously mentioned pavement structure:
  - Between Stations 40+000 and 43+350: partial depth reconstruction / asphalt replacement

  - Between Stations 43+350 and 44+050: full-depth pavement reconstruction
  - Between Stations 44+050 and 46+025: partial depth reconstruction / asphalt replacement
- Where vertical alignment modifications are proposed, full-depth pavement reconstruction will be required as pavement elevations will vary from existing
- Where a semi-rural cross-section applies, full-depth pavement reconstruction will be required to accommodate underground infrastructure
- Where a rural cross-section applies, the above recommendations based on vertical alignment should be followed

Therefore, based on the proposed cross-section and vertical alignment designs for Winston Churchill Boulevard, full-depth pavement reconstruction is proposed between Stations 40+000 (Olde Base Line Road) and 45+840, and between Stations 45+940 and 46+025 (Bush Street); and partial depth reconstruction / asphalt replacement is proposed between Stations 45+840 and 45+940.

More details on the geotechnical assessment and pavement structure recommendations can be found in **Appendix U.2**.

6.2.6 Drainage

The preliminary stormwater management plan is designed to prevent impacts from the future roadway configuration by using available technologies and opportunities to achieve the highest degree of control possible given the constraints of the study corridor. The following design elements are recommended as part of the proposed roadway improvements:

1. Based on the findings of the culvert condition assessment, the hydraulic capacity assessments, the geomorphology assessment as well as Peel Region's criteria for minimum culvert opening requirements, it is recommended to replace or upgrade 31 transverse culvert crossings within the project limits (13 of which are along Winston Churchill Boulevard). In each case, the existing culvert crossings will be replaced by a pipe or concrete open bottom box culvert.
2. It is recommended to extend a total of seven culvert crossings (three on Winston Churchill Boulevard) to accommodate the proposed roadway improvements.
3. In addition, along Winston Churchill Boulevard it is recommended to maintain one culvert crossing, add one new culvert crossing, and replace one culvert crossing with DICB and sewer.
4. Surface water takings will be required where culvert replacement/upgrades are proposed. The water quantity/quality monitoring program will be developed during detailed design, at the time the Permit to Take Water (PTTW) application is submitted.
5. Where the roadway improvements recommend the provision of a semi-rural roadway cross-section, a subsurface drainage system is recommended for inclusion into the roadway cross-section. The subsurface drainage system will consist of a series of catchbasins, storm sewers and subdrains which will collect and convey both the granular base material and surface runoff and discharge to existing drainage outlets. The storm

sewers shall be sized to accommodate a 10 year return period event, using a minimum inlet time of 15 minutes as per Region of Peel design standards. The design of the sewers will need to take into account any drainage from roadway boulevard areas as well as drainage external to the roadway right-of-way. Effort has been made to ensure that existing drainage patterns and locations are maintained throughout the various roadway corridors. A conceptual storm system layout is illustrated on the preliminary design plates in **Section 6.2.8**.

6. Where the proposed roadway improvements include a modification to a semi-rural cross-section, the requirement to maintain, relocate or remove entrance/driveway culverts should be examined during the detailed design phase. It is foreseeable that some culverts will no longer provide a drainage function under a semi-rural condition. In some instances however, external runoff from adjacent lands may need to be intercepted due to grade differences between roadway and adjacent properties. Where this occurs, appropriate ditch and culvert systems may need to be employed at driveway entrance locations to allow for conveyance of runoff to appropriate drainage outlets.
7. The principal features of the project’s stormwater management system are the provision of oil-grit separator (OGS) units to provide water quality control. A total of 14 OGS units are proposed throughout the study area (five of which are along Winston Churchill Boulevard) providing a total collective area for stormwater treatment of 5.56 ha. Water quality criteria will be met at each OGS location based on Enhanced (Level 1) protection as outlined in the MOE Stormwater Management Practices Manual.
8. Existing roadside ditches will be re-graded to flat-bottom swale systems (grassed swales), where possible, to provide additional water quality benefits within the project limits. It is recommended that during detailed design, the proposed grassed swale areas are reviewed for their effectiveness in meeting the MOE criteria for flowrate, velocity and contributing area.
9. It is noted that runoff from existing roadways do not provide any quality control. The incorporation of OGS and grassed swale systems will provide a net improvement to the quality of storm runoff within the project limits.
10. Erosion and sediment control measures should be implemented and monitored through the construction period. Construction activity should be conducted during periods that are least likely to result in in-stream impacts to fish habitat.

More details on the proposed stormwater management plan can be found in **Appendix R.3**.

6.2.7 Traffic Controls

The proposed design accommodates a 70 km/h design speed and 60 km/h posted speed limit. Between Olde Base Line Road and Sideroad 10, it is recommended to lower the posted speed from 70 km/h to 60 km/h. Between Sideroad 10 and Bush Street, it is recommended to retain the 60 km/h posted speed limit. A 60 km/h posted speed throughout Winston Churchill Boulevard is also consistent with the posted speed south of Olde Base Line Road.

All-way stop control is proposed at the Winston Churchill Boulevard / Old Base Line Road intersection, as per the completed EA and current detailed design for Winston Churchill

Boulevard south of Olde Base Line Road. Stop control at all other intersections is proposed to remain as per existing conditions.

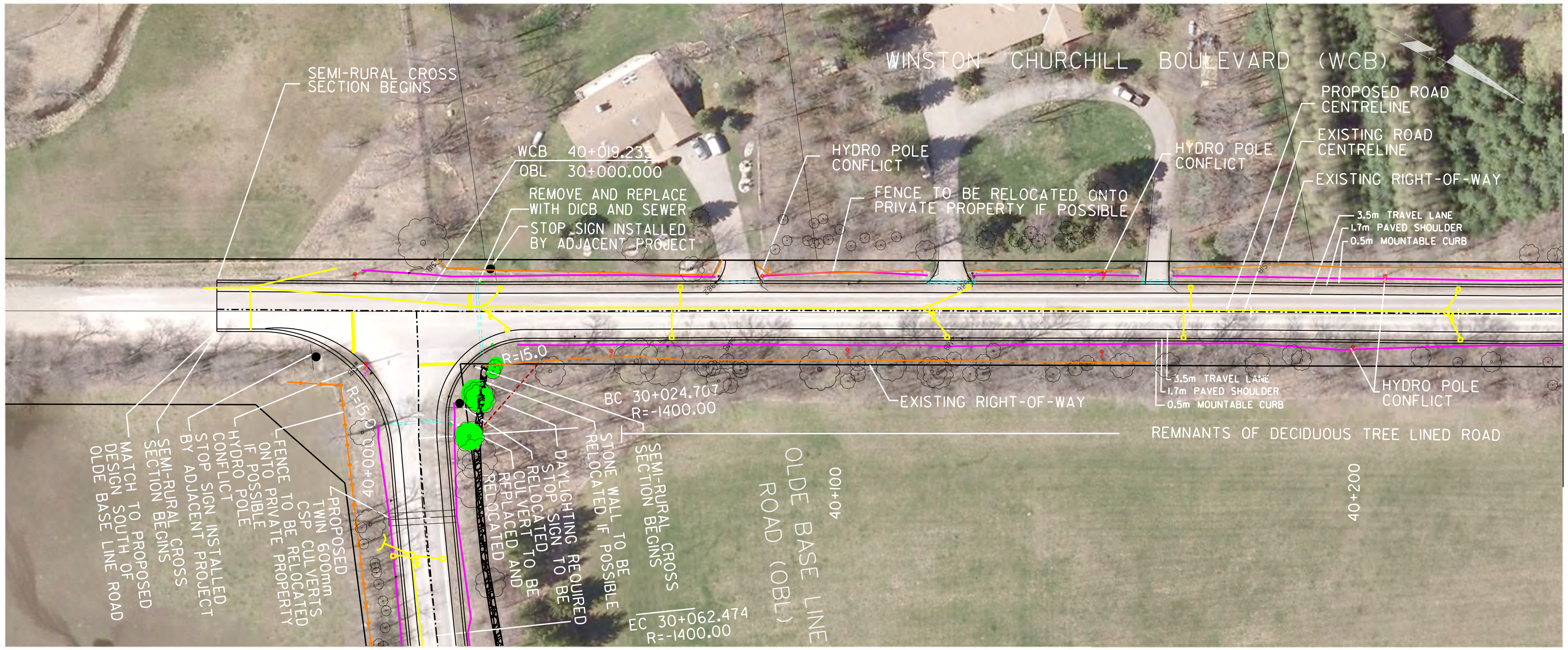
Illumination is proposed to remain as per existing conditions. Illumination at Sideroad 5 and Sideroad 10 can be further reviewed during detailed design.

Some signs and bollards will need to be relocated to accommodate the new road platform. Locations are to be confirmed during detailed design. Roadway protection systems, such as guiderails, are to be considered where significant profile adjustments are proposed. This also needs to be reviewed during detailed design.

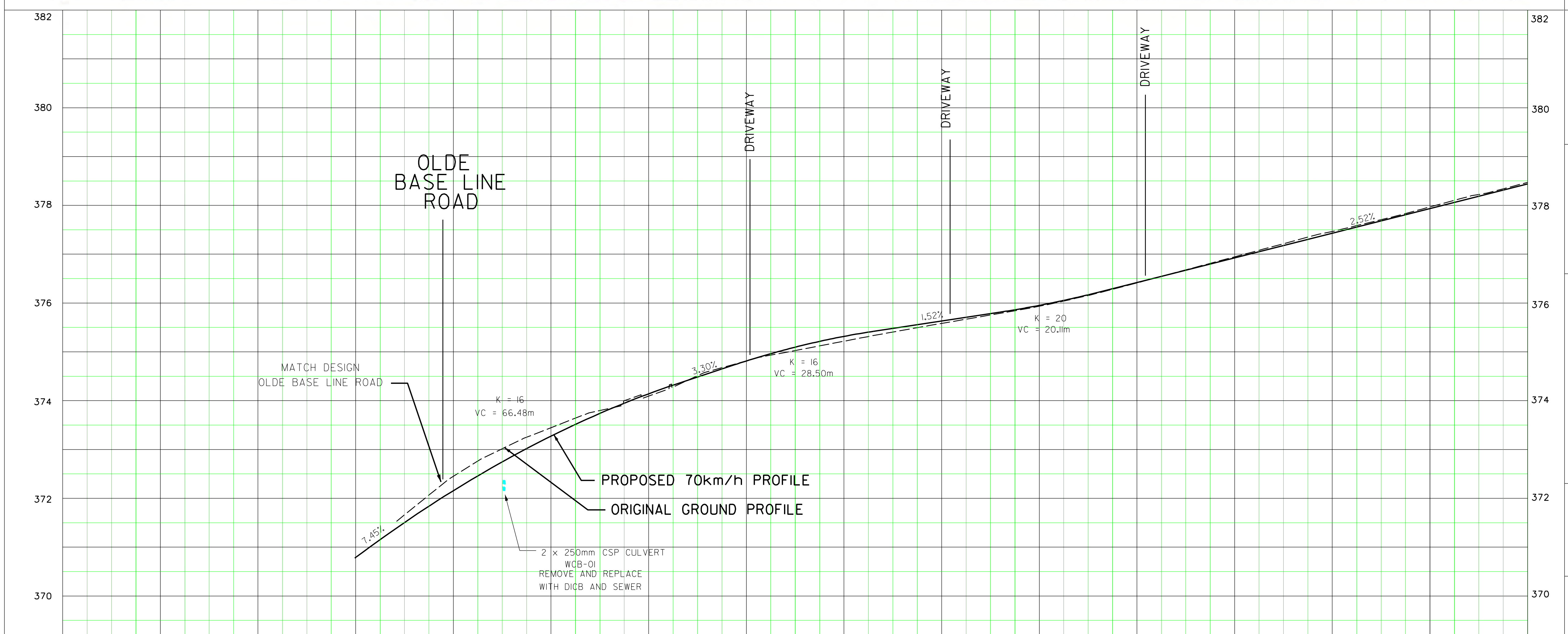
Existing truck and load restrictions along Winston Churchill Boulevard are proposed to remain.

6.2.8 Design Plates

The following pages contain plan and profile plates illustrating the proposed design for Winston Churchill Boulevard.



MATCH LINE STA. 40+240



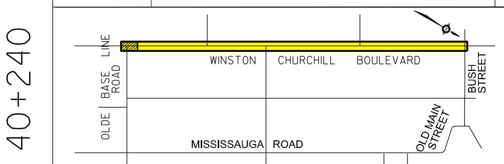
	40+000	40+100	40+200
BOT.EL. OF WM.			
EX. ROAD ELEV.			
ROAD CHAINAGE	40+000	40+100	40+200

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

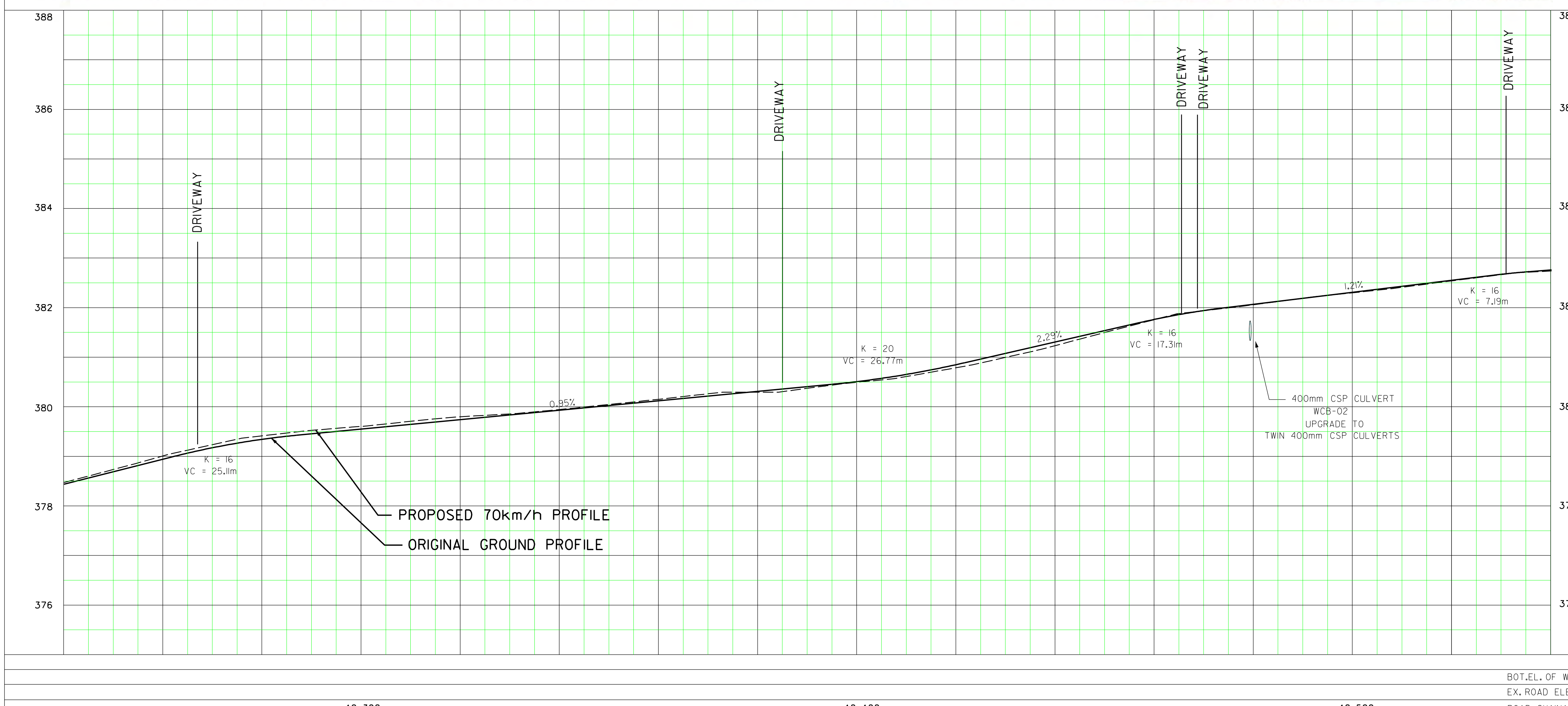
Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 40+000 to STA 40+240)

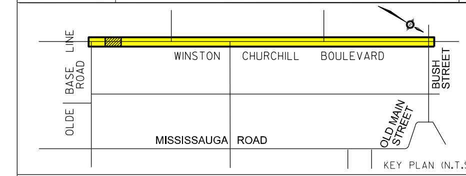
NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 1 of 21	Plan No. -D



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
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- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
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- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

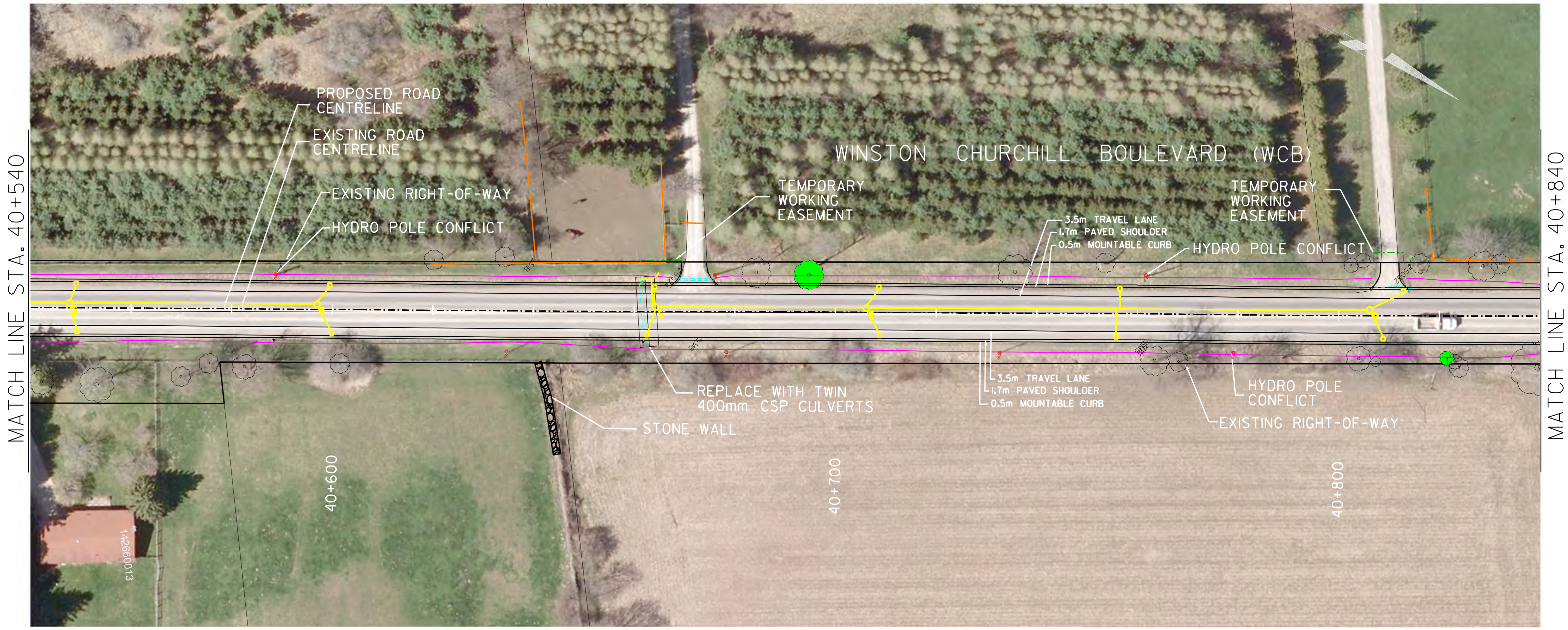
Region of Peel
Working for you

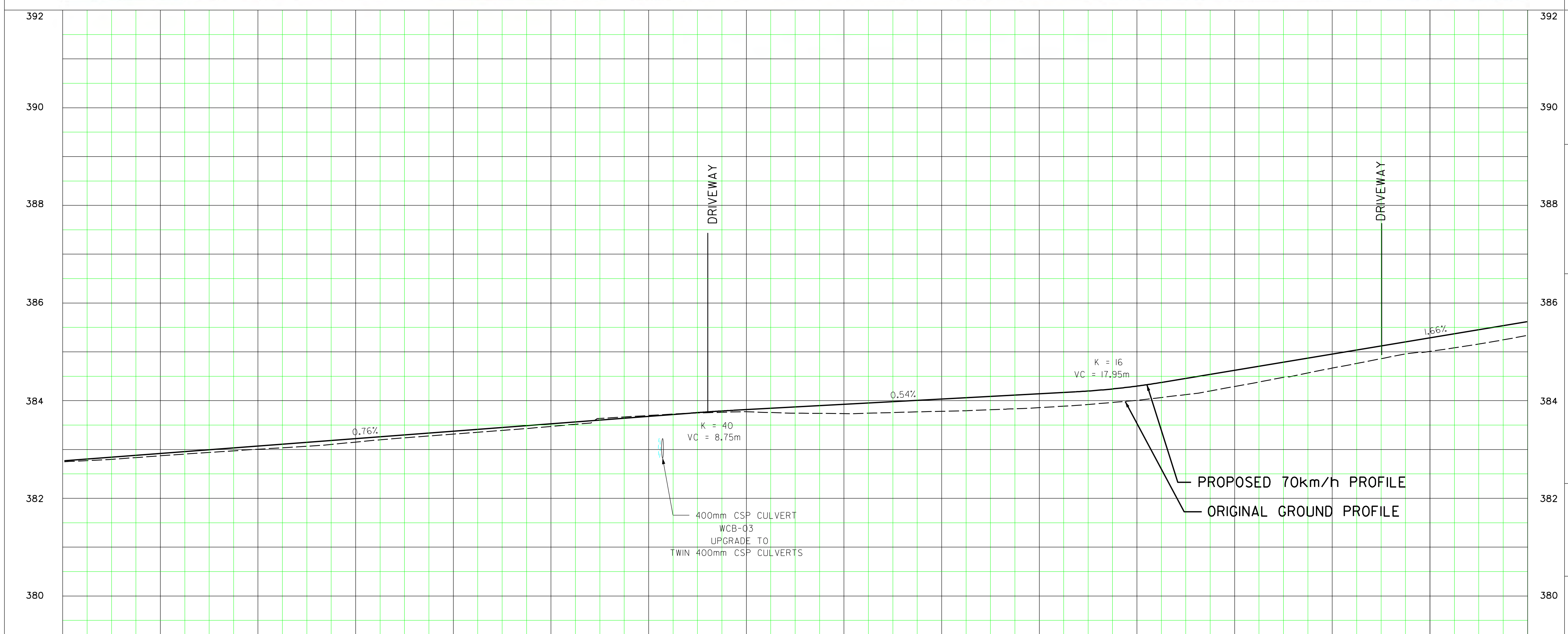
WINSTON CHURCHILL BOULEVARD

(FROM STA 40+240 to STA 40+540)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 2 of 21	Plan No. -D





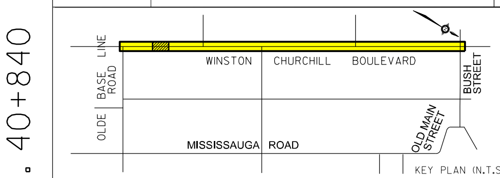
BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	40+600 40+700 40+800

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

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B.M. No. Elev.

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Designed by Chkd. Approved by

NOTICE TO CONTRACTOR
48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

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HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
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CABLE TELEVISION/FIBREOPTIC PROVIDERS:
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ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE
1m 0 1 2 3m VERTICAL SCALE

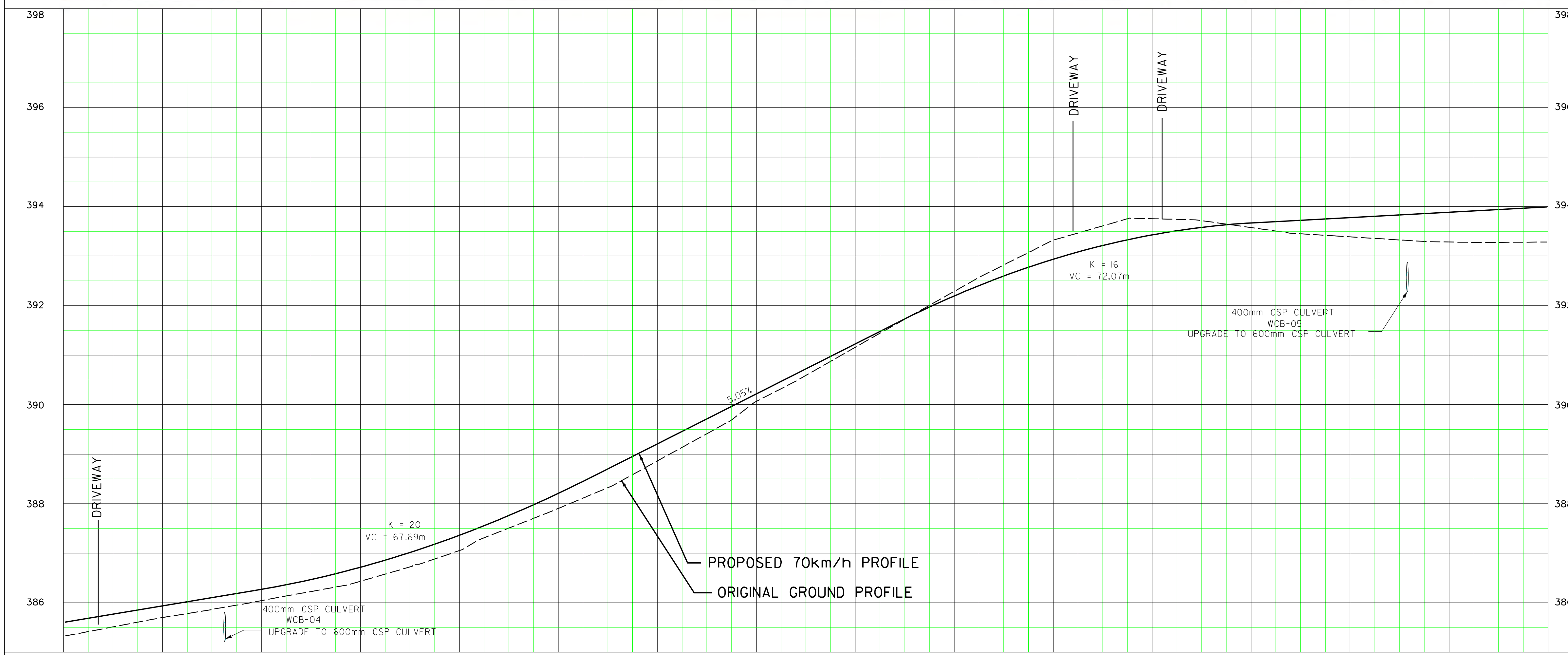
Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 40+540 to STA 40+840)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 3 of 21	Plan No. -D



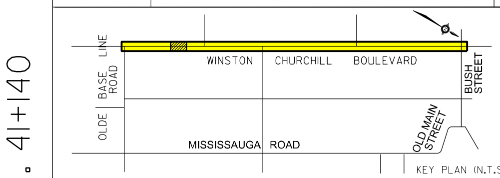
BOT.EL. OF WM.			
EX. ROAD ELEV.			
ROAD CHAINAGE	40+900	41+000	41+100

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
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- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

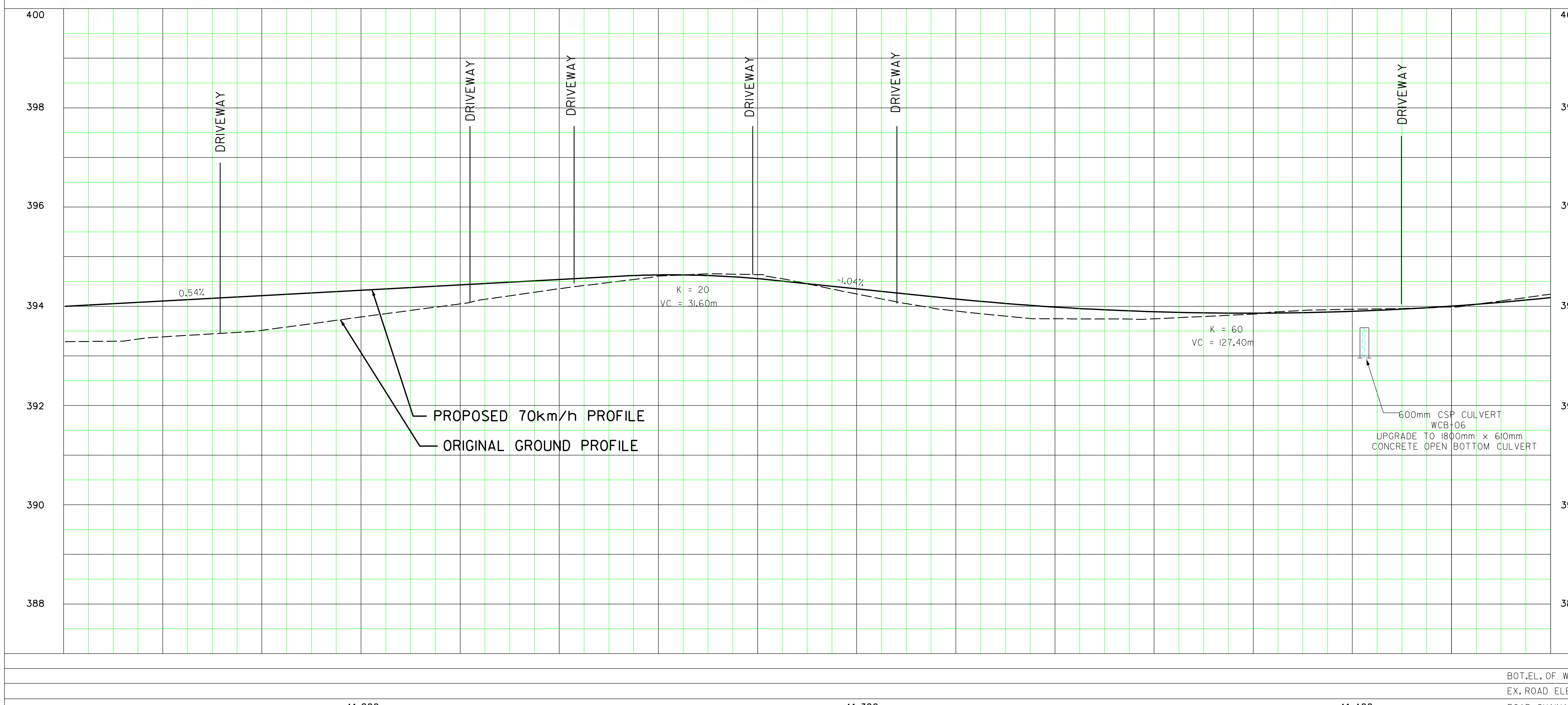
Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 40+840 to STA 41+140)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 4 of 21	Plan No. -D

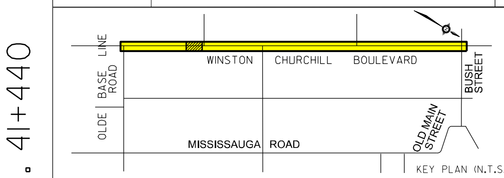


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

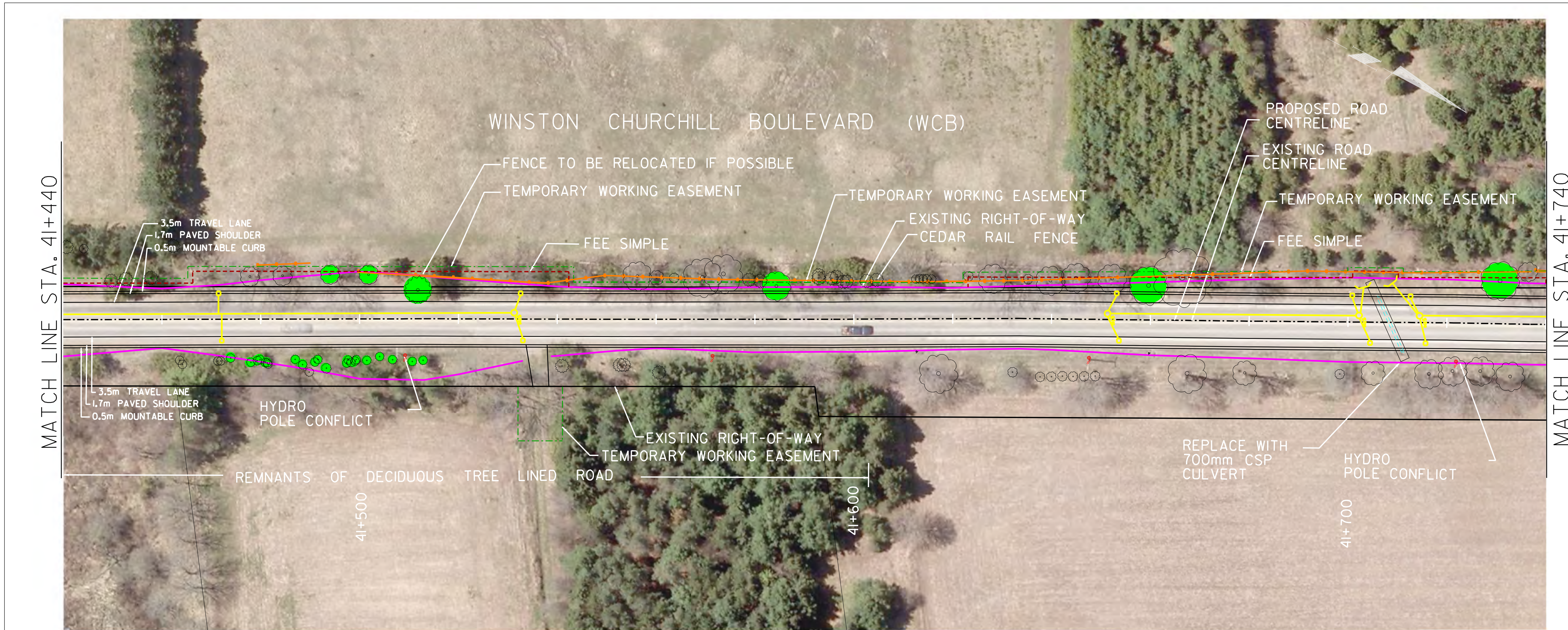
Region of Peel
Working for you

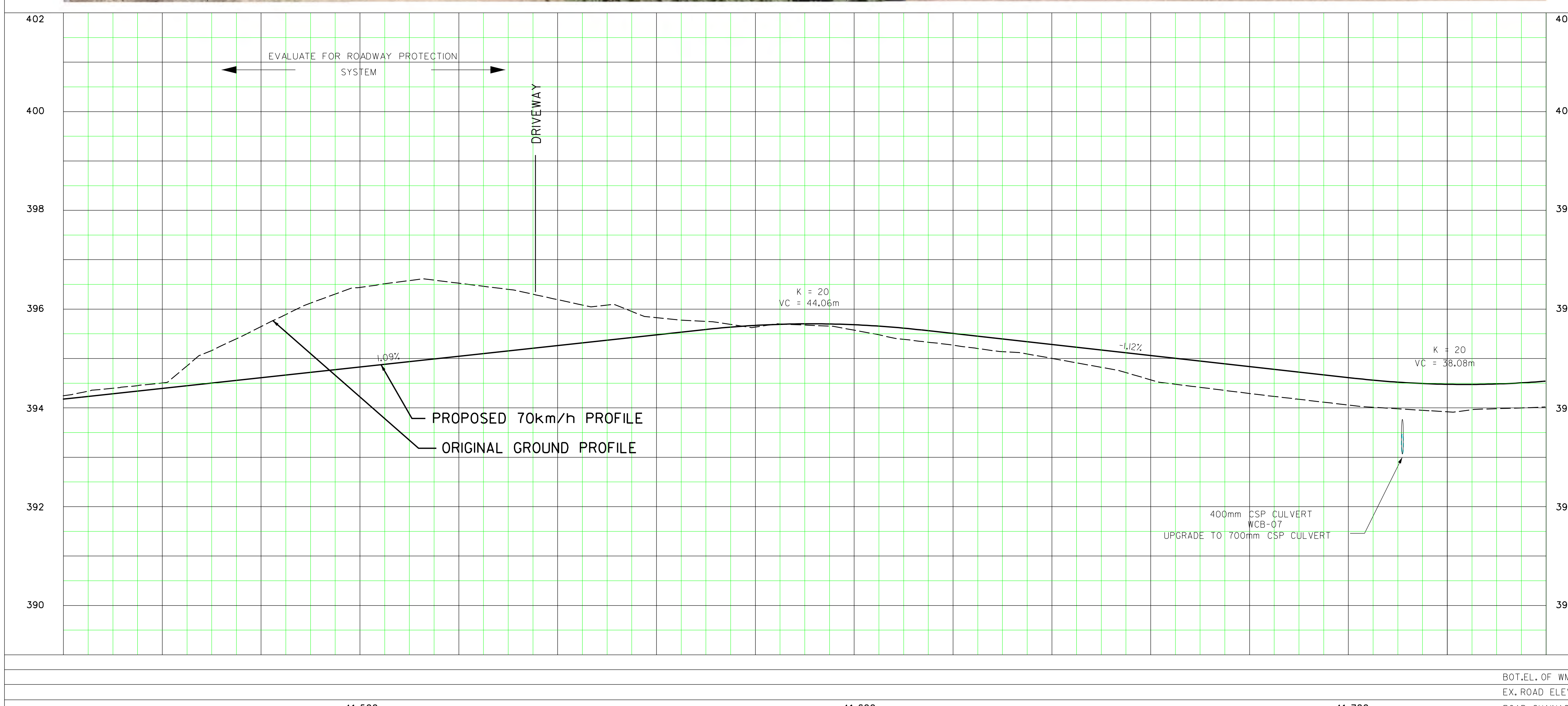
WINSTON CHURCHILL BOULEVARD

(FROM STA 41+140 to STA 41+440)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 5 of 21	Plan No. -D



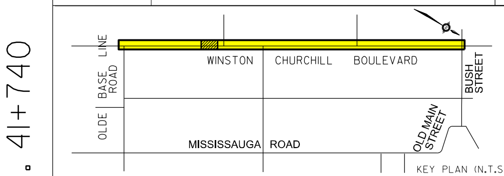


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- HERITAGE STONE WALL
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- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
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Designed by ______ Chkd.______ Approved by ______

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ONTARIO MINISTRY OF TRANSPORTATION
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HYDRO ONE NETWORKS
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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

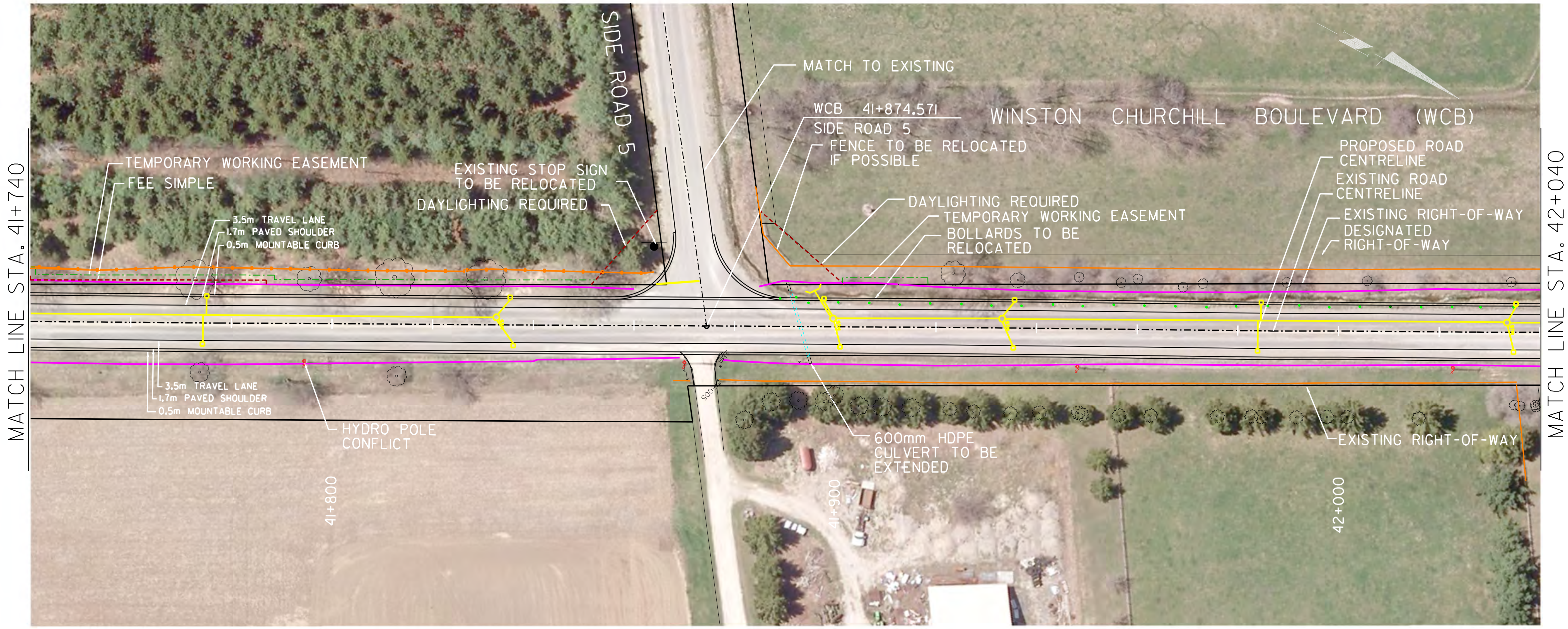
Region of Peel
Working for you

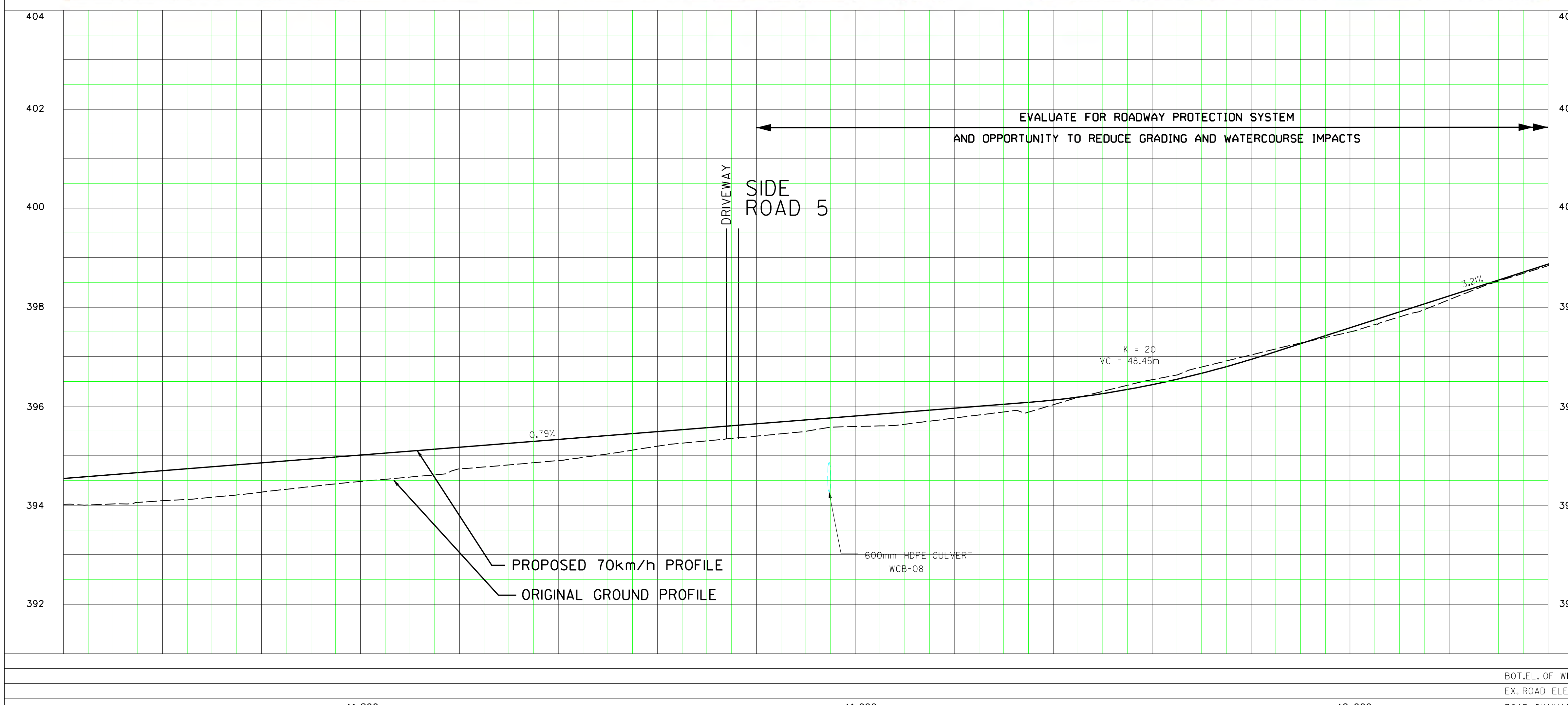
WINSTON CHURCHILL BOULEVARD

(FROM STA 41+440 to STA 41+740)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 6 of 21	Plan No. -D



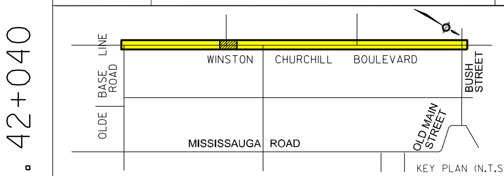


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

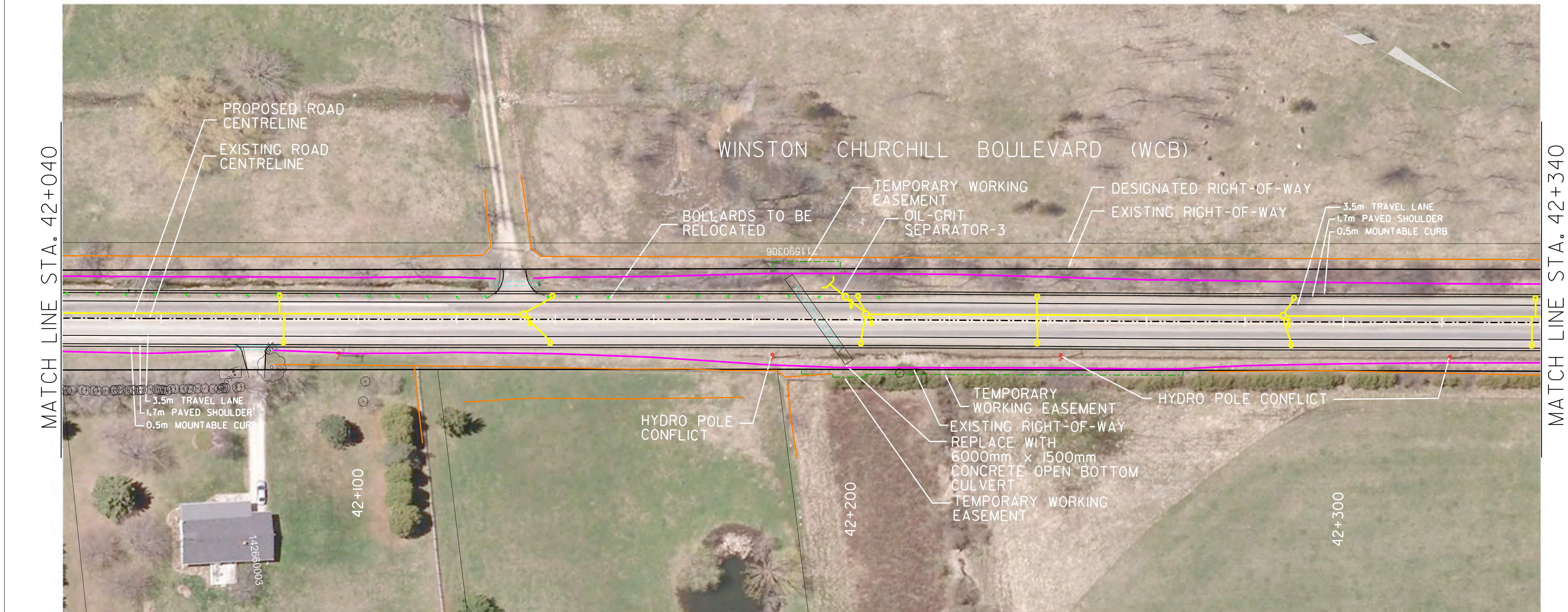
Region of Peel
Working for you

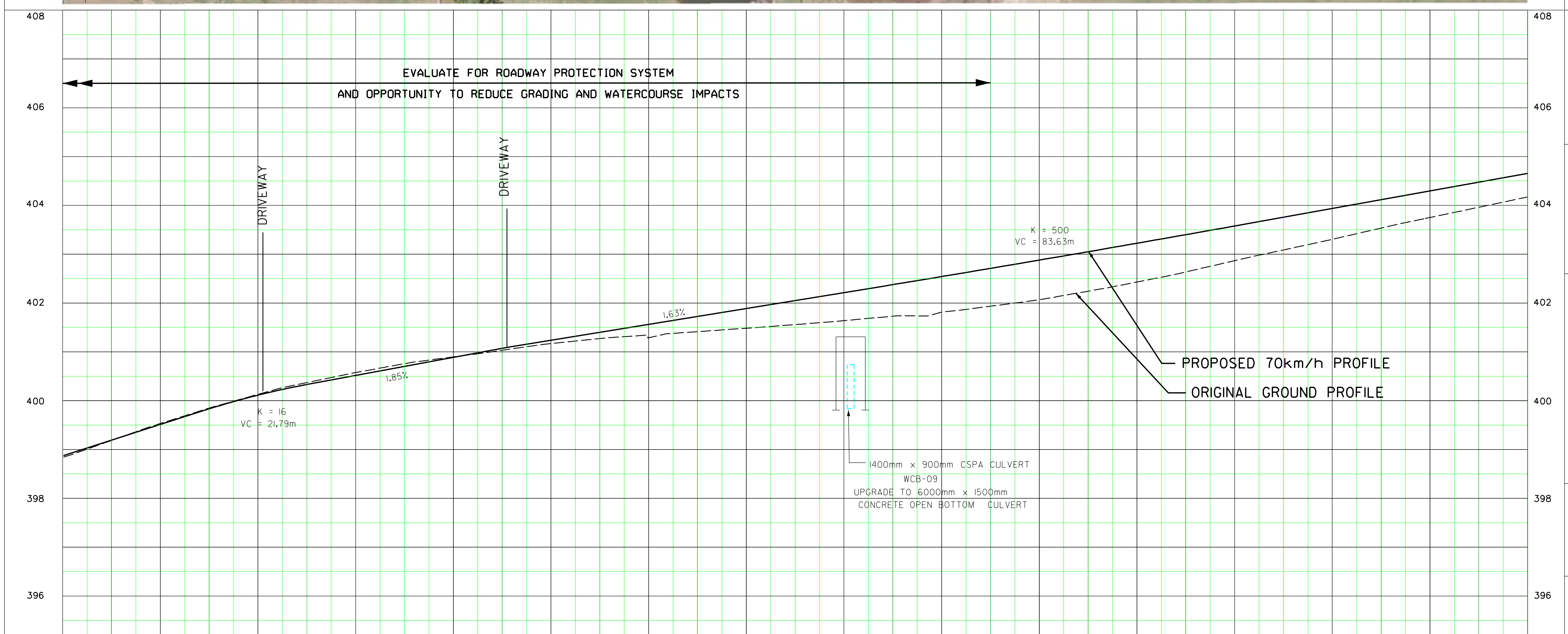
WINSTON CHURCHILL BOULEVARD

(FROM STA 41+740 to STA 42+040)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 7 of 21	Plan No. -D





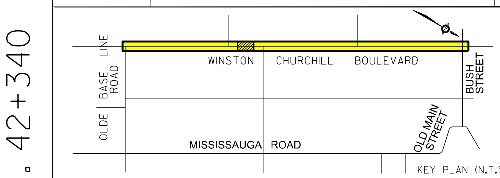
BOT.EL. OF WM.			
EX. ROAD ELEV.			
ROAD CHAINAGE	42+100	42+200	42+300

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES
1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd. ____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

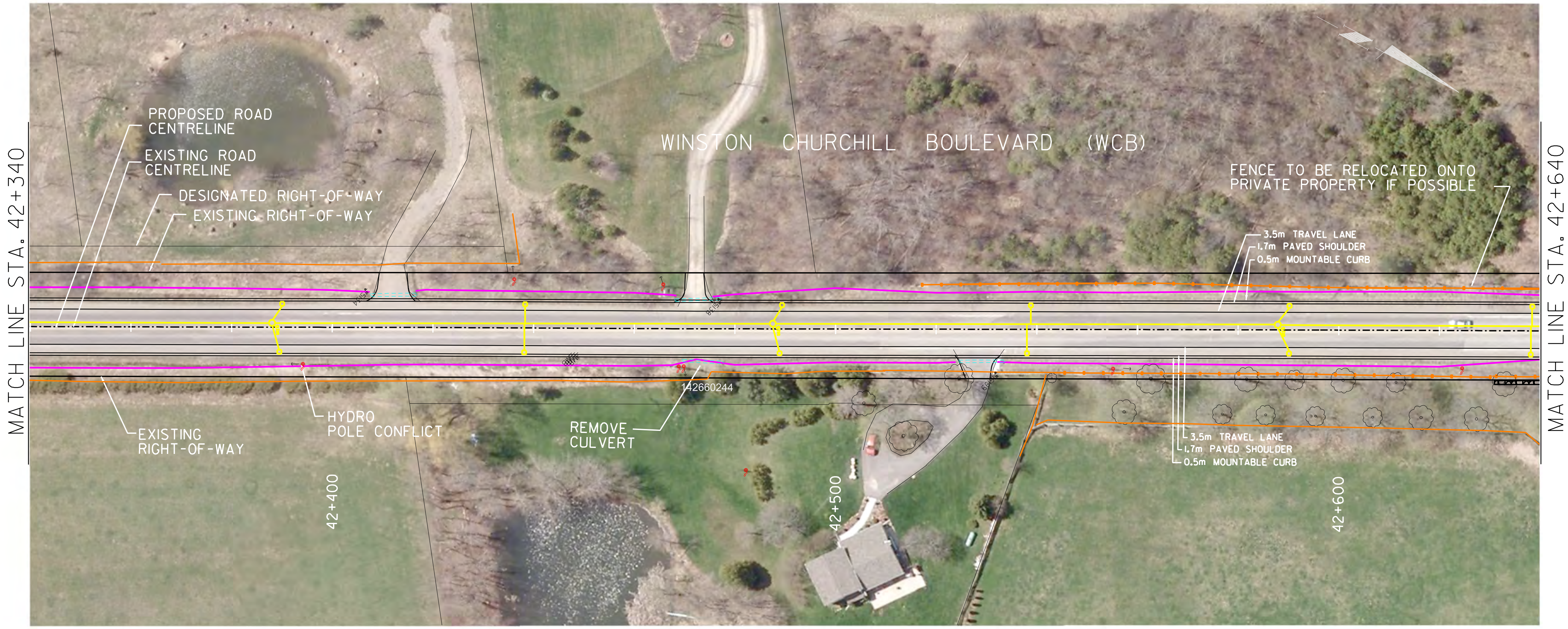
Region of Peel
Working for you

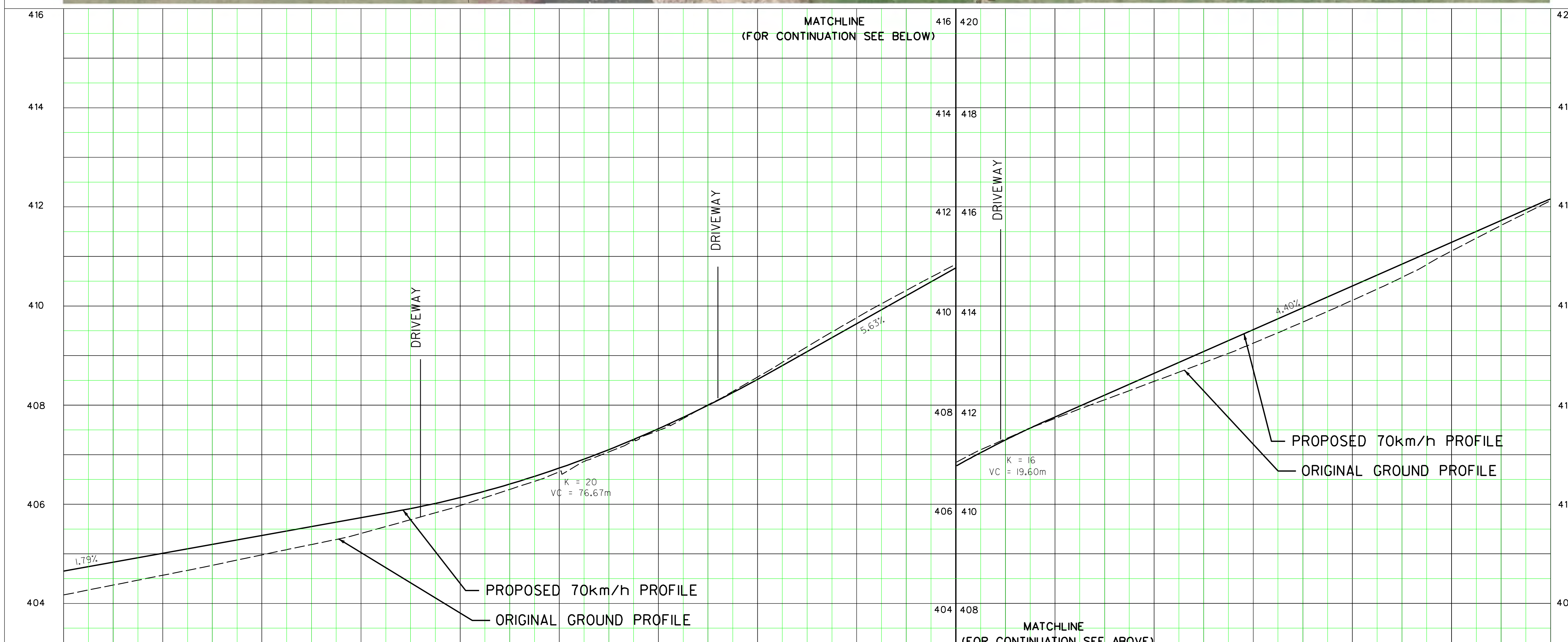
WINSTON CHURCHILL BOULEVARD

(FROM STA 42+040 to STA 42+340)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 8 of 21	Plan No. -D





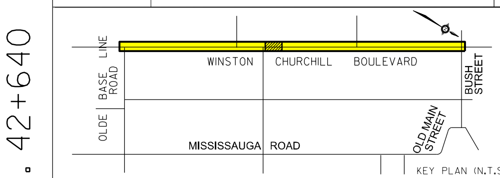
BOT.EL. OF WM.			
EX. ROAD ELEV.			
ROAD CHAINAGE	42+400	42+500	42+600

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
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- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
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- DITCH GRADING
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- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

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CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

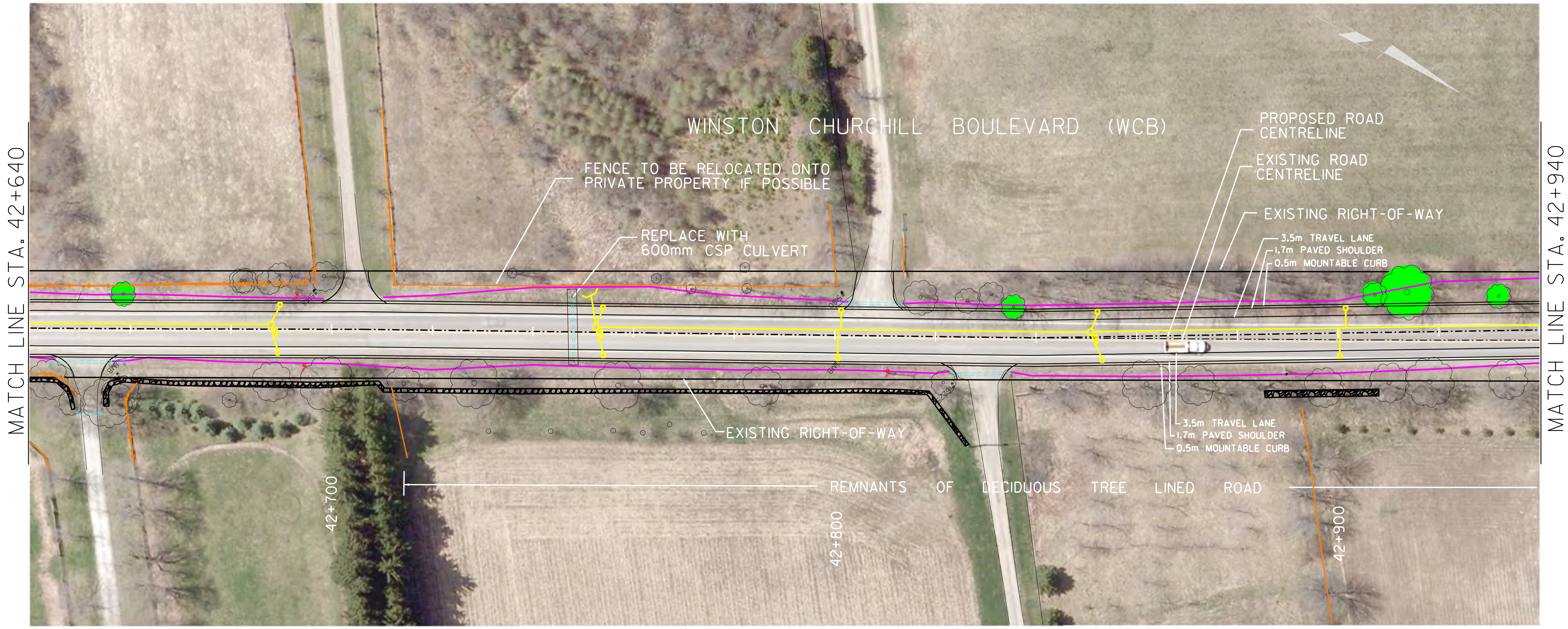
Region of Peel
Working for you

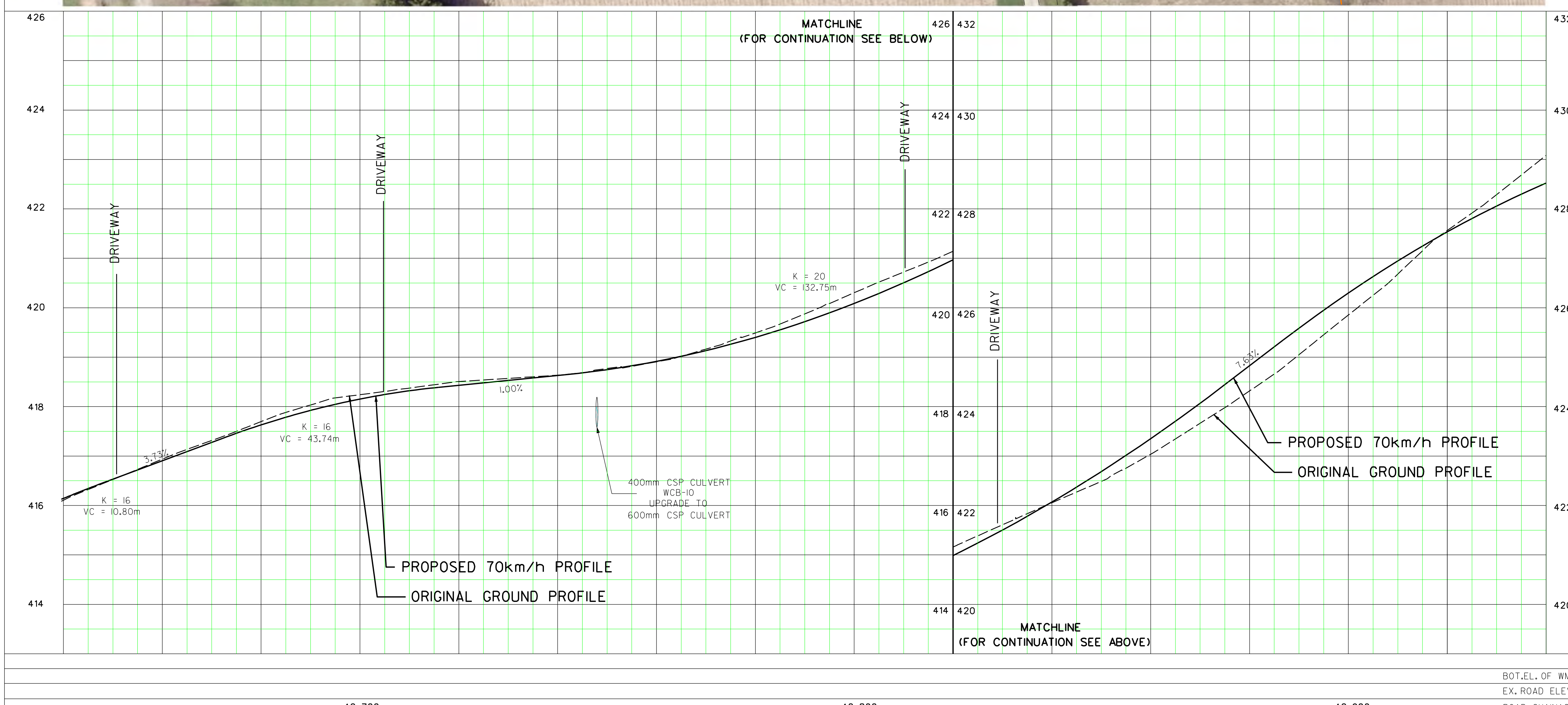
WINSTON CHURCHILL BOULEVARD

(FROM STA 42+340 to STA 42+640)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 9 of 21	Plan No. -D



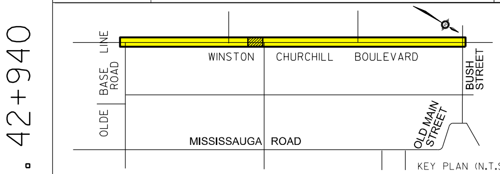


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

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B.M. No. Elev.

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Designed by Chkd. Approved by

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

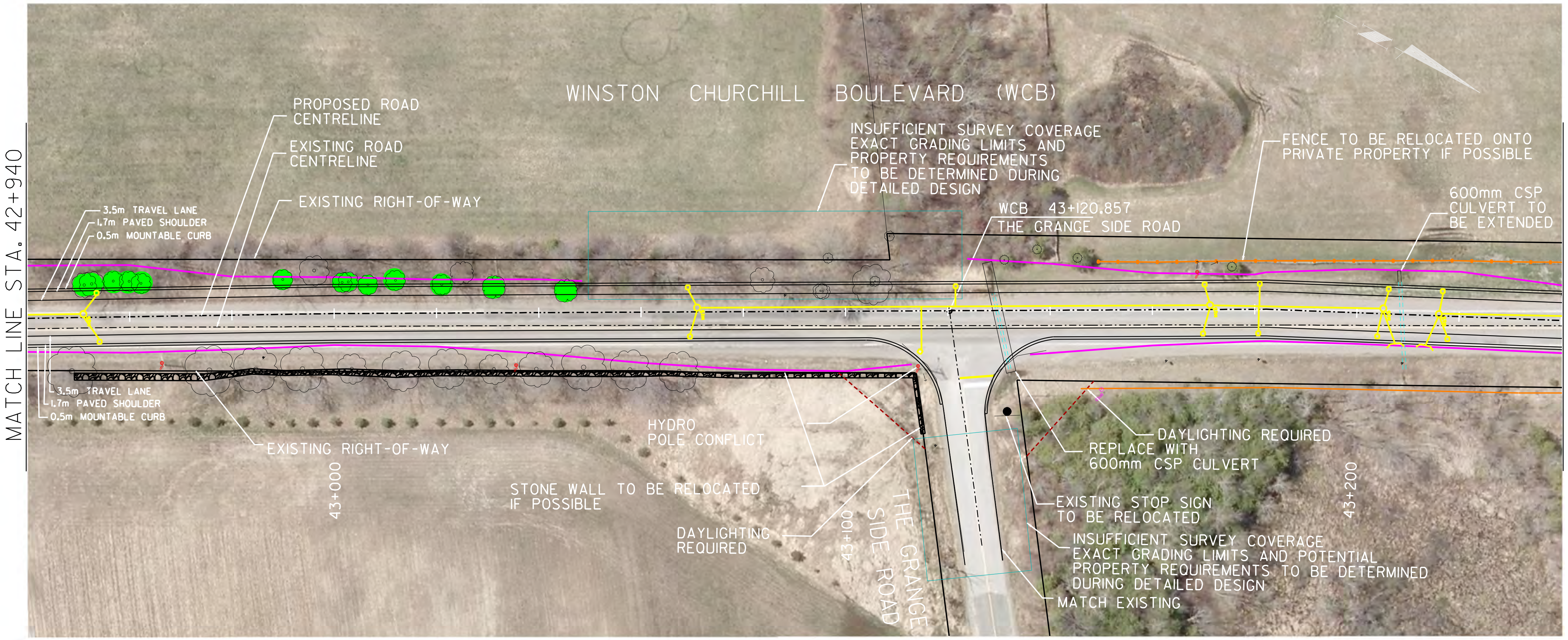
Region of Peel
Working for you

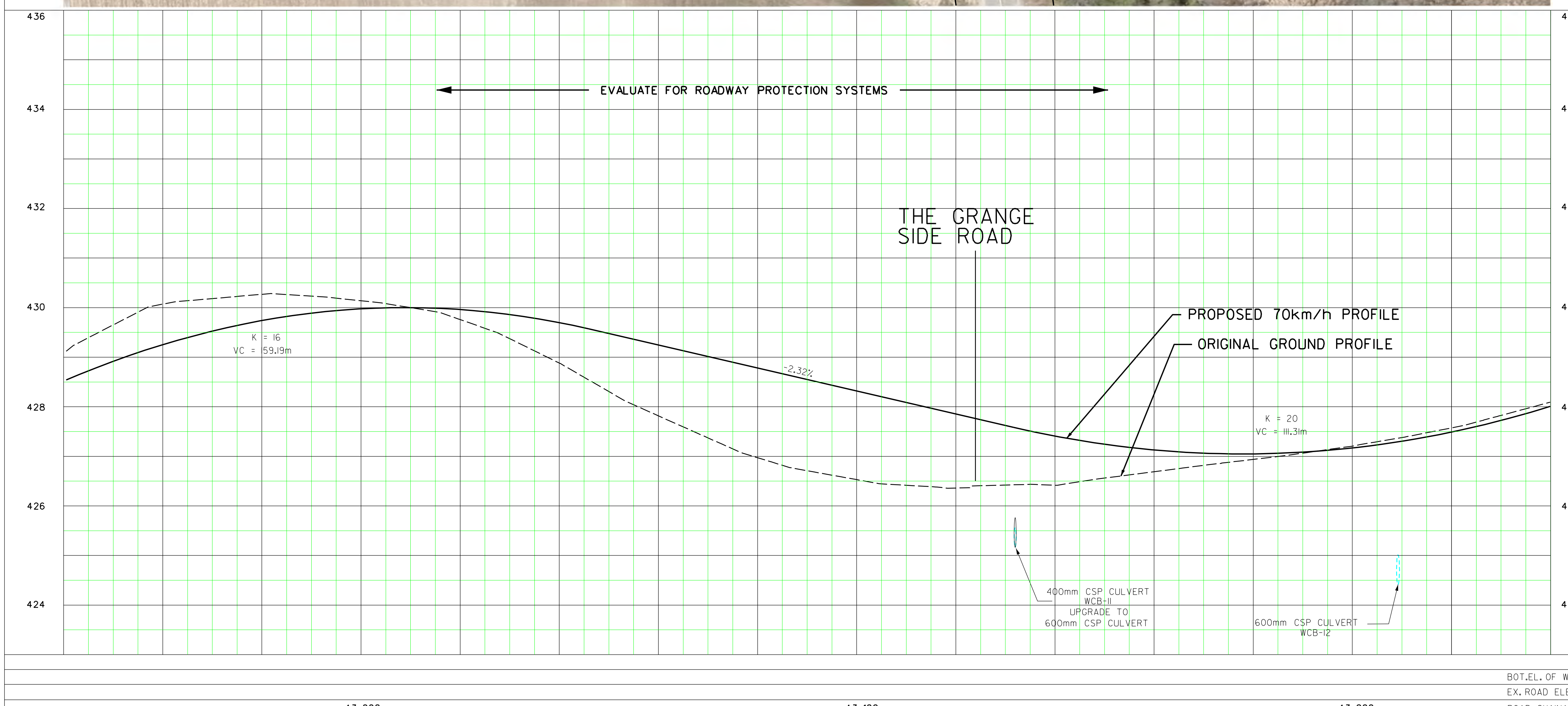
WINSTON CHURCHILL BOULEVARD

(FROM STA 42+640 to STA 42+940)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 10 of 21	Plan No. -D



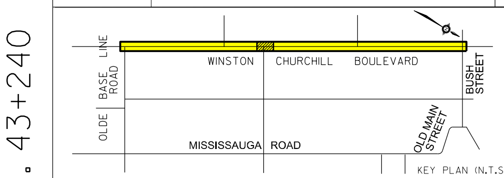


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
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- PROPOSED CATCHBASIN
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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

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BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
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ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

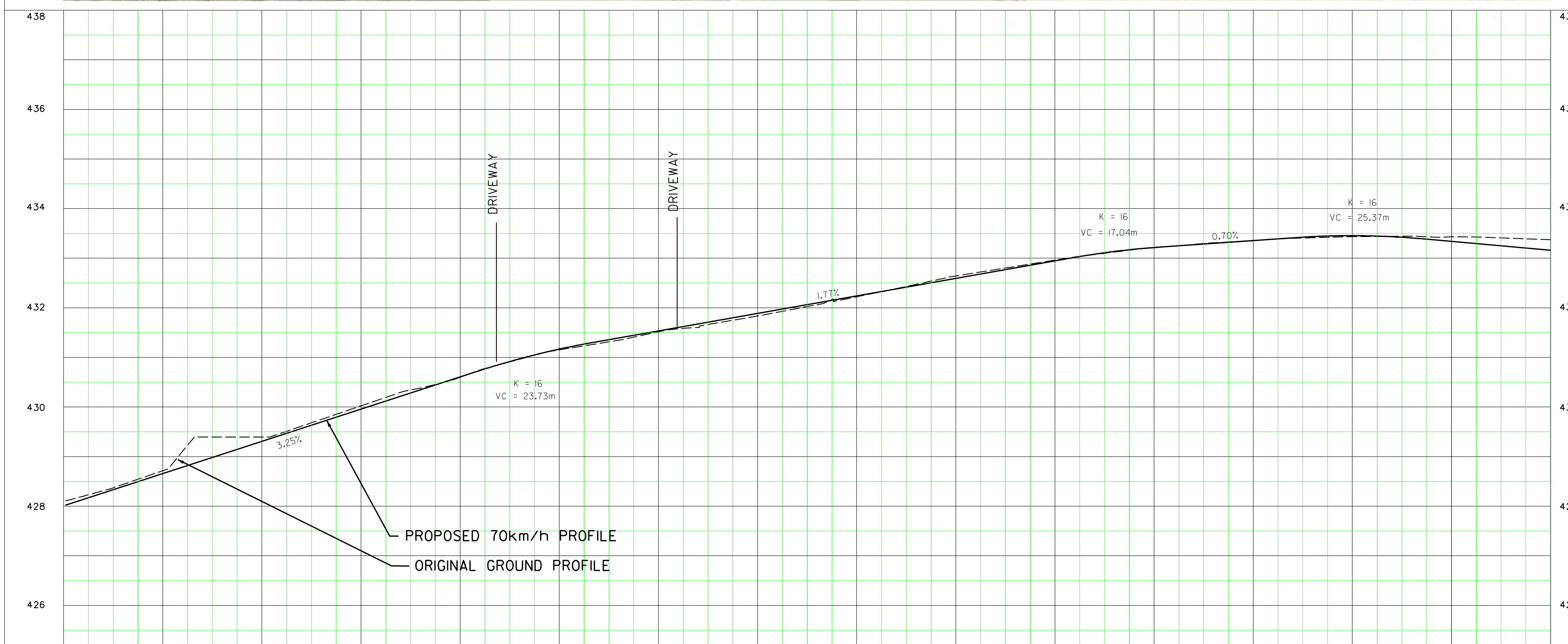
Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 42+940 to STA 43+240)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 11 of 21	Plan No. -D



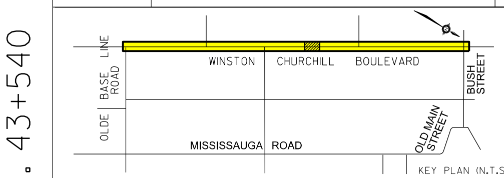
BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	43+300 43+400 43+500

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

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- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
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ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
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HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 43+240 to STA 43+540)

NEW CONSTRUCTION

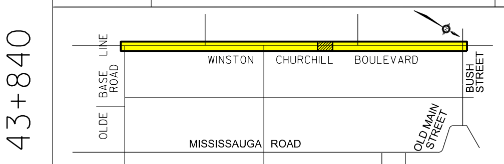
CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 12 of 21	Plan No. -D

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

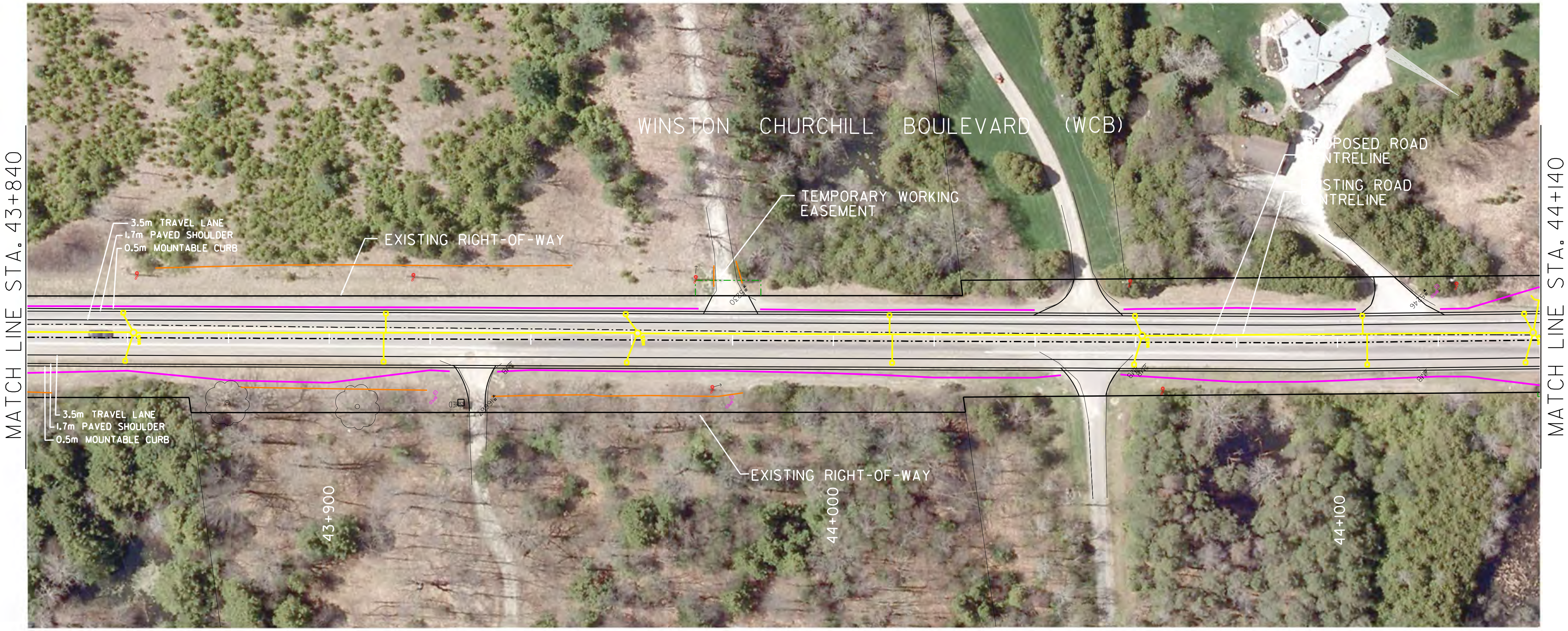
Region of Peel
Working for you

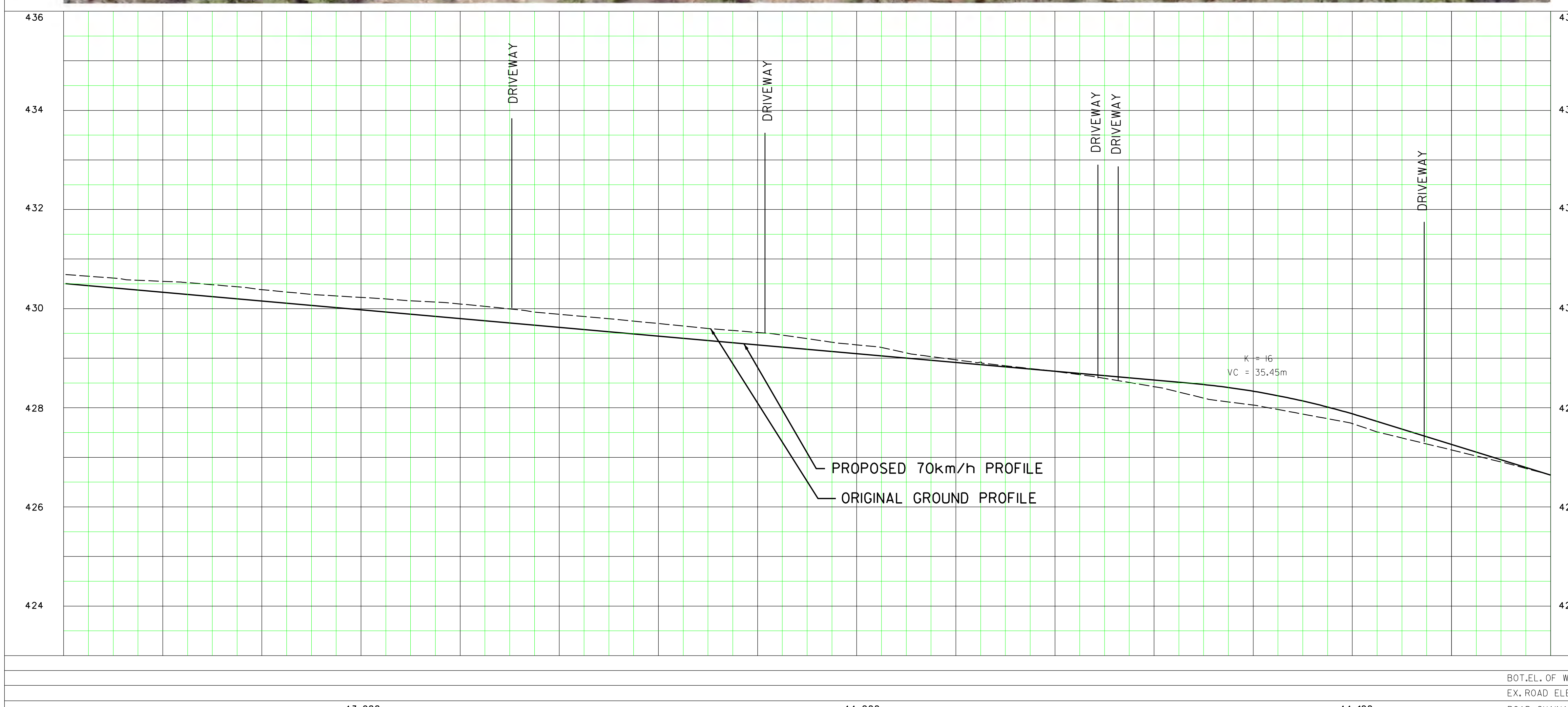
WINSTON CHURCHILL BOULEVARD

(FROM STA 43+540 to STA 43+840)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 13 of 21	Plan No. -D



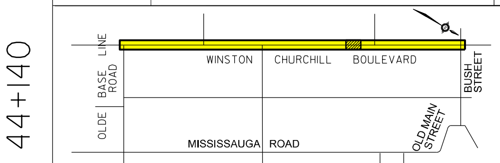


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES
1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
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5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

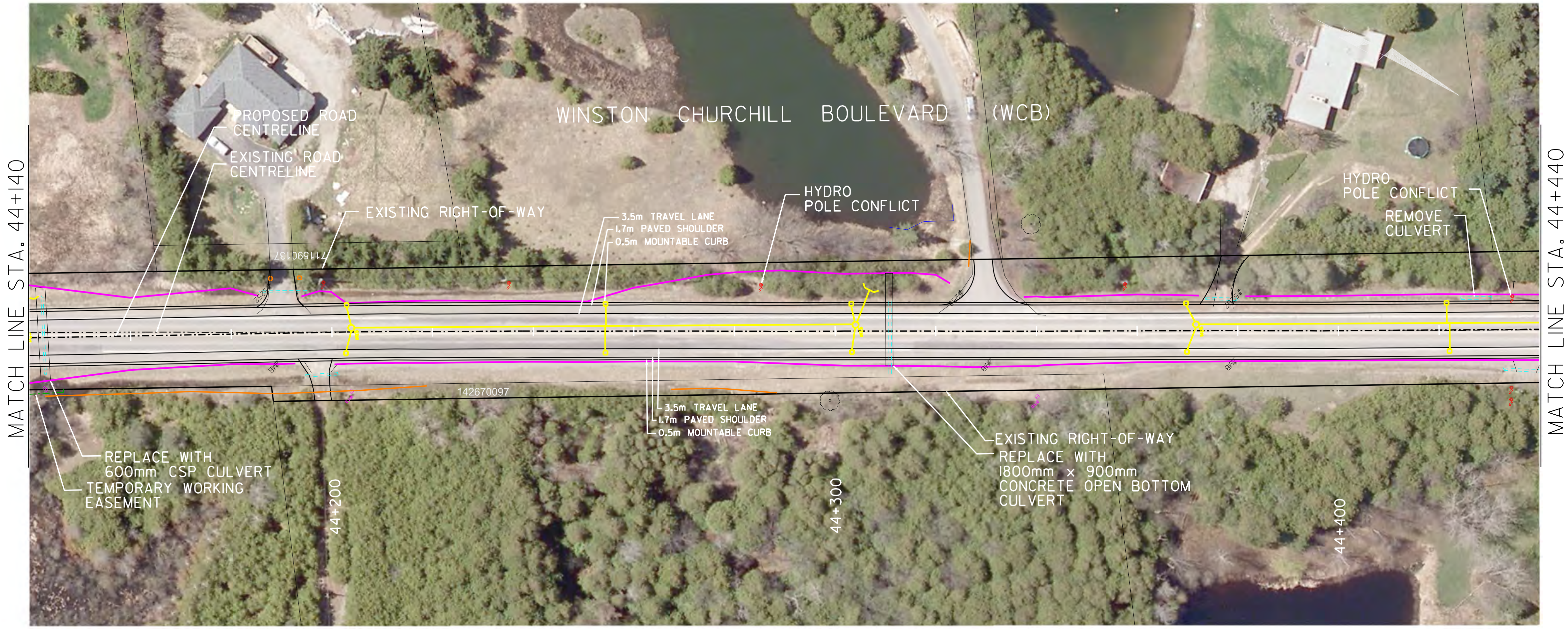
Region of Peel
Working for you

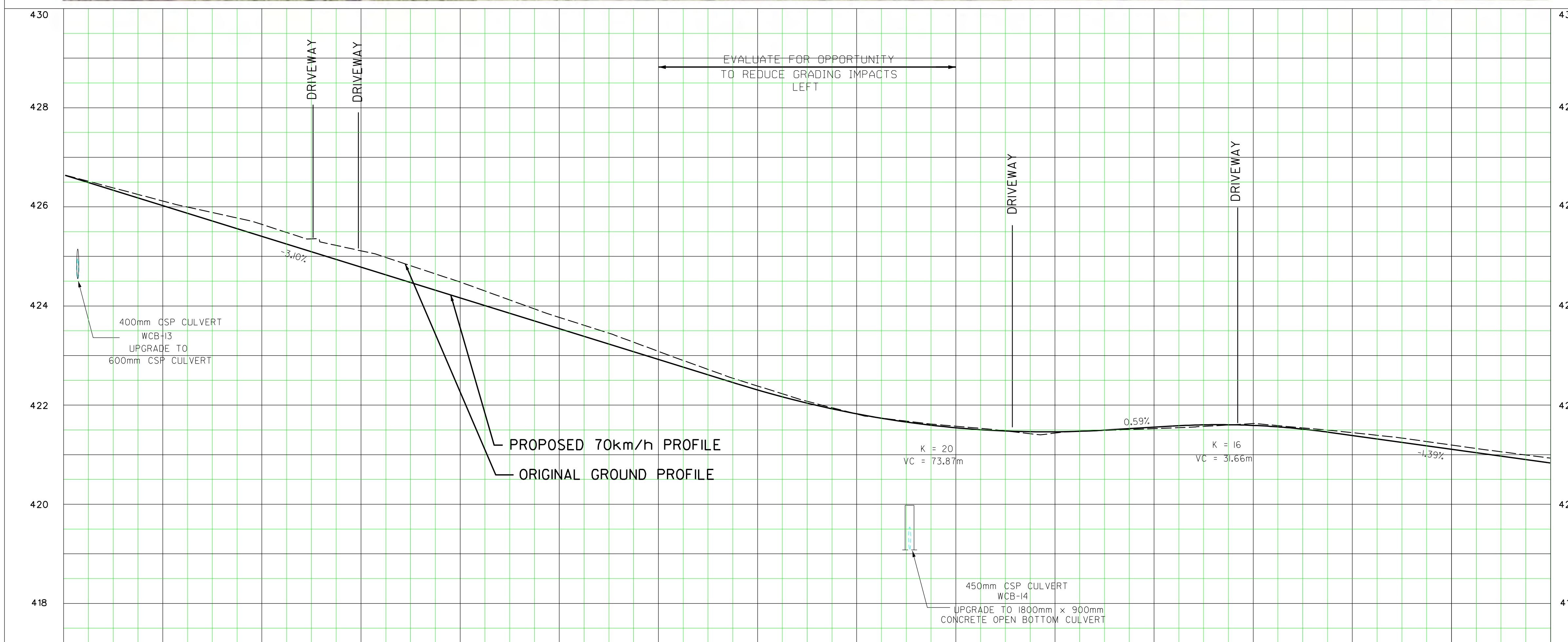
WINSTON CHURCHILL BOULEVARD

(FROM STA 43+840 to STA 44+140)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 14 of 21	Plan No. -D





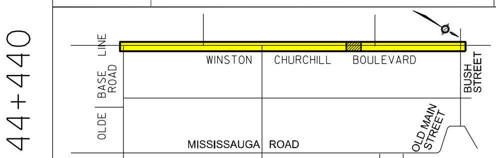
BOT.EL. OF WM.			
EX. ROAD ELEV.			
ROAD CHAINAGE	44+200	44+300	44+400

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
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- HP HYDRO POLE
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Designed by
Chkd.

Approved by

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ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

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PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE
1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 44+140 to STA 44+440)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 15 of 21	Plan No. -D

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
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WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
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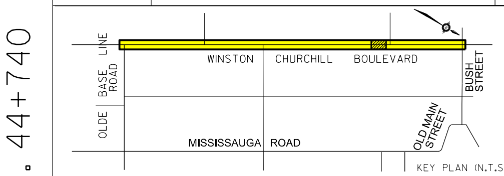
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



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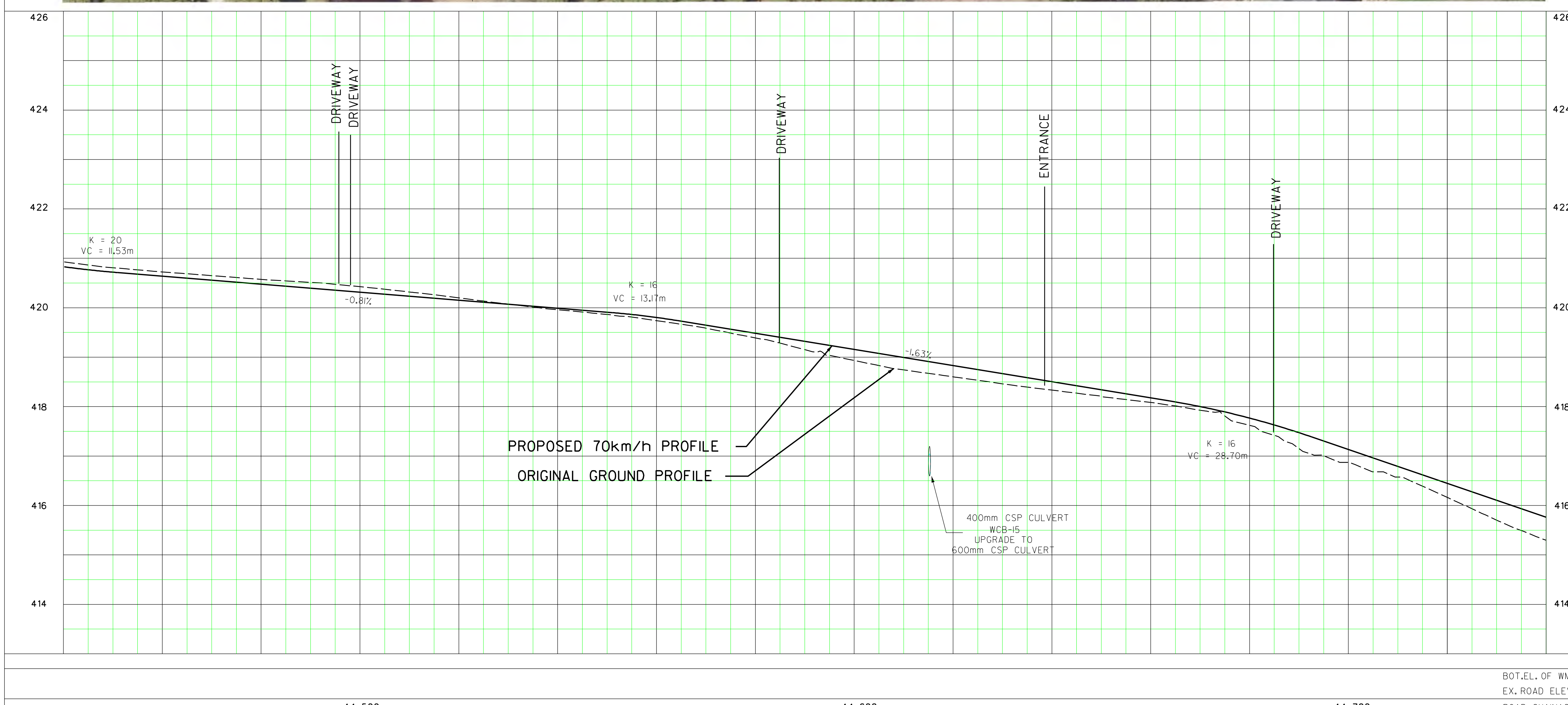

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Approved by ____ ____ ____ ____ ____

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10m 0 10 20 30m HORIZONTAL SCALE

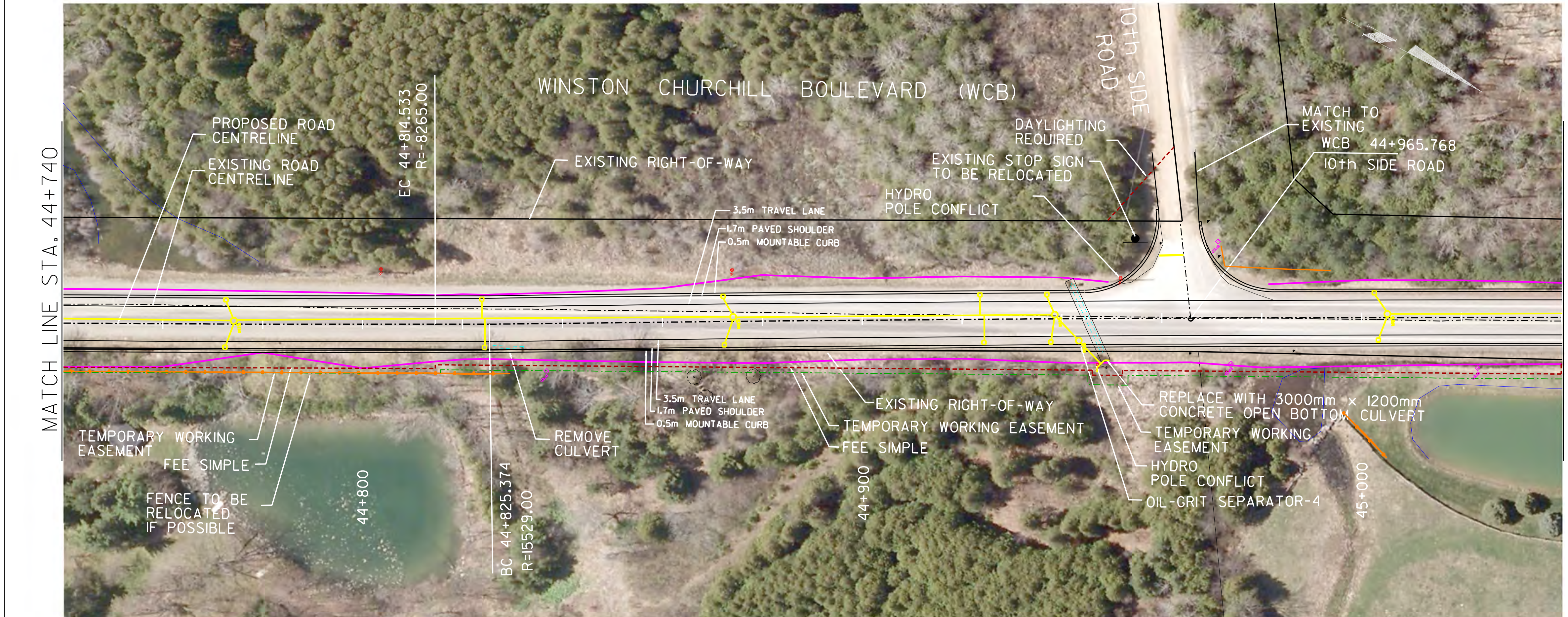
1m 0 1 2 3m VERTICAL SCALE

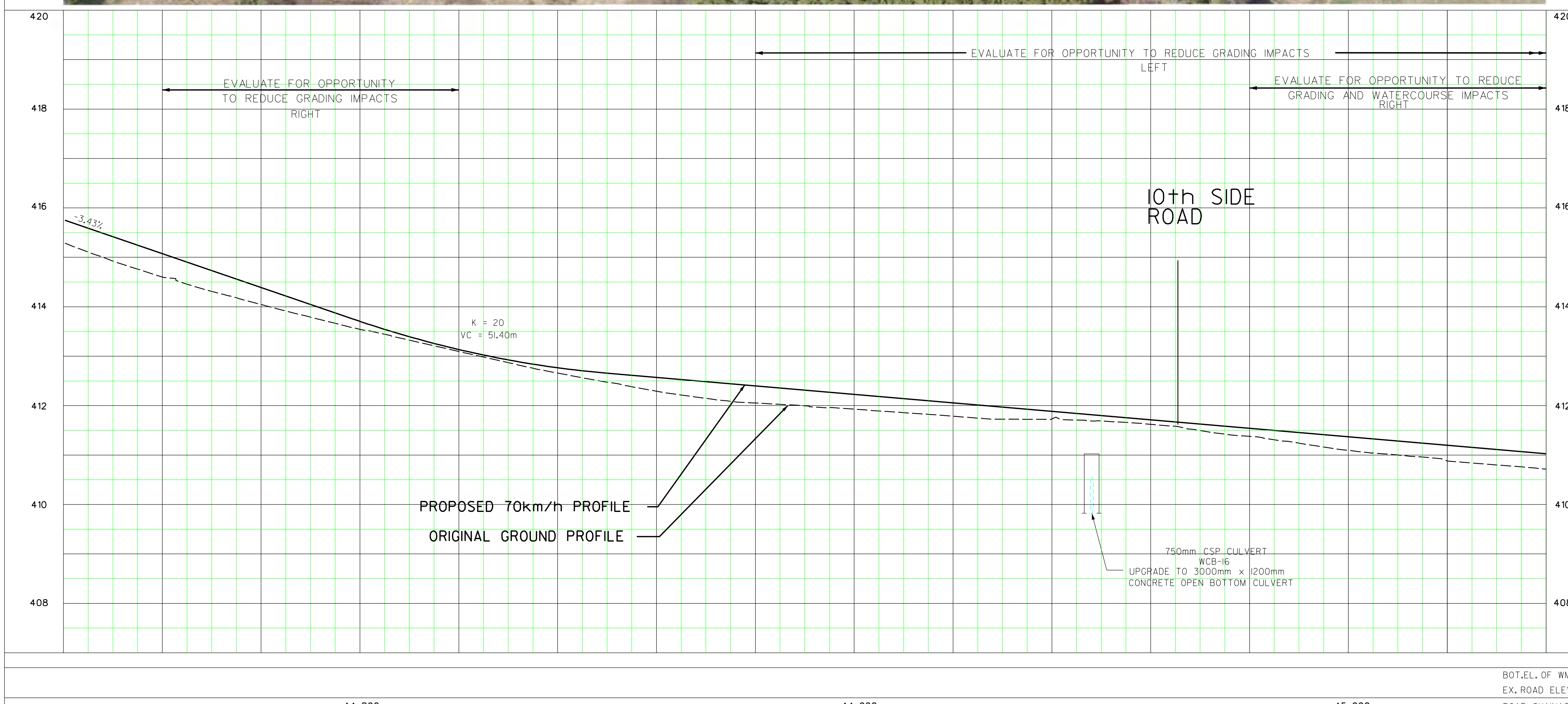
Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD
(FROM STA 44+440 to STA 44+740)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 16 of 21	Plan No. -D





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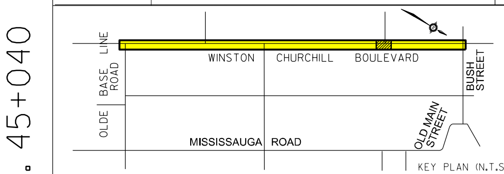
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- EXISTING RIGHT OF WAY
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- EXISTING CULVERT
- DITCH GRADING
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- PROPOSED CATCHBASIN
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ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

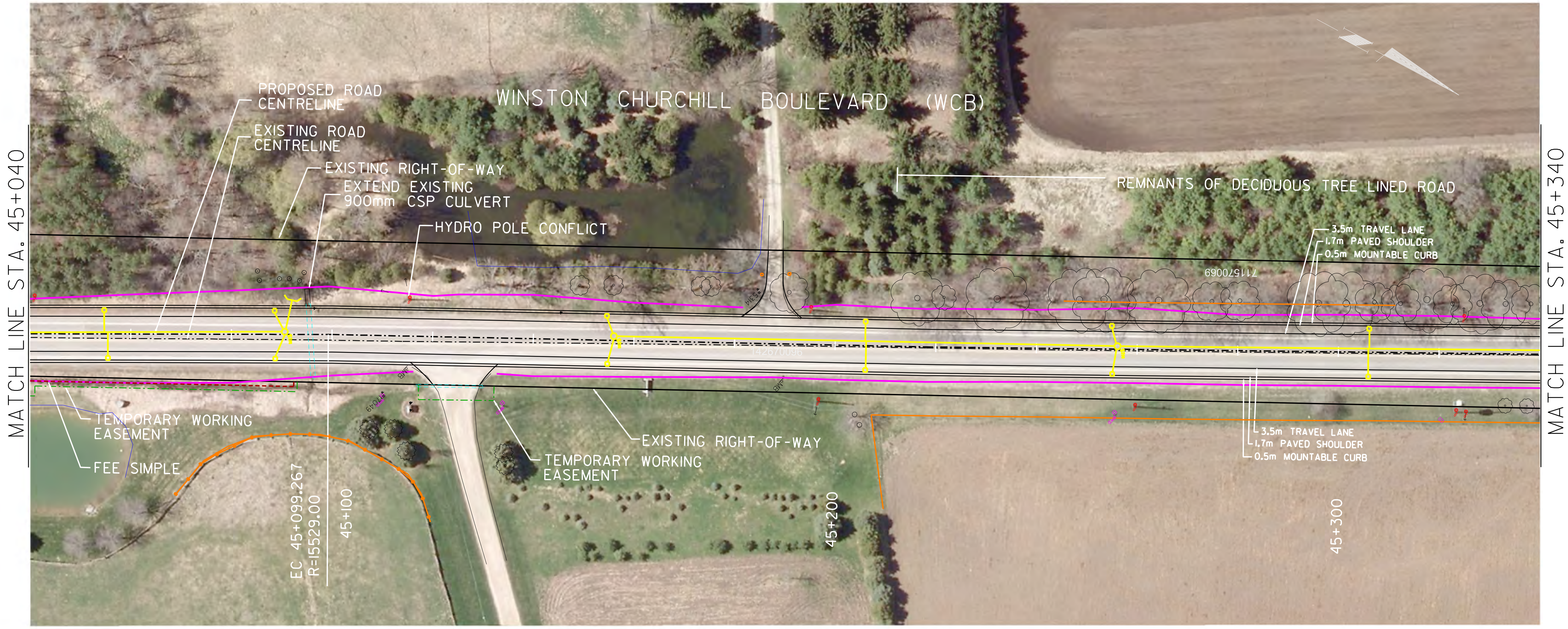
Region of Peel
Working for you

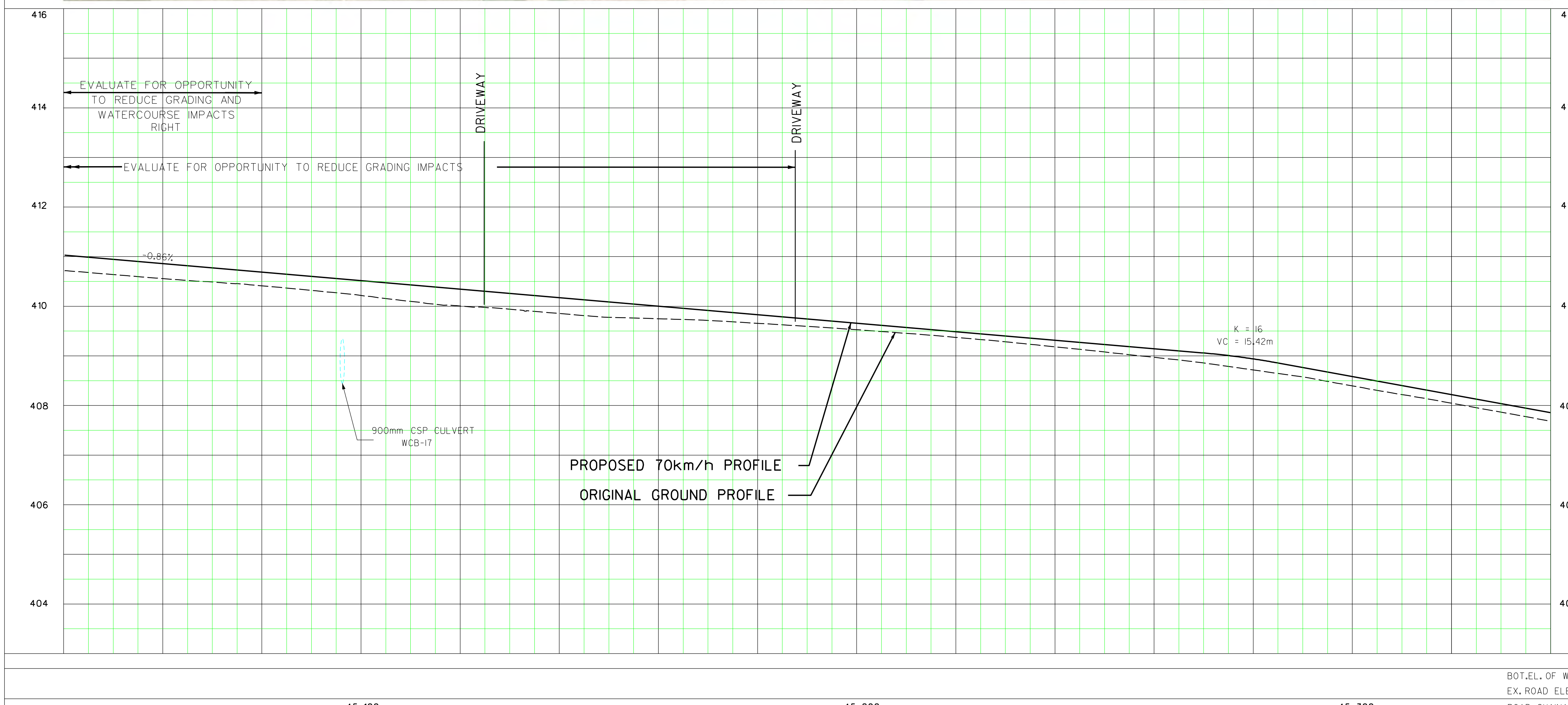
WINSTON CHURCHILL BOULEVARD

(FROM STA 44+740 to STA 45+040)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 17 of 21	Plan No. -D





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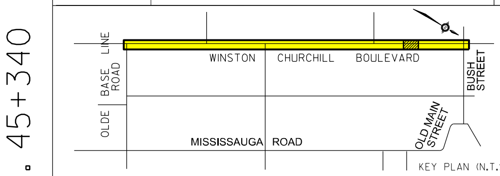
REVISIONS

DATE	DETAILS	INIT.



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10m 0 10 20 30m HORIZONTAL SCALE

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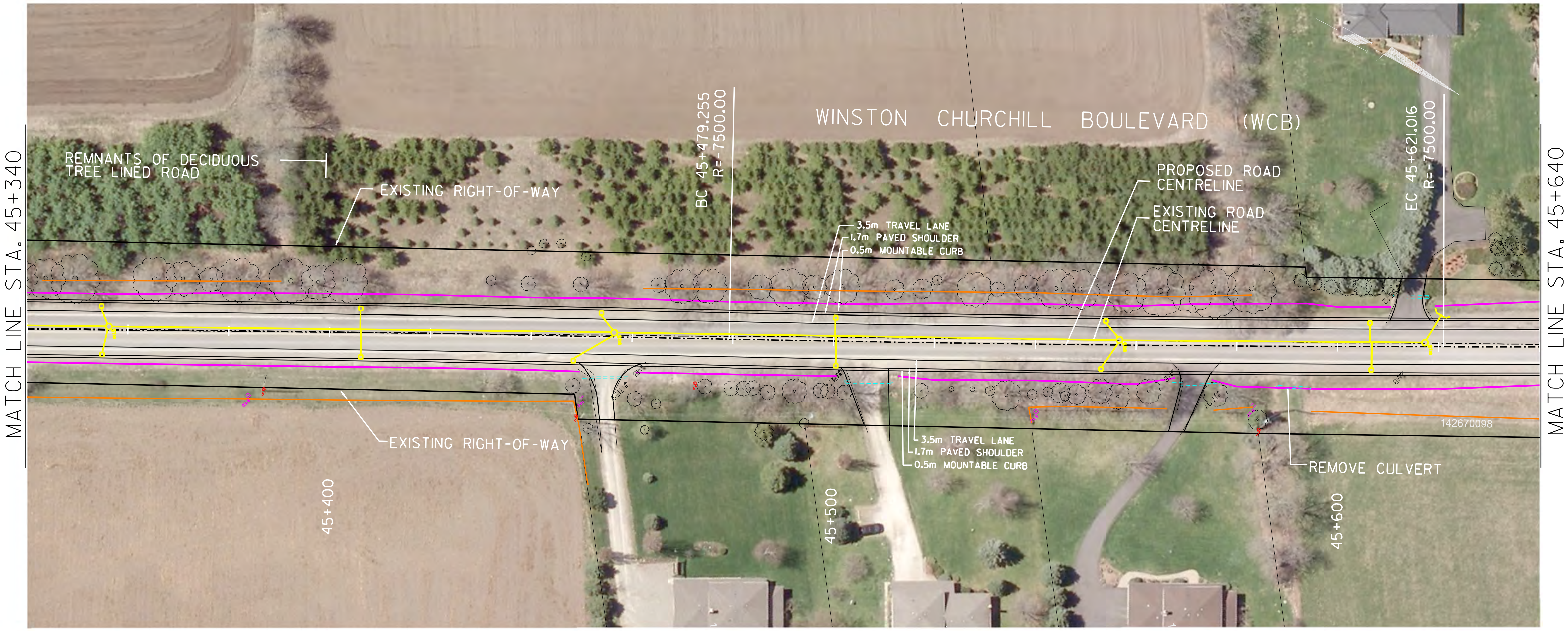
Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 45+040 to STA 45+340)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 18 of 21	Plan No. -D



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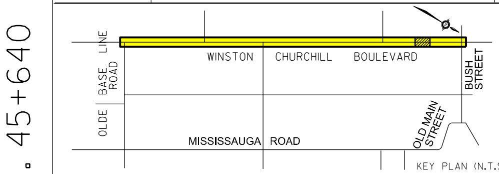
REVISIONS

DATE	DETAILS	INIT.



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- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR
48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE
1m 0 1 2 3m VERTICAL SCALE

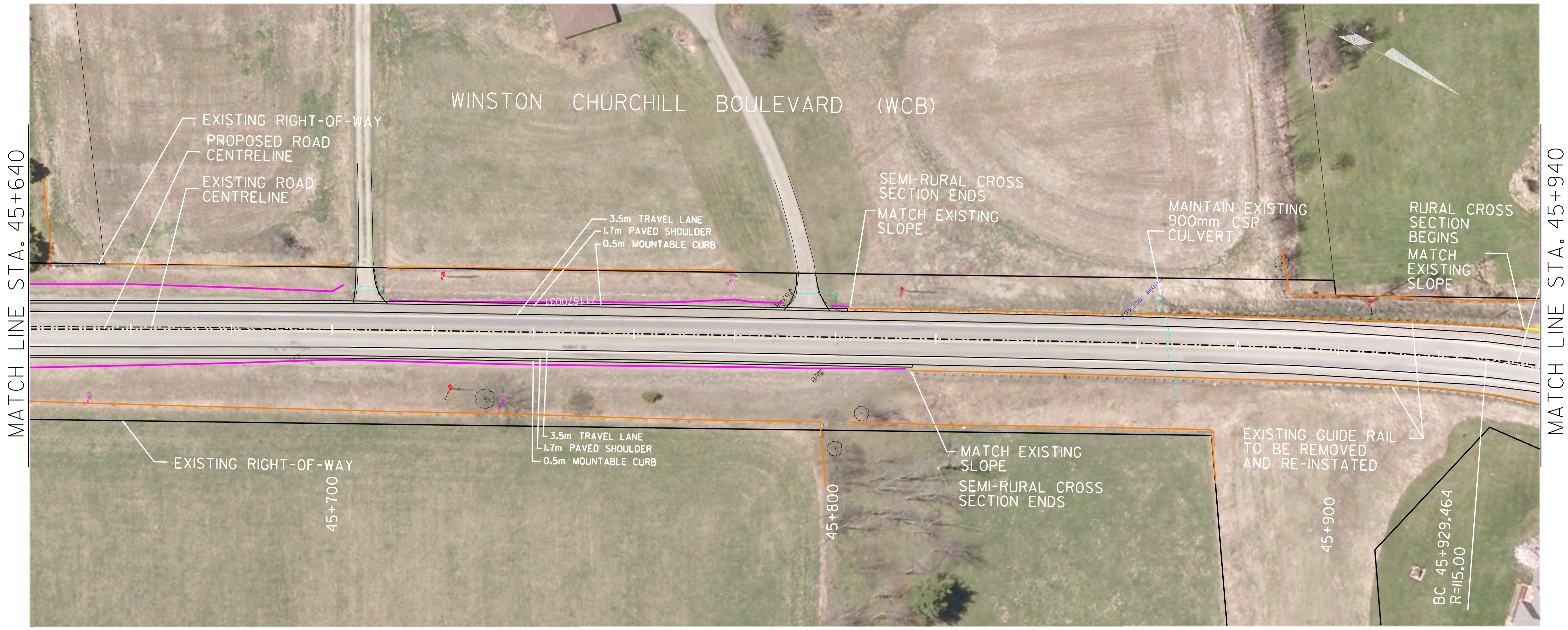
Region of Peel
Working for you

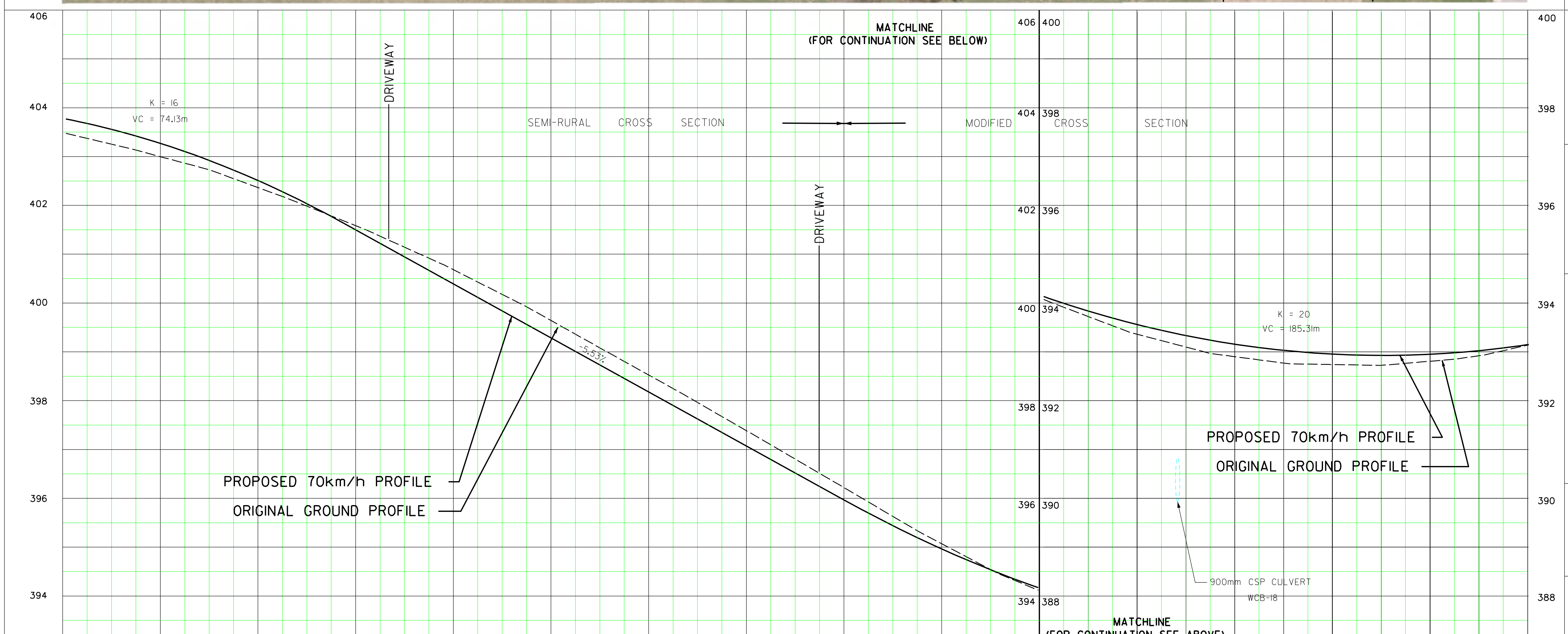
WINSTON CHURCHILL BOULEVARD

(FROM STA 45+340 to STA 45+640)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 19 of 21	Plan No. -D





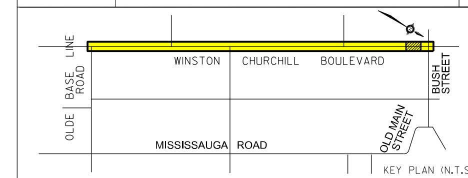
	45+700	45+800	45+900
BOT.EL. OF WM.			
EX. ROAD ELEV.			
ROAD CHAINAGE	45+700	45+800	45+900

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

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Designed by	Approved by
Chkd.	

NOTICE TO CONTRACTOR

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THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
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HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

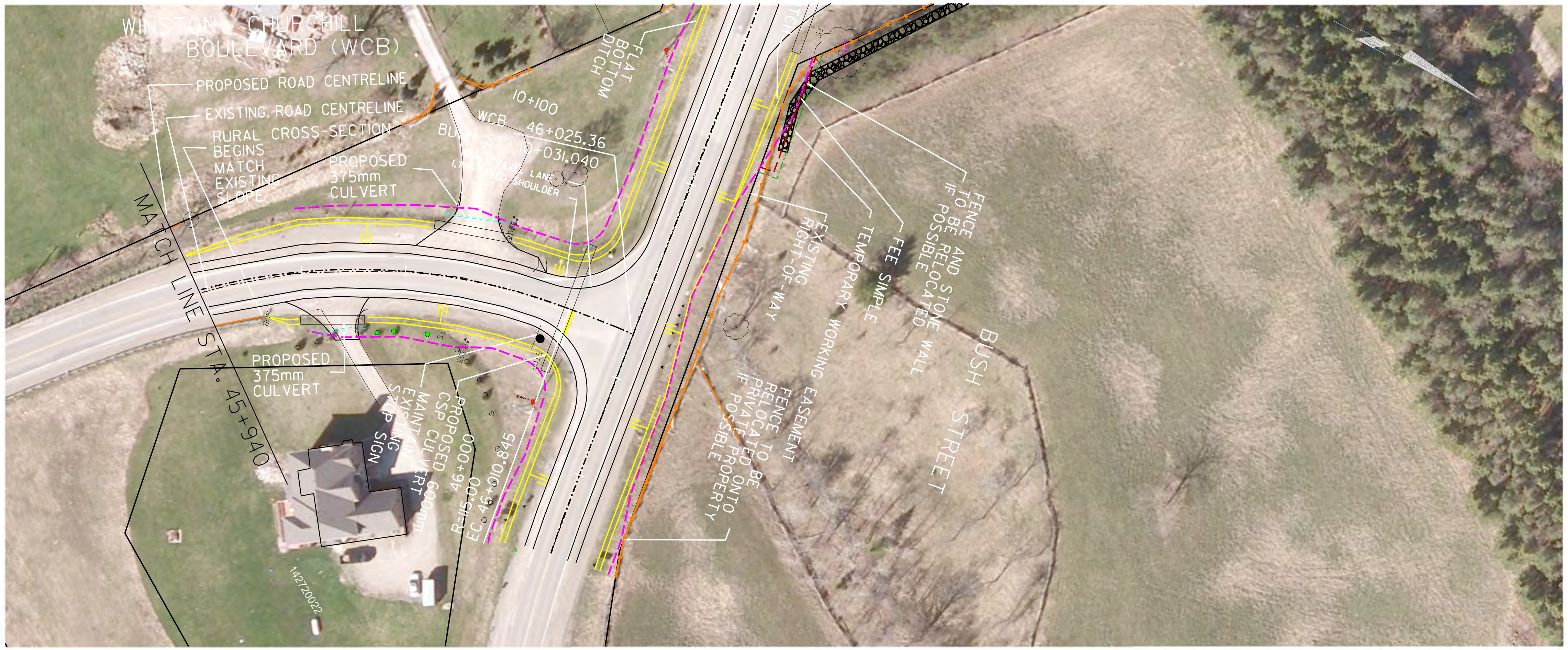
Region of Peel
Working for you

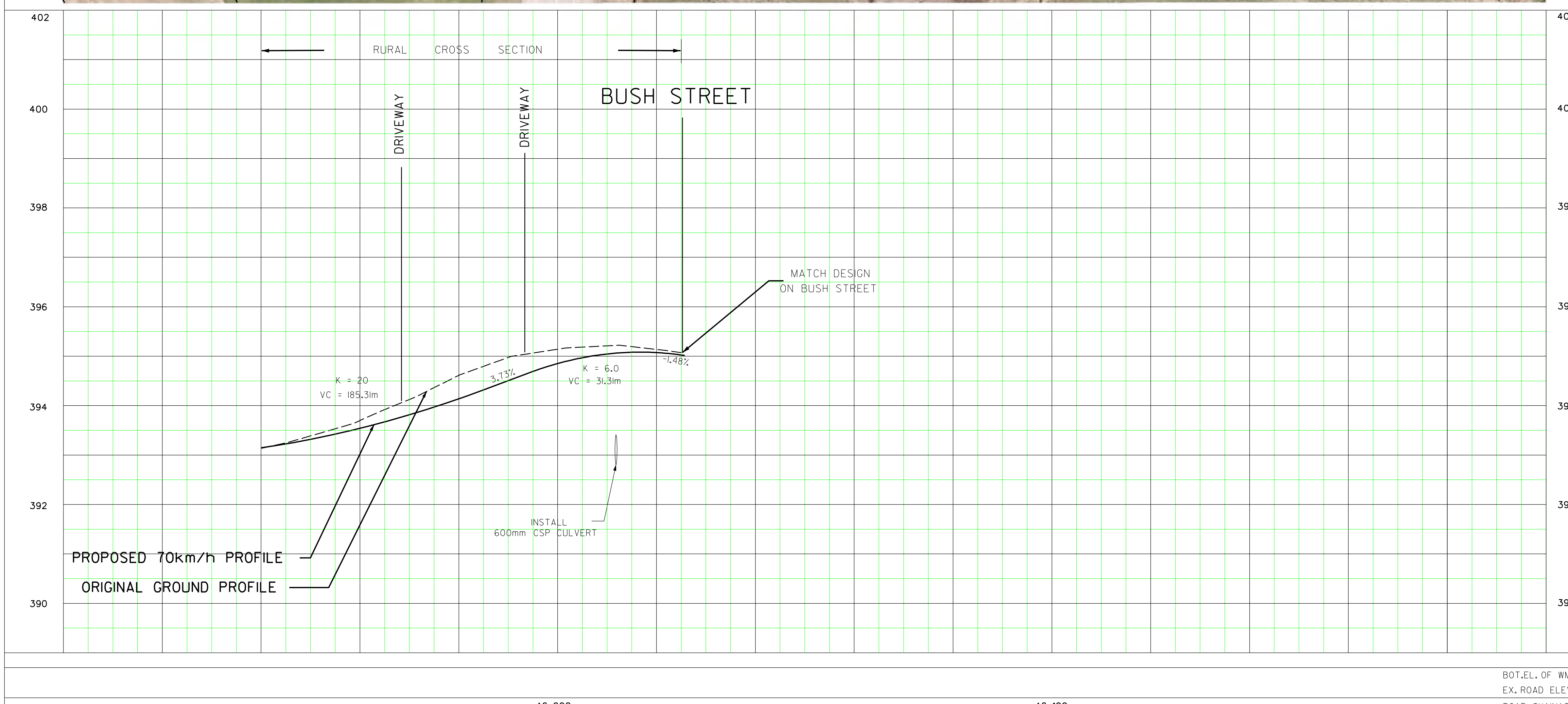
WINSTON CHURCHILL BOULEVARD

(FROM STA 45+640 to STA 45+940)

NEW CONSTRUCTION

CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 20 of 21	Plan No. -D





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
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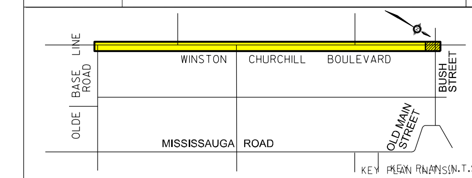
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
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Approved by ____ ____ ____ ____ ____

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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

WINSTON CHURCHILL BOULEVARD

(FROM STA 45+940 to STA 46+025)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 21 of 21	Plan No. -D

6.3 Impacts and Mitigation

The proposed cross-section, horizontal and vertical alignment designs aim to minimize impacts to adjacent lands and features, including naturally sensitive areas, vegetation, culturally significant fences and stone walls, buildings, and properties outside the road right-of-way. However, in order to accommodate all road users and bring the road up to standards for its role and function within the Regional road network, some impacts will need to be mitigated, as described in the following section.

6.3.1 Summary of Identified Concerns and Mitigation Measures

Impacts along Winston Churchill Boulevard (as identified in the preliminary design plates in **Section 6.2.8**) and potential mitigation measures include:

- Grading impacts along the corridor can be mitigated by modifying the grading slope (in accordance with geotechnical recommendations), or in some cases considering a retaining wall or other type of soil retention feature.
- Impacts to sensitive natural lands and features, including wetlands, have been mitigated by realigning the road centreline at some locations, and using a semi-rural cross-section to reduce the grading footprint. Tree removals will be required at various locations. In some cases, grading can be modified to minimize impacts and reduce the number of tree removals. Natural environment impacts and recommended mitigation measures are summarized in **Table 31**. Additional details are included in Natural Heritage report (**Appendix B**).
- Where impacts to cedar rail fencing (also referred to as culturally significant fencing) and heritage stone walls, the following recommendations should be considered, in order of preference:
  - Where technically possible, make further adjustments to the profile, cross-section and grading limits of the proposed road improvements to avoid directly impacting the cedar rail fencing and the heritage stone walls.
  - If direct impacts are unavoidable, document and relocate cedar rail fencing and heritage stone walls further back on to the property in advance of construction activities. Prior to relocation, these resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a relocation plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to relocate and re-use the resource.
  - Where relocation is not possible for structural or other technical reasons, document and salvage cedar rail fencing and heritage stone walls in advance of construction activities. These resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a salvage plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to salvage the resource.
  - Complete a cultural heritage landscape documentation report to document the roadscapes in advance of construction activities.

- In cases where cultural heritage resources are subject to indirect impacts, appropriate mitigation measures may include the introduction of landscape designs and vegetative elements to screen the disruptive aspects of the proposed road improvements.
- The extent of impacts to particular sections of cedar and stone fence lines will require further review during detailed design. This is a result of insufficient data regarding the exact location of these fence lines, therefore making it difficult to provide a detailed impact assessment at this stage. The following cedar fence lines and stone fence lines shall be reviewed by a qualified cultural heritage consultant at the earliest stage possible during detailed design to determine level of impact and to develop appropriate mitigation measures at that time:
  - Station 42+800 – 43+100 (west side)
- Where features such as private signs, fences, etc. encroach onto the road right-of-way, they should be relocated onto private property, if possible. If further assessment determines that it is not feasible to relocate the features, an encroachment agreement with the Region would be required.
- Some traffic signs and bollards will need to be relocated, as described in **Section 6.2.7**.
- Some hydro poles are currently located within or in close proximity to the proposed road platform and will need to be relocated. Clearance zone requirements and utility guidelines should be followed. Hydro pole conflicts identified in the design plates are to be confirmed during detailed design. Permanent aerial easements and potential vegetation removals as a result of hydro pole relocation are to be identified through the development of utility relocation design.
- Property acquisition will be required at some locations, as described in **Section 6.3.2**. In some cases, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations), or considering a retaining wall or other type of soil retention feature to minimize the amount of property acquisition required.
- Where driveways are to be regraded to accommodate vertical profile and cross-section modifications, temporary working easements will be required and are to be confirmed during detailed design.
- During detailed design, opportunities to reduce grading and watercourse impacts (such as realignment of the road centreline, reducing profile adjustments, channel realignment, retaining walls or other types of soil retention features, etc.) should be considered at the following locations:
  - Between Station 41+880 and 42+230 (east and west sides)
  - Between Station 44+260 and 44+320 (west side)
  - Between Station 44+760 and 44+820 (east side)
  - Between Station 44+880 and 45+190 (west side)
  - Between Station 44+980 and 45+080 (east side)
- Due to insufficient survey coverage, the extent of impacts and potential mitigation measures at the following locations will require further review during detailed design:
  - Station 43+050 – 43+125 (west side)
  - The Grange Side Road intersection
- If construction extends beyond the disturbed ROW, a Stage 2 archaeological assessment is recommended on any lands along the study corridor where there is potential for

archaeological sites (as identified in **Appendix C.1)**, in accordance with Draft Standards and Guidelines for Consultant Archaeologists (MCL 2009).

- Should the proposed work extend beyond the current study area, further Stage 1 assessment must be conducted to determine archaeological potential of the surrounding lands.
- In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.
- No permanent noise and air quality impacts are anticipated as a result of the proposed road improvements, as no additional travel lanes will be provided and traffic is not expected to increase significantly. During construction, best management practices (such as the application of non-chloride dust suppressants) are to be applied to mitigate any air quality impacts caused by construction dust.
- If soil removed during construction is determined to be contaminated, the disposal of contaminated soil is to be consistent with Part XV.1 of the Environmental Protection Act and Ontario Regulation 153/04, Records of Site Condition, which detail the requirements related to site assessment and clean up.
- Water supply wells within or in close proximity to the study area may be affected by road construction, either because of construction activities or, later, due to additional or more proximate road salt application. Prior to construction, it is recommended to confirm which wells are used domestically, to ensure that affected well owners will continue to have water supplies of appropriate quality and in adequate quantities, and to ensure that any work done on affected wells or any replacement wells is done pursuant to O. Reg. 903, Wells (pursuant to the Ontario Water Resources Act).

All of these impacts and potential mitigation measures are to be confirmed during detailed design. Temporary construction impacts should also be reviewed and confirmed during detailed design.

Table 31: Summary of Natural Heritage Impacts and Recommended Mitigation – Winston Churchill Boulevard

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Vegetation/habitat removal	▪ The majority of areas to be directly impacted by site grading and vegetation removal are culturally influenced. No encroachment into Significant Woodlands are anticipated. ▪ Grading limits should be maintained outside of tree driplines to the extent feasible. ▪ Tree protection measures will be implemented as detailed within a Tree Management Plan to be developed during the detailed design stage. ▪ Restoration/enhancement plantings along adjacent natural feature boundaries will help mitigate and buffer negative impacts associated with the proposed undertaking. ▪ Road grading limits should be maintained outside of wetland boundaries, such as through the use of retaining walls. ▪ Protective fencing should be established around regionally significant plant species during construction to avoid impacts; where avoidance is not possible, regionally significant plant species should be relocated to suitable areas of habitat restoration, where feasible. All transplanted individuals must be monitored prior to at least one year prior to their relocation to ensure proper re-establishment.	▪ No significant impact	▪ Detailed tree inventory and protection measures to be determined as part of a Tree Management Plan ▪ Visual impact assessment to be undertaken, where necessary, to evaluate the impact of vegetation removal. ▪ Vegetation Restoration Planting Plan and/or Woodland Edge Management Plan to be developed ▪ Detailed three-season surveys are to be completed during the detailed design stage to identify and map regionally significant plant species within the study area. ▪ Tree inventory work completed during Detailed Design should include inventories for snags and cavity trees to assess potential for impacts to Little Brown Myotis habitat. ▪ Follow-up surveys should be implemented to verify the presence of, and potential for impact to the following Candidate Significant Wildlife Habitat types: • Snake hibernacula • Bat maternal roosts • Habitat for significant odonate species ▪ Wetland boundaries to be accurately mapped and reviewed by agencies, where they occur adjacent to proposed road construction limits
Amphibian road mortality and habitat fragmentation	▪ Road signs alerting motorists to the potential for amphibian crossings should be considered at significant amphibian crossing locations along the study area ROW.	▪ No significant impact	▪ Appropriate road sign locations to be determined in consultation with agencies, municipality
Deer/motor vehicle collisions	▪ Seasonally-flashing deer crossing signs, larger than the standard existing signs, should be installed at the east and west approaches of each high-density deer crossing location. ▪ Recommended lowered speed limits should be effectively enforced. ▪ Snow banks should be removed by snow plows in winter to increase visibility for both crossing deer and motorists. ▪ An increase in the annual sustainable deer hunt for the study area vicinity should be explored with OMNR as a means to control local deer populations.	▪ No significant impact	▪ Appropriate road sign locations to be determined in consultation with agencies, municipality
Impacts to Fish and Fish Habitat	▪ Concrete open-bottom culverts and/or increases in the diameter of replacement culverts have been recommended. ▪ All in-water work should occur during dry and/or low flow conditions to avoid or minimize impact to fish and fish habitat within and downstream of the construction site. ▪ Specific timing windows are to be determined in consultation with the OMNR and DFO. ▪ Where feasible, culvert replacements should comprise arch/open bottom culverts to provide better fish habitat, connectivity, and improve the potential for groundwater inputs. ▪ Where impacts to fish and fish habitat may occur, a DFO Fisheries Act Authorization may be required. ▪ Any fish that may be caught within areas impounded and de-watered for in-water construction activities should be captured and relocated prior to construction.	▪ No significant impact	▪ Where necessary, fish and wildlife salvage plans should be created for watercourse areas to be de-watered for in-water construction work.
Bird nesting disruption and avoidance, and active nest destruction	▪ Time vegetation removal activities to occur outside the typical bird breeding season (May 1 – July 31) ▪ If vegetation removal must occur during the bird breeding season, retain an avian biologist to survey for active nests just prior to vegetation removal activities	▪ No significant impact	
Wildlife avoidance of the area, and other impacts associated with construction	▪ Restrict the daily timing of construction activities to between 7:00 am and 7:00 pm. ▪ Moisten bare dirt surfaces with water to limit impacts caused by dust. ▪ Direct night-time lighting away from adjacent natural features.	▪ No significant impact	

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
	▪ These construction-related impacts are expected to be temporary, minimal and localized.		
Damage or other disturbance to the adjacent natural features	▪ Clearly demarcate the limits of construction with silt fencing or brightly coloured snow fencing around the limits of the construction zone.	▪ No significant impact	
Erosion and sedimentation	▪ A Sediment and Erosion Control Plan should be developed and implemented. ▪ Install silt fencing along the boundaries of the construction zone, inspect on a regular basis, remove accumulated sediment as needed and immediately replace any damaged fencing. ▪ Construction activities should be timed to occur outside of seasonally wet periods, during heavy rain, or during periods of rapid snowmelt.	▪ No significant impact	▪ Sediment and Erosion Control Plan to be developed.
Alterations to hydrological regime of watercourses and wetlands	▪ Increased stormwater runoff associated with increased areas of impervious surface are not anticipated to cause significant increases to natural feature hydrological inputs, due to the relatively small hydrological contributions provided by road surfaces versus surrounding areas of catchment. ▪ Replacement culverts must be properly sized to prevent increases or decreases in hydrological flow to wetland features, particularly those wetlands that provide significant habitat for Jefferson salamander, western chorus frog, or where they provide significant amphibian breeding habitat. ▪ Any upgrades to culverts that provide flow between wetlands will be maintained at existing culvert invert elevations in order to maintain wetland levels. ▪ In semi-rural sections where subsurface drainage systems are proposed, the incorporation of trench plugs will be required to minimize groundwater interception. These should be employed in the vicinity of all wetlands.	▪ No significant impact	
Impacts to water quality of watercourses and wetlands	▪ Treatment trains comprising OGS units and grassed swales are designed to provide an Enhanced (Level 1) level of water quality treatment to intercepted stormwater runoff. ▪ Where only one component (OGS unit or grassed swale) has been proposed, water quality improvements are anticipated over existing conditions. ▪ Treated pavement area significantly exceeds the area of new pavement proposed for the study area, representing a 101% increase in treated pavement area. ▪ At a minimum, the most sensitive natural features (i.e., PSWs, including Jefferson salamander breeding habitat, fish habitat) should receive an Enhanced level of water quality treatment. ▪ Construction machinery should arrive on-site in a clean state and should be refueled and washed at least 30 m away from permanent watercourses or wetlands. ▪ A Spill Response Plan should be developed and implemented as necessary during site construction. ▪ Water removal required for in-water construction de-watering purposes must be adequately filtered prior to discharge into the receiving watercourse, and monitored for pertinent water quality parameters, following established protocols and standards.	▪ No significant impact	▪ A water quality monitoring program may be considered within the framework of a Post-Construction Monitoring Program to be determined in consultation with the applicable agencies

6.3.2 Property Requirements

The proposed design attempts to minimize property requirements. Potential property acquisition (fee simple takings) and temporary working easements as a result of the proposed design are shown on the plates and summarized in **Table 32**. Although the Region of Peel Official Plan identifies wider designated right-of way widths at some locations, property acquisition as a result of the proposed design is only identified where required for the proposed improvements. Temporary working easements are based on a 1 metre buffer around grading, and 2.5 metre buffer around culverts and storm sewers.

Table 32: Potential Property Acquisition along Winston Churchill Boulevard

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
North-east corner of Olde Base Line Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
Station 40+478 to 40+486 (west side, culvert)		5 m^2
Station 40+661 to 40+669 (west side, culvert)		5 m^2
Station 40+806 to 40+812 (west side, driveway)		15 m^2
Station 40+843 to 40+851 (east side, driveway)		25 m^2
Station 40+861 to 40+871 (east side, culvert)		15 m^2
Station 41+041 to 41+048 (west side, driveway)		35 m^2
Station 41+107 to 41+115 (west side, culvert)		5 m^2
Station 41+217 to 41+227 (west side, driveway)		50 m^2
Station 41+315 to 41+852 (west side, grading / culvert)		580 m^2
Station 41+315 to 41+852 (west side, grading)	290 m^2	
Station 41+532 to 41+541 (east side, driveway)		100 m^2
South-west corner of Sideroad 5 intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
North-west corner of Sideroad 5 intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
Station 41+901 to 41+918 (west side, grading)		25 m^2
Station 42+184 to 42+198 (west side, culvert)		20 m^2
Station 42+190 to 42+268 (east side, grading / culvert)		85 m^2
South-east corner of The Grange Side Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
North-east corner of The Grange Side Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
Station 43+725 to 43+737 (west side, driveway)		65 m^2
Station 43+972 to 43+985 (west side, driveway)		35 m^2
Station 44+140 to 44+147 (east side, culvert)		5 m^2
Station 44+552 to 45+093 (east side, grading / culvert / driveway)		1125 m^2
Station 44+552 to 45+093 (east side, grading)	1505 m^2	
South-west corner of Sideroad 10 intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
Station 45+117 to 45+132 (east side, driveway)		45 m^2

As described in **Section 6.3.1**, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations) to reduce the amount of area required, or in some cases considering a retaining wall or other type of soil retention feature. Property and easement requirements identified in this section and shown on the design plates are preliminary and are to be confirmed during detailed design.

7. OLDE BASE LINE ROAD

7.1 Identification and Evaluation of Alternative Design Concepts

This section discusses the different design alternatives considered for Olde Base Line Road between Winston Churchill Boulevard and Mississauga Road. For intersection options considered at Olde Base Line Road / Winston Churchill Boulevard and Olde Base Line Road / Mississauga Road, refer to Sections **11.1** and **11.2** respectively.

7.1.1 Olde Base Line Road Cross-Section Options

Alternative cross-section options were considered for each of the roads in the study area. Some options greatly differ from other options in terms of cross-section elements/widths and overall ROW required, while other alternatives consist of modifications to options that were considered earlier in the process to make them a more desirable alternative. Therefore, some cross-section options were screened out earlier in the process and others were only evaluated for the specific road segment where they best apply. All cross-section options considered during this study are included in **Appendix V**. The vehicle zone illustrated in the cross-sections refers to the general purpose travel lane, and the two terms are interchangeable. The most feasible options considered for Olde Base Line Road include:

- **Option 1:** Do Nothing (Existing Rural Conditions): 3.4-3.5 metre wide travel lanes and narrow unpaved shoulders (**Figure 56**)
- **Option 2:** 10 metre Platform Rural Road: 3.5 metre wide travel lane, 1.0 metre wide paved shoulder, and adequate ditches (**Figure 57**)
- **Option 3:** 11.4 metre Platform Rural Road: 3.5 metre wide travel lane, 1.7 metre wide paved shoulder, and adequate ditches (**Figure 58**)
- **Option 4:** 11.4 metre Platform Semi-Rural Road: 3.5 metre wide travel lane, 1.7 metre wide paved shoulders, 0.5 metre mountable curb, and underground infrastructure (**Figure 59**)
- **Option 5:** 10 metre Platform Semi-Rural Road: 3.5 metre wide travel lane, 1.0 metre wide grass boulevard, 0.5 metre mountable curb, and underground infrastructure (**Figure 60**)

Figure 56: Option 1 - Do Nothing Option – Existing Conditions on Olde Base Line Road

Figure 57: Option 2 - 10 m Platform Rural Option Considered for Olde Base Line Road

Figure 58: Option 3 - 11.4 m Platform Rural Option Considered for Olde Base Line Road

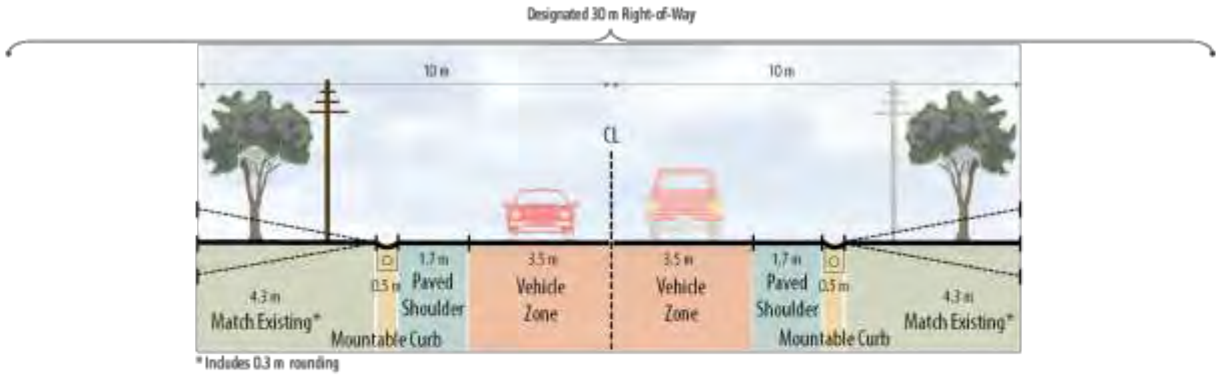


Figure 59: Option 4 - 11.4 m Platform Semi-Rural Option Considered for Olde Base Line Road

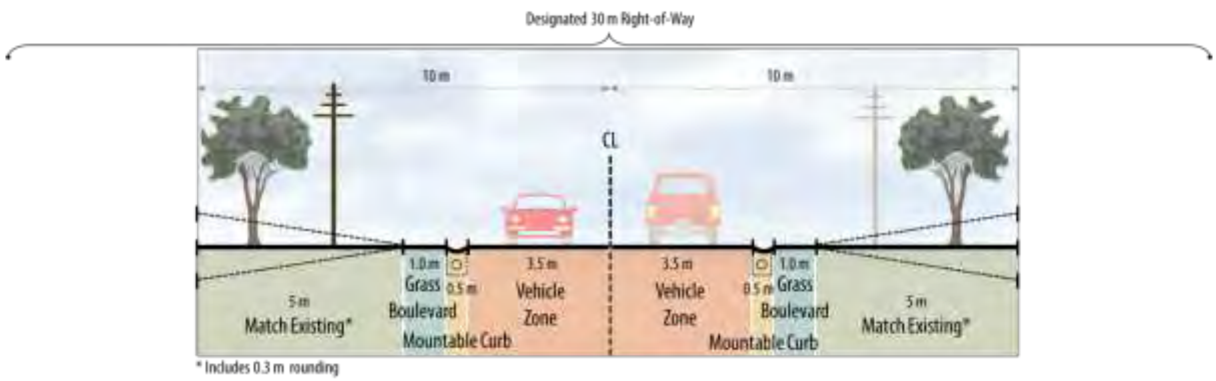


Figure 60: Option 6 - 10 m Platform Semi-Rural Option Considered for Olde Base Line Road

The evaluation for the above noted options is shown in **Table 33**.

Table 33: Olde Base Line Road Cross-Section Option Evaluation

EVALUATION CRITERIA	Olde Base Line Road Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	Option 5: 10 m Platform Semi-Rural Road	
Option Description	• 20-33 m ROW, predominantly 20-25 m • 3.4-3.5 m wide travel lane • 0.4-0.8 m wide unpaved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Rural Character						
Maintains rural character and countryside scenic quality	• Retains rural character	• Retains rural character	• Retains rural character	• Significant changes to rural character and countryside scenic quality with a more urbanized cross-section	• Significant changes to rural character and countryside scenic quality with a more urbanized cross-section	• Options 1, 2, 3 preferred
Transportation						
Geometric alignment	• N/A	• N/A	• N/A	• N/A	• N/A	• No difference
Traffic operations	• Vehicular capacity limited by all road users sharing 1 travel lane in each direction with unpaved shoulders • Conflicts between motorized vehicles and cyclists/pedestrians	• Partially reduced delays due to provision of separate paved shoulder of sub-standard width • Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder of sub-standard width	• Reduced delays due to provision of separate paved shoulder • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Reduced delays due to provision of separate paved shoulder • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Partially reduced delays due to provision of separate grass boulevard of sub-standard width • Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate grass boulevard of sub-standard width	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of motorists	• One 3.4-3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• Options 2, 3, 4, 5 preferred as travel lane width meets design standards
Accommodation of trucks	• 3.4-3.5 m paved travel lane, with narrow unpaved shoulders available, but shared with all road users • Truck restriction on Olde Base Line Road	• 3.5 m paved travel lane available • 1.0 m paved shoulder of sub-standard width provides some separation from other road users • Existing truck restriction on Olde Base Line Road to remain	• 3.5 m paved travel lane available • 1.7 m paved shoulder provides separation from other road users • Existing truck restriction on Olde Base Line Road to remain	• 3.5 m paved travel lane available • 1.7 m paved shoulder provides separation from other road users • Existing truck restriction on Olde Base Line Road to remain	• 3.5 m paved travel lane available • 1.0 m grass boulevard of sub-standard width provides some separation from other road users • Existing truck restriction on Olde Base Line Road to remain	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of farm vehicles	• 3.4-3.5 m of paved travel lane, with narrow unpaved shoulders available, but shared with all road users	• 4.5 m of pavement available, but shared with all road users • Some separation from other road users through paved shoulder of sub-standard width	• 5.2 m of pavement available, but shared with all road users • Separation from other road users through paved shoulder	• 5.7 m of pavement available, but shared with all road users • Separation from other road users through paved shoulder	• 4.0 m of pavement available, but shared with all road users • Some separation from other road users through grass boulevard of sub-standard width	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of cyclists	• No separate facility to accommodate cyclists • Cyclists share the road or use narrow unpaved shoulders where available	• 1.0 m paved shoulder of sub-standard width available • Cyclists will likely encroach on travel lanes	• 1.7 m paved shoulder available	• 1.7 m paved shoulder available	• 1.0 m grass boulevard of substandard width available • Cyclists may also share the road with all other road users	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Accommodation of pedestrians	• No separate facility to accommodate pedestrians • Pedestrians use narrow unpaved shoulders where available • Minimal streetscaping	• 1.0 m paved shoulder of sub-standard width available • Opportunities for streetscaping	• 1.7 m paved shoulder available • Opportunities for streetscaping	• 1.7 m paved shoulder available • Opportunities for streetscaping	• 1.0 m grass boulevard of substandard width available • Opportunities for streetscaping	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	Option 5: 10 m Platform Semi-Rural Road	
Option Description	• 20-33 m ROW, predominantly 20-25 m • 3.4-3.5 m wide travel lane • 0.4-0.8 m wide unpaved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Accommodation of horses	• 3.4-3.5 m of paved travel lane, with narrow unpaved shoulders available, but shared with all road users	• 3.5 m paved travel lane, and 1.0 m paved shoulder of sub-standard width available	• 3.5 m paved travel lane, and 1.7 m paved shoulder available	• 3.5 m paved travel lane, and 1.7 m paved shoulder available	• 3.5 m paved travel lane, and 1.0 m grass boulevard of sub-standard width available	• Options 3, 4 preferred as they reduce conflicts between different road users with paved shoulder width that meets design standards
Safety	• Conflicts between motorized vehicles and cyclists/pedestrians	• Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder of sub-standard width	• Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate grass boulevard of sub-standard width	• Options 3, 4 preferred as they provide a paved shoulder width that meets design standards for cyclists and pedestrians, minimizing conflicts between different road users
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies through adequate ditches	• Designed to address drainage deficiencies through adequate ditches	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Options 2, 3, 4, 5 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction	• Pavement reconstruction	• Options 2, 3, 4, 5 preferred
Socio-Economic Environment						
Residential properties	• No impacts	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and grading; less than Option 3	• Cross-section extends beyond existing ROW in some areas • Potential property acquisition and driveway impacts due to increased roadway platform width and more extensive grading	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3
Farm operations	• No impacts	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and grading; less than Option 3	• Cross-section extends beyond existing ROW in some areas • Potential land acquisition and driveway impacts due to increased roadway platform width and more extensive grading	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3
Businesses	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and grading, which may require additional assessment	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to modification of roadway platform and more extensive grading, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	Option 5: 10 m Platform Semi-Rural Road	
Option Description	• 20-33 m ROW, predominantly 20-25 m • 3.4-3.5 m wide travel lane • 0.4-0.8 m wide unpaved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Built and cultural heritage resources	• No impacts	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and grading, which may require additional assessment	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to modification of roadway platform and more extensive grading, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 4, 5 preferred as there is less impact than Option 3
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction; more than Options 2, 3 due semi-rural cross-section elements	• Moderate air, noise, vibration impacts during construction; more than Options 2, 3 due semi-rural cross-section elements	• Option 1 preferred as there are no impacts
Natural Environment						
Terrestrial habitat	• No impacts	• Requires encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities, somewhat less so than Option 3 but more so than Options 4 or 5 • Requires tree removals within areas to be graded, somewhat less so than Option 3 but more so than Options 4 or 5 • Encroaches into sensitive/ significant natural areas designated as Life Science ANSI (Caledon Mountain Slope Forest) and ESA (Caledon Mountain), somewhat less so than Option 3 but more so than Options 4 or 5 • Requires terrestrial habitat removal in areas to be graded, somewhat less so than Option 3 but more so than Options 4 or 5	• Requires most encroachment among Options into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires greatest number of tree removals among Options • Requires greatest amount of encroachment into sensitive/ significant natural areas designated as Life Science ANSI (Caledon Mountain Slope Forest) and ESA (Caledon Mountain) • Requires greatest amount of terrestrial habitat removal	• Requires encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities, somewhat less so than Option 2 or 3 but more so than Option 5 • Requires tree removals within areas to be graded, somewhat less so than Options 2 or 3 but more so than Option 5 • Encroaches into sensitive/ significant natural areas designated as Life Science ANSI (Caledon Mountain Slope Forest) and ESA (Caledon Mountain), somewhat less so than Options 2 or 3 but more so than Option 5 • Requires terrestrial habitat removal in areas to be graded, somewhat less so than Options 2 or 3 but more so than Option 5	• Requires least amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires fewest tree removals within areas to be graded • Requires least amount of encroachment into sensitive/ significant natural areas designated as Life Science ANSI (Caledon Mountain Slope Forest) and ESA (Caledon Mountain) • Requires least amount of terrestrial habitat removal in areas to be graded	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 5 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	Option 5: 10 m Platform Semi-Rural Road	
Option Description	• 20-33 m ROW, predominantly 20-25 m • 3.4-3.5 m wide travel lane • 0.4-0.8 m wide unpaved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Aquatic environment	• No impacts	• 11 culvert crossings, 3 of which (culverts 19, 23 and 25) convey watercourses, others of which support adjacent wetland hydrology; potential for impact to aquatic features if culvert replacements required due to grading requirements • Potential impact to direct fish habitat associated with Trib. A to Second Creek (culvert 19), and indirect fish habitat associated with Trib. A to Rogers Creek (culvert 23) and Trib. B to Rogers Creek (culvert 25)	• 11 culvert crossings, 3 of which (culverts 19, 23 and 25) convey watercourses, others of which support adjacent wetland hydrology; greatest potential for impact to aquatic features if culvert replacements required due to more extensive grading requirements • Potential impact to direct fish habitat associated with Trib. A to Second Creek (culvert 19), and indirect fish habitat associated with Trib. A to Rogers Creek (culvert 23) and Trib. B to Rogers Creek (culvert 25).	• 11 culvert crossings, 3 of which (culverts 19, 23 and 25) convey watercourses, others of which support adjacent wetland hydrology; potential for impact to aquatic features if culvert replacements required due to grading requirements • Potential impact to direct fish habitat associated with Trib. A to Second Creek (culvert 19), and indirect fish habitat associated with Trib. A to Rogers Creek (culvert 23) and Trib. B to Rogers Creek (culvert 25)	• 11 culvert crossings, 3 of which (culverts 19, 23 and 25) convey watercourses, others of which support adjacent wetland hydrology; least potential for impact to aquatic features if existing culverts can be maintained • Potential impact to direct fish habitat associated with Trib. A to Second Creek (culvert 19), and indirect fish habitat associated with Trib. A to Rogers Creek (culvert 23) and Trib. B to Rogers Creek (culvert 25)	• Option 1 is preferred as it avoids potential impacts to aquatic features and habitat • Otherwise, Options 2 and 5 are preferred as they require minimal increase in platform width, and potentially less requirement for culvert replacement/additional in-water work
Wetlands and watercourses	• No impacts	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Potential for direct impact to wetlands, including PSW, through encroachment; somewhat less so than Option 3 but more so than Options 4 or 5 • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Potential for impacts to amphibian breeding SWH due to grading requirements	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Greatest potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Greatest potential for impacts to amphibian breeding SWH due to more extensive grading requirements	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Potential for direct impact to wetlands, including PSW, through encroachment; somewhat less so than Options 2 or 3 but more so than Option 5 • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Potential for impacts to amphibian breeding SWH due to grading requirements	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Least potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Least potential for impacts to amphibian breeding SWH due to grading requirements	• Option 1 is preferred as it avoids impacts to wetlands • Otherwise, Option 5 is preferred due to lesser required encroachment into adjacent wetlands and habitats

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	Option 5: 10 m Platform Semi-Rural Road	
Option Description	• 20-33 m ROW, predominantly 20-25 m • 3.4-3.5 m wide travel lane • 0.4-0.8 m wide unpaved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Species at risk	• No impacts	• Occurs within Jefferson Salamander regulated habitat along east half of ROW; potential for direct impact to regulated habitat; less so than Option 3 but more so than Options 4 or 5 • Potential for Jefferson Salamander road mortality and potential road crossing deterrence due to wider road platform, but less so than Options 3 or 4 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; potential impact due to grading requirements, less so than Option 3 but more so than Options 4 or 5 • Barn Swallow foraging habitat and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Occurs within Jefferson Salamander regulated habitat along east half of ROW; greatest potential for direct impact to regulated habitat among Options • With Option 4, greatest potential for Jefferson Salamander road mortality and potential road crossing deterrence due to widest road platform • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; greatest potential impact among Options due to more extensive grading requirements • Barn Swallow foraging habitat and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Occurs within Jefferson Salamander regulated habitat along east half of ROW; potential for direct impact to regulated habitat; less so than Options 2 or 3 but more so than Option 5 • With Option 3, greatest potential for Jefferson Salamander road mortality and potential road crossing deterrence due to widest road platform • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; potential impact due to grading requirements, less so than Options 2 or 3 but more so than Option 5 • Barn Swallow foraging habitat and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Occurs within Jefferson Salamander regulated habitat along east half of ROW; least potential for direct impact to regulated habitat among Options • Least potential for Jefferson Salamander road mortality and potential road crossing deterrence due to negligible increase in paved surface • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; least potential impact among Options due to grading requirements • Barn Swallow foraging habitat and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Option 1 is preferred as it avoids impacts to regulated Jefferson Salamander habitat and potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 5 is preferred due to less required encroachment into regulated Jefferson Salamander habitat, and fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Direct impact to known Northern Flying Squirrel habitat at east end of ROW, less so than Option 3 but more so than Options 4 or 5 • Proposed grading requirements may exceed maximum ROW gap length to permit Northern Flying Squirrels to glide from one side to the other (i.e. > approx. 23 m); potential habitat fragmentation • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern, less so than Option 3 but more so than Options 4 or 5	• Greatest direct impact to known Northern Flying Squirrel habitat at east end of ROW • Proposed grading requirements may create a gap across ROW too large to permit Northern Flying Squirrels to glide from one side to the other (i.e. > approx. 23 m); potential habitat fragmentation • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Greatest impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern	• Direct impact to known Northern Flying Squirrel habitat at east end of ROW, less so than Options 2 or 3 but more so than Option 5 • Proposed grading requirements may allow maintenance of a suitable gap across ROW to permit Northern Flying Squirrels to glide from one side to the other (i.e. < approx. 23 m) • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern, less so than Options 2 or 3 but more so than Option 5	• Least direct impact to known Northern Flying Squirrel habitat at east end of ROW • Proposed grading requirements may allow maintenance of a suitable gap across ROW to permit Northern Flying Squirrels to glide from one side to the other (i.e. < approx. 23 m) • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Least impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern	• Option 1 is preferred as it avoids impacts to habitat for Northern Flying Squirrel and potential habitat for species of conservation concern Odonates • Otherwise, Option 5 is preferred due to less required encroachment into habitat for these species, and is most likely to maintain suitable ROW gaps to permit Northern Flying Squirrels to continue gliding from one side to the other

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	Option 5: 10 m Platform Semi-Rural Road	
Option Description	• 20-33 m ROW, predominantly 20-25 m • 3.4-3.5 m wide travel lane • 0.4-0.8 m wide unpaved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Wildlife movement corridors	• No impacts	• Two high-density deer movement corridors occur across the ROW, as well as multiple low-density crossings • May cause disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Option 5 but less so than Options 3 or 4	• Two high-density deer movement corridors occur across the ROW, as well as multiple low-density crossings • May cause disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Options 2 and 5	• Two high-density deer movement corridors occur across the ROW, as well as multiple low-density crossings • May cause disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands, but less so than Options 2 or 3; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Options 2 and 5	• Two high-density deer movement corridors occur across the ROW, as well as multiple low-density crossings • May cause disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands, but less so than Options 2 or 3; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Least potential for amphibian mortality or crossing deterrence due to negligible increase in paved surface	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 5 is preferred because a narrower paved surface may increase the likelihood of amphibian crossing success, and because less potential site grading may maintain more suitable amphibian movement habitat along roadsides
Stormwater management	• No impacts	• Increase in surface runoff volumes due to wider platform of impervious surface • Improved roadside drainage system	• With Option 4, greatest increase in surface runoff volumes among Options due to widest platform of impervious surface • Improved roadside drainage system	• With Option 3, greatest increase in surface runoff volumes among Options due to widest platform of impervious surface • Improved roadside drainage system	• Negligible increase in surface runoff volumes among Options due to minor increase impervious surface • Stormwater runoff will be intercepted by grass boulevards. • Improved roadside drainage system	• Option 5 is preferred as it incorporates improved drainage systems over current conditions but features less impervious surface as well as grass boulevards that can intercept road surface runoff
Natural hazards	• No impacts	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Option 1 is preferred as it avoids impacts to regulated watercourses and wetlands

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Cross-Section Options					EVALUATION
	Option 1: Do Nothing	Option 2: 10 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	Option 5: 10 m Platform Semi-Rural Road	
Option Description	• 20-33 m ROW, predominantly 20-25 m • 3.4-3.5 m wide travel lane • 0.4-0.8 m wide unpaved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 20 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved shoulders	• 23 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	• 20 m typical ROW • 3.5 m wide travel lane • 0.5 m mountable curb • 1.0 m wide grass boulevard	
Niagara Escarpment impacts	• No impacts	• Directly impacts features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading; less so than Option 3 but more so than Options 4 or 5 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Greatest direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to more extensive site grading, among Options • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Directly impacts features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading; less so than Options 2 or 3 but more so than Option 5 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Smallest direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading, among Options • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Option 1 is preferred as it avoids impacts to Niagara Escarpment Plan policy protection areas and regulated habitat • Otherwise, Option 5 is preferred as it requires the least encroachment and potential for impact to escarpment natural features
Capital Costs						
Construction costs	• Low construction cost due to minimal construction work required	• Moderate construction cost from modification of roadway platform	• Moderate construction cost from modification of roadway platform	• Highest construction cost from wider paved platform, semi-rural cross-section, and underground infrastructure	• Higher construction cost from semi-rural cross-section and underground infrastructure	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• No property acquisition anticipated; potential impacts and easements may be required for localized improvements	• Some property acquisition and easements anticipated for localized improvements	• No property acquisition anticipated; potential impacts and easements may be required for localized improvements	• No property acquisition anticipated; potential impacts and easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated • Otherwise, Options 2, 4, 5 preferred
OVERALL						
			• Option 3 preferred where feasible as it retains the rural character of the road, better accommodates and reduces conflicts between all road users through paved shoulders that meet design standards, while reducing property and natural environment impacts	• Option 4 preferred where Option 3 results in significant impacts beyond existing ROW, as it accommodates and reduces conflicts between all road users through paved shoulders that meet design standards, while minimizing property and natural environment impacts		

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, the 11.4 metre platform rural cross-section (Option 3) is preferred for Olde Base Line Road between Winston Churchill Boulevard and Mississauga Road, where ROW width and constraints allow, and the 11.4 metre platform semi-rural cross-section (Option 4) is preferred where the rural option results in significant impacts beyond the existing ROW.

7.1.2 Olde Base Line Road Profile Options

Profile options were considered based on different design speeds. Generally, lower design speeds allow for the profile to remain closer to existing conditions. Higher design speeds, on the other hand, require more significant profile adjustments and therefore result in greater impacts to adjacent lands and features.

For Olde Base Line Road, profile options were considered for the following speeds:
- **Option 1:** Do Nothing (60 km/h existing posted speed)
- **Option 2:** 60 km/h Design Speed (50 km/h Posted Speed)
- **Option 3:** 70 km/h Design Speed (60 km/h Posted Speed)

The evaluation for the above noted options is shown in **Table 34**.

Table 34: Olde Base Line Road Profile Option Evaluation – Winston Churchill Boulevard to Mississauga Road

EVALUATION CRITERIA	Olde Base Line Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	**Option 2: 60 km/h Design Speed 50 km/h Posted Speed**	**Option 3: 70 km/h Design Speed 60 km/h Posted Speed**	
Option Description	• 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 60 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 50 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 70 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	
Rural Character				
Maintains rural character and countryside scenic quality	• Retains rural character	• Vertical alignment modifications result in some changes to rural character	• Vertical alignment modifications result in significant changes to rural character	• Option 1 preferred
Transportation				
Geometric alignment	• Vertical alignment consists of rolling profile with moderate crests/sags throughout, with two sharp crests/sags between 30+500 and 30+900, and one sharp crest/sag between 31+700 and 32+100	• Vertical alignment significantly flattens crests/sags throughout	• Vertical alignment significantly flattens crests/sags throughout, more so than option 2	• Options 2, 3 preferred due to smoother vertical alignment
Traffic operations	• Limited and sub-standard visibility due to limited sightlines of rolling vertical alignment • Conflicts between all road users due to poor visibility along vertical profile • Motorists significantly exceed posted speed limits by 25-30 km/h	• Similar travel time due to decrease in posted speed limit, offset by smoother vertical profile • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Requires motorists to reduce speeds below existing speed limit by 10 km/h	• Slightly reduced travel time due to maintaining existing posted speed limit, improved by smoother vertical profile • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Motorists maintain existing posted speed	• Options 2, 3 preferred as visibility is improved to meet design standards, and conflicts are reduced between all road users
Accommodation of motorists	• Rolling profile with numerous adjacent sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with numerous adjacent sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits • Truck restriction on Olde Base Line Road	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits • Existing truck restriction on Olde Base Line Road to remain	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits • Existing truck restriction on Olde Base Line Road to remain	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, and reduced posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits	• Options 2, 3 preferred as significantly smoother profile improves travel along corridor and reduces conflicts with all other road users

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Vertical Alignment Options Option 1: Do Nothing 60 km/h Posted Speed	Option 2: 60 km/h Design Speed 50 km/h Posted Speed	Option 3: 70 km/h Design Speed 60 km/h Posted Speed	EVALUATION
Option Description	• 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 60 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 50 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 70 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	
Accommodation of cyclists	• Rolling profile with numerous adjacent sharp crests/sags is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of pedestrians	• Rolling profile with numerous adjacent sharp crests/sags is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of horses	• Rolling profile with numerous adjacent sharp crests/sags is a less suitable environment for horses Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Options 2, 3 preferred as significantly smoother profile enhances environment and reduces conflicts with motorized vehicles
Safety	• Vertical alignment provides sufficient visibility for 30-50 km/h design speed at some locations • Posted speed exceeds design speed by 10-30 km/h in some locations • Limited and sub-standard visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 50 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 60 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Options 2, 3 preferred vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies based on cross-section options	• Designed to address drainage deficiencies based on cross-section options	• Options 2, 3 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Options 2, 3 preferred
Socio-Economic Environment				
Residential properties	• No impacts	• Potential significant impacts to properties adjacent to sharp crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be lowered by approximately 0.5 m or greater • Grading impacts moderately affect 1 driveway, to be lowered by approximately 1.0 m or greater; and 1 driveway, to be raised by approximately 1.0 m or greater • Grading impacts significantly affect 2 driveways, to be raised by approximately 1.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential significant impacts to properties adjacent to sharp crest/sags, as grading is more likely to extend beyond existing ROW • Grading impacts moderately affect 2 driveways, to be lowered by approximately 1.0 m or greater; and 1 driveway, to be raised by approximately 1.0 m or greater • Grading impacts significantly affect 3 driveways, to be raised by approximately 1.5 m or greater • Grading impacts significantly affect 1 driveway, to be raised by approximately 3.0 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	Option 2: 60 km/h Design Speed 50 km/h Posted Speed	Option 3: 70 km/h Design Speed 60 km/h Posted Speed	
Option Description	• 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 60 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 50 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 70 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	
Farm operations	• No impacts	• Potential significant impacts to properties adjacent to sharp crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be lowered by approximately 0.5 m or greater • Grading impacts moderately affect 1 driveway, to be lowered by approximately 1.0 m or greater; and 1 driveway, to be raised by approximately 1.0 m or greater • Grading impacts significantly affect 2 driveways, to be raised by approximately 1.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential significant impacts to properties adjacent to sharp crest/sags, as grading is more likely to extend beyond existing ROW • Grading impacts moderately affect 2 driveways, to be lowered by approximately 1.0 m or greater; and 1 driveway, to be raised by approximately 1.0 m or greater • Grading impacts significantly affect 3 driveways, to be raised by approximately 1.5 m or greater • Grading impacts significantly affect 1 driveway, to be raised by approximately 3.0 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Businesses	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts • Potential archaeological impacts if grading extends beyond existing ROW	• Potential archaeological impacts as grading is more likely to extend beyond existing ROW	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Built and cultural heritage resources	• No impacts	• Potential impacts to rubble stone wall/fence on the north side and cedar rail fence on the south side, if grading extends beyond existing ROW	• Anticipated impacts to rubble stone wall/fence on the north side and cedar rail fence on the south side, as grading is more likely to extend beyond existing ROW	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Moderate air, noise, vibration impacts during construction; greater than Option 2 due to increased cut and fill construction required • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Natural Environment				
Terrestrial habitat	• No impacts	• Requires least amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires fewest tree removals within areas to be graded • Requires least amount of encroachment into sensitive/significant natural areas designated as Life Science ANSI (Caledon Mountain Slope Forest) and ESA (Caledon Mountain) • Requires least amount of terrestrial habitat removal in areas to be graded	• Requires greatest amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires greatest number of tree removals within areas to be graded • Requires greatest amount of encroachment into sensitive/significant natural areas designated as Life Science ANSI (Caledon Mountain Slope Forest) and ESA (Caledon Mountain) • Requires greatest amount of terrestrial habitat removal in areas to be graded	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat
Aquatic environment	• No impacts	• 11 culvert crossings, 3 of which (culverts 19, 23 and 25) convey watercourses, others of which support adjacent wetland hydrology; least potential for impact to aquatic features if existing culverts can be maintained • Potential impact to direct fish habitat associated with Trib. A to Second Creek (culvert 19), and indirect fish habitat associated with Trib. A to Rogers Creek (culvert 23) and Trib. B to Rogers Creek (culvert 25)	• 11 culvert crossings, 3 of which (culverts 19, 23 and 25) convey watercourses, others of which support adjacent wetland hydrology; most potential for impact to aquatic features due to possibility of culvert replacement/additional in-water work • Potential impact to direct fish habitat associated with Trib. A to Second Creek (culvert 19), and indirect fish habitat associated with Trib. A to Rogers Creek (culvert 23) and Trib. B to Rogers Creek (culvert 25)	• Option 1 is preferred as it avoids potential impacts to aquatic features and habitat • Otherwise, Option 2 is preferred due to less potential for requiring culvert replacement/additional in-water work

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	**Option 2: 60 km/h Design Speed 50 km/h Posted Speed**	**Option 3: 70 km/h Design Speed 60 km/h Posted Speed**	
Option Description	• 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 60 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 50 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 70 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	
Wetlands and watercourses	• No impacts	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Less potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Less potential for impacts to amphibian breeding SWH due to grading requirements	• Multiple wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Greatest potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Greatest potential for impacts to amphibian breeding SWH due to more extensive grading requirements	• Option 1 is preferred as it avoids impacts to wetlands • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent wetlands and habitats
Species at risk	• No impacts	• Occurs within Jefferson Salamander regulated habitat along east half of ROW; less potential for direct impact to regulated habitat than Option 3 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; less potential impact than Option 3, due to grading requirements • Barn Swallow foraging habitat and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Occurs within Jefferson Salamander regulated habitat along east half of ROW; more potential for direct impact to regulated habitat than Option 2 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; greater potential impact than Option 2, due to more extensive grading requirements • Barn Swallow foraging habitat and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Option 1 is preferred as it avoids impacts to regulated Jefferson Salamander habitat and potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 2 is preferred due to less required encroachment into regulated Jefferson Salamander habitat, and fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Least direct impact to known Northern Flying Squirrel habitat at east end of ROW • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Least impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern	• Greatest direct impact to known Northern Flying Squirrel habitat at east end of ROW • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Greatest impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern	• Option 1 is preferred as it avoids impacts to habitat for Northern Flying Squirrel, and potential habitat for species of conservation concern Odonates • Otherwise, Option 2 is preferred due to less required encroachment into habitat for these species
Wildlife movement corridors	• No impacts	• Two high-density deer movement corridors occur across the ROW, as well as multiple low-density crossings • May cause disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; less so than Option 3	• Two high-density deer movement corridors occur across the ROW, as well as multiple low-density crossings • May cause disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • More extensive grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; more so than Option 2	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 2 is preferred because less potential site grading may maintain more suitable amphibian movement habitat along roadsides

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Olde Base Line Road Vertical Alignment Options: Option 1: Do Nothing 60 km/h Posted Speed	Option 2: 60 km/h Design Speed 50 km/h Posted Speed	Option 3: 70 km/h Design Speed 60 km/h Posted Speed	EVALUATION
Option Description	• 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 60 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 50 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	• 70 km/h design speed from Winston Churchill Boulevard to Mississauga Road • 60 km/h posted speed from Winston Churchill Boulevard to Mississauga Road	
Stormwater management	• No impacts	• Improved roadside drainage system	• Improved roadside drainage system	• Options 2 and 3 are preferred as they incorporate improved drainage systems over current conditions
Natural hazards	• No impacts	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Option 1 is preferred at it avoids potential impacts to regulated watercourses and wetlands
Niagara Escarpment impacts	• No impacts	• Less direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, than Option 3 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Greater direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, than Option 2 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Option 1 is preferred as it avoids impacts to Niagara Escarpment Plan policy protection areas and regulated habitat • Otherwise, Option 2 is preferred as it requires the least encroachment and potential for impact to escarpment natural features
Capital Costs				
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Highest construction cost due to cut and fill required for profile modifications, greater than Option 2	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• Potential property acquisition required if grading extends beyond existing ROW; potential easements may be required for localized improvements	• Anticipated property acquisition required as grading is more likely to extend further beyond existing ROW; potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL				
		• Option 2 preferred as it meets design standards for the proposed posted speed limit (lower than existing posted speed limit), and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts		

Legend:

Preferred	Less Preferred	Least Preferred

Based on the preceding evaluation, a 60 km/h design speed (50 km/h posted speed) profile (Option 2) is preferred for Olde Base Line Road between Winston Churchill Boulevard and Mississauga Road.

7.2 Olde Base Line Road Preferred Design Concept

The preferred designs were chosen with consideration to environmental impacts, cultural heritage impacts, safety, aesthetics, drainage, entrance access and property impacts, and capital construction and maintenance costs. This section presents the preferred designs that best incorporate these parameters. Consultation with agencies and the public, as discussed in **Section 2**, helped arrive at the preferred designs discussed in this section.

7.2.1 Design Criteria for Olde Base Line Road

The following outlines the design criteria for Olde Base Line Road, based on different design speed options considered. Although a higher (90 km/h) design speed is desired, in order to accommodate all road users while minimizing impacts to the study area features and surrounding landscape, the project-specific design standards are based on a lower (60 km/h) design speed.

	PRESENT CONDITIONS	DESIGN STANDARDS	**PROJECT** DESIGN STANDARDS	DESIGN STANDARDS	DESIGN STANDARDS	**DESIRED** DESIGN STANDARDS	REFERENCE
HIGHWAY CLASSIFICATION	RAU 70	RAU 50	RAU 60	RAU 70	RAU 80	RAU 90	
MINIMUM STOPPING SIGHT DISTANCE	N/A	60-65 m	75-85 m	95-110 m	115-140 m	130-170 m	(TAC – page 1.2.5.4 Table 1.2.5.3)
MIN. EQUIV. VERTICAL CURVE (WITH ILLUMINATION)[5]	N/A	6-7 - CREST 5-6 –SAG (Comfort)	10-13 - CREST 8-9 –SAG (Comfort)	16-23 - CREST 10-12 –SAG (Comfort)	24-26 - CREST 12-16 –SAG (Comfort)	32-53 - CREST 15-20 –SAG (Comfort)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MIN. EQUIV. VERTICAL CURVE (WITHOUT ILLUMINATION)[6]	N/A	6-7 - CREST 11-12 –SAG (Headlight Control)	10-13 - CREST 15-18 –SAG (Headlight Control)	16-23 - CREST 20-25 –SAG (Headlight Control)	24-26 - CREST 25-32 –SAG (Headlight Control)	32-53- CREST 30-40 –SAG (Headlight Control)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MAXIMUM GRADIENT	N/A	8-10%	8-10%	8-10%	8-10%	8-10%	(To reflect prevailing conditions and maintain existing rural character)
MINIMUM CURVATURE	N/A	90 m	130 m	190 m	250 m	340 m	(TAC – page 2.1.2.13 Table 2.1.2.6)
SUPERELEVATION (ON CURVE)	N/A	6%	6%	6%	6%	6%	(TAC – page 2.1.2.3)
LANE WIDTH	3.4-3.5 m – thru	3.3-3.7 m	3.3-3.7 m	3.5-3.7 m	3.5-3.7 m	3.5-3.7 m	(TAC – page 2.2.2.1 Table 2.2.2.1)
SHOULDER WIDTH	Varies (0.4-0.8 m)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
SHOULDER WIDTH ON SIGNED BICYCLE ROUTE	Varies (0.4-0.8 m)	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	(OTM BOOK 18 Table 4.2)
DRAINAGE ZONE	Varies (m – m)	8.0 m	8.0 m	8.0 m	8.0 m	8.0 m	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
R.O.W. WIDTH	20 - 33 m						
DESIGN SPEED		50 km/h	60 km/h	70 km/h	80 km/h	90 km/h	
POSTED SPEED	60 km/h	40 km/h	50 km/h	60 km/h	70 km/h	80 km/h	

NOTE 1: CROSS-SECTION ELEMENT WIDTHS MAY CHANGE DEPENDING ON AVAILABLE ROW WIDTHS
NOTE 2: ALTHOUGH HIGHER DESIGN SPEEDS ARE DESIRABLE, THEY MAY NOT BE ACHIEVABLE DUE TO EXISTING TERRAIN AND CONSTRAINTS, AS THEIR RESULTING IMPACTS WOULD BE SIGNIFICANT. THEREFORE, LOWER DESIGN SPEEDS HAVE BEEN SELECTED AS THE PROJECT DESIGN STANDARDS FOR THIS SEGMENT.

[5] Applies only at some locations
[6] Applies for the majority of the study area

7.2.2 Typical Cross Section

Due to the existing topography and constraints along the right-of-way, and to minimize grading impacts to adjacent properties and features, a semi-rural cross-section is proposed for the majority of the corridor, between Stations 30+000 (Winston Churchill Boulevard) and 30+945, and between Stations 31+380 and 32+760 (Mississauga Road). This cross-section consists of one 3.5 metre wide travel lane (vehicle zone) in each direction, with a 1.7 metre wide paved shoulder to accommodate active transportation and a 0.5 metre mountable curb on each side of the road (illustrated in **Figure 61**). 0.3 metre rounding and a 2:1 slope then match to existing ground on either side of the road. Drainage is addressed through underground infrastructure (refer to **Section 7.2.6** for more details). This cross-section connects to a semi-rural cross-section at Winston Churchill Boulevard and Mississauga Road.

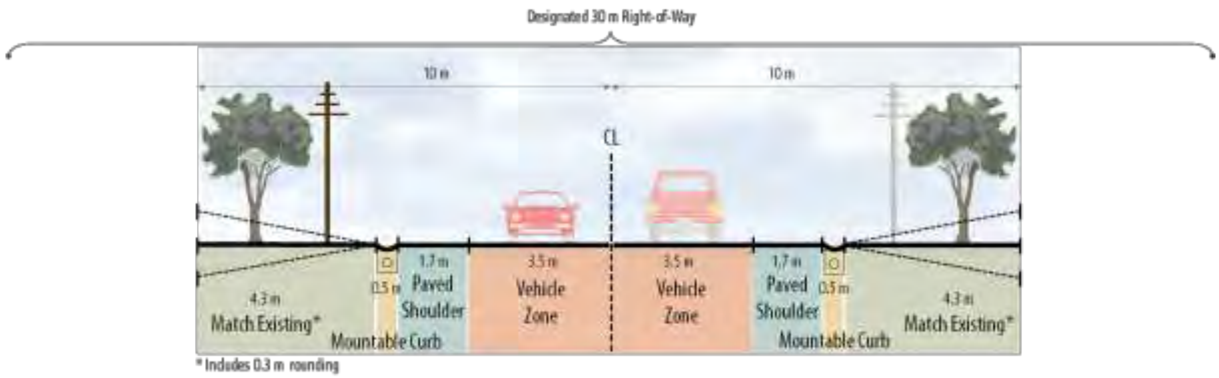


Figure 61: 11.4 m Platform Semi-Rural Cross-Section for Olde Base Line Road

Between Stations 30+945 and 31+380, a semi-rural cross-section was also considered for continuity, but due to the sensitive watercourse at this location where the design has the potential to address storm water management quality and improve flow conveyance, and where the wider right-of-way can accommodate more extensive grading, a rural cross-section is proposed. This cross-section consists of one 3.5 metre wide travel lane (vehicle zone) in each direction, with a 1.7 metre wide paved shoulder and 0.5 metre rounding on each side of the road (illustrated in **Figure 62**). Drainage is addressed through ditches with 2:1 slopes on either side (refer to **Section 7.2.6** for more details).

Opportunities to use alternative construction materials throughout the study area for curbs and other roadway elements, to maintain the rural character of the study area, can be reviewed during detailed design. These may include, for example, using dark coloured curbs to blend in with the asphalt and make them less noticeable.

Design cross-sections at an interval of 20 metres are included in **Appendix W**.

Figure 62: 11.4 m Platform Rural Cross-Section for Olde Base Line Road

7.2.3 Horizontal Alignment

The proposed design with a 60 km/h design speed generally follows the existing road centreline with a few exceptions, as follows:

- Shift to the north between Stations 30+460 and 30+780 to centre roadway within the existing right-of-way and minimize impacts to features and property on either side as a result of raising the vertical profile at this location
- Shift to the south between Stations 30+780 and 31+410 (Rockside Road) to centre roadway within the existing right-of-way and avoid property acquisition on the north side
- Shift to the north between Stations 31+900 and 32+430 to centre roadway within the existing right-of-way and minimize impacts to sensitive natural features (Caledon Mountain Slope Forest ANSI, Caledon Mountain ESA, deer movement corridor significant wildlife habitat) on the south side

The proposed horizontal alignment is illustrated on the plates in **Section 7.2.8**.

7.2.4 Vertical Alignment

The proposed vertical alignment accommodates a 60 km/h design speed. This vertical alignment was chosen to match the existing road profile wherever possible, while at the same time improving any existing substandard grades and vertical curves to meet the geometric standards required for the class of the road, as per the design criteria in **Section 7.2.1**. The vertical profile also aims to minimize impacts to existing entrances and driveways, and to reduce grading impacts to adjacent properties and features.

Crest and sag curves throughout Olde Base Line Road will have a minimum K value of 10 and 15, respectively, which will satisfy the stopping and comfort requirement for a design speed of 60 km/h. A minimum gradient of 0.5% allows for proper drainage, and a maximum gradient of 6% maintains existing rural character.

The proposed vertical profile and reduction in posted speed limit will provide sufficient stopping sight distance. The effect of grade on stopping sight distance at driveways was also assessed for the proposed vertical profile. In general, sufficient stopping sight distance is provided, or where the resulting stopping sight distance is deficient, conditions are improved compared to the exiting road profile.

The proposed vertical alignment is illustrated on the plates in **Section 7.2.8**.

7.2.5 Geotechnical

As discussed in **Section 4.7**, existing pavement along Olde Base Line Road is in fair to poor condition. Based on existing conditions, the general pavement structure below is recommended for the entire length of Olde Base Line Road (between Winston Churchill Boulevard and Mississauga Road):

- AC: 115 mm (Mill 50 mm pave 50 mm HL-3)
- Gran. A (Old): 422 mm
- Gran. B (Old): 245 mm

However, geotechnical design recommendations will vary based on the vertical alignment design and the typical cross-section to be applied:

- Where the vertical alignment is proposed to follow the existing ground profile, partial depth reconstruction / asphalt replacement applies as per the above pavement structure
- Where vertical alignment modifications are proposed, full-depth pavement reconstruction will be required as pavement elevation will vary from existing
- Where a semi-rural cross-section applies, full-depth pavement reconstruction will be required to accommodate underground infrastructure
- Where a rural cross-section applies, the above recommendations based on vertical alignment should be followed

Therefore, based on the proposed cross-section and vertical alignment designs for Olde Base Line Road, full-depth pavement reconstruction is proposed between Stations 30+000 (Winston Churchill Boulevard) and 30+945, and between Stations 31+380 and 32+760 (Mississauga Road); and partial depth reconstruction / asphalt replacement is proposed between Stations 30+945 and 31+380 (where the vertical alignment is proposed to be raised by less than 0.5 metres from the existing vertical profile).

More details on the geotechnical assessment and pavement structure recommendations can be found in **Appendix U.2**.

7.2.6 Drainage

The preliminary stormwater management plan is designed to prevent impacts from the future roadway configuration by using available technologies and opportunities to achieve the highest degree of control possible given the constraints of the study corridor. The following design elements are recommended as part of the proposed roadway improvements:

1. Based on the findings of the culvert condition assessment, the hydraulic capacity assessments, the geomorphology assessment as well as Peel Region's criteria for minimum culvert opening requirements, it is recommended to replace or upgrade 31 transverse culvert crossings within the project limits (seven of which are along Olde Base Line Road). In each case, the existing culvert crossings will be replaced by a pipe or concrete open bottom box culvert.
2. It is recommended to extend a total of seven culvert crossings (three on Olde Base Line Road) to accommodate the proposed roadway improvements.
3. In addition, along Olde Base Line Road it is recommended to maintain one culvert crossing and add one new culvert crossing.
4. Surface water takings will be required where culvert replacement/upgrades are proposed. The water quantity/quality monitoring program will be developed during detailed design, at the time the Permit to Take Water (PTTW) application is submitted.
5. Where the roadway improvements recommend the provision of a semi-rural roadway cross-section, a subsurface drainage system is recommended for inclusion into the roadway cross-section. The subsurface drainage system will consist of a series of catchbasins, storm sewers and subdrains which will collect and convey both the granular base material and surface runoff and discharge to existing drainage outlets. The storm sewers shall be sized to accommodate a 10 year return period event, using a minimum inlet time of 15 minutes as per Region of Peel design standards. The design of the sewers will need to take into account any drainage from roadway boulevard areas as well as drainage external to the roadway right-of-way. Effort has been made to ensure that existing drainage patterns and locations are maintained throughout the various roadway corridors. A conceptual storm system layout is illustrated on the preliminary design plates in **Section 7.2.8**.
6. Where the proposed roadway improvements include a modification to a semi-rural cross-section, the requirement to maintain, relocate or remove entrance/driveway culverts should be examined during the detailed design phase. It is foreseeable that some culverts will no longer provide a drainage function under a semi-rural condition. In some instances however, external runoff from adjacent lands may need to be intercepted due to grade differences between roadway and adjacent properties. Where this occurs, appropriate ditch and culvert systems may need to be employed at driveway entrance locations to allow for conveyance of runoff to appropriate drainage outlets.
7. The principal features of the project's stormwater management system are the provision of oil-grit separator units to provide water quality control. A total of 14 OGS units are proposed throughout the study area (three of which are along Olde Base Line Road) providing a total collective area for stormwater treatment of 5.56 ha. Water quality criteria will be met at each OGS location based on Enhanced (Level 1) protection as outlined in the MOE Stormwater Management Practices Manual.
8. Existing roadside ditches will be re-graded to flat-bottom swale systems (grassed swales), where possible, to provide additional water quality benefits within the project limits. It is recommended that during detailed design, the proposed grassed swale areas are reviewed for their effectiveness in meeting the MOE criteria for flowrate, velocity and contributing area.

9. It is noted that runoff from existing roadways do not provide any quality control. The incorporation of OGS and grassed swale systems will provide a net improvement to the quality of storm runoff within the project limits.
10. Erosion and sediment control measures should be implemented and monitored through the construction period. Construction activity should be conducted during periods that are least likely to result in in-stream impacts to fish habitat.

More details on the proposed stormwater management plan can be found in **Appendix R.3**.

7.2.7 Traffic Controls

The proposed design accommodates a 60 km/h design speed and 50 km/h posted speed limit. Between Winston Churchill Boulevard and Mississauga Road, it is therefore recommended to lower the posted speed from 60 km/h to 50 km/h.

All-way stop control is proposed at the Winston Churchill Boulevard / Old Base Line Road intersection, as per the completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road. Stop control at all other intersections is proposed to remain as per existing conditions.

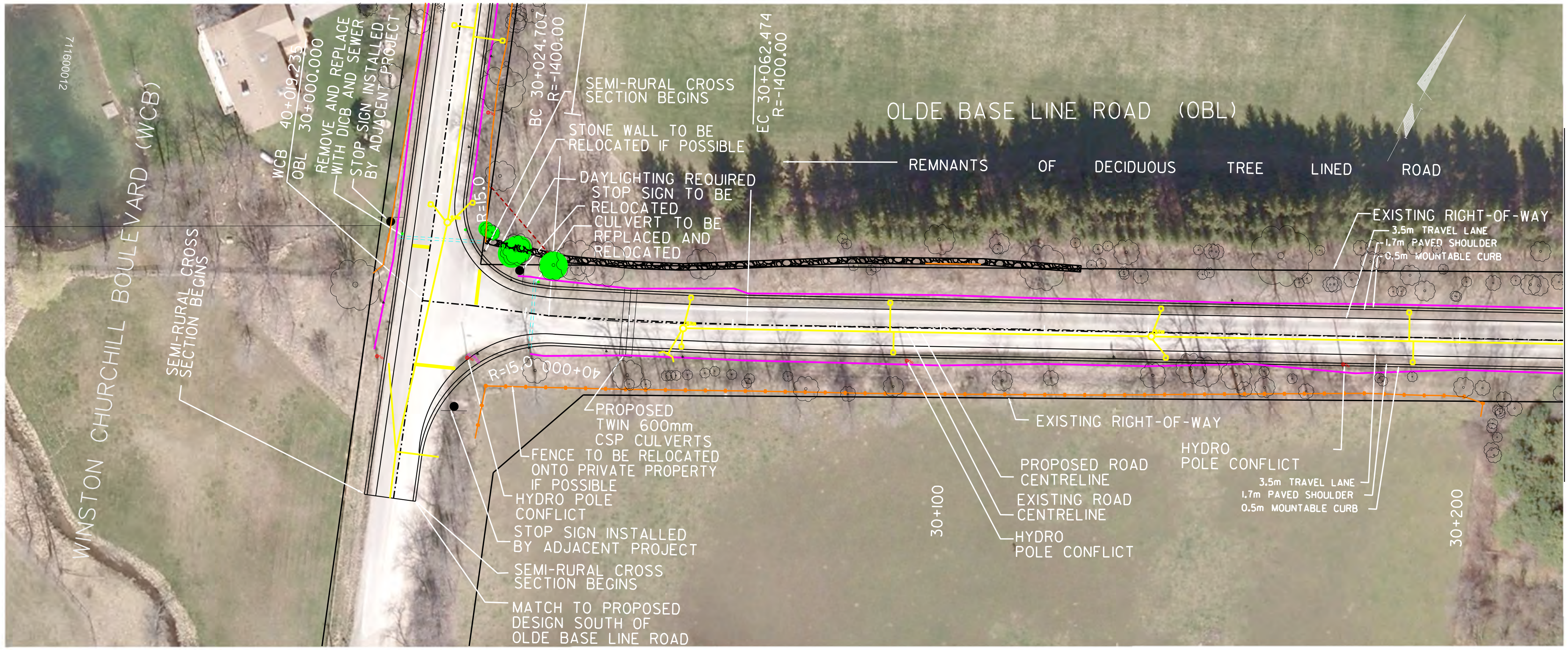
Illumination is proposed to remain as per existing conditions.

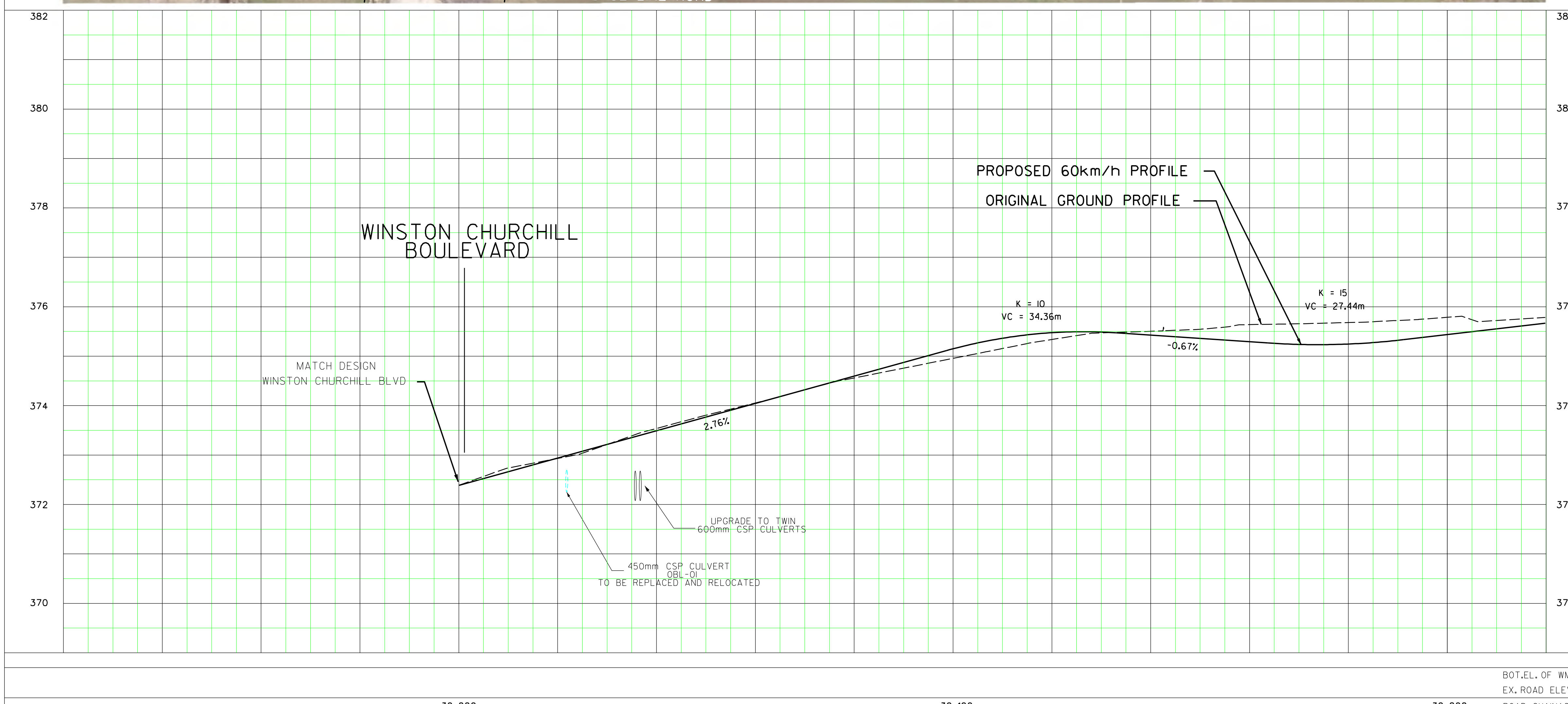
Some signs, bollards, and guiderails will need to be relocated to accommodate the new road platform. Locations are to be confirmed during detailed design. Roadway protection systems, such as guiderails, are to be considered where significant profile adjustments are proposed. This also needs to be reviewed during detailed design.

Existing truck and load restrictions along Olde Base Line Road are proposed to remain.

7.2.8 Design Plates

The following pages contain plan and profile plates illustrating the proposed design for Olde Base Line Road.



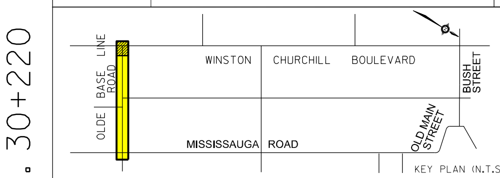


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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Designed by ______ Chkd.______

Approved by ______

NOTICE TO CONTRACTOR

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CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
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ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

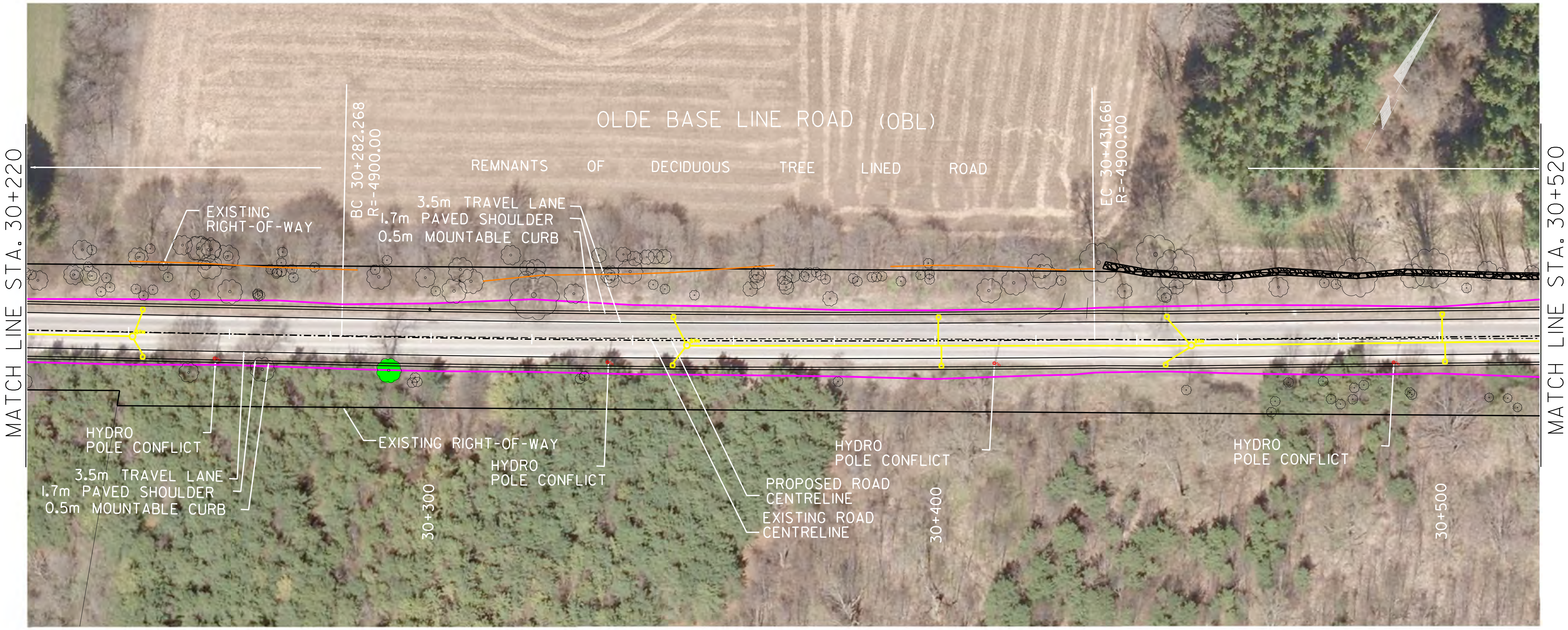
Region of Peel
Working for you

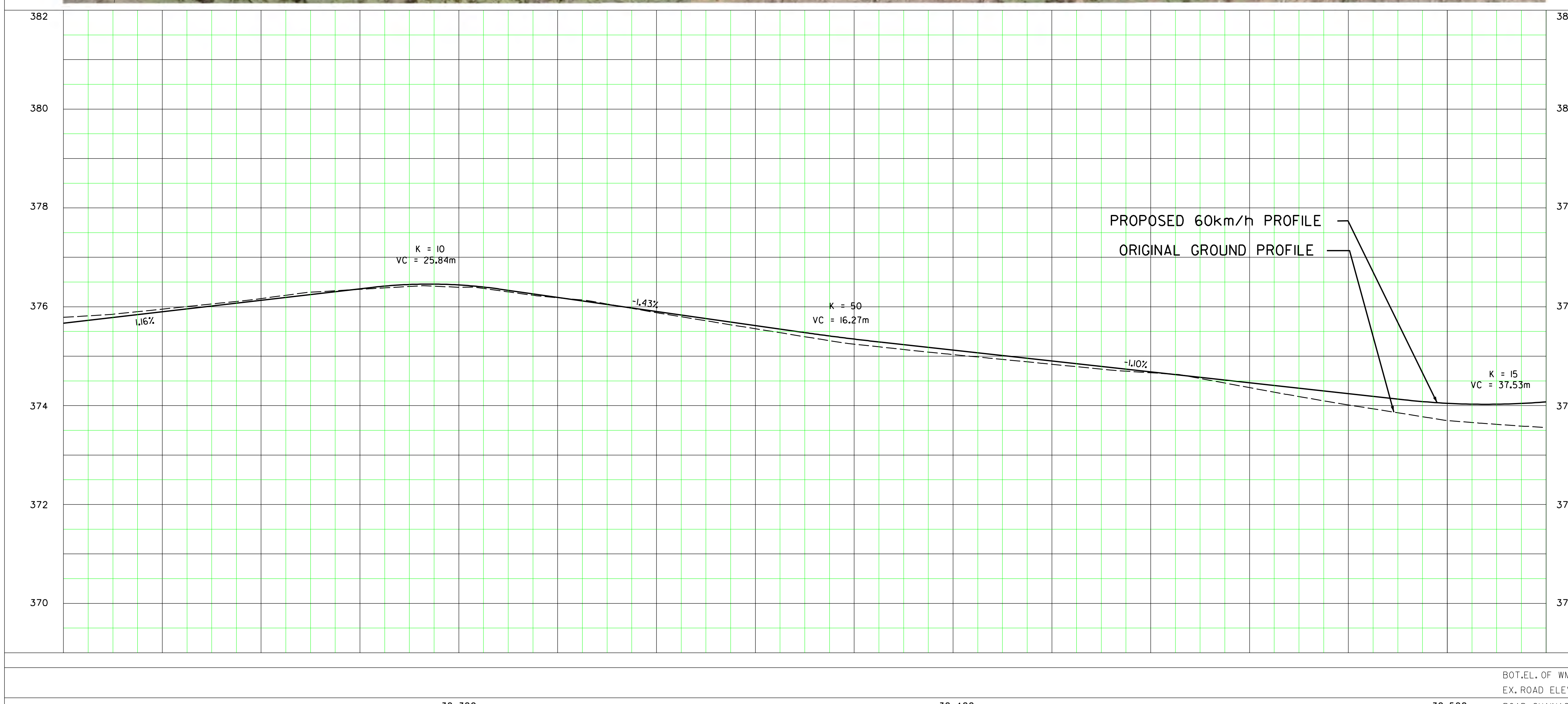
OLDE BASE LINE ROAD

(FROM STA 30+000 to STA 30+220)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 1 of 10	Plan No. -D





SERVICE DATA

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STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
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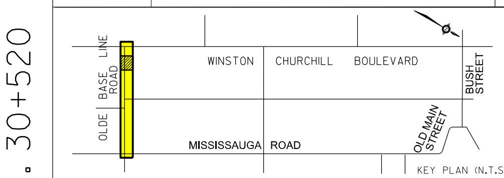

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Approved by ____

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Region of Peel
Working for you

OLDE BASE LINE ROAD

(FROM STA 30+220 to STA 30+520)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
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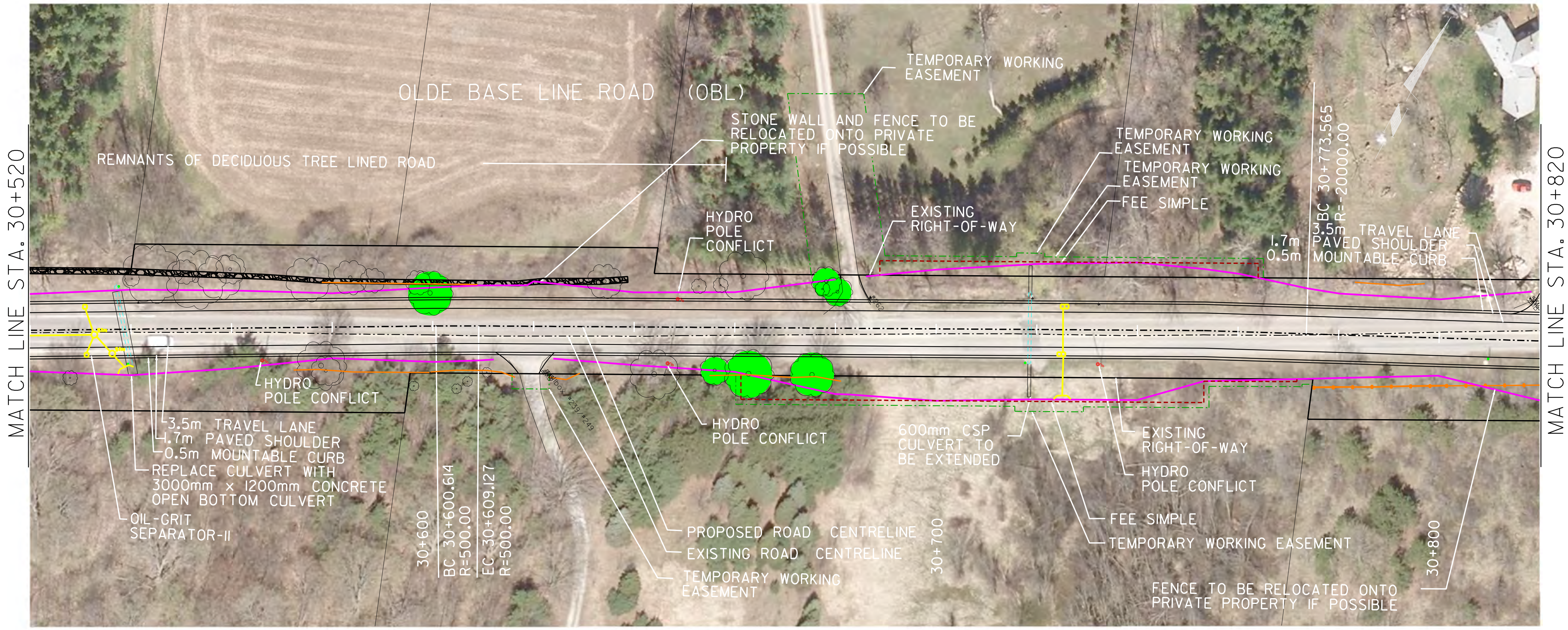
Date JUNE 6, 2014	Sheet 2 of 10	Plan No. -D



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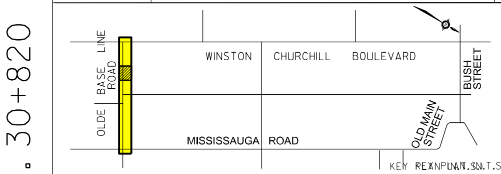

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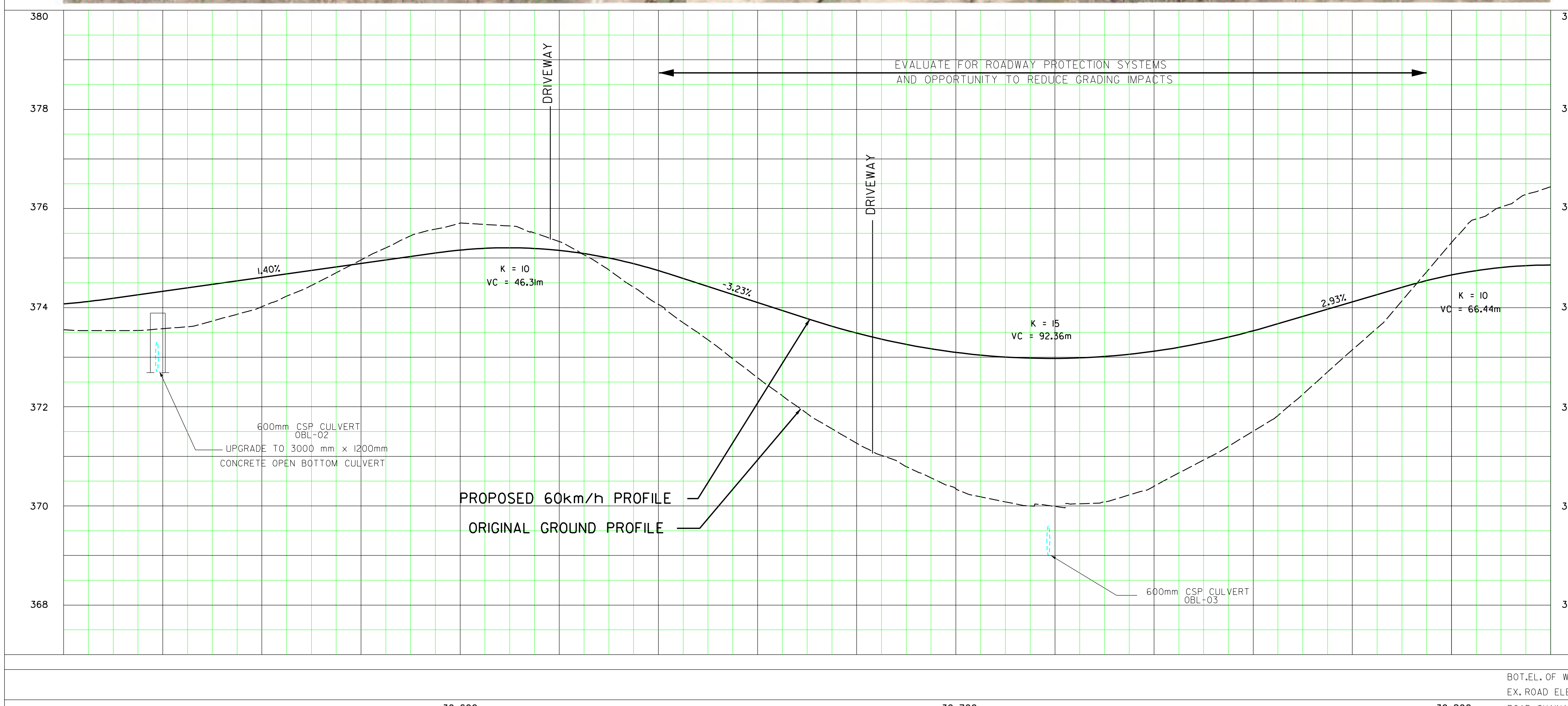

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OLDE BASE LINE ROAD

(FROM STA 30+520 to STA 30+820)

NEW CONSTRUCTION

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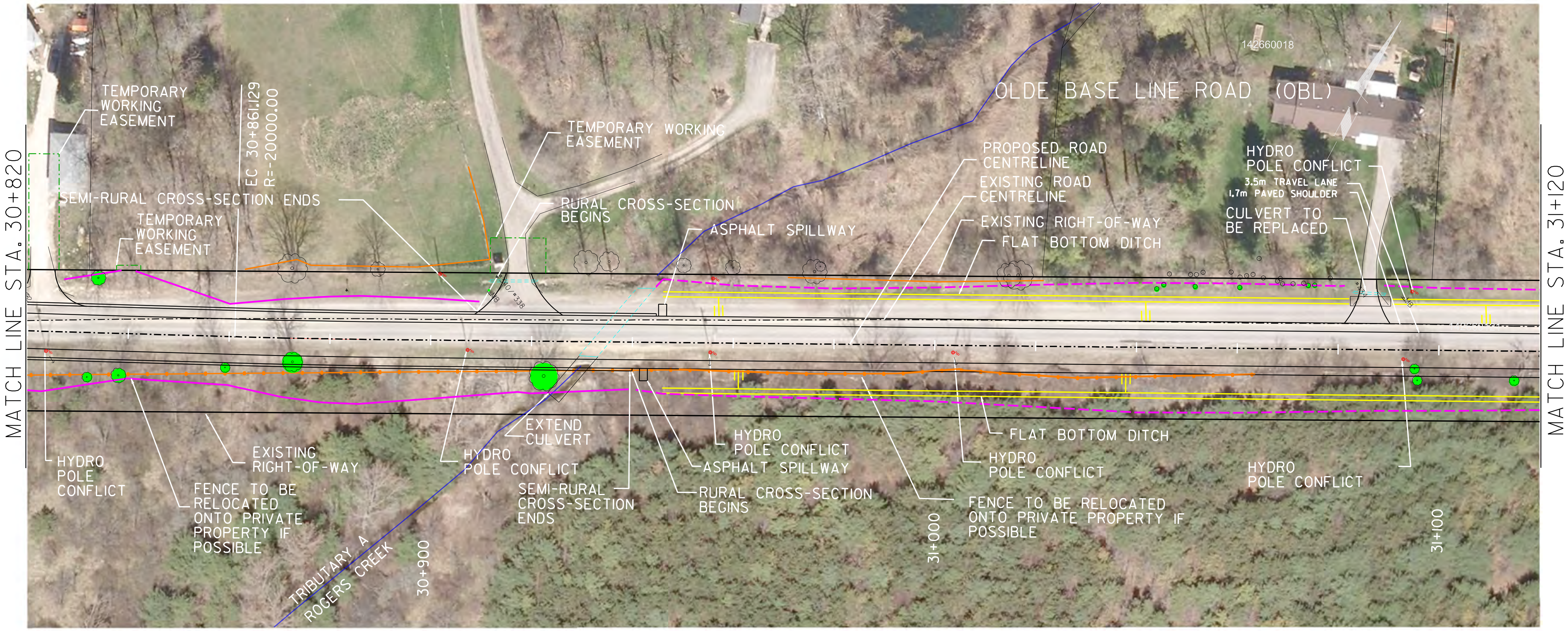
Date JUNE 6, 2014	Sheet 3 of 10	Plan No. -D



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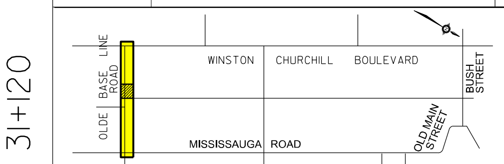

KEY PLAN (N.T.S.)

LEGEND:

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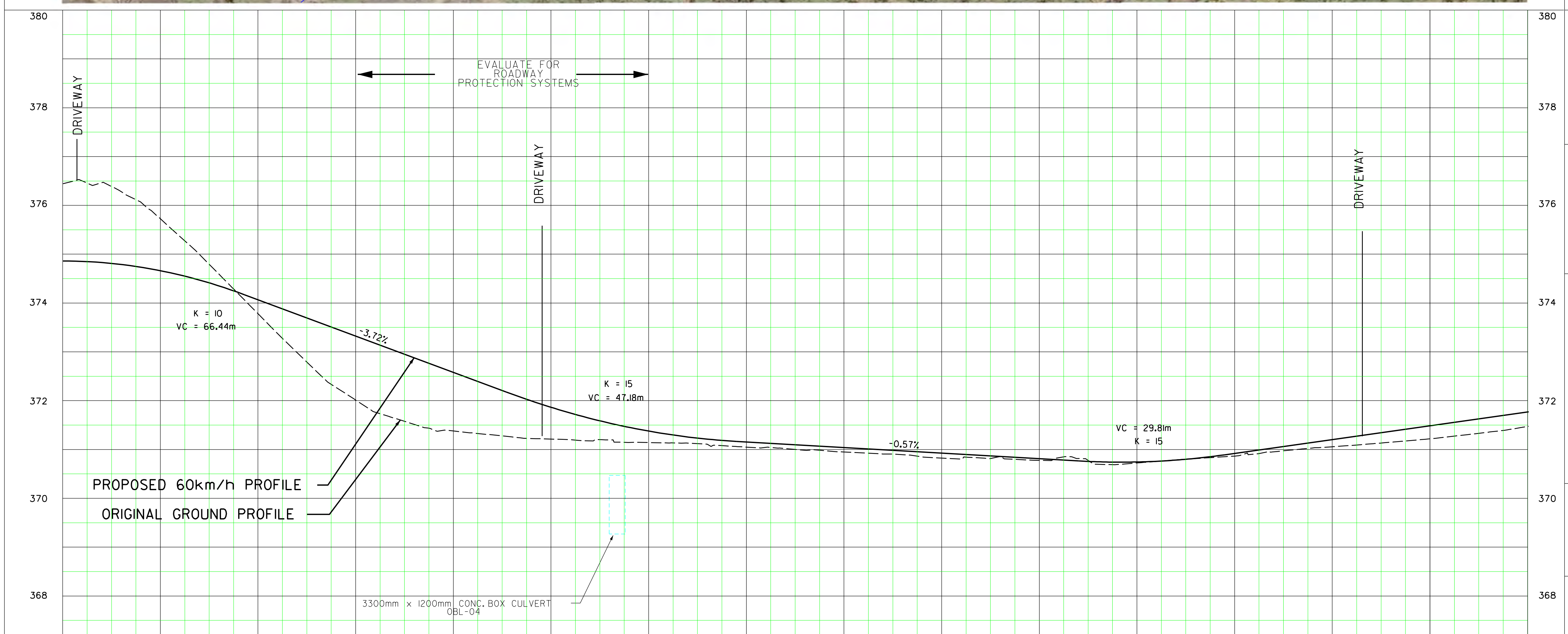

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HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

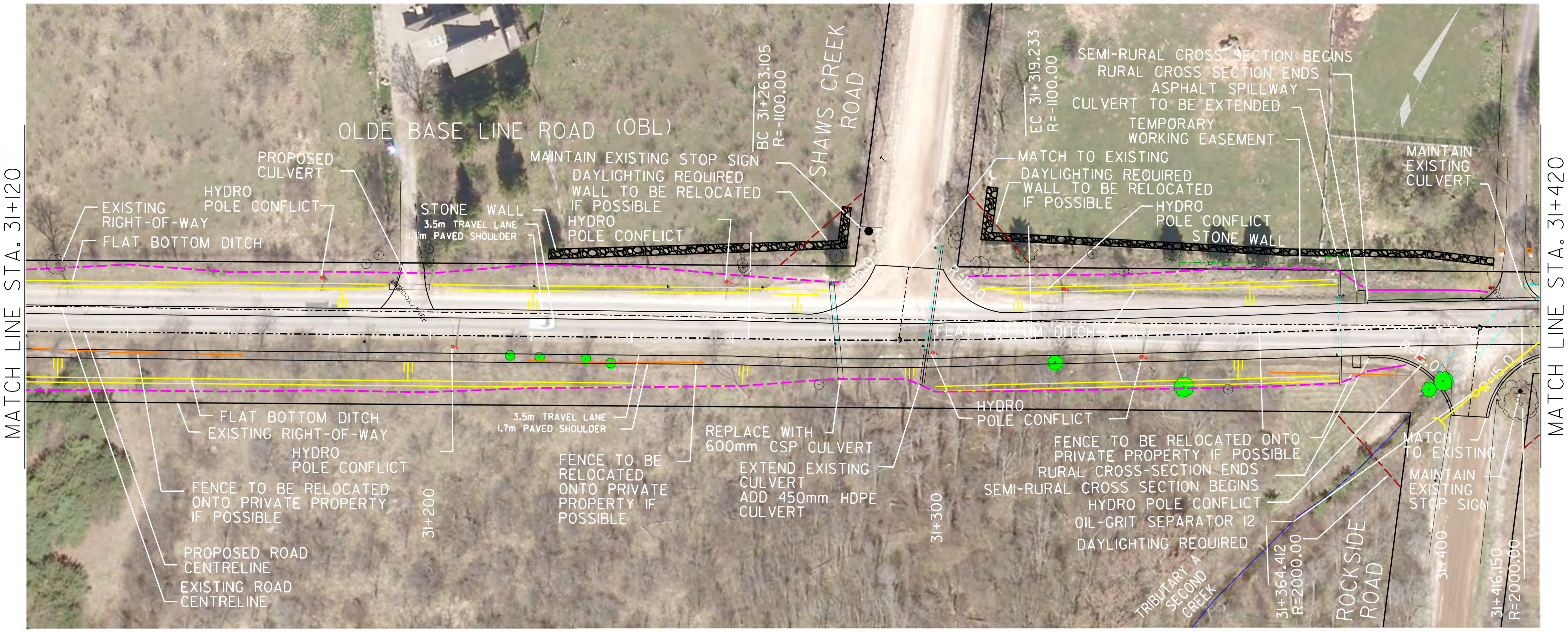
Region of Peel
Working for you

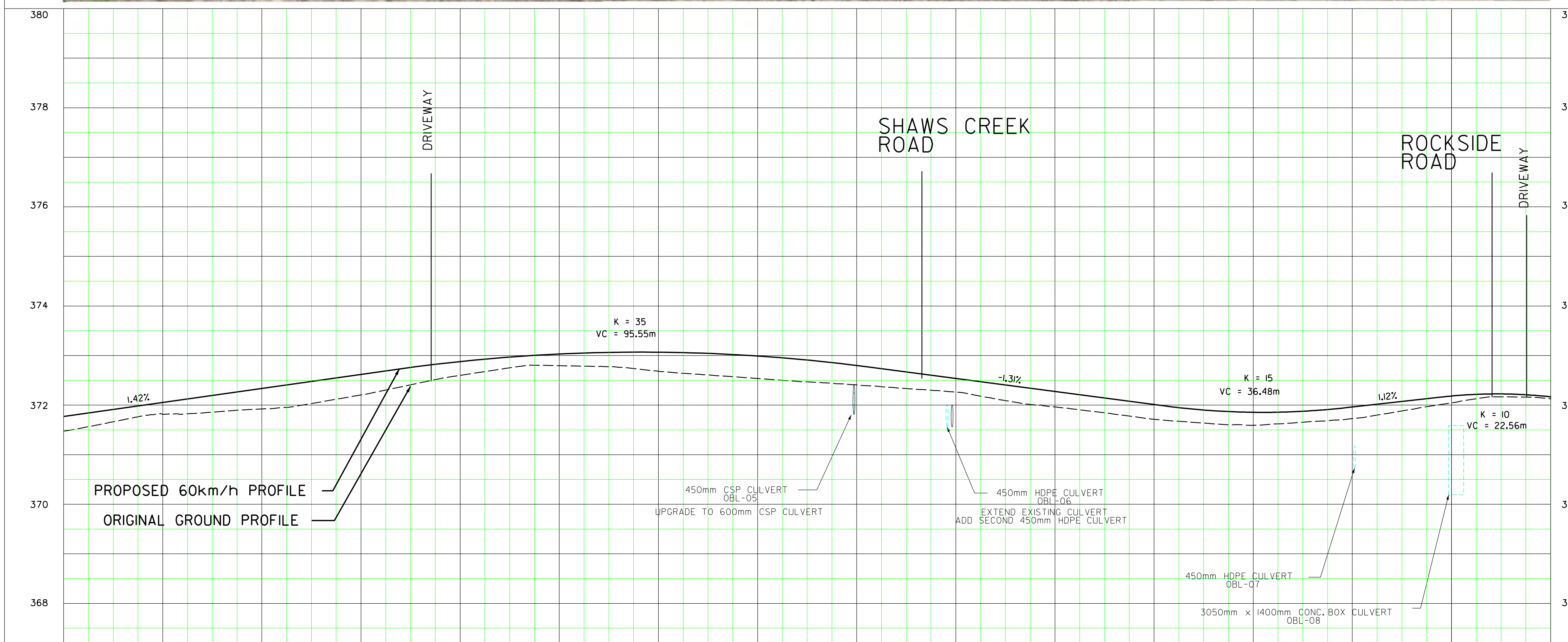
OLDE BASE LINE ROAD

(FROM STA 30+820 to STA 31+120)

NEW CONSTRUCTION

	BOT.EL. OF WM.	CAD Area	Area X-X	Project No. XX-XXX
	EX. ROAD ELEV.	Checked by	Drawn by JM	
30+900 31+000 31+100	ROAD CHAINAGE	Date JUNE 6, 2014	Sheet 4 of 10	Plan No. -D





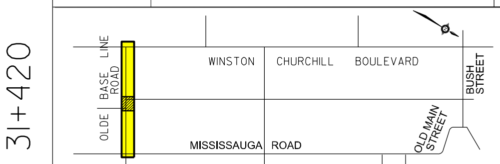
BOT.EL. OF WM.
EX. ROAD ELEV.
ROAD CHAINAGE: 31+200 · 31+300 · 31+400

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
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CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

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PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

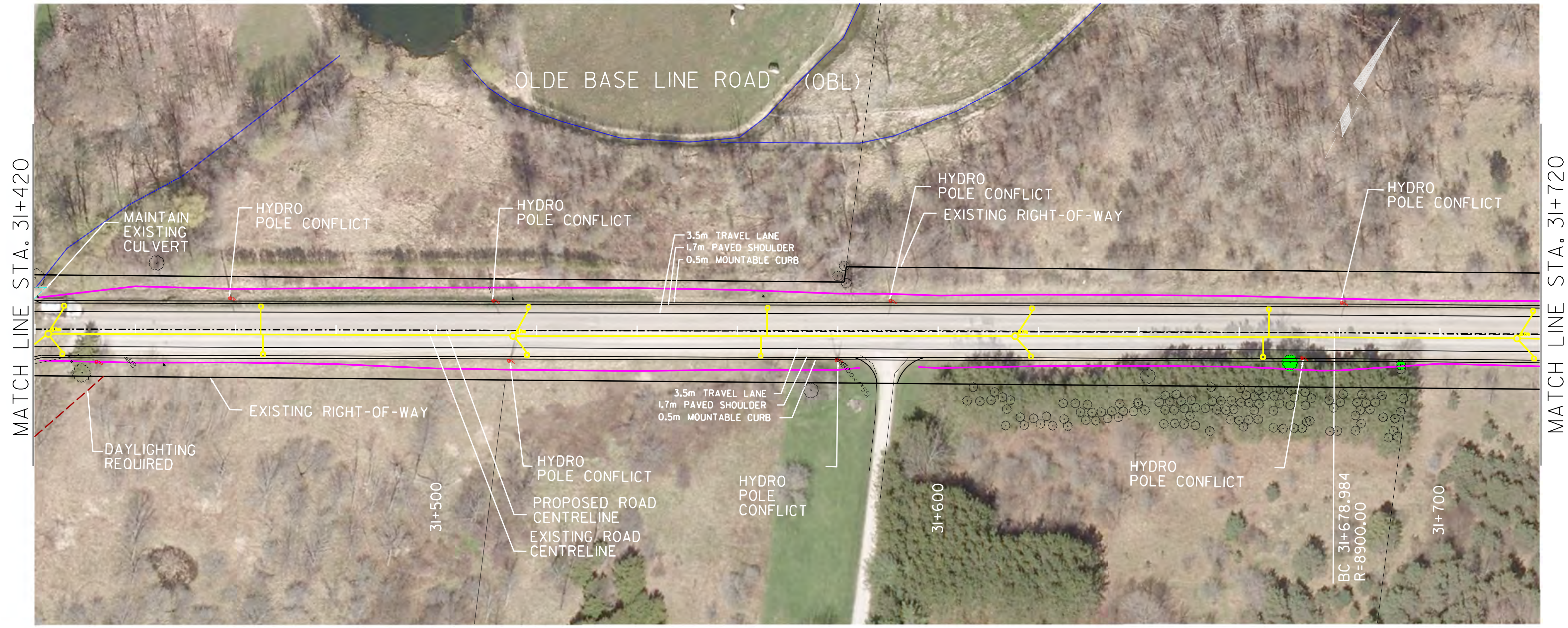
Region of Peel
Working for you

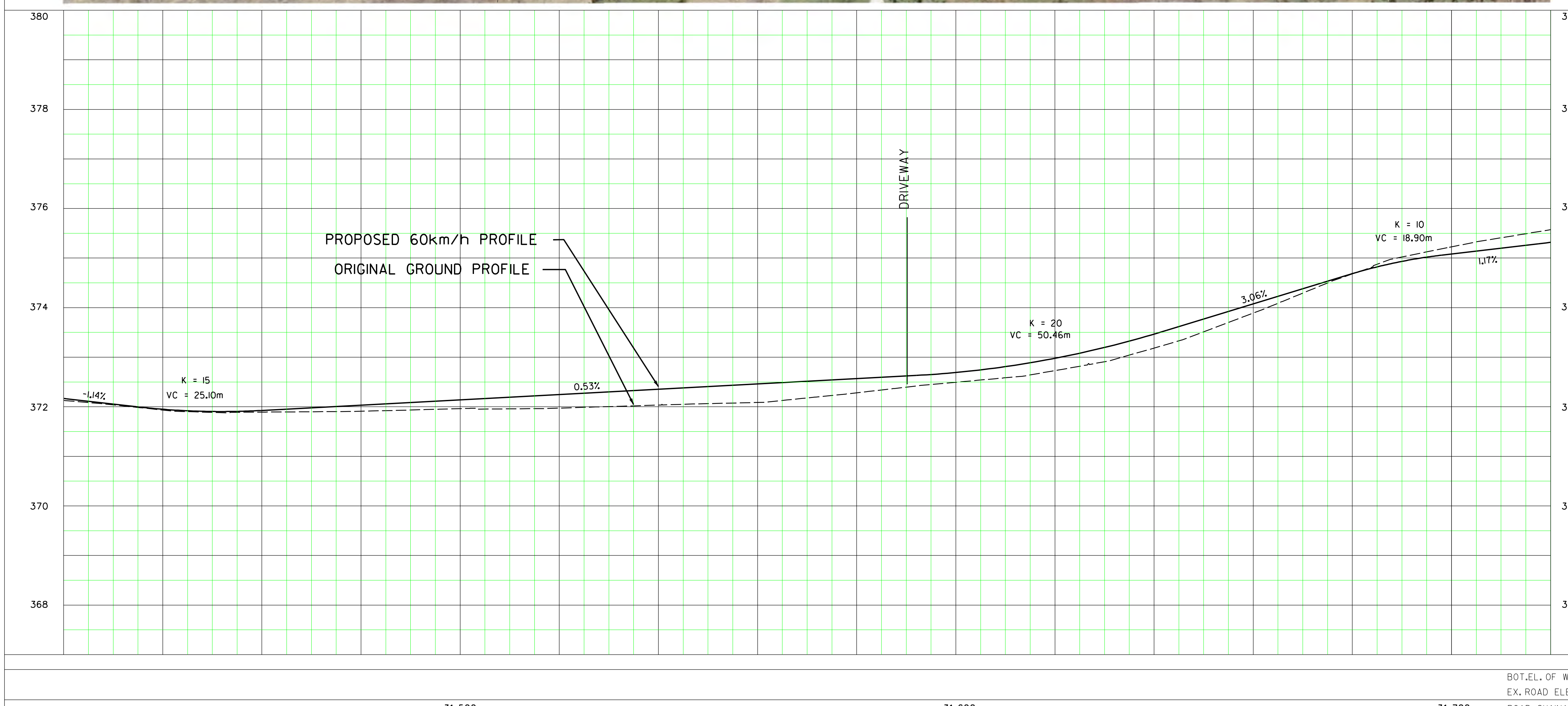
OLDE BASE LINE ROAD

(FROM STA 31+120 to STA 31+420)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 5 of 10	Plan No. -D



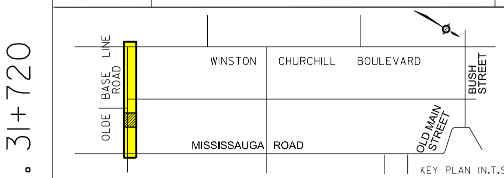


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
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- PROPOSED CATCHBASIN
- TRAFFIC SIGN
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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

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FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

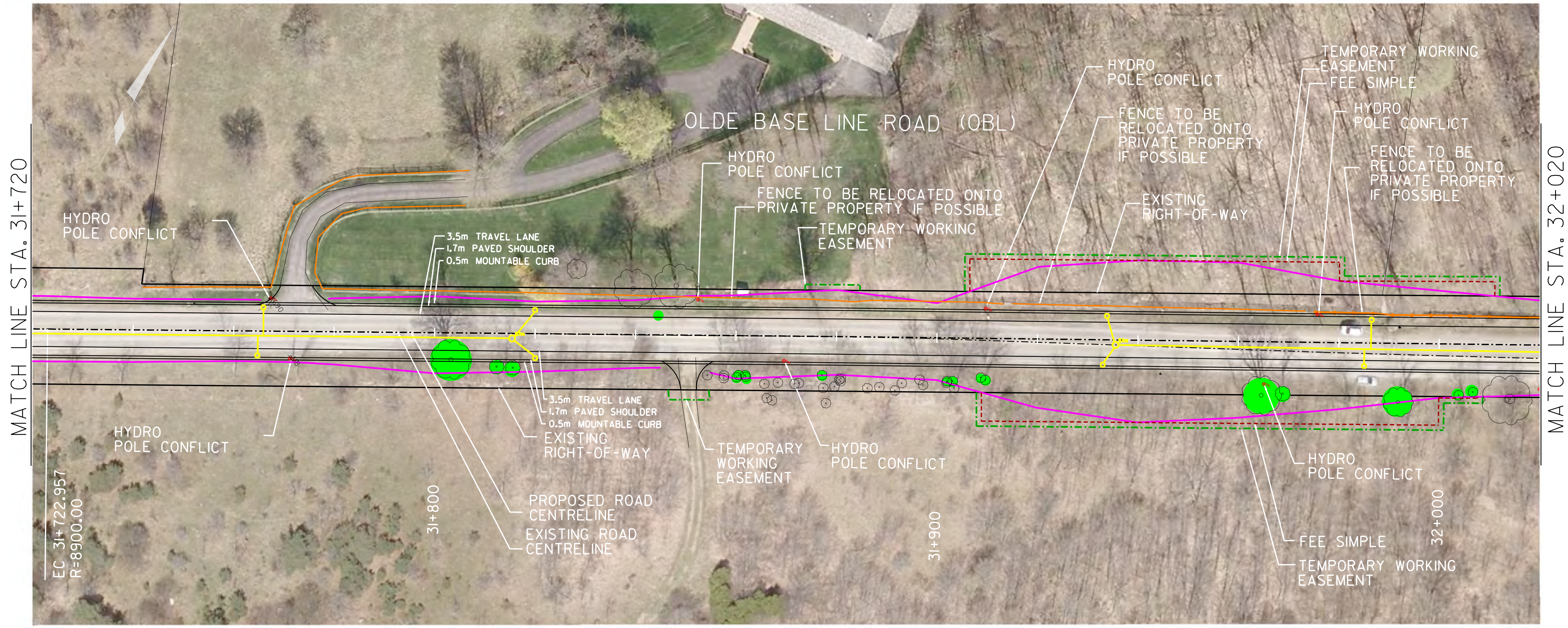
Region of Peel
Working for you

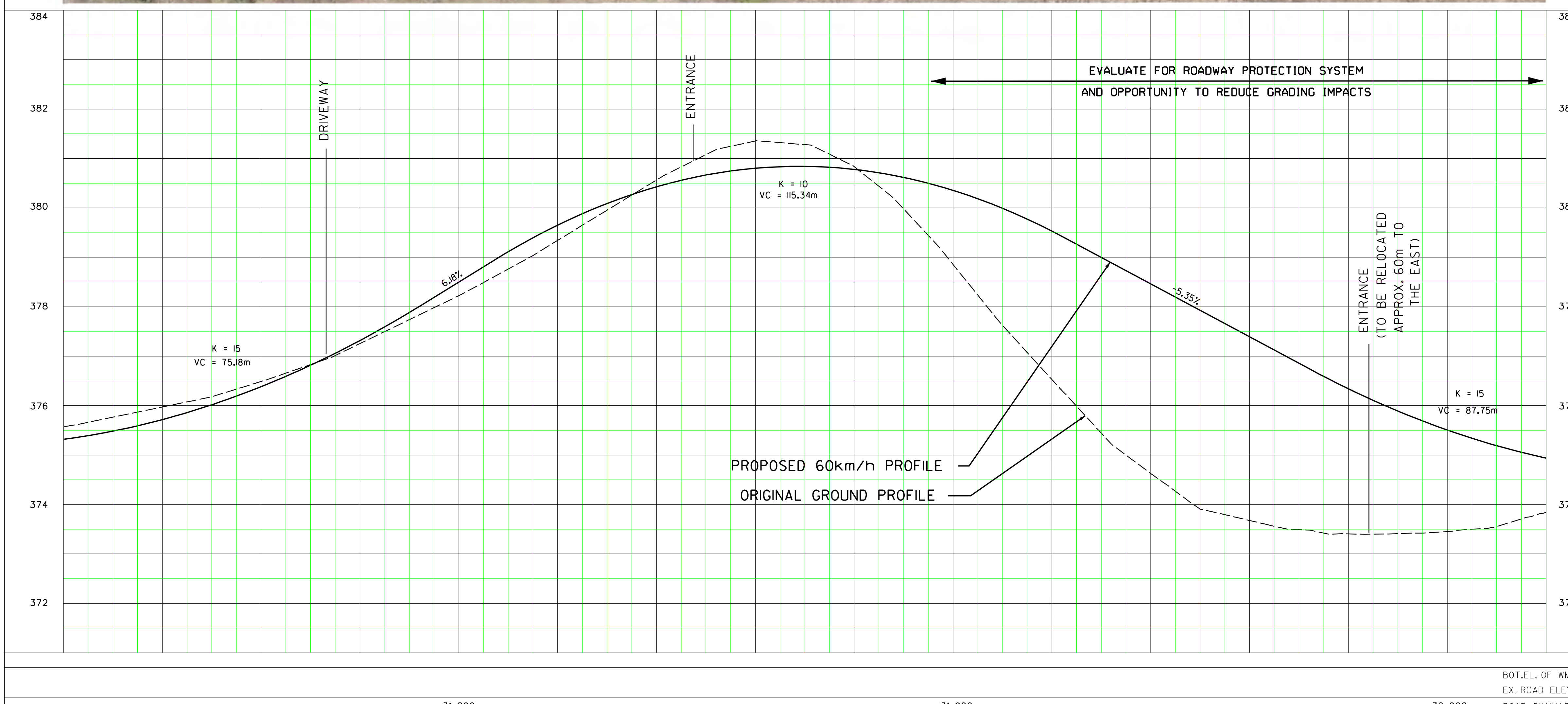
OLDE BASE LINE ROAD

(FROM STA 31+420 to STA 31+720)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 6 of 10	Plan No. -D



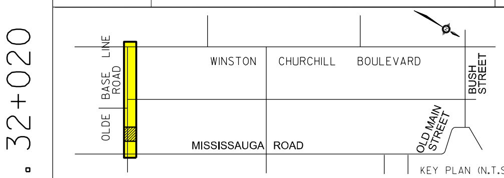


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- HP HYDRO POLE
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B.M. No. Elev.

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Designed by Chkd.

Approved by

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
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HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
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PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel

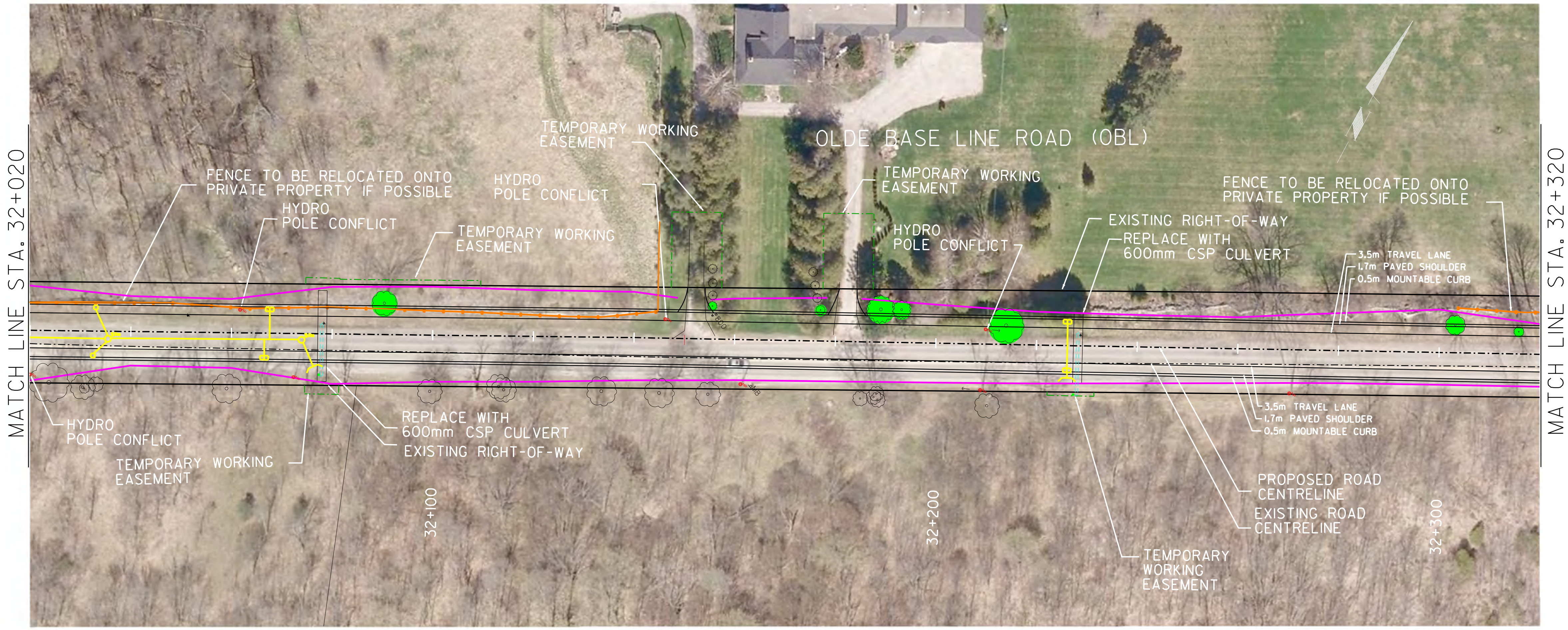
Working for you

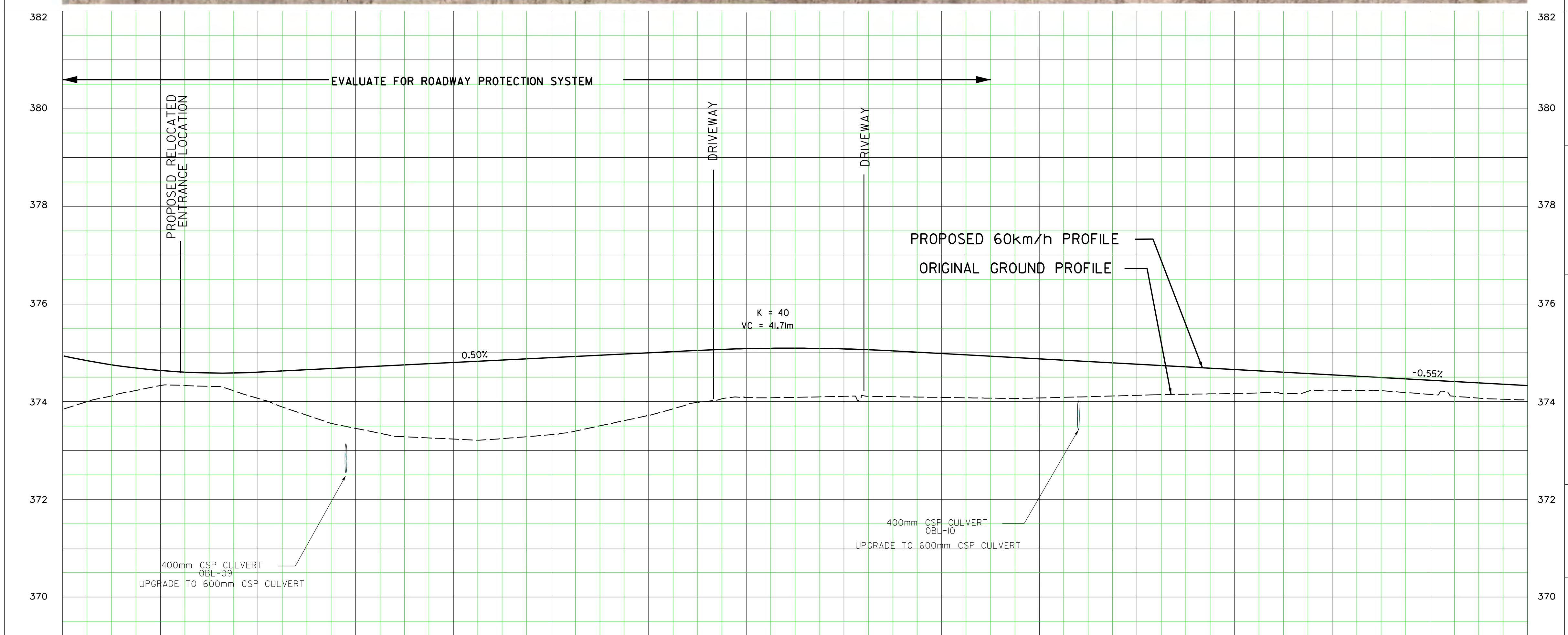
OLDE BASE LINE ROAD

(FROM STA 31+720 to STA 32+020)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 7 of 10	Plan No. -D





BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	32+100 · 32+200 · 32+300

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.

OLDE BASE LINE ROAD
WINSTON CHURCHILL BOULEVARD
BUSH STREET
OLD MAIN STREET
MISSISSAUGA ROAD
KEY PLAN (N.T.S.)

LEGEND:
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- EXISTING CENTRE LINE
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- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
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- EXISTING CULVERT
- DITCH GRADING
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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

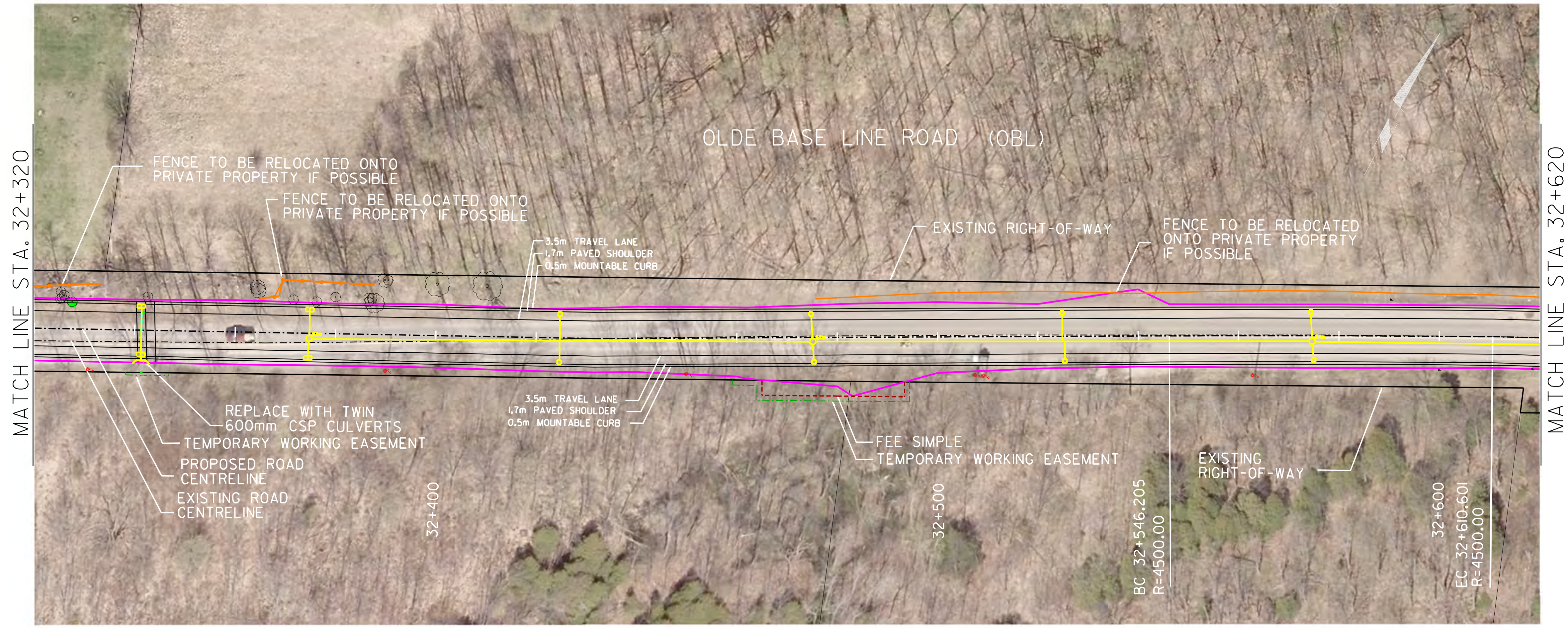
Region of Peel
Working for you

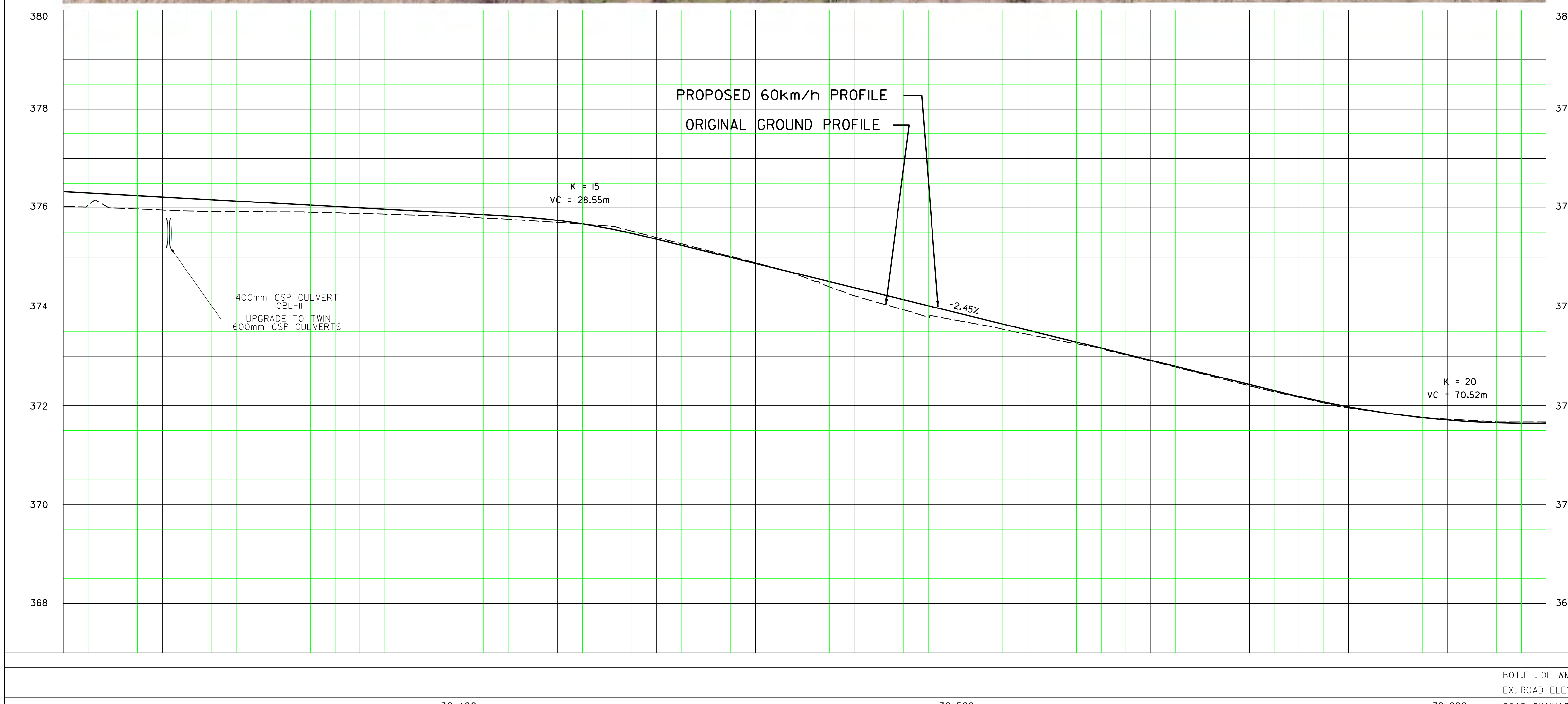
OLDE BASE LINE ROAD

(FROM STA 32+020 to STA 32+320)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 8 of 10	Plan No. -D





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
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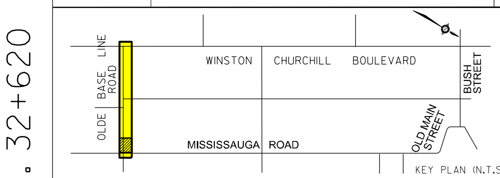
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

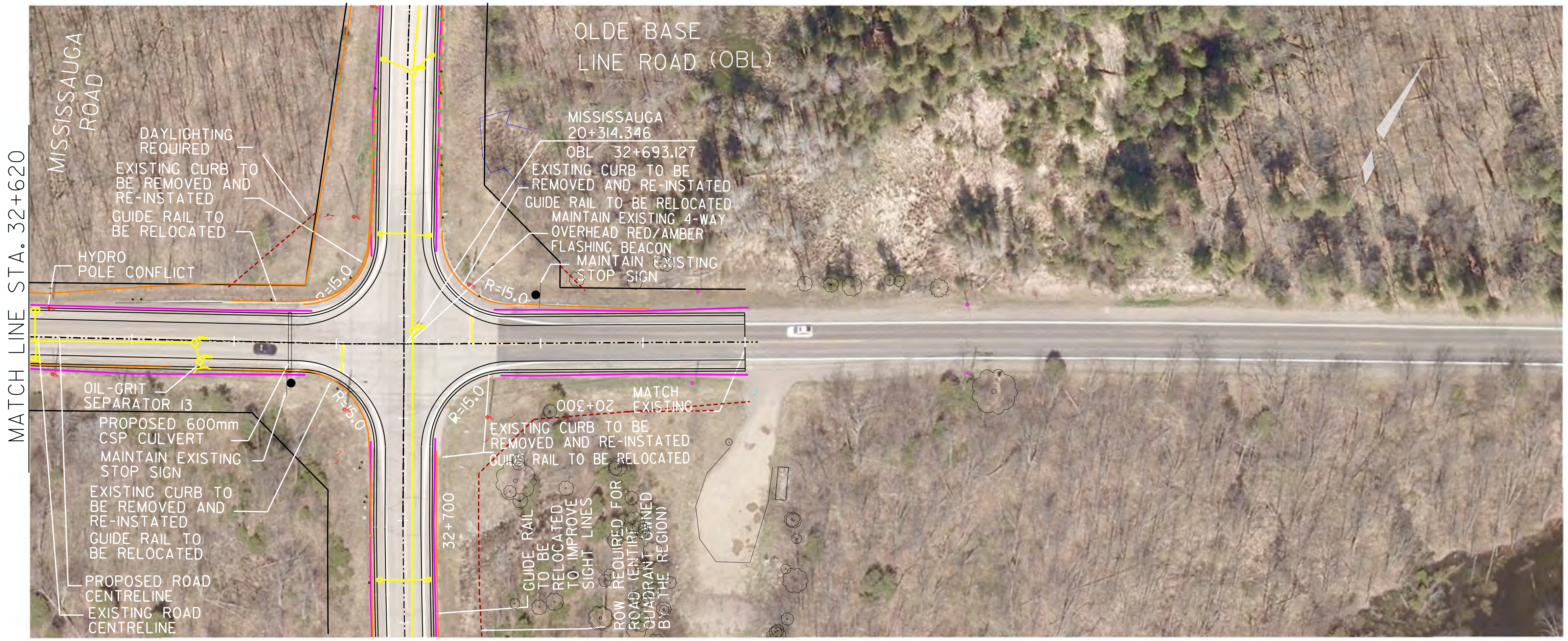
Region of Peel
Working for you

OLDE BASE LINE ROAD

(FROM STA 32+320 to STA 32+620)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 9 of 10	Plan No. -D



SERVICE DATA					
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STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
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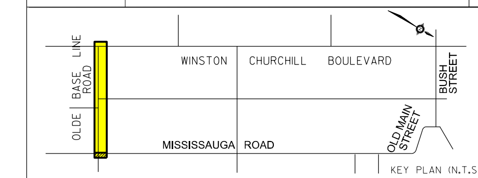
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

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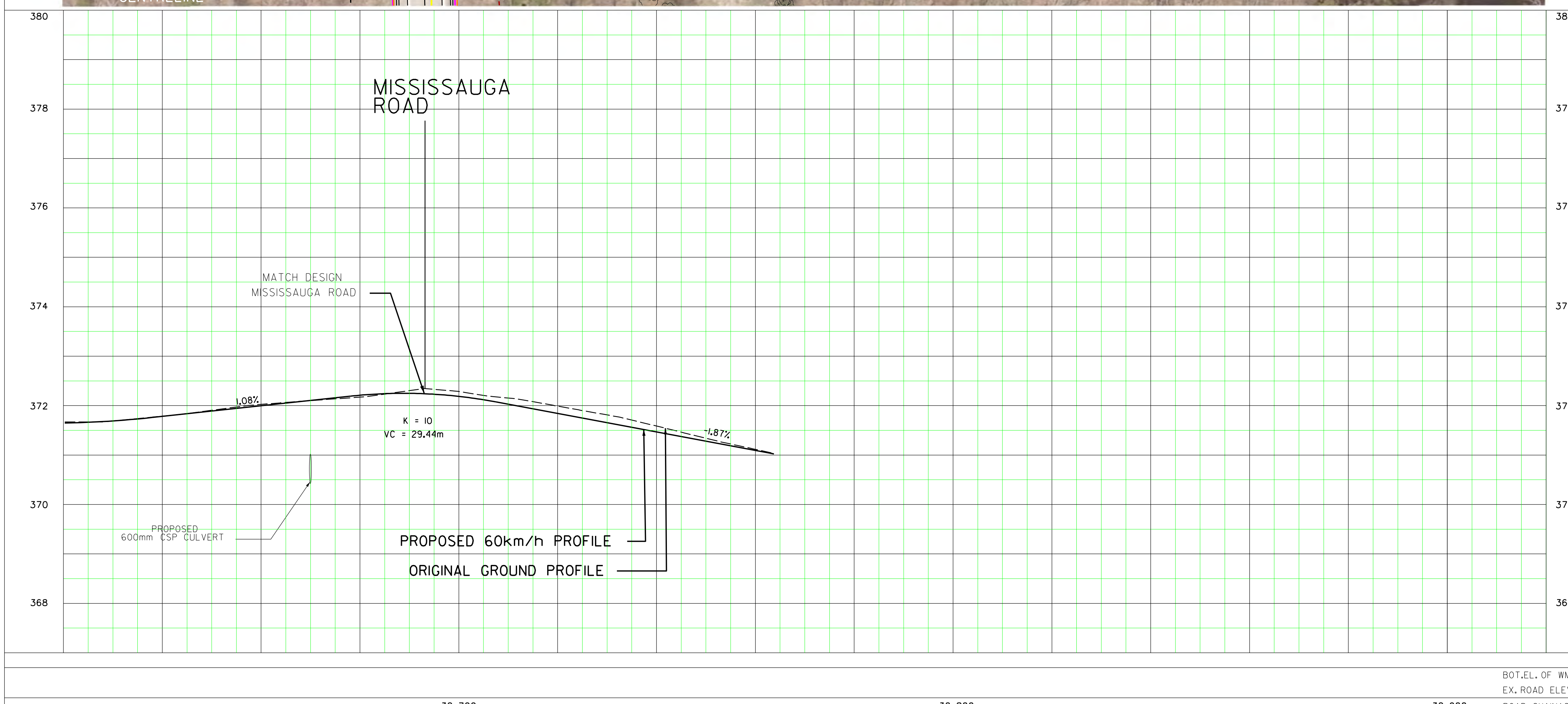
NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN



General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel

Working for you

OLDE BASE LINE ROAD

(FROM STA 32+620 to STA 32+760)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 10 of 10	Plan No. -D

7.3 Impacts and Mitigation

The proposed cross-section, horizontal and vertical alignment designs aim to minimize impacts to adjacent lands and features, including naturally sensitive areas, vegetation, culturally significant fences and stone walls, buildings, and properties outside the road right-of-way. However, in order to accommodate all road users and bring the road up to standards for its role and function within the Regional road network, some impacts will need to be mitigated, as described as follows.

7.3.1 Summary of Identified Concerns and Mitigation Measures

Impacts along Olde Base Line Road (as identified in the preliminary design plates in **Section 7.2.8**.) and potential mitigation measures include:

- Grading impacts along the corridor can be mitigated by modifying the grading slope (in accordance with geotechnical recommendations), or in some cases considering a retaining wall or other type of soil retention feature.
- Impacts to sensitive natural lands and features, including ANSIs, ESAs and Significant Wildlife Habitat, have been mitigated by realigning the road centreline at some locations, and using a semi-rural cross-section to reduce the grading footprint. Tree removals will be required at various locations. In some cases, grading can be modified to minimize impacts and reduce the number of tree removals. Natural environment impacts and recommended mitigation measures are summarized in **Table 35**. Additional details are included in Natural Heritage report (**Appendix B**).
- Where impacts to cedar rail fencing (also referred to as culturally significant fencing) and heritage stone walls, the following recommendations should be considered, in order of preference:
  - Where technically possible, make further adjustments to the profile, cross-section and grading limits of the proposed road improvements to avoid directly impacting the cedar rail fencing and the heritage stone walls.
  - If direct impacts are unavoidable, document and relocate cedar rail fencing and heritage stone walls further back on to the property in advance of construction activities. Prior to relocation, these resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a relocation plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to relocate and re-use the resource.
  - Where relocation is not possible for structural or other technical reasons, document and salvage cedar rail fencing and heritage stone walls in advance of construction activities. These resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a salvage plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to salvage the resource.
  - Complete a cultural heritage landscape documentation report to document the roadscapes in advance of construction activities.

- In cases where cultural heritage resources are subject to indirect impacts, appropriate mitigation measures may include the introduction of landscape designs and vegetative elements to screen the disruptive aspects of the proposed road improvements.
- The extent of impacts to particular sections of cedar and stone fence lines will require further review during detailed design. This is a result of insufficient data regarding the exact location of these fence lines, therefore making it difficult to provide a detailed impact assessment at this stage. The following cedar fence lines and stone fence lines shall be reviewed by a qualified cultural heritage consultant at the earliest stage possible during detailed design to determine level of impact and to develop appropriate mitigation measures at that time:
  - Station 31+100 – 31+300 (north side)
  - Station 32+200 – 32+300 (north side, east of the driveway)
- Where features such as private signs, fences, etc. encroach onto the road right-of-way, they should be relocated onto private property, if possible. If further assessment determines that it is not feasible to relocate the features, an encroachment agreement with the Region would be required. Some traffic signs, bollards, and guiderails will need to be relocated, as described in **Section 7.2.7**.
- Some hydro poles are currently located within or in close proximity to the proposed road platform and will need to be relocated. Clearance zone requirements and utility guidelines should be followed. Hydro pole conflicts identified in the design plates are to be confirmed during detailed design. Permanent aerial easements and potential vegetation removals as a result of hydro pole relocation are to be identified through the development of utility relocation design.
- Property acquisition will be required at some locations, as described in **Section 7.3.2**. In some cases, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations), or considering a retaining wall or other type of soil retention feature to minimize the amount of property acquisition required.
- Where driveways are to be regraded to accommodate vertical profile and cross-section modifications, temporary working easements will be required and are to be confirmed during detailed design.
- During detailed design, opportunities to reduce grading impacts (such as realignment of the road centreline, reducing profile adjustments, retaining walls or other types of soil retention features, etc.) should be considered at the following locations:
  - Between Station 30+640 and 30+795 (north and south sides)
  - Between Station 31+895 and 32+020 (north and south sides)
- If construction extends beyond the disturbed ROW, a Stage 2 archaeological assessment is recommended on any lands along the study corridor where there is potential for archaeological sites (as identified in **Appendix C.1)**, in accordance with Draft Standards and Guidelines for Consultant Archaeologists (MCL 2009).
- Should the proposed work extend beyond the current study area, further Stage 1 assessment must be conducted to determine archaeological potential of the surrounding lands.

- In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.
- No permanent noise and air quality impacts are anticipated as a result of the proposed road improvements, as no additional travel lanes will be provided and traffic is not expected to increase significantly. During construction, best management practices (such as the application of non-chloride dust suppressants) are to be applied to mitigate any air quality impacts caused by construction dust.
- If soil removed during construction is determined to be contaminated, the disposal of contaminated soil is to be consistent with Part XV.1 of the Environmental Protection Act and Ontario Regulation 153/04, Records of Site Condition, which detail the requirements related to site assessment and clean up.
- Water supply wells within or in close proximity to the study area may be affected by road construction, either because of construction activities or, later, due to additional or more proximate road salt application. Prior to construction, it is recommended to confirm which wells are used domestically, to ensure that affected well owners will continue to have water supplies of appropriate quality and in adequate quantities, and to ensure that any work done on affected wells or any replacement wells is done pursuant to O. Reg. 903, Wells (pursuant to the Ontario Water Resources Act).

All of these impacts and potential mitigation measures are to be confirmed during detailed design. Temporary construction impacts should also be reviewed and confirmed during detailed design.

Table 35: Summary of Natural Heritage Impacts and Recommended Mitigation – Olde Base Line Road

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Vegetation/habitat removal	▪ The majority of areas to be directly impacted by site grading and vegetation removal are culturally influenced. No significant encroachment into Significant Woodland/ESAs/ANSIs are anticipated. ▪ Grading limits are to be maintained outside of tree driplines to the extent feasible. ▪ Tree protection measures will be implemented as detailed within a Tree Management Plan to be developed during the detailed design stage. ▪ Restoration/enhancement plantings along adjacent natural feature boundaries will help mitigate and buffer negative impacts associated with the proposed undertaking. ▪ Road grading limits should be maintained outside of wetland boundaries, such as through the use of retaining walls. ▪ Protective fencing should be established around regionally significant plant species during construction to avoid impacts; where avoidance is not possible, regionally significant plant species should be relocated to suitable areas of habitat restoration, where feasible. All transplanted individuals must be monitored prior to at least one year prior to their relocation to ensure proper re-establishment.	▪ No significant impact	▪ Detailed tree inventory and protection measures to be determined as part of a Tree Management Plan ▪ Visual impact assessment to be undertaken, where necessary, to evaluate the impact of vegetation removal. ▪ Vegetation Restoration Planting Plan and/or Woodland Edge Management Plan to be developed ▪ Detailed three-season surveys are to be completed during the detailed design stage to identify and map regionally significant plant species within the study area. ▪ Tree inventory work completed during Detailed Design should include inventories for snags and cavity trees to assess potential for impacts to Little Brown Myotis habitat. ▪ Follow-up surveys should be implemented to verify the presence of, and potential for impact to the following Candidate Significant Wildlife Habitat types: • Snake hibernacula • Bat maternal roosts • Habitat for significant odonate species ▪ Wetland boundaries to be accurately mapped and reviewed by agencies, where they occur adjacent to proposed road construction limits
Construction-stage impacts to crossing Jefferson Salamanders and other amphibians	▪ A permit under Section 17(2)(c) of the Endangered Species Act may be required where the proposed undertaking may cause impact to regulated habitat for Jefferson Salamander ▪ Avoid construction during peak amphibian movement period of March 15 – April 30. ▪ Provide construction personnel with materials to assist in the identification of Jefferson Salamanders. If any potential Jefferson Salamanders are observed, all work is to stop until the individual leaves the work zone and the OMNR has been notified.	▪ No significant impact	▪ Strategies to minimize impact and provide Overall Benefit to Jefferson Salamander to be determined in development of ESA “C” permit application ▪ Construction Sightings Protocol to be developed
Jefferson Salamander and general amphibian road mortality and habitat fragmentation	▪ A wildlife passage culvert is recommended near station 32+600 to mitigate potential for Jefferson Salamander and general amphibian road mortality and habitat fragmentation. ▪ Funnel fencing is to be installed on either side of each wildlife passage opening according to design plans established during the detailed design stage. ▪ Suitable ground substrates and cover objects should be established within around the openings of the wildlife passage to enhance their attractiveness to wildlife.	▪ No significant impact	▪ Effectiveness monitoring of wildlife passage and funnel fencing to be completed as detailed in a Post-Construction Monitoring Plan developed in conjunction with applicable agencies ▪ Wildlife road mortality mitigation approaches will be further discussed at the detailed design stage in consultation with MNR. It is recommended to undertake a more detailed analysis of area of impact within the regulated habitat for Jefferson Salamander at the detailed design stage. This information will be used to complete an Avoidance Alternatives Form.

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Deer/motor vehicle collisions	▪ Seasonally-flashing deer crossing signs, larger than the standard existing signs, should be installed at the east and west approaches of each high-density deer crossing location. ▪ Recommended lowered speed limits should be effectively enforced. ▪ Snow banks should be removed by snow plows in winter to increase visibility for both crossing deer and motorists. ▪ An increase in the annual sustainable deer hunt for the study area vicinity should be explored with OMNR as a means to control local deer populations.	▪ No significant impact	▪ Appropriate road sign locations to be determined in consultation with agencies, municipality
Impacts to Fish and Fish Habitat	▪ Concrete open-bottom culverts and/or increases in the diameter of replacement culverts have been recommended. ▪ All in-water work should occur during dry and/or low flow conditions to avoid or minimize impact to fish and fish habitat within and downstream of the construction site. ▪ Specific timing windows are to be determined in consultation with the OMNR and DFO. ▪ Where feasible, culvert replacements should comprise arch/open bottom culverts to provide better fish habitat, connectivity, and improve the potential for groundwater inputs. ▪ Where impacts to fish and fish habitat may occur, a DFO Fisheries Act Authorization may be required. ▪ Any fish that may be caught within areas impounded and de-watered for in-water construction activities should be captured and relocated prior to construction.	▪ No significant impact	▪ Where necessary, fish and wildlife salvage plans should be created for watercourse areas to be de-watered for in-water construction work.
Bird nesting disruption and avoidance, and active nest destruction	▪ Time vegetation removal activities to occur outside the typical bird breeding season (May 1 – July 31) ▪ If vegetation removal must occur during the bird breeding season, retain an avian biologist to survey for active nests just prior to vegetation removal activities	▪ No significant impact	
Wildlife avoidance of the area, and other impacts associated with construction	▪ Restrict the daily timing of construction activities to between 7:00 am and 7:00 pm. ▪ Moisten bare dirt surfaces with water to limit impacts caused by dust. ▪ Direct night-time lighting away from adjacent natural features. ▪ These construction-related impacts are expected to be temporary, minimal and localized.	▪ No significant impact	
Damage or other disturbance to the adjacent natural features	▪ Clearly demarcate the limits of construction with silt fencing or brightly coloured snow fencing around the limits of the construction zone.	▪ No significant impact	
Erosion and sedimentation	▪ A Sediment and Erosion Control Plan should be developed and implemented. ▪ Install silt fencing along the boundaries of the construction zone, inspect on a regular basis, remove accumulated sediment as needed and immediately replace any damaged fencing. ▪ Construction activities should be timed to occur outside of seasonally wet periods, during heavy rain, or during periods of rapid snowmelt.	▪ No significant impact	▪ Sediment and Erosion Control Plan to be developed.
Alterations to hydrological regime of watercourses and wetlands	▪ Increased stormwater runoff associated with increased areas of impervious surface are not anticipated to cause significant increases to natural feature hydrological inputs, due to the relatively small hydrological contributions provided by road surfaces versus surrounding areas of catchment. ▪ Replacement culverts must be properly sized to prevent increases or decreases in hydrological flow to wetland features, particularly those wetlands that provide significant habitat for Jefferson salamander, western chorus frog, or where they provide significant amphibian breeding habitat. ▪ Any upgrades to culverts that provide flow between wetlands will be maintained at existing culvert invert elevations in order to maintain wetland levels. ▪ In semi-rural sections where subsurface drainage systems are proposed, the incorporation of trench plugs will be required to minimize groundwater interception. These should be employed in the vicinity of all wetlands.	▪ No significant impact	

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Impacts to water quality of watercourses and wetlands	▪ Treatment trains comprising OGS units and grassed swales are designed to provide an Enhanced (Level 1) level of water quality treatment to intercepted stormwater runoff. ▪ Where only one component (OGS unit or grassed swale) has been proposed, water quality improvements are anticipated over existing conditions. ▪ Treated pavement area significantly exceeds the area of new pavement proposed for the study area, representing a 101% increase in treated pavement area. ▪ At a minimum, the most sensitive natural features (i.e., PSWs, including Jefferson salamander breeding habitat, fish habitat) should receive an Enhanced level of water quality treatment. ▪ Construction machinery should arrive on-site in a clean state and should be refueled and washed at least 30 m away from permanent watercourses or wetlands. ▪ A Spill Response Plan should be developed and implemented as necessary during site construction. ▪ Water removal required for in-water construction de-watering purposes must be adequately filtered prior to discharge into the receiving watercourse, and monitored for pertinent water quality parameters, following established protocols and standards.	▪ No significant impact	▪ A water quality monitoring program may be considered within the framework of a Post-Construction Monitoring Program to be determined in consultation with the applicable agencies

7.3.2 Property Requirements

The proposed design attempts to minimize property requirements. Potential property acquisition (fee simple takings) and temporary working easements as a result of the proposed design are shown on the plates and summarized in **Table 36**. Although the Region of Peel Official Plan identifies wider designated right-of way widths at some locations, property acquisition as a result of the proposed design is only identified where required for the proposed improvements. Temporary working easements are based on a 1 metre buffer around grading, and 2.5 metre buffer around culverts and storm sewers.

Table 36: Potential Property Acquisition along Olde Base Line Road

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
North-east corner of Winston Churchill Boulevard intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
Station 30+616 to 30+624 (south side, driveway)		25 m^2
Station 30+660 to 30+775 (south side, grading / culvert)		140 m^2
Station 30+660 to 30+775 (south side, grading / culvert)	450 m^2	
Station 30+675 to 30+765 (north side, driveway / culvert / grading)		625 m^2
Station 30+675 to 30+765 (north side, grading / culvert)	220 m^2	
Station 30+820 to 30+826 (north side, driveway)		140 m^2
Station 30+838 to 30+842 (north side, grading)		5 m^2
Station 30+912 to 30+923 (north side, driveway)		80 m^2
North-west corner of Shaws Creek Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
North-east corner of Shaws Creek Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
Station 31+349 to 31+383 (north side, grading)		50 m^2
South-west corner of Rockside Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
South-east corner of Rockside Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
Station 31+846 to 31+854 (south side, driveway)		15 m^2
Station 31+873 to 31+884 (north side, grading)		15 m^2
Station 31+905 to 32+012 (north side, grading)		120 m^2

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
Station 31+905 to 32+012 (north side, grading)	565 m^2	
Station 31+908 to 32+009 (south side, grading)		115 m^2
Station 31+908 to 32+009 (south side, grading)	525 m^2	
Station 32+074 to 32+081 (south side, culvert)		15 m^2
Station 32+074 to 32+110 (north side, culvert / grading)		40 m^2
Station 32+147 to 32+157 (north side, driveway)		150 m^2
Station 32+177 to 32+187 (north side, driveway)		150 m^2
Station 32+222 to 32+232 (south side, culvert)		10 m^2
Station 32+337 to 32+346 (south side, culvert)		5 m^2
Station 32+459 to 32+495 (south side, grading)		45 m^2
Station 32+459 to 32+495 (south side, grading)	85 m^2	
North-west corner of Mississauga Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
North-east corner of Mississauga Road intersection (area to complete daylighting triangle)	20 m^2	

As described in **Section 7.3.1**, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations) to reduce the amount of area required, or in some cases considering a retaining wall or other type of soil retention feature. Property and easement requirements identified in this section and shown on the design plates are preliminary and are to be confirmed during detailed design.

8. MISSISSAUGA ROAD / OLD MAIN STREET

8.1 Identification and Evaluation of Alternative Design Concepts

This section discusses the different design alternatives considered for Mississauga Road / Old Main Street between Olde Base Line Road and approximately 580 metres north / west of Caledon Mountain Drive. The segment of Old Main Street through the Belfountain Village (between approximately 580 metres north/west of Caledon Mountain Drive and Bush Street) is discussed in **Section 9**. For intersection options considered at Mississauga Road / Olde Base Line Road, refer to Section **11.2**.

8.1.1 Mississauga Road / Old Main Street Cross-Section Options

Alternative cross-section options were considered for each of the roads in the study area. Some options greatly differ from other options in terms of cross-section elements/widths and overall ROW required, while other alternatives consist of modifications to options that were considered earlier in the process to make them a more desirable alternative. Therefore, some cross-section options were screened out earlier in the process and others were only evaluated for the specific road segment where they best apply. All cross-section options considered during this study are included in **Appendix V**. The vehicle zone illustrated in the cross-sections refers to the general purpose travel lane, and the two terms are interchangeable. The most feasible options considered for Mississauga Road / Old Main Street (outside the Belfountain Village) include:

- **Option 1:** Do Nothing (Existing Rural Conditions): 3.3-3.5 metre wide travel lanes and partially paved shoulders (**Figure 63**)
- **Option 2:** 14 metre Platform Rural Road: 3.5 metre wide travel lane, 1.0 metre wide paved buffer, 2.0 metre wide paved shoulder, and adequate ditches (**Figure 64**)
- **Option 3:** 11.4 metre Platform Rural Road: 3.5 metre wide travel lane, 1.7 metre wide paved shoulder, and adequate ditches (**Figure 65**)
- **Option 4:** 11.4 metre Platform Semi-Rural Road: 3.5 metre wide travel lane, 1.7 metre wide paved shoulders, 0.5 metre mountable curb, and underground infrastructure (**Figure 66**)

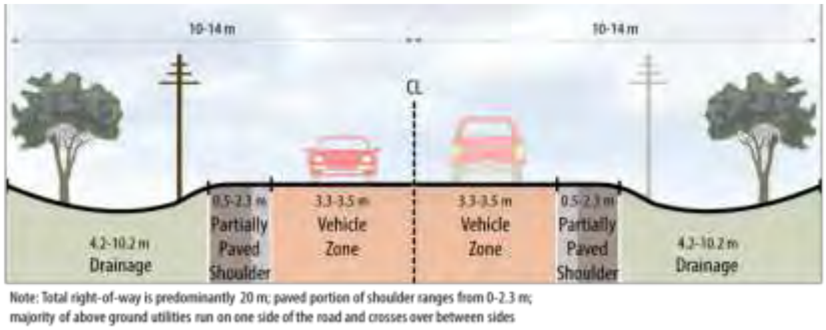


Figure 63: Option 1 - Do Nothing Option - Existing Conditions on Mississauga Rd. / Old Main St.

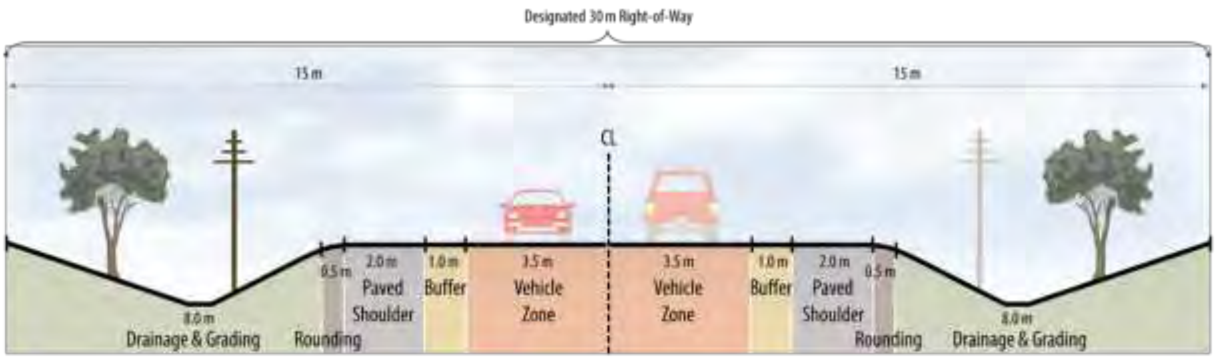


Figure 64: Option 2 - 14 m Platform Rural Option Considered for Mississauga Rd. / Old Main St.

Figure 65: Option 3 - 11.4 m Platform Rural Option Considered for Mississauga Rd. / Old Main St.

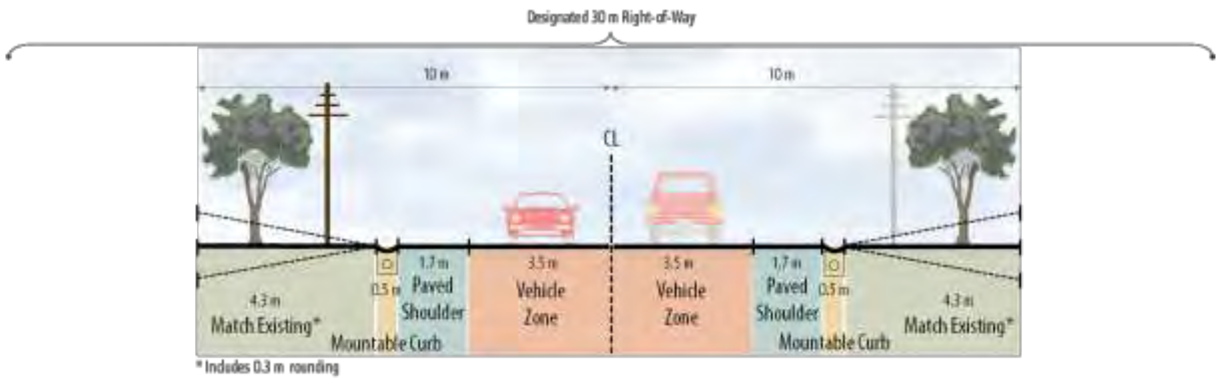


Figure 66: Option 4 - 11.4 m Platform Semi-Rural Option Considered for Mississauga Rd. / Old Main St.

The evaluation for the above noted options is shown in **Table 37**.

Table 37: Mississauga Rd. / Old Main St. Cross-Section Option Evaluation

EVALUATION CRITERIA	Mississauga / Old Main Street Cross-Section Options				EVALUATION
	Option 1: Do Nothing	Option 2: 14 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20 m • 3.3-3.5 m wide travel lane • 0.5-2.3 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	
Rural Character					
Maintains rural character and countryside scenic quality	▪ Retains rural character	▪ Retains rural character	▪ Retains rural character	▪ Significant changes to rural character and countryside scenic quality with a more urbanized cross-section	• Options 1, 2, 3 preferred
Transportation					
Geometric alignment	▪ N/A	▪ N/A	▪ N/A	▪ N/A	▪ No difference
Traffic operations	▪ Vehicular capacity limited by all road users sharing 1 travel lane in each direction with partially paved shoulders ▪ Conflicts between motorized vehicles and cyclists/pedestrians	▪ Reduced delays due to provision of separate paved shoulder ▪ Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate buffer and paved shoulder	▪ Reduced delays due to provision of separate paved shoulder ▪ Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	▪ Reduced delays due to provision of separate paved shoulder ▪ Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Option 2 preferred as it reduces conflicts between different road users with paved shoulder, and additional buffer for separation • Otherwise Options 3, 4 preferred
Accommodation of motorists	▪ One 3.3-3.5 m travel lane in each direction	▪ One 3.5 m travel lane in each direction	▪ One 3.5 m travel lane in each direction	▪ One 3.5 m travel lane in each direction	• Options 2, 3, 4 preferred as travel lane width meets design standards
Accommodation of trucks	▪ 3.3-3.5 m paved travel lane, with partially paved shoulders available, but shared with all road users ▪ Truck restriction on Mississauga Road	▪ 3.5 m paved travel lane available ▪ 1.0 m buffer and 2.0 m paved shoulder provides separation from other road users ▪ Existing truck restriction on Mississauga Road to remain	▪ 3.5 m paved travel lane available ▪ 1.7 m paved shoulder provides separation from other road users ▪ Existing truck restriction on Mississauga Road to remain	▪ 3.5 m paved travel lane available ▪ 1.7 m paved shoulder provides separation from other road users ▪ Existing truck restriction on Mississauga Road to remain	• Option 2 preferred as it reduces conflicts between different road users with paved shoulder, and additional buffer for separation • Otherwise Options 3, 4 preferred
Accommodation of farm vehicles	▪ 3.3-3.5 m of paved travel lane, with partially paved shoulders available, but shared with all road users	▪ 6.5 m of pavement available, but shared with all road users ▪ Separation from other road users through buffer and paved shoulder	▪ 5.2 m of pavement available, but shared with all road users ▪ Separation from other road users through paved shoulder	▪ 5.7 m of pavement available, but shared with all road users ▪ Separation from other road users through paved shoulder	• Option 2 preferred as it reduces conflicts between different road users with paved shoulder, and additional buffer for separation • Otherwise Options 3, 4 preferred
Accommodation of cyclists	▪ No separate facility to accommodate cyclists ▪ Cyclists share the road or use partially paved shoulders where available	▪ 2.0 m paved shoulder available ▪ 1.0 m paved buffer provides additional separation from motorized vehicles	▪ 1.7 m paved shoulder available	▪ 1.7 m paved shoulder available	• Option 2 preferred as it reduces conflicts between different road users with paved shoulder, and additional buffer for separation • Otherwise Options 3, 4 preferred
Accommodation of pedestrians	▪ No separate facility to accommodate pedestrians ▪ Pedestrians use partially paved shoulders where available ▪ Minimal streetscaping	▪ 2.0 m paved shoulder available ▪ 1.0 m paved buffer provides additional separation from motorized vehicles ▪ Opportunities for streetscaping	▪ 1.7 m paved shoulder available ▪ Opportunities for streetscaping	▪ 1.7 m paved shoulder available ▪ Opportunities for streetscaping	• Option 2 preferred as it reduces conflicts between different road users with paved shoulder, and additional buffer for separation • Otherwise Options 3, 4 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga / Old Main Street Cross-Section Options				EVALUATION
	Option 1: Do Nothing	Option 2: 14 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20 m • 3.3-3.5 m wide travel lane • 0.5-2.3 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	
Accommodation of horses	▪ 3.3-3.5 m of paved travel lane, with partially paved shoulders available, but shared with all road users	▪ 3.5 m paved travel lane, 1.0 m paved buffer, and 2.0 m paved shoulder available	▪ 3.5 m paved travel lane and 1.7 m paved shoulder available	▪ 3.5 m paved travel lane and 1.7 m paved shoulder available	• Option 2 preferred as it reduces conflicts between different road users with paved shoulder, and additional buffer for separation • Otherwise Options 3, 4 preferred
Safety	▪ Conflicts between motorized vehicles and cyclists/pedestrians	▪ Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder ▪ 1.0 m buffer provides separation between motorized vehicles and cyclists/pedestrians	▪ Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	▪ Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	▪ Option 2 is preferred as it provides a paved shoulder for cyclists and pedestrians with a buffer separating them from motorized vehicles, minimizing conflicts between different road users ▪ Otherwise Options 3, 4 preferred
Stormwater quality and quantity	▪ Deficient drainage	▪ Designed to address drainage deficiencies through adequate ditches	▪ Designed to address drainage deficiencies through adequate ditches	▪ Designed to address drainage deficiencies through underground infrastructure	▪ Options 2, 3, 4 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	▪ Pavement reconstruction	▪ Options 2, 3, 4 preferred
Socio-Economic Environment					
Residential properties	• No impacts	• Cross-section extends beyond existing ROW in many areas • Potential property acquisition required and driveway impacts due to increased roadway platform width and grading	• Cross-section extends beyond existing ROW in some areas • Potential property acquisition required and driveway impacts due to increased roadway platform width and grading; less than Option 2	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements; less than other options	• Option 1 preferred as there are no impacts • Otherwise, Option 4 preferred as there is less impact than Options 2, 3
Farm operations	• No impacts	• Cross-section extends beyond existing ROW in many areas • Potential land acquisition required and driveway impacts due to increased roadway platform width and grading	• Cross-section extends beyond existing ROW in some areas • Potential property acquisition required and driveway impacts due to increased roadway platform width and grading; less than Option 2	• Cross-section typically within existing ROW • Potential driveway impacts due to modification of roadway platform and semi-rural cross-section elements; less than other options	• Option 1 preferred as there are no impacts • Otherwise, Option 4 preferred as there is less impact than Options 2, 3
Businesses	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to widening of roadway platform and grading, which may require additional assessment	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to widening of roadway platform and grading, which may require additional assessment; less than Option 2	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment; less than other options	• Option 1 preferred as there are no impacts • Otherwise, Option 4 preferred as there is less impact than Options 2, 3

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga / Old Main Street Cross-Section Options				EVALUATION
	Option 1: Do Nothing	**Option 2: 14 m Platform Rural Road**	**Option 3: 11.4 m Platform Rural Road**	**Option 4: 11.4 m Platform Semi-Rural Road**	
Option Description	• 20-28 m ROW, predominantly 20 m • 3.3-3.5 m wide travel lane • 0.5-2.3 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	
Built and cultural heritage resources	• No impacts	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to widening of roadway platform and grading, which may require additional assessment	• Cross-section extends beyond existing ROW in some areas • Potential impacts within and beyond existing ROW due to widening of roadway platform and grading, which may require additional assessment; less than Option 2	• Cross-section typically within existing ROW • Potential impacts mostly within existing ROW due to modification of roadway platform and semi-rural cross-section elements, which may require additional assessment; less than other options	• Option 1 preferred as there are no impacts • Otherwise, Option 4 preferred as there is less impact than Options 2, 3
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction; more than Options 2, 3 due semi-rural cross-section elements	• Option 1 preferred as there are no impacts
Natural Environment					
Terrestrial habitat	• No impacts	• Requires most encroachment among Options into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires greatest number of tree removals among Options • Encroaches into sensitive/significant natural areas designated as Life Science ANSI (Credit Forks) and ESA (Credit Forks-Devil's Pulpit, Grange Woods), more so than the other Options • Requires greatest amount of terrestrial habitat removal	• Requires encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities, somewhat less so than Option 2 but more so than Option 4 • Requires tree removals within areas to be graded, somewhat less so than Option 2 but more so than Option 4 • Encroaches into sensitive/significant natural areas designated as Life Science ANSI (Credit Forks) and ESA (Credit Forks-Devil's Pulpit, Grange Woods), somewhat less so than Option 2 but more so than Option 4 • Requires terrestrial habitat removal in areas to be graded, somewhat less so than Option 2 but more so than Option 4	• Requires least amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires fewest tree removals within areas to be graded • Requires least amount of encroachment into sensitive/significant natural areas designated as Life Science ANSI (Credit Forks) and ESA (Credit Forks-Devil's Pulpit, Grange Woods) • Requires least amount of terrestrial habitat removal in areas to be graded	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 4 is preferred over Options 2 or 3 due to lesser required encroachment into adjacent terrestrial natural features and habitat as a result of grading requirements
Aquatic environment	• No impacts	• 10 culvert crossings, 2 of which (culverts 10 and 12) convey watercourses; greatest potential for impact to aquatic features if culvert replacements required due to more extensive grading requirements • Potential impact to direct fish habitat associated with Trib. A to Second Creek, conveyed by culvert 10 • Provides potential habitat for Brook Trout; groundwater influence observed	• 10 culvert crossings, 2 of which (culverts 10 and 12) convey watercourses; potential for impact to aquatic features if culvert replacements required due to grading requirements, potentially less so than Option 2 • Potential impact to direct fish habitat associated with Trib. A to Second Creek, conveyed by culvert 10 • Provides potential habitat for Brook Trout; groundwater influence observed	• 10 culvert crossings, 2 of which (culverts 10 and 12) convey watercourses; potential for impact to aquatic features if culvert replacements required due to grading requirements, potentially less so than Option 2 • Potential impact to direct fish habitat associated with Trib. A to Second Creek, conveyed by culvert 10; • Provides potential habitat for Brook Trout; groundwater influence observed	• Option 1 is preferred as it avoids potential impacts to aquatic features and habitat • Otherwise, Options 3 and 4 are preferred over Option 2 as they require smaller increases in platform width and less potential for requiring culvert replacement/additional in-water work

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga / Old Main Street Cross-Section Options				EVALUATION
	Option 1: Do Nothing	**Option 2: 14 m Platform Rural Road**	**Option 3: 11.4 m Platform Rural Road**	**Option 4: 11.4 m Platform Semi-Rural Road**	
Option Description	• 20-28 m ROW, predominantly 20 m • 3.3-3.5 m wide travel lane • 0.5-2.3 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	
Wetlands and watercourses	• No impacts	• Several wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Greatest potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Greatest potential for impacts to amphibian breeding SWH due to more extensive grading requirements	• Several wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Potential for direct impact to wetlands, including PSW, through encroachment; somewhat less so than Option 2 but more so than Option 4 • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Potential for impacts to amphibian breeding SWH due to grading requirements; somewhat less so than Option 2 but more so than Option 4	• Several wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Least potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Least potential for impacts to amphibian breeding SWH due to grading requirements	• Option 1 is preferred as it avoids impacts to wetlands • Otherwise, Option 4 is preferred over Options 2 or 3 due to lesser required encroachment into adjacent wetlands and habitats.
Species at risk	• No impacts	• Occurs within Jefferson Salamander regulated habitat at north and south ends; greatest potential for direct impact to regulated habitat, including known breeding ponds, among Options • Greatest potential for Jefferson Salamander road mortality and potential road crossing deterrence due to widest road platform • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; greatest potential impact among Options due to more extensive grading requirements • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Occurs within Jefferson Salamander regulated habitat at north and south ends; potential for direct impact to regulated habitat, including known breeding ponds, less so than Option 2 but more so than Option 4 • Potential for Jefferson Salamander road mortality and potential road crossing deterrence due to wider road platform, less so than Option 2 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; greater potential impact than Option 2 but less so than Option 4, due to grading requirements • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Occurs within Jefferson Salamander regulated habitat at north and south ends; least potential for direct impact to regulated habitat, including known breeding ponds, among Options • Potential for Jefferson Salamander road mortality and potential road crossing deterrence due to wider road platform, less so than Option 2 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; least potential impact among Options due to grading requirements • Barn Swallow foraging habitat, and Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Option 1 is preferred as it avoids impacts to regulated Jefferson Salamander habitat and potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 4 is preferred over Options 2 and 3 due to less required encroachment into regulated Jefferson Salamander habitat, and fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga / Old Main Street Cross-Section Options Option 1: Do Nothing	Option 2: 14 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	EVALUATION
Option Description	• 20-28 m ROW, predominantly 20 m • 3.3-3.5 m wide travel lane • 0.5-2.3 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Greatest direct impact to known Northern Flying Squirrel habitat at north and south ends of ROW • Proposed grading creates a gap across ROW too large to permit Northern Flying Squirrels to glide from one side to the other (i.e. > approx. 23 m); potential habitat fragmentation • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Greatest impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern • Greatest potential for Western Chorus Frog road mortality and potential road crossing deterrence due to widest road platform	• Direct impact to known Northern Flying Squirrel habitat at north and south ends of ROW, less so than Option 2 but more so than Option 4 • Proposed grading creates a gap across ROW too large to permit Northern Flying Squirrels to glide from one side to the other (i.e. > approx. 23 m); potential habitat fragmentation • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern; less so than Option 2 but more so than Option 4 • Potential for Western Chorus Frog road mortality and potential road crossing deterrence due to wider road platform; less so than Option 2	• Least direct impact to known Northern Flying Squirrel habitat at north and south ends of ROW • Most likely to maintain a suitable gap length across the ROW, among Options, to permit continued Northern Flying Squirrel gliding from one side to the other • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Least impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern • Potential for Western Chorus Frog road mortality and potential road crossing deterrence due to wider road platform; less so than Option 2	• Option 1 is preferred as it avoids impacts to habitat for Northern Flying Squirrel and Western Chorus Frog, and potential habitat for species of conservation concern Odonates • Otherwise, Option 4 is preferred over Options 2 and 3 due to less required encroachment into habitat for these species, and is most likely to maintain suitable ROW gaps to permit Northern Flying Squirrels to continue gliding from one side to the other
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Options 3 and 4; multiple significant amphibian crossing locations affected	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), but somewhat less so than Option 2; multiple significant amphibian crossing locations affected	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands, but less so than Options 2 or 3; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), but somewhat less so than Option 2; less required grading may maintain more suitable habitat along roadsides; multiple significant amphibian crossing locations affected	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 4 is preferred over Option 2 because a narrower paved surface may increase the likelihood of amphibian crossing success, and preferred over Option 3 because less potential site grading may maintain more suitable amphibian movement habitat along roadsides
Stormwater management	• No impacts	• Greatest increase in surface runoff volumes among Options due to widest platform of impervious surface • Improved roadside drainage system	• Increase in surface runoff volumes due to wider platform of impervious surface • Improved roadside drainage system	• Increase in surface runoff volumes due to wider platform of impervious surface • Improved roadside drainage system	• Options 3 and 4 are preferred as they incorporate improved drainage systems over current conditions but features less impervious surface than Option 2

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga / Old Main Street Cross-Section Options				EVALUATION
	Option 1: Do Nothing	Option 2: 14 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	Option 4: 11.4 m Platform Semi-Rural Road	
Option Description	• 20-28 m ROW, predominantly 20 m • 3.3-3.5 m wide travel lane • 0.5-2.3 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	• 20 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders • 0.5 m mountable curb	
Natural hazards	• No impacts	• Part of ROW occurs adjacent to West Credit River valley • Crosses regulated habitat for watercourses and wetlands	• Part of ROW occurs adjacent to West Credit River valley • Crosses regulated habitat for watercourses and wetlands	• Part of ROW occurs adjacent to West Credit River valley • Crosses regulated habitat for watercourses and wetlands	• Option 1 is preferred at it avoids potential impacts to natural valley features and regulated watercourses and wetlands
Niagara Escarpment impacts	• No impacts	• Greatest direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to more extensive site grading, among Options • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading; less so than Option 2 but more so than Option 4 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Least direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading, among Options • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Option 1 is preferred as it avoids impacts to Niagara Escarpment Plan policy protection areas and regulated habitat • Otherwise, Option 4 is preferred as it requires the least encroachment and potential for impact to escarpment natural features
Capital Costs					
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost from increased roadway platform width and grading	• Moderate construction cost from increased roadway platform width and grading; less than Option 2	• Significantly higher construction cost from semi-rural cross-section elements and underground infrastructure	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• Potential property acquisition anticipated as necessary in areas that beyond the existing ROW	• Potential property acquisition anticipated as necessary in areas that beyond the existing ROW; less than Option 2	• No property acquisition anticipated; potential impacts and easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated • Otherwise, Option 4 preferred
OVERALL					
			• Option 3 preferred where feasible as it retains the rural character of the road, better accommodates and reduces conflicts between all road users through paved shoulders that meet design standards, while reducing property and natural environment impacts	• Option 4 preferred where Option 3 results in significant impacts beyond existing ROW, as it accommodates and reduces conflicts between all road users through paved shoulders that meet design standards, while minimizing property and natural environment impacts	

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, the 11.4 metre platform rural cross-section (Option 3) is preferred for Mississauga Road / Old Main Street between Olde Base Line Road and approximately 580 metres north of Caledon Mountain Drive, where ROW width and constraints allow, and the 11.4 metre platform semi-rural cross-section (Option 4) is preferred where the rural option results in significant impacts beyond the existing ROW.

8.1.2 Mississauga Road / Old Main Street Profile Options

Profile options were considered based on different design speeds. Generally, lower design speeds allow for the profile to remain closer to existing conditions. Higher design speeds, on the other hand, require more significant profile adjustments and therefore result in greater impacts to adjacent lands and features.

For Mississauga Road/Old Main Street, profile options were considered for the following speeds:

- **Option 1:** Do Nothing (50-70 km/h existing posted speed)
- **Option 2:** 70 km/h Design Speed (60 km/h Posted Speed)
- **Option 3:** 80 km/h Design Speed (70 km/h Posted Speed)
- **Option 4:** 60 km/h Design Speed (50 km/h Posted Speed)

The evaluation for the above noted options is shown in **Table 38** for the segment between Olde Base Line Road and The Grange Side Road (where the current posted speed is 70 km/h), in **Table 39** for the segment between The Grange Side Road and Caledon Mountain Drive (where the current posted speed is 60 km/h), and in **Table 40** for the segment between Caledon Mountain Drive and approximately 580 metres north of Caledon Mountain Drive (where the current posted speed is 50 km/h).

Table 38: Mississauga Road Profile Option Evaluation – Olde Base Line Road to The Grange Side Road

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options: Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 70 km/h design speed from Olde Base Line Road to The Grange Side Road • 60 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 80 km/h design speed from Olde Base Line Road to The Grange Side Road • 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	
Rural Character				
Maintains rural character and countryside scenic quality	• Retains rural character	• Vertical alignment modifications result in some changes to rural character	• Vertical alignment modifications result in some changes to rural character	• Option 1 preferred
Transportation				
Geometric alignment	• Vertical alignment consists of rolling profile with moderate crests/sags throughout, with a sharp crest/sag between 22+650 and 23+000	• Vertical alignment moderately flattens crests/sags throughout	• Vertical alignment significantly flattens crests/sags throughout	• Options 2, 3 preferred due to smoother vertical alignment
Traffic operations	• Limited and sub-standard visibility due to limited sightlines of rolling vertical alignment • Conflicts between all road users due to poor visibility along vertical profile • Motorists significantly exceed posted speed limits	• Slightly increased travel time due to decrease in posted speed limit • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Requires motorists to reduce speeds below the existing posted speed limit	• Similar travel time as posted speed limit is unchanged • Improved visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Motorists maintain existing posted speed	• Options 2, 3 preferred as visibility is improved to meet design standards, and conflicts are reduced between all road users
Accommodation of motorists	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, and lowered posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits	• Options 2, 3 preferred as smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits • Truck restriction on Mississauga Road	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, and lowered posted speed limits • Existing truck restriction on Mississauga Road to remain	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits • Existing truck restriction on Mississauga Road to remain	• Options 2, 3 preferred as smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, and lowered posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits	• Options 2, 3 preferred as smoother profile improves travel along corridor and reduces conflicts with all other road users

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	
Option Description	• 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 70 km/h design speed from Olde Base Line Road to The Grange Side Road • 60 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 80 km/h design speed from Olde Base Line Road to The Grange Side Road • 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	
Accommodation of cyclists	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with motorized vehicles due to improved and adequate visibility of vertical alignment, and lowered posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with motorized vehicles due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits	• Options 2, 3 preferred as smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of pedestrians	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along the corridor, and enhances environment for pedestrians • Reduced conflicts with motorized vehicles due to improved and adequate visibility of vertical alignment, and lowered posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along the corridor, and enhances environment for pedestrians • Reduced conflicts with motorized vehicles due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits	• Options 2, 3 preferred as smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of horses	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for horses • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along the corridor, and enhances environment for horses • Reduced conflicts with motorized vehicles due to improved and adequate visibility of vertical alignment, and lowered posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along the corridor, and enhances environment for horses • Reduced conflicts with motorized vehicles due to improved and adequate visibility of vertical alignment, while maintaining posted speed limits	• Options 2, 3 preferred as smoother profile enhances environment and reduces conflicts with motorized vehicles
Safety	• Vertical alignment provides sufficient visibility for 30-40 km/h design speed at some locations • Posted speed exceeds design speed by 30-40 km/h in some locations • Limited and sub-standard visibility for motorists to see other vehicles on the road, vehicles on residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 60 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 70 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on residential driveways, and cyclists/pedestrians	• Options 2, 3 preferred vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies based on cross-section options	• Designed to address drainage deficiencies based on cross-section options	• Options 2, 3 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Options 2, 3 preferred
Socio-Economic Environment				
Residential properties	• No impacts	• Potential moderate impacts to properties adjacent to moderate and sharp crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be raised by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways throughout corridor	• Potential significant impacts to properties adjacent to moderate and sharp crest/sags, as grading is more likely to extend beyond existing ROW • Grading impacts moderately affect 2 driveways, to be raised or lowered by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Farm operations	• No impacts	• Potential moderate impacts to properties adjacent to moderate and sharp crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 1 driveway, to be raised by 0.5 m or greater • Improved visibility of vehicles entering and existing driveways throughout corridor	• Potential significant impacts to properties adjacent to moderate and sharp crest/sags, as grading is more likely to extend beyond existing ROW • Grading impacts moderately affect 2 driveways, to be raised or lowered by 0.5 m or greater • Improved visibility of vehicles entering and existing driveways throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	
Option Description	• 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 70 km/h design speed from Olde Base Line Road to The Grange Side Road • 60 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 80 km/h design speed from Olde Base Line Road to The Grange Side Road • 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	
Businesses	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts • Potential archaeological impacts if grading extends beyond existing ROW	• Potential archaeological impacts as grading is more likely to extend beyond existing ROW	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Built and cultural heritage resources	• No impacts	• Potential impacts to cultural heritage landscape (farm complex including stone fence) on the east side, if grading extends beyond existing ROW	• Anticipated impacts to cultural heritage landscape (farm complex including stone fence) on the east side, as grading is more likely to extend beyond existing ROW	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Moderate air, noise, vibration impacts during construction; greater than Option 2 due to increased cut and fill construction required • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Natural Environment				
Terrestrial habitat	• No impacts	• Requires least amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires fewest tree removals within areas to be graded • Requires least amount of encroachment into sensitive/significant natural areas designated as ESA (Credit Forks-Devil's Pulpit, Grange Woods) • Requires least amount of terrestrial habitat removal in areas to be graded	• Requires greatest amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires greatest number of tree removals within areas to be graded • Requires greatest amount of encroachment into sensitive/significant natural areas designated as ESA (Credit Forks-Devil's Pulpit, Grange Woods) • Requires greatest amount of terrestrial habitat removal in areas to be graded	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat
Aquatic environment	• No impacts	• 9 culvert crossings, 2 of which (culverts 10 and 12) convey watercourses; potential for impact to aquatic features if culvert replacements required due to road widening, potentially less so than Option 3 • Potential impact to direct fish habitat associated with Trib. A to Second Creek, conveyed by culvert 10 • Provides potential habitat for Brook Trout; groundwater influence observed	• 9 culvert crossings, 2 of which (culverts 10 and 12) convey watercourses; potential for impact to aquatic features if culvert replacements required due to road widening, potentially more so than Option 2 • Potential impact to direct fish habitat associated with Trib. A to Second Creek, conveyed by culvert 10 • Provides potential habitat for Brook Trout; groundwater influence observed	• Option 1 is preferred as it avoids potential impacts to aquatic features and habitat • Otherwise, Option 2 is preferred due to less potential for requiring culvert replacement/additional in-water work
Wetlands and watercourses	• No impacts	• Several wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Least potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Least potential for impacts to amphibian breeding SWH due to grading requirements	• Several wetlands extend within or adjacent to ROW, including parts of the Caledon Mountain PSW complex • Greatest potential for direct impact to wetlands, including PSW, through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Greatest potential for impacts to amphibian breeding SWH due to more extensive grading requirements	• Option 1 is preferred as it avoids impacts to wetlands • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent wetlands and habitats

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 70 km/h Posted Speed	**Option 2: 70 km/h Design Speed 60 km/h Posted Speed**	**Option 3: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 70 km/h design speed from Olde Base Line Road to The Grange Side Road • 60 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 80 km/h design speed from Olde Base Line Road to The Grange Side Road • 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	
Species at risk	• No impacts	• Occurs within Jefferson Salamander regulated habitat at south end; less potential for direct impact to regulated habitat, including known breeding ponds, than Option 3 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; less potential for impact due to grading requirements than Option 3 • Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Occurs within Jefferson Salamander regulated habitat at south end; more potential for direct impact to regulated habitat, including known breeding ponds, than Option 2 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; more potential for impact due to grading requirements than Option 2 • Bobolink and Eastern Meadowlark breeding habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Option 1 is preferred as it avoids impacts to regulated Jefferson Salamander habitat and potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 2 is preferred due to less required encroachment into regulated Jefferson Salamander habitat, and fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Least direct impact to known Northern Flying Squirrel habitat at south end of ROW • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Least impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern • Least potential for direct impact to Western Chorus Frog habitat through site grading	• Most potential for direct impact to known Northern Flying Squirrel habitat at south end of ROW • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Greatest impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern • Greatest potential for direct impact to Western Chorus Frog habitat through more extensive site grading	• Option 1 is preferred as it avoids impacts to habitat for Northern Flying Squirrel and Western Chorus Frog, and potential habitat for species of conservation concern Odonates • Otherwise, Option 2 is preferred due to less required encroachment into habitat for these species
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • May cause minor disturbance to amphibian crossing activities during construction • Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; less so than Option 3	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • May cause minor disturbance to amphibian crossing activities during construction • More extensive grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; more so than Option 2	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 2 is preferred because less potential site grading may maintain more suitable amphibian movement habitat along roadsides
Stormwater management	• No impacts	• Improved stormwater drainage	• Improved stormwater drainage	• Options 2 and 3 are preferred as they incorporate improved drainage systems over current conditions
Natural hazards	• No impacts	• Crosses regulated habitat for watercourses and wetlands	• Crosses regulated habitat for watercourses and wetlands	• Option 1 is preferred at it avoids potential impacts to regulated wetlands

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options Option 1: Do Nothing 70 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 70 km/h design speed from Olde Base Line Road to The Grange Side Road • 60 km/h posted speed from Olde Base Line Road to The Grange Side Road	• 80 km/h design speed from Olde Base Line Road to The Grange Side Road • 70 km/h posted speed from Olde Base Line Road to The Grange Side Road	
Niagara Escarpment impacts	• No impacts	• Less potential for direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading, than Option 3 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Greater potential for direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to more extensive site grading, than Option 2 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Option 1 is preferred as it avoids impacts to Niagara Escarpment Plan policy protection areas and regulated habitat • Otherwise, Option 2 is preferred as it requires the least encroachment and potential for impact to escarpment natural features
Capital Costs				
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Highest construction cost due to cut and fill required for profile modifications, greater than Option 2	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• Potential property acquisition required if grading extends beyond existing ROW; potential easements may be required for localized improvements	• Anticipated property acquisition required as grading is more likely to extend beyond existing ROW; potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL				
		• Option 2 preferred as it meets design standards for the reduced proposed posted speed limit, and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts		

Legend:

Preferred	Less Preferred	Least Preferred

Table 39: Mississauga Road Profile Option Evaluation – The Grange Side Road to Caledon Mountain Drive

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	**Option 2: 70 km/h Design Speed 60 km/h Posted Speed**	**Option 3: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 70 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 80 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 70 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	
Rural Character				
Maintains rural character and countryside scenic quality	• Retains rural character	• Vertical alignment modifications result in some changes to rural character	• Vertical alignment modifications result in some changes to rural character	• Option 1 preferred
Transportation				
Geometric alignment	• Vertical alignment consists of rolling profile with moderate crests/sags and a sharp crest/sag between 24+520 and 24+900	• Vertical alignment moderately flattens sharp crests/sags throughout	• Vertical alignment significantly flattens sharp crests/sags throughout	• Options 2, 3 preferred due to smoother vertical alignment
Traffic operations	• Limited and sub-standard visibility due to limited sightlines of rolling vertical alignment and sharp crest/sag • Conflicts between all road users due to poor visibility along vertical profile • Motorists significantly exceed posted speed limits by 25-30 km/h	• Similar travel time as posted speed limit is unchanged • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Motorists maintain existing posted speed	• Reduced travel time as posted speed limit is increased • Improved visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility • Motorists increase speeds as posted speed limit is increased by 10 km/h	• Options 2, 3 preferred as visibility is improved to meet design standards, and conflicts are reduced between all road users
Accommodation of motorists	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited and sub-standard visibility of vertical alignment • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits • Truck restriction on Mississauga Road	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits • Existing truck restriction on Mississauga Road applies	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits • Existing truck restriction on Mississauga Road applies	• Options 2, 3 preferred as smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as smoother profile improves travel along corridor and reduces conflicts with all other road users
Accommodation of cyclists	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as smoother profile enhances environment and reduces conflicts with motorized vehicles

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options Option 1: Do Nothing 60 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 70 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 80 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 70 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	
Accommodation of pedestrians	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as smoother profile enhances environment and reduces conflicts with motorized vehicles
Accommodation of horses	• Rolling profile with moderate and sharp crests/sags is a less suitable environment for horses • Conflicts with motorized vehicles due to limited and sub-standard visibility of vertical alignment, and vehicles significantly exceeding posted speed limits	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Smoother profile with significantly flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate increased posted speed limits	• Options 2, 3 preferred as smoother profile enhances environment and reduces conflicts with motorized vehicles
Safety	• Vertical alignment provides sufficient visibility for 40-50 km/h design speed at some locations • Posted speed exceeds design speed by 10-20 km/h in some locations • Limited and sub-standard visibility for motorists to see other vehicles on the road, vehicles on residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 60 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 70 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on residential driveways, and cyclists/pedestrians	• Options 2, 3 preferred vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies based on cross-section options	• Designed to address drainage deficiencies based on cross-section options	• Options 2, 3 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Options 2, 3 preferred
Socio-Economic Environment				
Residential properties	• No impacts	• Potential moderate impacts to properties adjacent to moderate and sharp crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 2 driveways, to be raised by approximately 0.5 m or greater; and 3 driveways, to be lowered by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential significant impacts to properties adjacent to moderate and sharp crest/sags, as grading is more likely to extend beyond existing ROW • Grading impacts moderately affect 2 driveways, to be raised by approximately 0.5 m or greater; and 5 driveways, to be lowered by approximately 0.5 m or greater • Grading impacts moderately affect 2 driveways, to be lowered by approximately 1.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Farm operations	• No impacts	• Potential moderate impacts to properties adjacent to moderate and sharp crest/sags, if grading extends beyond existing ROW • Grading impacts moderately affect 2 driveways, to be raised by approximately 0.5 m or greater; and 3 driveways, to be lowered by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Potential significant impacts to properties adjacent to moderate and sharp crest/sags, as grading is more likely to extend beyond existing ROW • Grading impacts moderately affect 2 driveways, to be raised by approximately 0.5 m or greater; and 5 driveways, to be lowered by approximately 0.5 m or greater • Grading impacts moderately affect 2 driveways, to be lowered by approximately 1.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	Option 2: 70 km/h Design Speed 60 km/h Posted Speed	Option 3: 80 km/h Design Speed 70 km/h Posted Speed	
Option Description	• 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 70 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 80 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 70 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	
Businesses	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• Potential archaeological impacts, immediately south of Woodland Court (west side), if grading extends beyond existing ROW • All other areas have no archaeological potential	• Anticipated archaeological impacts, immediately south of Woodland Court (west side), as grading is more likely to extend beyond existing ROW • All other areas have no archaeological potential	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Built and cultural heritage resources	• No impacts	• No anticipated impacts • No known built or cultural heritage resources at this location	• No anticipated impacts • No known built or cultural heritage resources at this location	• No difference
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Moderate air, noise, vibration impacts during construction; greater than Option 2 due to increased cut and fill construction required • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are no impacts • Otherwise Option 2 preferred
Natural Environment				
Terrestrial habitat	• No impacts	• Requires least amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires fewest tree removals within areas to be graded • Requires least amount of encroachment into sensitive/significant natural areas designated as Life Science ANSI (Credit Forks) and ESA (Credit Forks-Devil's Pulpit) • Requires least amount of terrestrial habitat removal in areas to be graded	• Requires greatest amount of encroachment into adjacent natural features including Significant Woodland as well as culturally influenced vegetation communities • Requires greatest number of tree removals within areas to be graded • Requires greatest amount of encroachment into sensitive/significant natural areas designated as Life Science ANSI (Credit Forks) and ESA (Credit Forks-Devil's Pulpit) • Requires greatest amount of terrestrial habitat removal in areas to be graded	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat
Aquatic environment	• No impacts	• 1 culvert crossing, which does not convey a watercourse; no impact to watercourse features or fish habitat	• 1 culvert crossing, which does not convey a watercourse; no impact to watercourse features or fish habitat	• No difference
Wetlands and watercourses	• No impacts	• Multiple wetlands extend within or adjacent to ROW, none of which are provincially significant • Less potential for direct impact to wetlands through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Less potential for impacts to amphibian breeding SWH due to grading requirements	• Multiple wetlands extend within or adjacent to ROW, none of which are provincially significant • Most potential for direct impact to wetlands through encroachment • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Greatest potential for impacts to amphibian breeding SWH due to grading requirements	• Option 1 is preferred as it avoids impacts to wetlands • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent wetlands and habitats
Species at risk	• No impacts	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; less potential for impact due to grading requirements than Option 3 • Barn Swallow foraging habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals; more potential for impact due to grading requirements than Option 2 • Barn Swallow foraging habitat identified in certain adjacent fields; no significant impact anticipated due to minor loss of roadside habitat	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 2 is preferred due fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	**Option 2: 70 km/h Design Speed 60 km/h Posted Speed**	**Option 3: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 70 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 80 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 70 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Less direct impact to known Northern Flying Squirrel habitat at north end of ROW • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Less impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern • Less potential for direct impact to Western Chorus Frog habitat through site grading	• Greatest direct impact to known Northern Flying Squirrel habitat at north end of ROW • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • Greatest impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern • Greatest potential for direct impact to Western Chorus Frog habitat through more extensive site grading	• Option 1 is preferred as it avoids impacts to habitat for Northern Flying Squirrel and Western Chorus Frog, and potential habitat for species of conservation concern Odonates. • Otherwise, Option 2 is preferred due to less required encroachment into habitat for these species
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • May cause minor disturbance to amphibian crossing activities during construction • Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; less so than Option 3	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • May cause minor disturbance to amphibian crossing activities during construction • More extensive grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation; more so than Option 2	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 2 is preferred because less potential site grading may maintain more suitable amphibian movement habitat along roadsides
Stormwater management	• No impacts	• Improved stormwater drainage.	• Improved stormwater drainage.	• Options 2 and 3 are preferred as they incorporate improved drainage systems over current conditions
Natural hazards	• No impacts	• Crosses regulated habitat for wetlands	• Crosses regulated habitat for wetlands	• Option 1 is preferred at it avoids potential impacts to regulated watercourses and wetlands
Niagara Escarpment impacts	• No impacts	• Less potential for direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading, than Option 3 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Greater potential for direct impact to features within areas designated as Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area, due to site grading, than Option 2 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Option 1 is preferred as it avoids impacts to Niagara Escarpment Plan policy protection areas and regulated habitat • Otherwise, Option 2 is preferred as it requires the least encroachment and potential for impact to escarpment natural features
Capital Costs				
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Highest construction cost due to cut and fill required for profile modifications, greater than Option 2	• Option 1 results in lowest construction cost

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road Vertical Alignment Options			EVALUATION
	Option 1: Do Nothing 60 km/h Posted Speed	**Option 2: 70 km/h Design Speed 60 km/h Posted Speed**	**Option 3: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 70 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 60 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	• 80 km/h design speed from The Grange Side Road to Caledon Mountain Drive • 70 km/h posted speed from The Grange Side Road to Caledon Mountain Drive	
Property acquisition	• No property acquisition required	• Potential property acquisition required if grading extends beyond existing ROW; potential easements may be required for localized improvements	• Anticipated property acquisition required as grading is more likely to extend further beyond existing ROW; potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL				
		• Option 2 preferred as it meets design standards for the proposed posted speed limit (maintains existing posted speed limit), and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts		

Legend:

Preferred	Less Preferred	Least Preferred

Table 40: Mississauga Road / Old Main Street Profile Option Evaluation – Caledon Mountain Drive to approximately 580 metres north of Caledon Mountain Drive

EVALUATION CRITERIA	Mississauga Road/Old Main Street Vertical Alignment Options		EVALUATION
	Option 1: Do Nothing 50 km/h Posted Speed	**Option 4: 60 km/h Design Speed 50 km/h Posted Speed**	
Option Description	• 50 km/h posted speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive	• 60 km/h design speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive • 50 km/h posted speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive	
Rural Character			
Maintains rural character and countryside scenic quality	• Retains rural character	• Minimal vertical alignment modifications retain rural character	• No difference
Transportation			
Geometric alignment	• Vertical alignment consists of rolling profile with moderate crests/sags	• Vertical alignment generally follows existing vertical profile, and slightly flattens moderate crests/sags	• Option 2 preferred due to smoother vertical alignment
Traffic operations	• Limited visibility due to limited sightlines of rolling vertical alignment • Conflicts between all road users due to limited visibility along vertical profile • Motorists exceed posted speed limits	• Similar travel time due to maintained existing posted speed limit • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility	• Option 2 preferred as visibility is improved to meet design standards, and conflicts are reduced between all road users
Accommodation of motorists	• Rolling profile with moderate crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited visibility of vertical alignment • Conflicts with all other road users due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as moderately smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with moderate crests/sags is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited visibility of vertical alignment • Conflicts with all other road users due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits • Load restriction on Bush Street	• Smoother profile with moderately flattened crests/sags improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits • Existing load restriction on Bush Street applies	• Option 2 preferred as slightly smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with moderate crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as slightly smoother profile improves travel along corridor, improves visibility, and reduces conflicts with all other road users
Accommodation of cyclists	• Rolling profile with moderate crests/sags is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as slightly smoother profile enhances environment, and reduces conflicts with all other road users
Accommodation of pedestrians	• Rolling profile with moderate crests/sags is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as slightly smoother profile enhances environment, and reduces conflicts with all other road users
Accommodation of horses	• Rolling profile with moderate crests/sags is a less suitable environment for horses • Conflicts with motorized vehicles due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with slightly flattened crests/sags improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as slightly smoother profile enhances environment, and reduces conflicts with all other road users

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road/Old Main Street Vertical Alignment Options Option 1: Do Nothing 50 km/h Posted Speed	Option 4: 60 km/h Design Speed 50 km/h Posted Speed	EVALUATION
Option Description	• 50 km/h posted speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive	• 60 km/h design speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive • 50 km/h posted speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive	
Safety	• Vertical alignment provides sufficient visibility for 30 km/h design speed at some locations • Posted speed exceeds design speed by 20 km/h in some locations • Limited and sub-standard visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 50 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Option 2 preferred as vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies based on cross-section options	• Option 2 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Option 2 preferred
Socio-Economic Environment			
Residential properties	• No impacts	• Potential moderate impacts to properties, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts
Farm operations	• No impacts	• Potential moderate impacts to properties, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts
Businesses	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts • Potential archaeological impacts if grading extends beyond existing ROW	• Option 1 preferred
Built and cultural heritage resources	• No impacts	• Potential impacts to cultural heritage landscape (remnant farm complex) approximately 500 metres north of Caledon Mountain Drive on the south side, if grading extends beyond existing ROW	• Option 1 preferred as there are no impacts
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are no impacts
Natural Environment			
Terrestrial habitat	• No impacts	• Potential encroachment into adjacent natural features, including Core Area Woodland as well as culturally influenced vegetation communities • Removal of some individual trees may be required due to site grading • Potential encroachment into sensitive/significant natural areas designated as Life Science ANSI (Credit Forks) and ESA (Credit Forks-Devil's Pulpit)	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat
Aquatic environment	• No impacts	• 2 culvert crossings, which do not convey a watercourse; no impact to watercourse features or fish habitat	• No difference
Wetlands and watercourses	• No impacts	• No impacts	• No difference
Species at risk	• No impacts	• Potential encroachment into Jefferson Salamander regulated habitat • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals if necessary • Three Butternuts occur outside the existing ROW west of Caledon Mountain Rd. Not expected to be impacted by proposed profile adjustments	• Option 1 is preferred as it avoids impacts to Jefferson Salamander regulated habitat and potential impacts to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No significant impact to Northern Flying Squirrel habitat anticipated through tree removal • No significant impact anticipated to potential Hooded Warbler habitat in woodlands	• Option 1 is preferred as it avoids impacts to habitat for Northern Flying Squirrel and potential habitat for Hooded Warbler

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road/Old Main Street Vertical Alignment Options Option 1: Do Nothing 50 km/h Posted Speed	Option 4: 60 km/h Design Speed 50 km/h Posted Speed	EVALUATION
Option Description	• 50 km/h posted speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive	• 60 km/h design speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive • 50 km/h posted speed from Caledon Mountain Drive to 580 metres north of Caledon Mountain Drive	
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands and wetlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • May cause minor disturbance to amphibian crossing activities during construction • Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success
Stormwater management	• No impacts	• Improved stormwater drainage system	• Option 2 is preferred as it incorporates improved stormwater drainage.
Natural hazards	• No impacts	• No anticipated impacts	• No difference
Niagara Escarpment impacts	• No impacts	• Portion of ROW occurs within Escarpment Natural Area designation; no significant impacts anticipated.	• No difference
Capital Costs			
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• Potential property acquisition required if grading extends beyond existing ROW, potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL			
		• Option 4 preferred as the improved vertical alignment meets design standards for the proposed posted speed limit (same as existing posted speed limit), and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts	

Legend:

Preferred	Less Preferred	Least Preferred

Based on the preceding evaluation, a 70 km/h design speed (60 km/h posted speed) profile (Option 2) is preferred for Mississauga Road between Olde Base Line Road and Caledon Mountain Drive, and a 60 km/h design speed (50 km/h posted speed) profile (Option 4) is preferred for Mississauga Road / Old Main Street between Shaws Creek Road and approximately 580 metres north of Caledon Mountain Drive.

8.2 Mississauga Road Preferred Design Concept

The preferred designs were chosen with consideration to environmental impacts, cultural heritage impacts, safety, aesthetics, drainage, entrance access and property impacts, and capital construction and maintenance costs. This section presents the preferred designs that best incorporate these parameters. Consultation with agencies and the public, as discussed in **Section 2**, helped arrive at the preferred designs discussed in this section.

8.2.1 Design Criteria for Mississauga Road / Old Main Street

The following outlines the design criteria for Mississauga Road/Old Main Street, based on different design speed options considered. Although a higher (90 km/h) design speed is desired, in order to accommodate all road users while minimizing impacts to the study area features and surrounding landscape, the project-specific design standards are based on a lower (60-70 km/h) design speed.

	PRESENT CONDITIONS	**PROJECT** DESIGN STANDARDS (for segment north of Caledon Mountain Drive, excluding the Village)	**PROJECT** DESIGN STANDARDS (for segment from Olde Base Line Road to Caledon Mountain Drive)	DESIGN STANDARDS	**DESIRED** DESIGN STANDARDS	REFERENCE
HIGHWAY CLASSIFICATION	RAU 60/70/80	RAU 60	RAU 70	RAU 80	RAU 90	
MINIMUM STOPPING SIGHT DISTANCE	N/A	75-85 m	95-110 m	115-140 m	130-170 m	(TAC – page 1.2.5.4 Table 1.2.5.3)
MIN. EQUIV. VERTICAL CURVE (WITH ILLUMINATION)[7]	N/A	10-13 - CREST 8-9 –SAG (Comfort)	16-23 - CREST 10-12 –SAG (Comfort)	24-36 - CREST 12-16 –SAG (Comfort)	32-53 - CREST 15-20 –SAG (Comfort)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MIN. EQUIV. VERTICAL CURVE (WITHOUT ILLUMINATION)[8]	N/A	10-13 - CREST 15-18 –SAG (Headlight Control)	16-23 - CREST 20-25 –SAG (Headlight Control)	24-36 - CREST 25-32 –SAG (Headlight Control)	32-53- CREST 30-40 –SAG (Headlight Control)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MAXIMUM GRADIENT	N/A	8-10%	8-10%	8-10%	8-10%	(To reflect prevailing conditions and maintain existing rural character)
MINIMUM CURVATURE	N/A	130 m	190 m	250 m	340 m	(TAC – page 2.1.2.13 Table 2.1.2.6)
SUPERELEVATION (ON CURVE)	N/A	6%	6%	6%	6%	(TAC – page 2.1.2.3)
LANE WIDTH	3.3-3.5 m – thru	3.3-3.7 m	3.5-3.7 m	3.5-3.7 m	3.5-3.7 m	(TAC – page 2.2.2.1 Table 2.2.2.1)
SHOULDER WIDTH	Varies (0.5-2.3 m)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
SHOULDER WIDTH ON SIGNED BICYCLE ROUTE	Varies (0.5-2.3 m)	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	(OTM BOOK 18 Table 4.2)
DRAINAGE ZONE	Varies (m – m)	8.0 m	8.0 m	8.0 m	8.0 m	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
R.O.W. WIDTH	20 - 28 m					
DESIGN SPEED		60 km/h	70 km/h	80 km/h	90 km/h	
POSTED SPEED	50/60/70 km/h	50 km/h	60 km/h	70 km/h	80 km/h	

NOTE 1: CROSS-SECTION ELEMENT WIDTHS MAY CHANGE DEPENDING ON AVAILABLE ROW WIDTHS
NOTE 2: ALTHOUGH HIGHER DESIGN SPEEDS ARE DESIRABLE, THEY MAY NOT BE ACHIEVABLE DUE TO EXISTING TERRAIN AND CONSTRAINTS, AS THEIR RESULTING IMPACTS WOULD BE SIGNIFICANT. THEREFORE, LOWER DESIGN SPEEDS HAVE BEEN SELECTED AS THE PROJECT DESIGN STANDARDS FOR THIS SEGMENT.

[7] Applies only at some locations
[8] Applies for the majority of the study area

8.2.2 Typical Cross Section

Due to the existing topography and constraints along the narrow right-of-way, and to minimize grading impacts to adjacent properties and features, a semi-rural cross-section is proposed for the entire length of the corridor, between Olde Base Line Road and approximately 580 metres north/west of Caledon Mountain Drive. This cross-section consists of one 3.5 metre wide travel lane (vehicle zone) in each direction, with a 1.7 metre wide paved shoulder to accommodate active transportation and a 0.5 metre mountable curb on each side of the road (illustrated in **Figure 67**). 0.3 metre rounding and a 2:1 slope then match to existing ground on either side of the road. Drainage is addressed through underground infrastructure (refer to **Section 8.2.6** for more details). This cross-section connects to a semi-rural cross-section at Olde Base Line Road, and transitions into a semi-rural cross-section through the Belfountain Village.

Figure 67: 11.4 m Platform Semi-Rural Cross-Section for Mississauga Rd. / Old Main St.

Opportunities to use alternative construction materials throughout the study area for curbs and other roadway elements, to maintain the rural character of the study area, can be reviewed during detailed design. These may include, for example, using dark coloured curbs to blend in with the asphalt and make them less noticeable.

Design cross-sections at an interval of 20 metres are included in **Appendix W**.

8.2.3 Horizontal Alignment

The proposed design with a 60-70 km/h design speed generally follows the existing road centreline. No significant horizontal realignment is proposed along this segment of Mississauga Road / Old Main Street.

The proposed horizontal alignment is illustrated on the plates in **Section 8.2.8**.

8.2.4 Vertical Alignment

The proposed vertical alignment accommodates a 60-70 km/h design speed. Between Olde Base Line Road and approximately 250 metres north of Caledon Mountain Drive, the proposed design follows a 70 km/h design speed. North/west of this location, towards the village, the design follows a 60 km/h design speed to accommodate the existing 50 km/h posted speed limit. This vertical alignment was chosen to match the existing road profile wherever possible, while at the same time improving any existing substandard grades and vertical curves to meet the geometric standards required for the class of the road, as per the design criteria in **Section 8.2.1**. The vertical profile also aims to minimize impacts to existing entrances and driveways, and to reduce grading impacts to adjacent properties and features.

Crest and sag curves throughout Mississauga Road / Old Main Street will have a minimum K value of 16 and 20, respectively, for the 70 km/h design speed section, and a minimum K value of 10 and 15, respectively, for the 60 km/h design speed section. This will satisfy the stopping and comfort requirement for a design speed of 60-70 km/h. A minimum gradient of 0.5% allows for proper drainage, and a maximum gradient of 9% maintains existing rural character.

The proposed vertical profile and reduction in posted speed limit will provide sufficient stopping sight distance. The effect of grade on stopping sight distance at driveways was also assessed for the proposed vertical profile. In general, sufficient stopping sight distance is provided, or where the resulting stopping sight distance is deficient, conditions are improved compared to the exiting road profile.

The proposed vertical alignment is illustrated on the plates in **Section 8.2.8**.

8.2.5 Geotechnical

As discussed in **Section 4.7**, existing pavement along Mississauga Road / Old Main Street is generally in good condition. Based on existing conditions, the general pavement structure below is recommended for Mississauga Road / Old Main Street:

- HMA: 125 mm
  - 50 mm HL-1 or Superpave 12.5 FC1 surface course
  - 75 mm HL-8 or Superpave 19 Binder Course
- Granular A: 150 mm
- Granular B: 400 mm

Terraprobe provided the geotechnical recommendations shown in **Table 41** based on a preliminary profile that HDR did not have access to at the time of writing this report.

Table 41: General Pavement Recommendations for Mississauga Road / Old Main Street

Mississauga Road / Old Main Street Rehabilitation (Sta. 36+900 to Sta. 42+680)*			
Full Depth Reconstruction	**Full Depth Asphalt Replacement**	**Cold In Place Pulverization (CIP)**	**Remarks**
	36 + 900 – 37 + 325	36 + 900 – 37 + 325 (Mill 35 mm)	Only Gran A to be used for Grade Raise
37 +325 – 37 + 390			
	37 + 390 – 37 + 850	37 + 390 – 37 + 850 (Mill 115 mm)	Only Gran A to be used for Grade Raise
37 + 850 – 38 + 010			
	38 + 010 – 38 + 070	38 + 010 – 38 + 070 (Mill 75 mm)	Only Gran A to be used for Grade Raise
38 + 070 – 38 + 195			
	38 + 195 – 38 + 465	38 + 195 – 38 + 465 (Mill 75 mm)	Only Gran A to be used for Grade Raise
38 + 465 – 38 +520			
	38 + 520 – 38 + 640	38 + 520 – 38 + 640 (Mill 75 mm)	Only Gran A to be used for Grade Raise
38 + 640 – 38 + 700			
	38 +700 – 38 + 800	38 +700 – 38 + 800 (Mill 75 mm)	Only Gran A to be used for Grade Raise
38 + 800 – 38 + 920			
	38 + 920 – 39 + 985	38 + 920 – 39 + 985 (Mill 105 mm)	Only Gran A to be used for Grade Raise
39 +985 – 39 + 065			
	39 + 065 – 39 +140	39 + 065 – 39 +140 (Mill 105 mm)	Only Gran A to be used for Grade Raise
39 + 140 – 39 + 170			
	39 +170 – 39 +370	39 +170 – 39 +370 (Mill 105 mm)	Only Gran A to be used for Grade Raise
39 +370 – 39 + 505			
	39 +505 – 39 + 900	39 +505 – 39 + 900 (Mill 105 mm)	Only Gran A to be used for Grade Raise
	39 + 900 – 40 +500	39 + 900 – 40 +500 (Mill 150 mm)	Only Gran A to be used for Grade Raise
	40 + 500 – 40 +690	40 + 500 – 40 +690 (Mill 20 mm)	Only Gran A to be used for Grade Raise
40 + 690 – 40 + 730			
	40 + 730 – 41 + 420	40 + 730 – 41 + 420 (Mill 20 mm)	Only Gran A to be used for Grade Raise
41 +420 – 41 + 485			
	41 + 485 – 42 + 080	41 + 485 – 42 + 080 (Mill 20 mm)	Only Gran A to be used for Grade Raise
42 + 080 – 42 + 100			
	42 + 100 – 42 + 680	42 + 100 – 42 + 680 (Mill 20 mm)	Only Gran A to be used for Grade Raise

* Stationing is based on Terraprobe report, and differs from HDR station numbers. Terraprobe's Station 36+900 corresponds to HDR's 20+314, at the intersection of Mississauga Road and Olde Base Line Road.

However, geotechnical design recommendations will vary based on the vertical alignment design and the typical cross-section to be applied, as proposed in this study:

- Where the vertical alignment is proposed to follow the existing ground profile, the above geotechnical recommendations apply
- Where vertical alignment modifications are proposed, full-depth pavement reconstruction will be required as pavement elevation will vary from existing
- Where a semi-rural cross-section applies, full-depth pavement reconstruction will be required to accommodate underground infrastructure
- Where a rural cross-section applies, the above recommendations based on vertical alignment should be followed

Therefore, based on the proposed cross-section and vertical alignment designs, full-depth pavement reconstruction is proposed for Mississauga Road / Old Main Street between Stations 20+200 (Olde Base Line Road) and 25+960 (Approximately 580 metres north/west of Caledon Mountain Drive).

More details on the geotechnical assessment and pavement structure recommendations can be found in **Appendix U.1**.

8.2.6 Drainage

The preliminary stormwater management plan is designed to prevent impacts from the future roadway configuration by using available technologies and opportunities to achieve the highest degree of control possible given the constraints of the study corridor. The following design elements are recommended as part of the proposed roadway improvements:

1. Based on the findings of the culvert condition assessment, the hydraulic capacity assessments, the geomorphology assessment as well as Peel Region's criteria for minimum culvert opening requirements, it is recommended to replace or upgrade 31 transverse culvert crossings within the project limits (nine of which are along Mississauga Road / Old Main Street). In each case, the existing culvert crossings will be replaced by a pipe or concrete open bottom box culvert. Additional hydraulic analysis for non-watercourse crossings along Mississauga Road/Old Main Street and Bush Street will be required to finalize culvert crossing sizes.
2. It is recommended to extend a total of seven culvert crossings (one on Mississauga Road) to accommodate the proposed roadway improvements.
3. Surface water takings will be required where culvert replacement/upgrades are proposed. The water quantity/quality monitoring program will be developed during detailed design, at the time the Permit to Take Water (PTTW) application is submitted.
4. Where the roadway improvements recommend the provision of a semi-rural roadway cross-section, a subsurface drainage system is recommended for inclusion into the roadway cross-section. The subsurface drainage system will consist of a series of

catchbasins, storm sewers and subdrains which will collect and convey both the granular base material and surface runoff and discharge to existing drainage outlets. The storm sewers shall be sized to accommodate a 10 year return period event, using a minimum inlet time of 15 minutes as per Region of Peel design standards. The design of the sewers will need to take into account any drainage from roadway boulevard areas as well as drainage external to the roadway right-of-way. Effort has been made to ensure that existing drainage patterns and locations are maintained throughout the various roadway corridors. A conceptual storm system layout is illustrated on the preliminary design plates in **Section 8.2.8**.

5. Where the proposed roadway improvements include a modification to a semi-rural cross-section, the requirement to maintain, relocate or remove entrance/driveway culverts should be examined during the detailed design phase. It is foreseeable that some culverts will no longer provide a drainage function under a semi-rural condition. In some instances however, external runoff from adjacent lands may need to be intercepted due to grade differences between roadway and adjacent properties. Where this occurs, appropriate ditch and culvert systems may need to be employed at driveway entrance locations to allow for conveyance of runoff to appropriate drainage outlets.
6. The principal features of the project's stormwater management system are the provision of oil-grit separator units to provide water quality control. A total of 14 OGS units are proposed throughout the study area (four of which are along Mississauga Road / Old Main Street) providing a total collective area for stormwater treatment of 5.56 ha. Water quality criteria will be met at each OGS location based on Enhanced (Level 1) protection as outlined in the MOE Stormwater Management Practices Manual.
7. Existing roadside ditches will be re-graded to flat-bottom swale systems (grassed swales), where possible, to provide additional water quality benefits within the project limits. It is recommended that during detailed design, the proposed grassed swale areas are reviewed for their effectiveness in meeting the MOE criteria for flowrate, velocity and contributing area.
8. It is noted that runoff from existing roadways do not provide any quality control. The incorporation of OGS and grassed swale systems will provide a net improvement to the quality of storm runoff within the project limits.
9. Erosion and sediment control measures should be implemented and monitored through the construction period. Construction activity should be conducted during periods that are least likely to result in in-stream impacts to fish habitat.

More details on the proposed stormwater management plan can be found in **Appendix R.3**.

8.2.7 Traffic Controls

The proposed design accommodates a 60-70 km/h design speed and 50-60 km/h posted speed limit. Between Olde Base Line Road and The Grange Side Road, it is recommended to lower the posted speed from 70 km/h to 60 km/h. Between The Grange Side Road and Caledon Mountain Drive, it is recommended to retain the 60 km/h posted speed limit. Between Caledon Mountain Drive and approximately 580 metres north/west of Caledon Mountain

Drive, it is recommended to retain the 50 km/h posted speed limit as a transition into the Belfountain Village, where the posted speed limit is proposed to remain at 40 km/h.

Stop control at all intersections is proposed to remain as per existing conditions. No all-way stop control is proposed at any intersections along this section of Mississauga Road / Old Main Street.

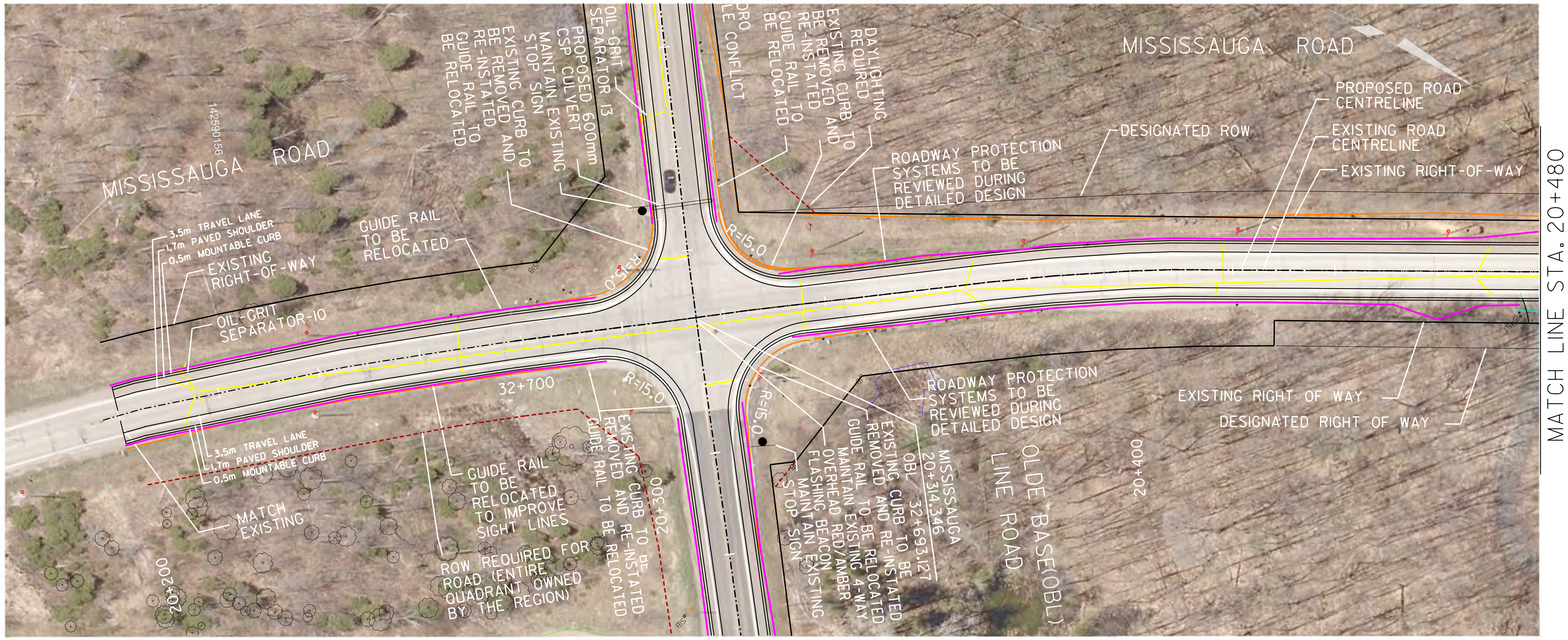
Illumination is proposed to remain as per existing conditions.

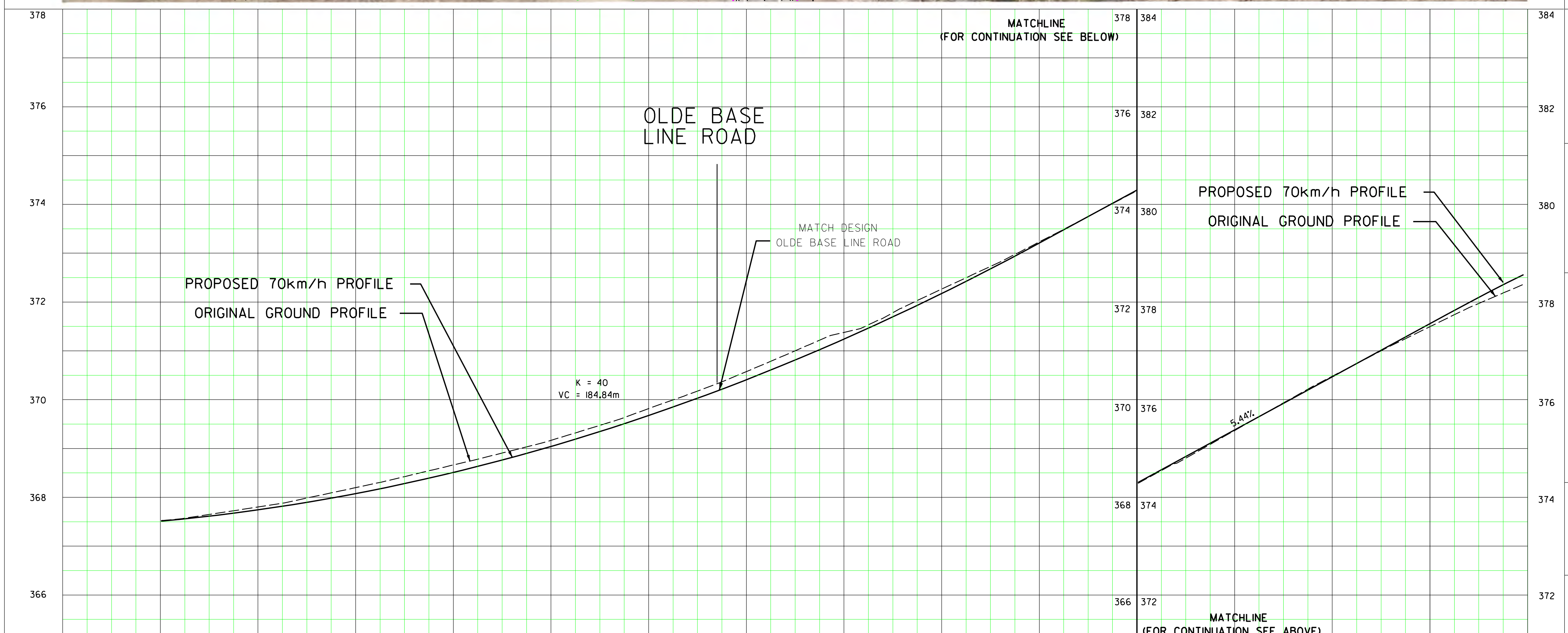
Some signs and bollards will need to be relocated to accommodate the new road platform. Locations are to be confirmed during detailed design. Roadway protection systems, such as guiderails, are to be considered where significant profile adjustments are proposed. This also needs to be reviewed during detailed design.

Existing truck and load restrictions along Mississauga Road / Old Main Street are proposed to remain.

8.2.8 Design Plates

The following pages contain plan and profile plates illustrating the proposed design for Mississauga Road / Old Main Street.





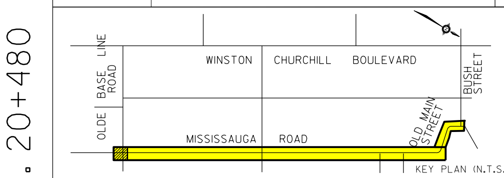
BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	20+200 · 20+300 · 20+400

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES
1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

- — — All Driveways ASPHALT Unless Otherwise Noted.
- — — All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

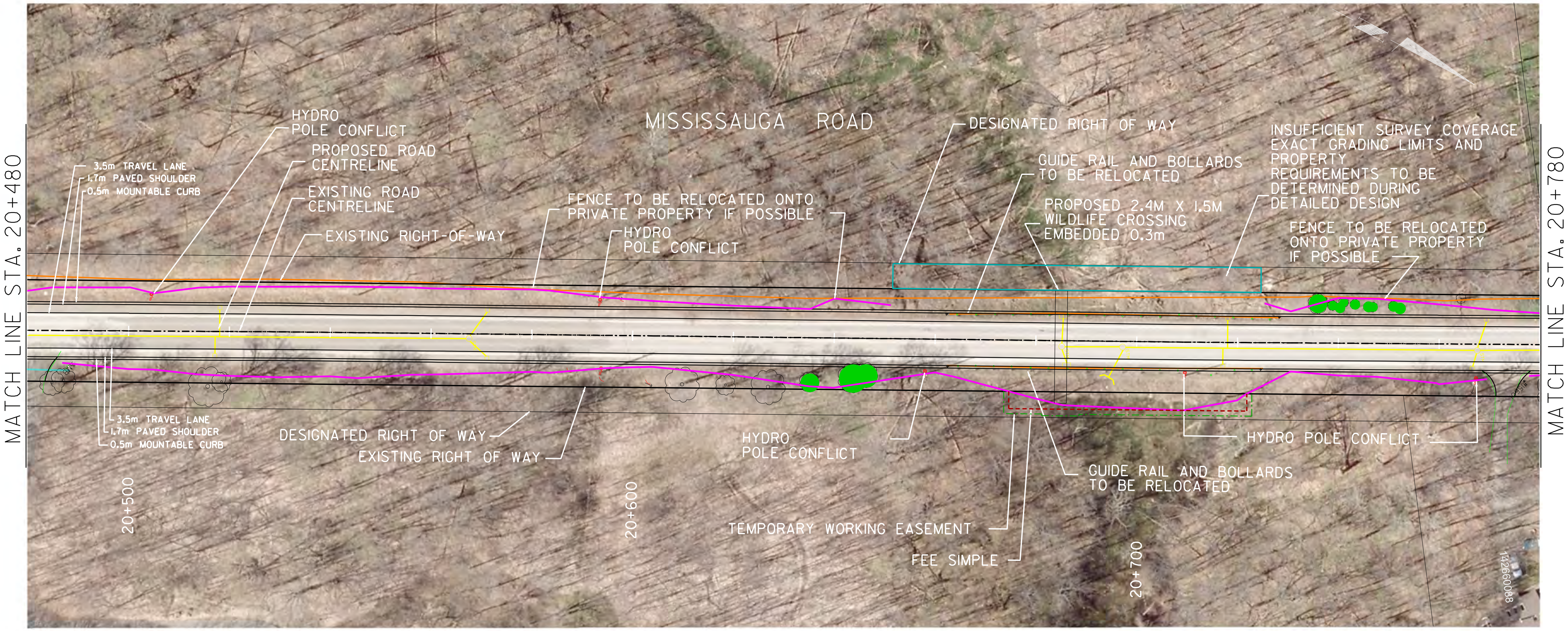
Region of Peel
Working for you

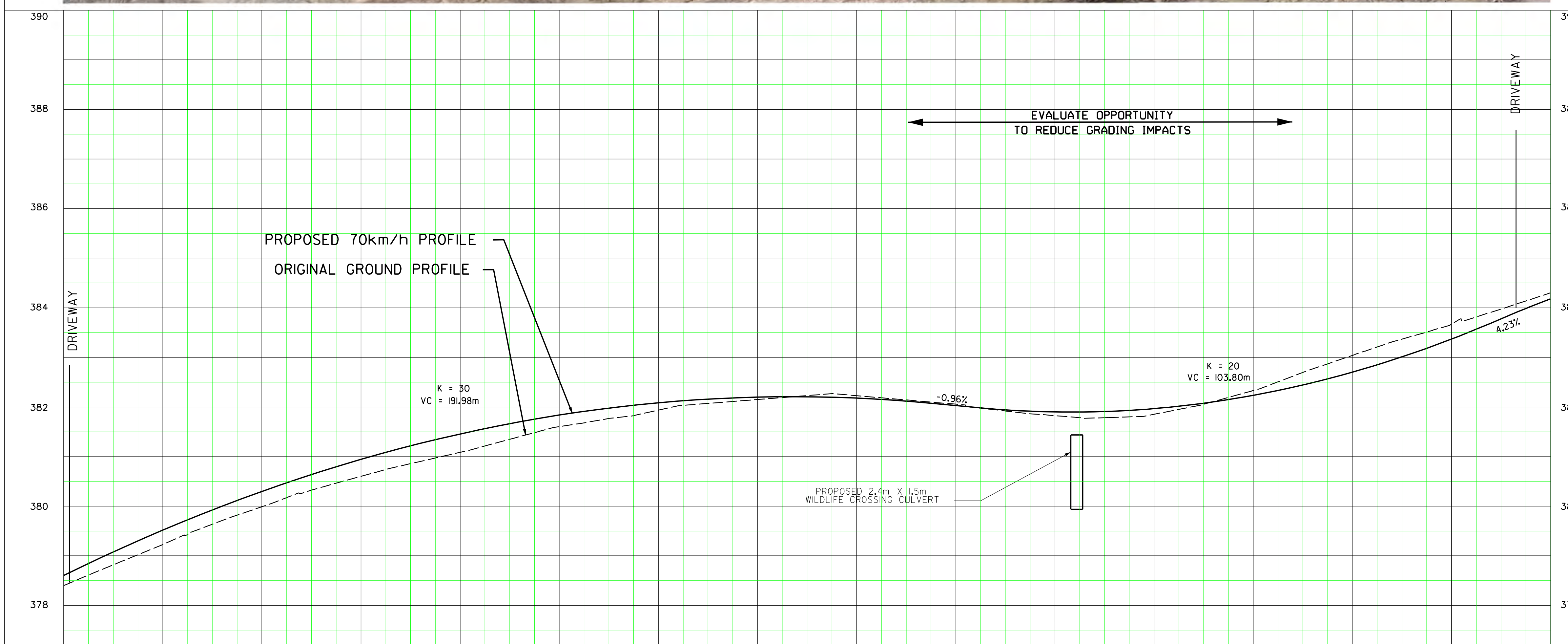
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 20+200 to STA 20+480)

NEW CONSTRUCTION

CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 1 of 21	Plan No. -D





BOT.EL. OF WM.
EX. ROAD ELEV.
ROAD CHAINAGE 20+500 20+600 20+700

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.

KEY PLAN (N.T.S.): OLDE BASE LINE ROAD, WINSTON CHURCHILL BOULEVARD, MISSISSAUGA ROAD, OLD MAIN STREET, BUSH STREET

LEGEND:
- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

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4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
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General Notes

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Approved by ____ ____ ____ ____ ____

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HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

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HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

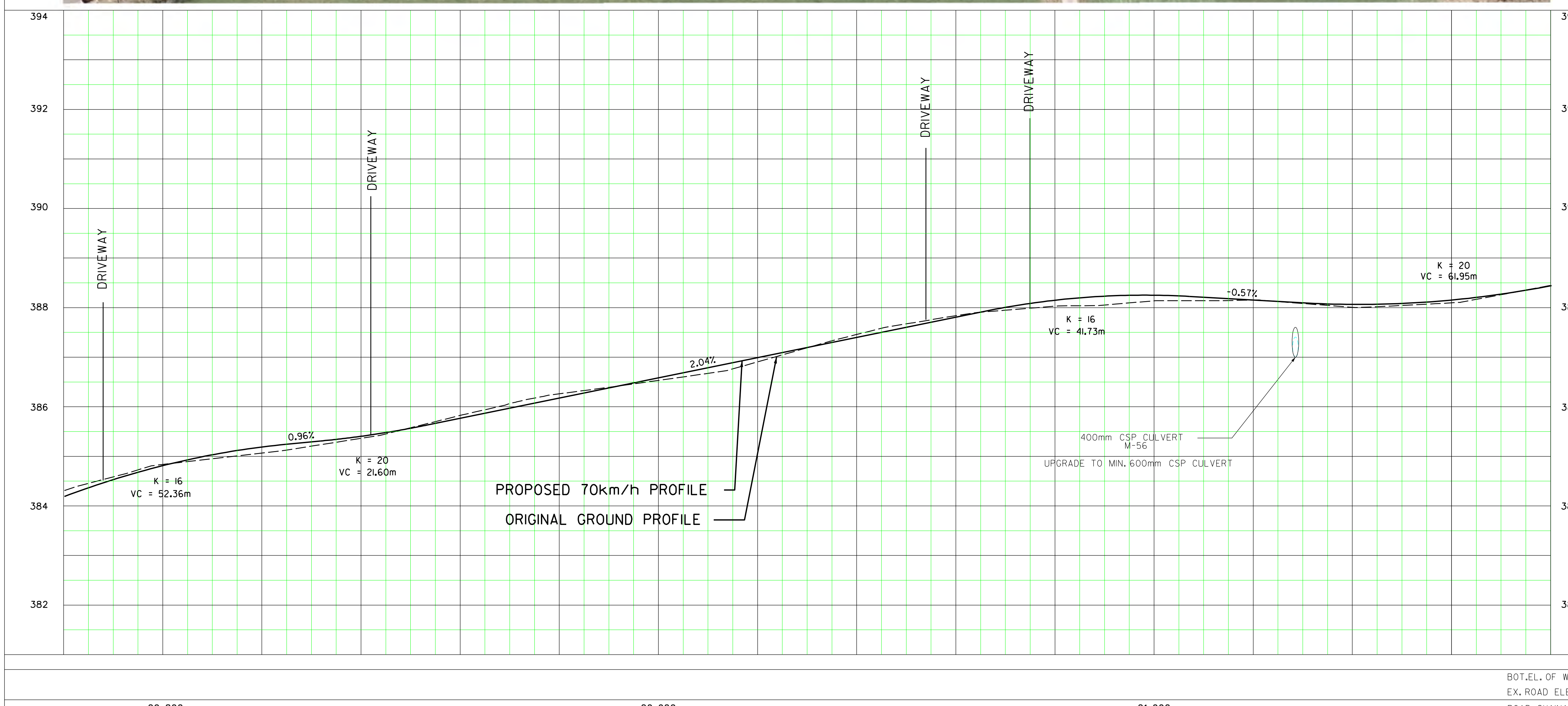
Region of Peel
Working for you

MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 20+480 to STA 20+780)

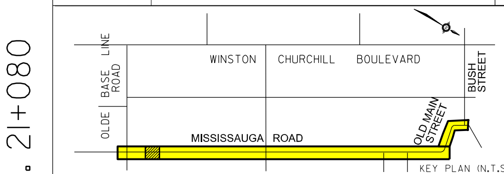
NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 2 of 21	Plan No. -D



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



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- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
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- PROPOSED CATCHBASIN
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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

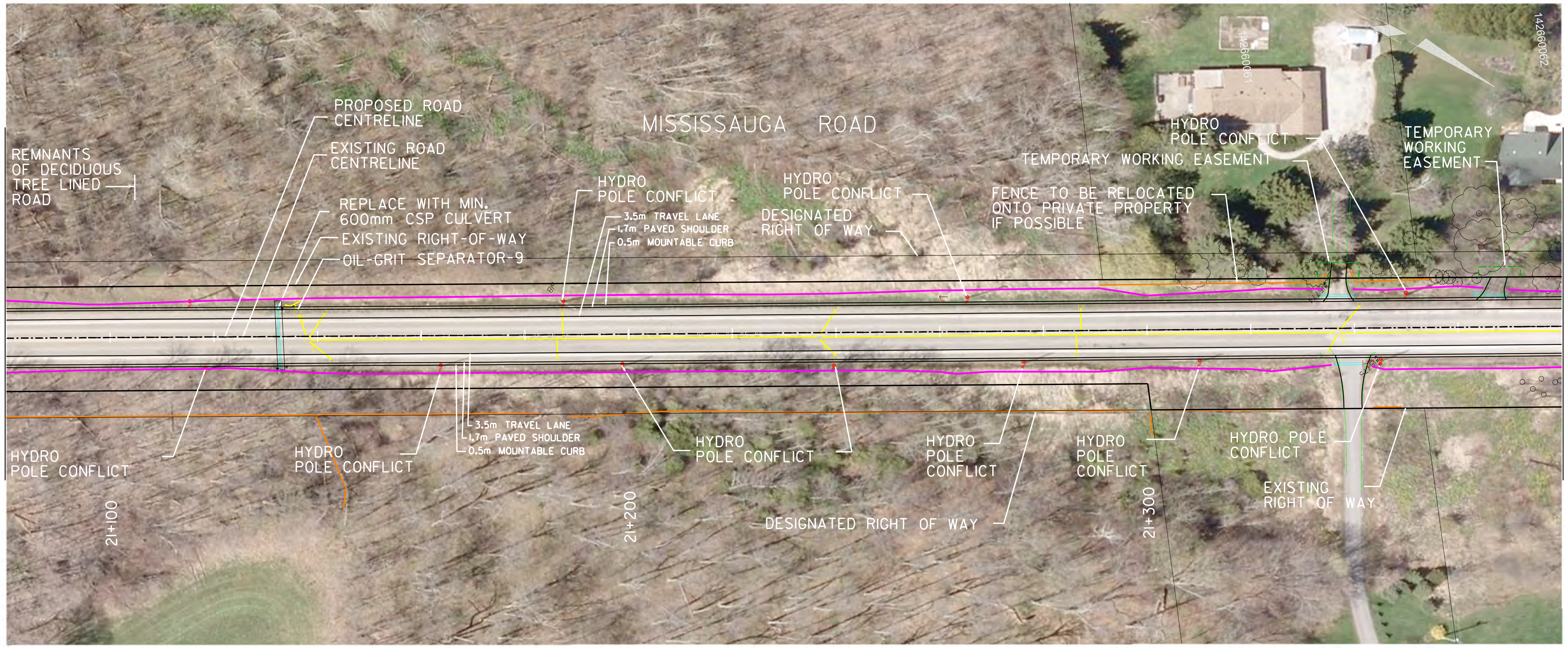
Region of Peel
Working for you

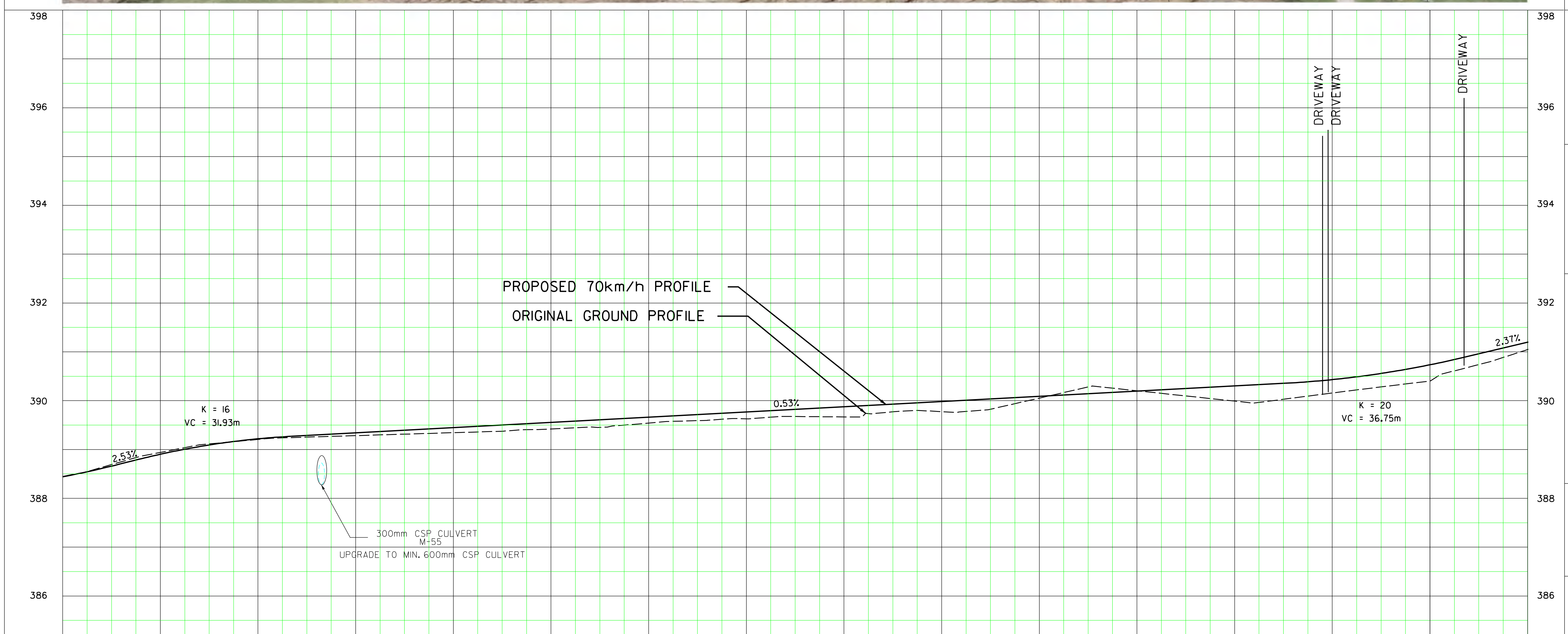
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 20+780 to STA 21+080)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 3 of 21	Plan No. -D





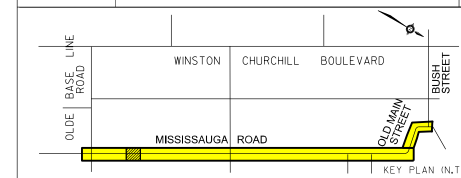
BOT.EL. OF WM.				
EX. ROAD ELEV.				
ROAD CHAINAGE	21+100	21+200	21+300	

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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NOTICE TO CONTRACTOR

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FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

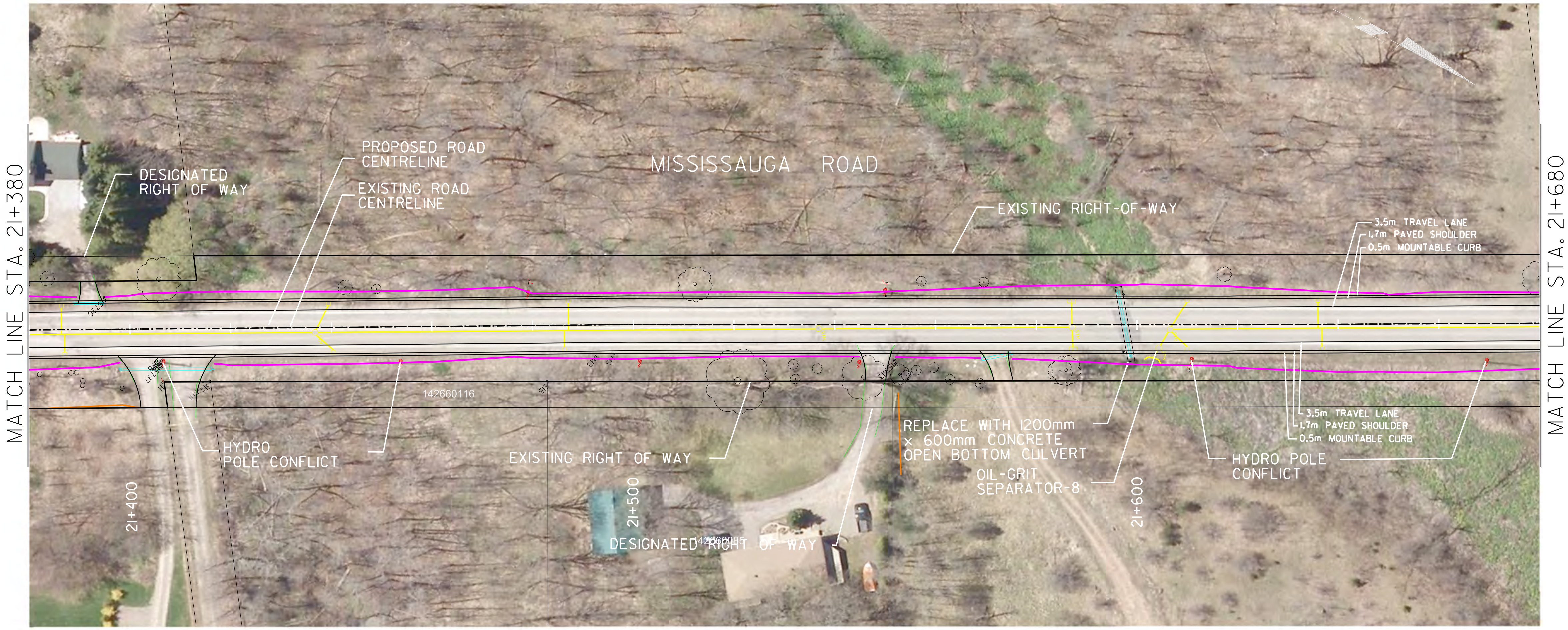
Region of Peel
Working for you

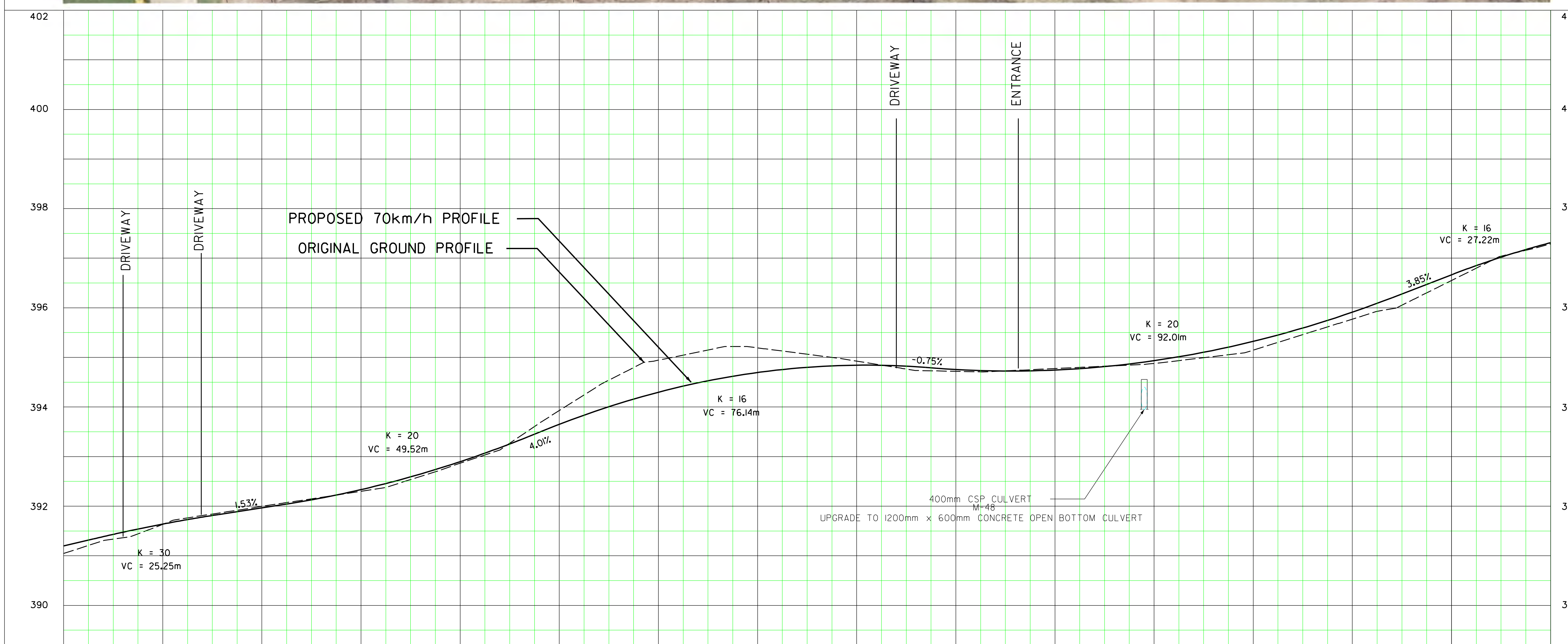
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 21+080 to STA 21+380)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 4 of 21	Plan No. -D





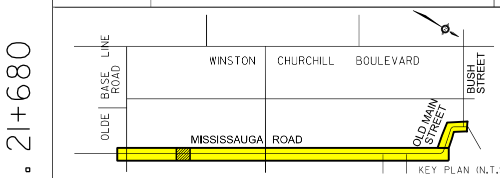
BOT.EL. OF WM.
EX. ROAD ELEV.
ROAD CHAINAGE 21+400 21+500 21+600

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
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- EXISTING CULVERT
- DITCH GRADING
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- PROPOSED CATCHBASIN
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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

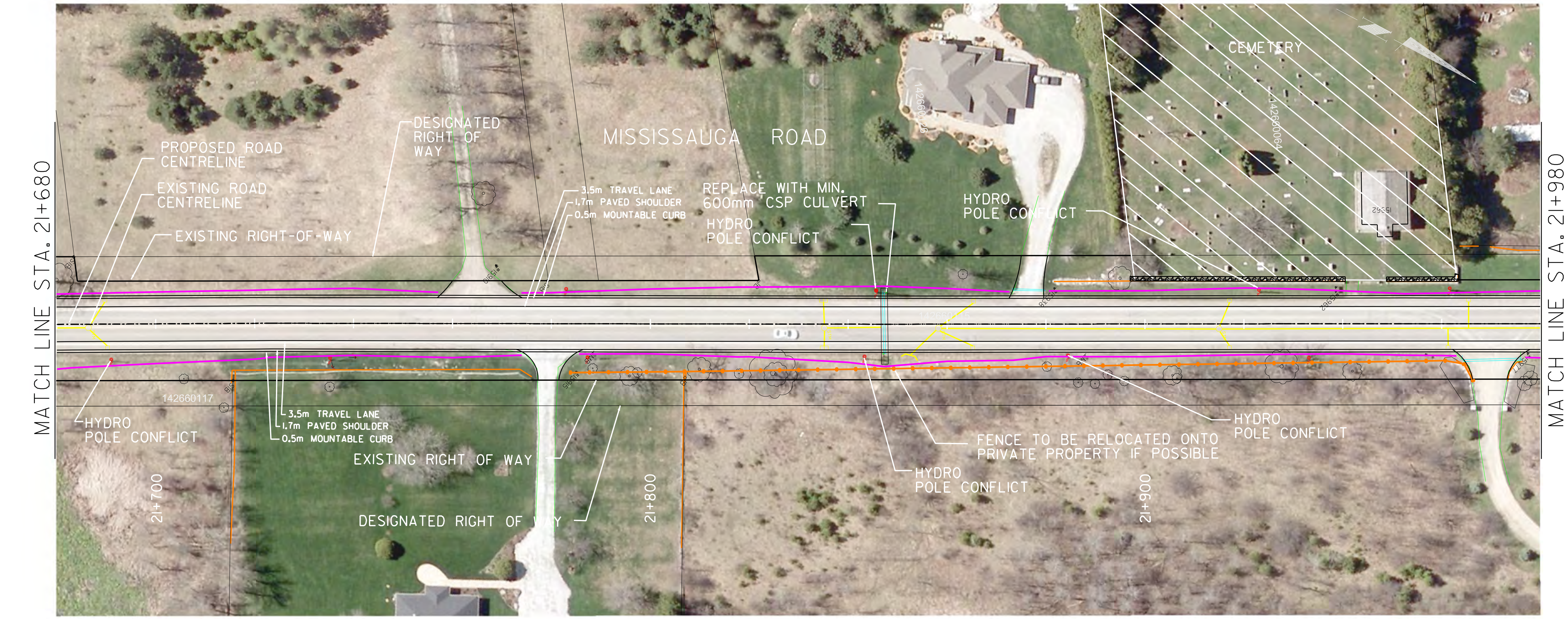
Region of Peel
Working for you

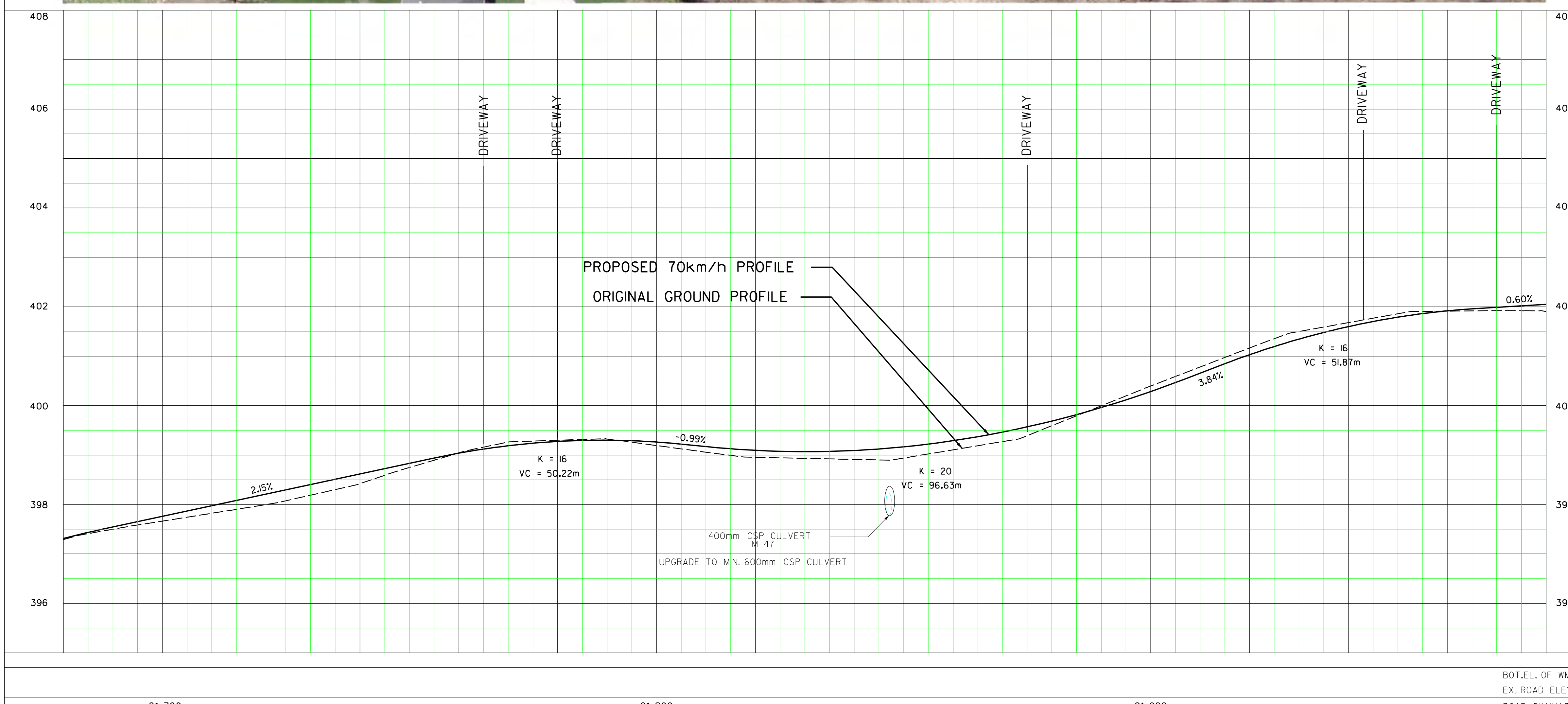
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 21+380 to STA 21+680)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 5 of 21	Plan No. -D





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
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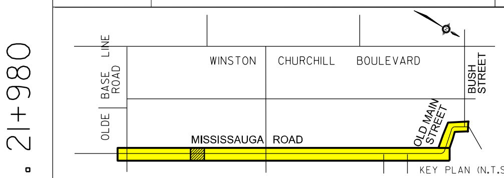
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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10m 0 10 20 30m HORIZONTAL SCALE

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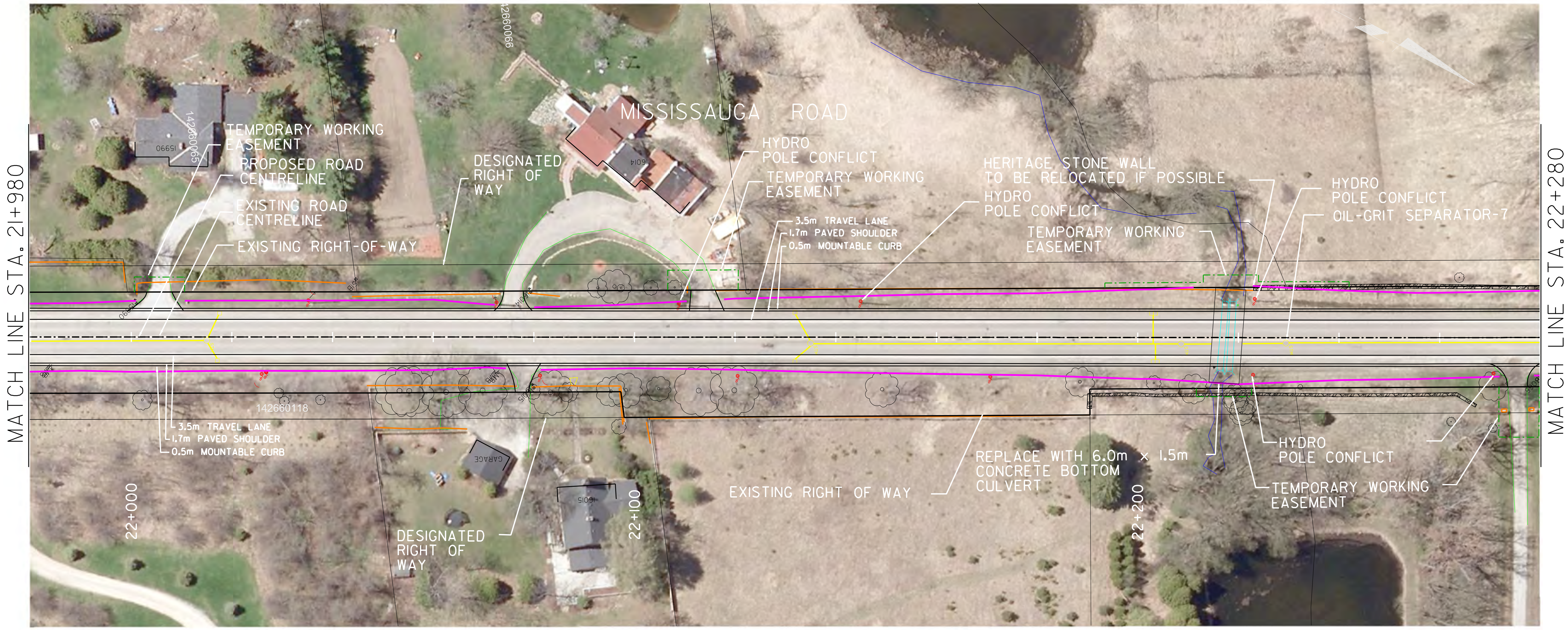
Region of Peel
Working for you

MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 21+680 to STA 21+980)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 6 of 21	Plan No. -D



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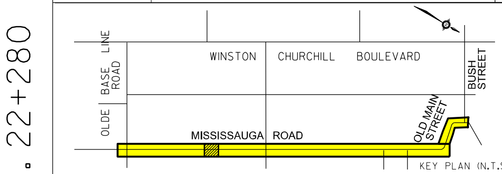
REVISIONS

DATE	DETAILS	INIT.



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- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

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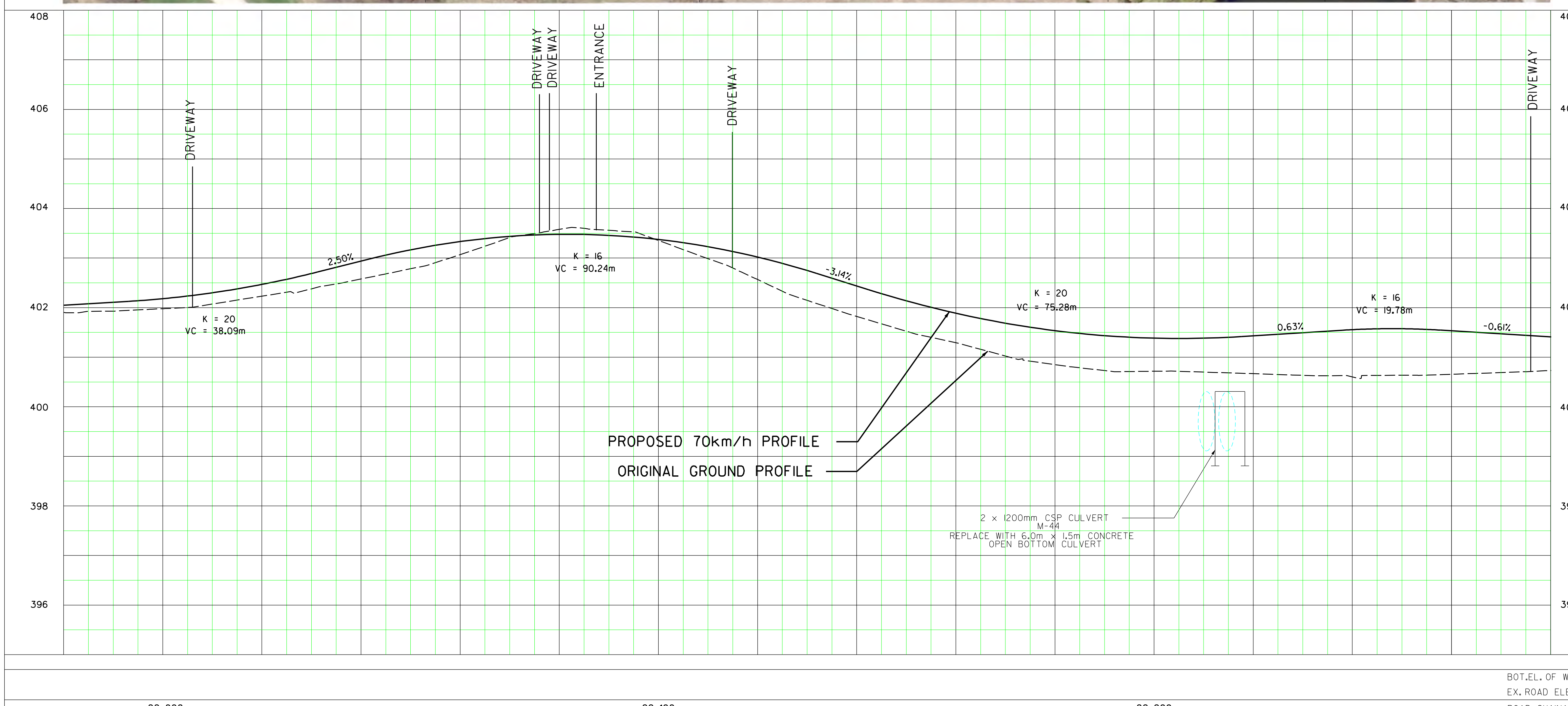
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN



General Notes

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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

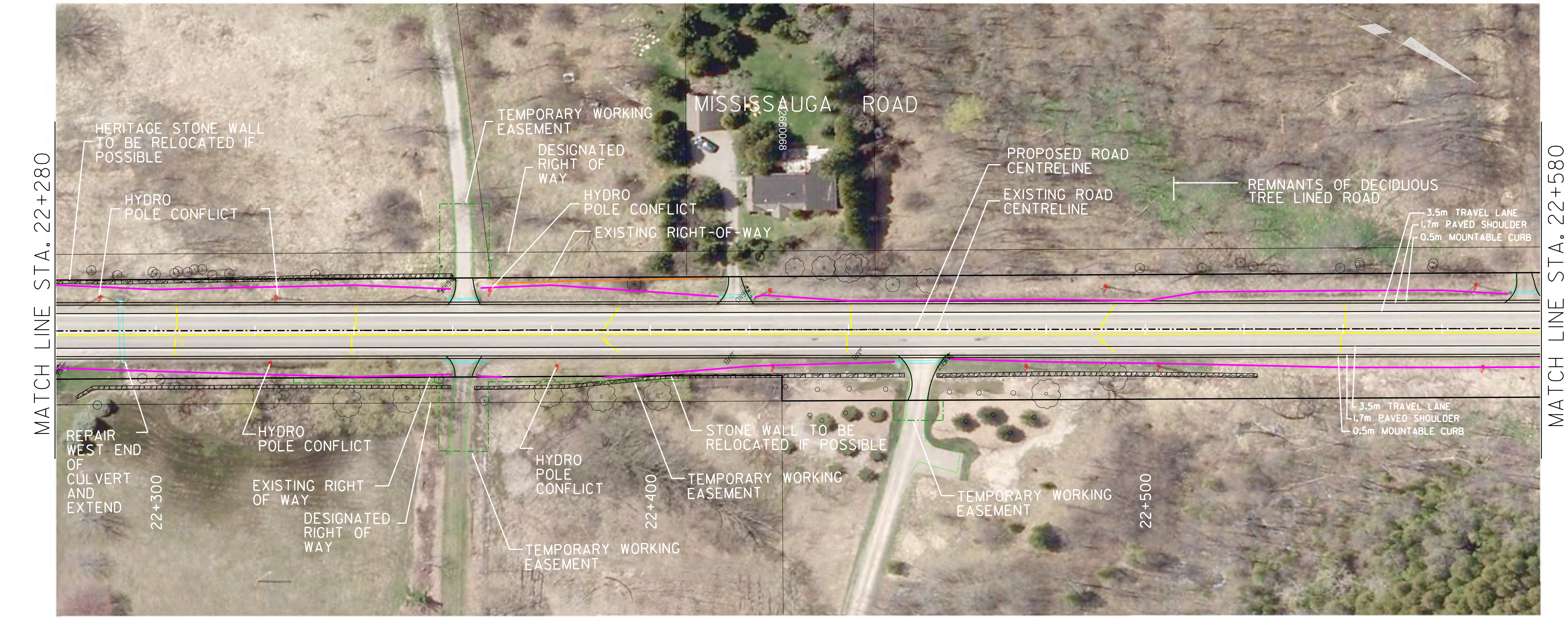
Region of Peel
Working for you

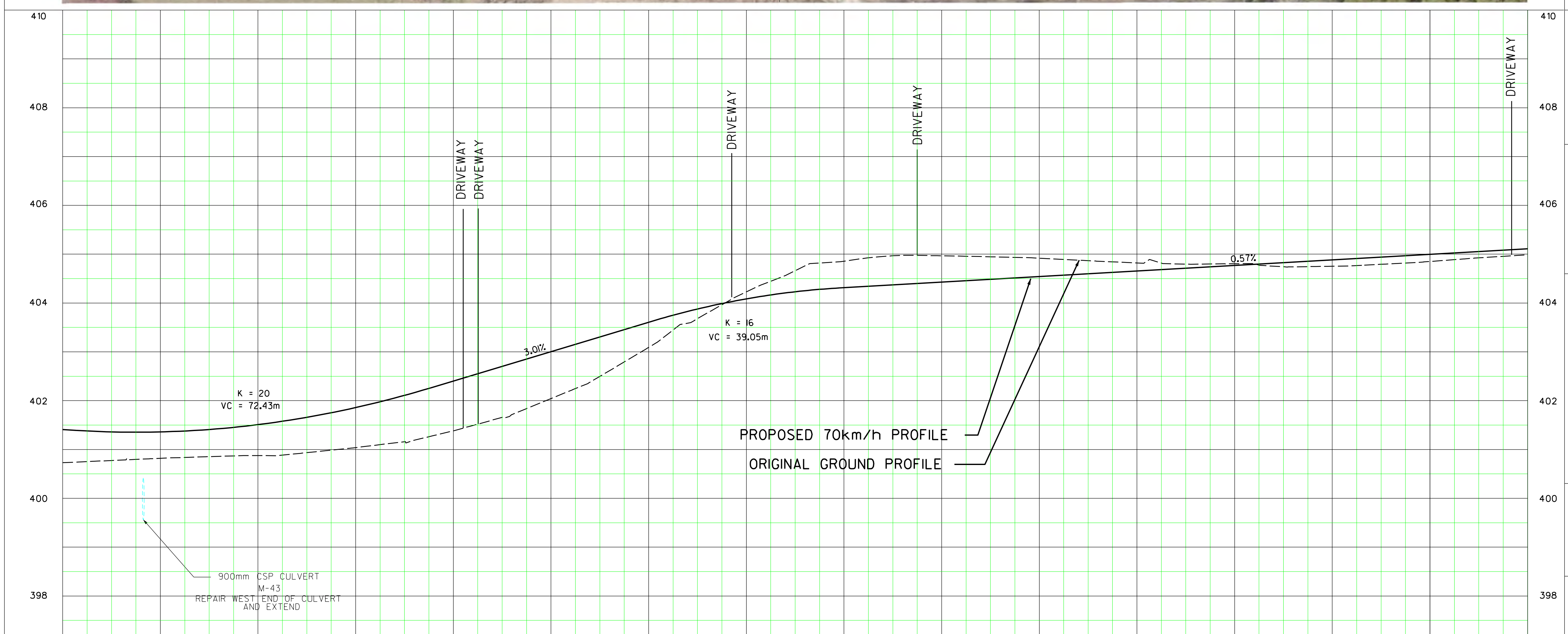
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 21+980 to STA 22+280)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 7 of 21	Plan No. -D





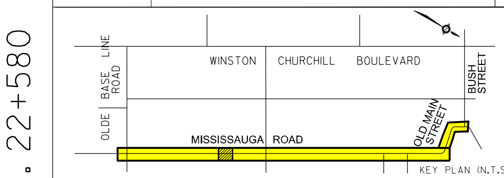
BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	22+300 · 22+400 · 22+500

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
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- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

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Designed by ____ ____ ____ ____ Chkd. ____

Approved by ____ ____ ____ ____ ____

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ONTARIO CLEAN WATER AGENCY
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ROGERS CABLE
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PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

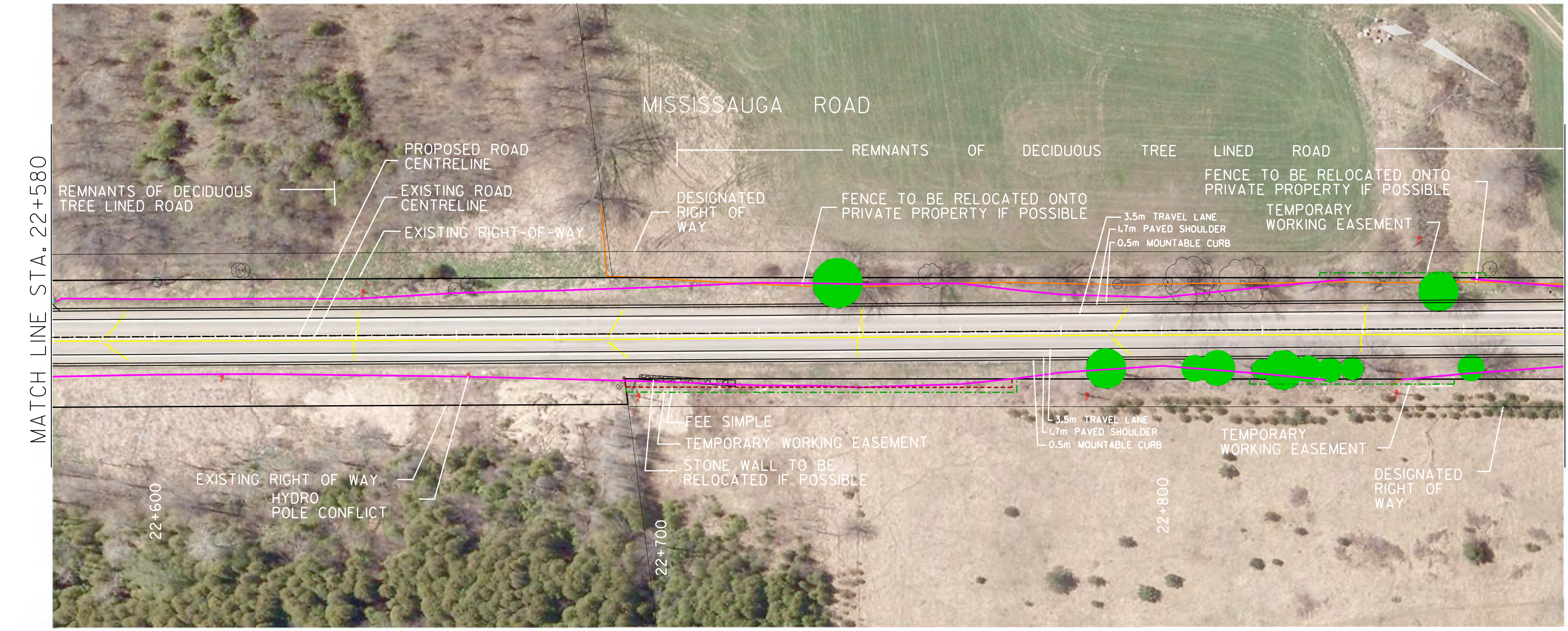
Region of Peel
Working for you

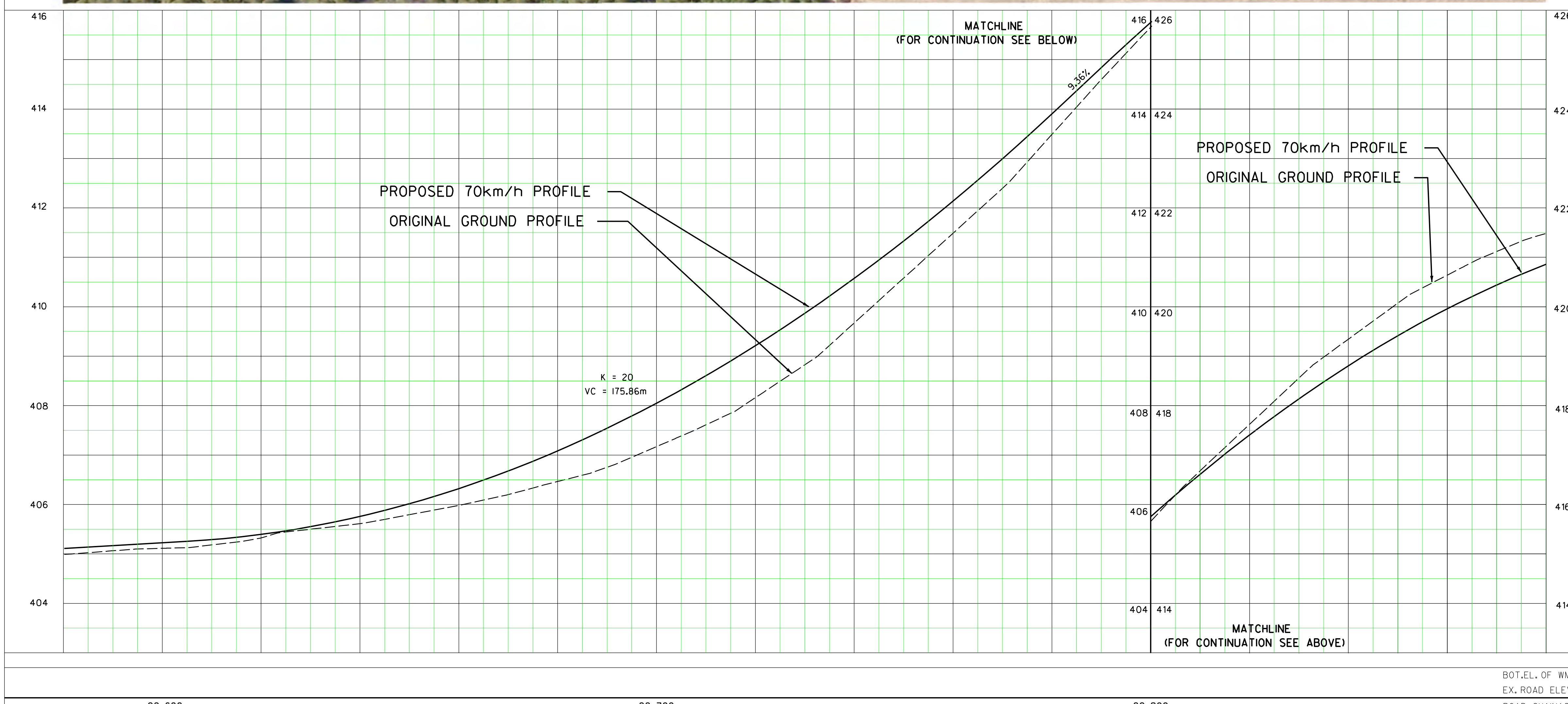
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 22+280 to STA 22+580)

NEW CONSTRUCTION

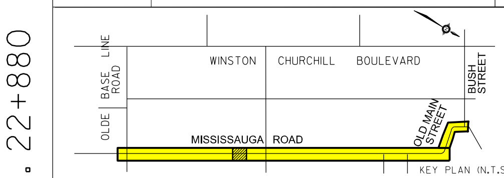
CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 8 of 21	Plan No. -D





SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
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- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
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- EXISTING CULVERT
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- PROPOSED CATCHBASIN
- TRAFFIC SIGN
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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

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ONTARIO CLEAN WATER AGENCY
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FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

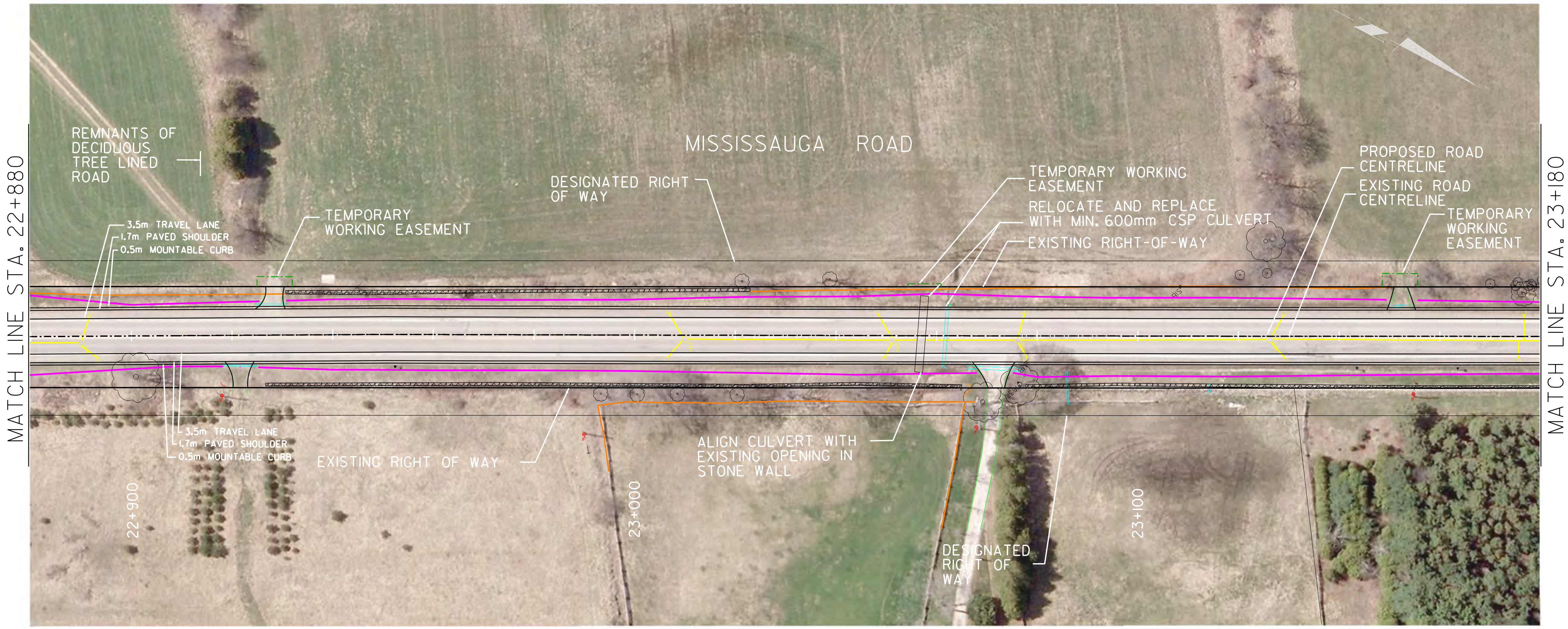
Region of Peel
Working for you

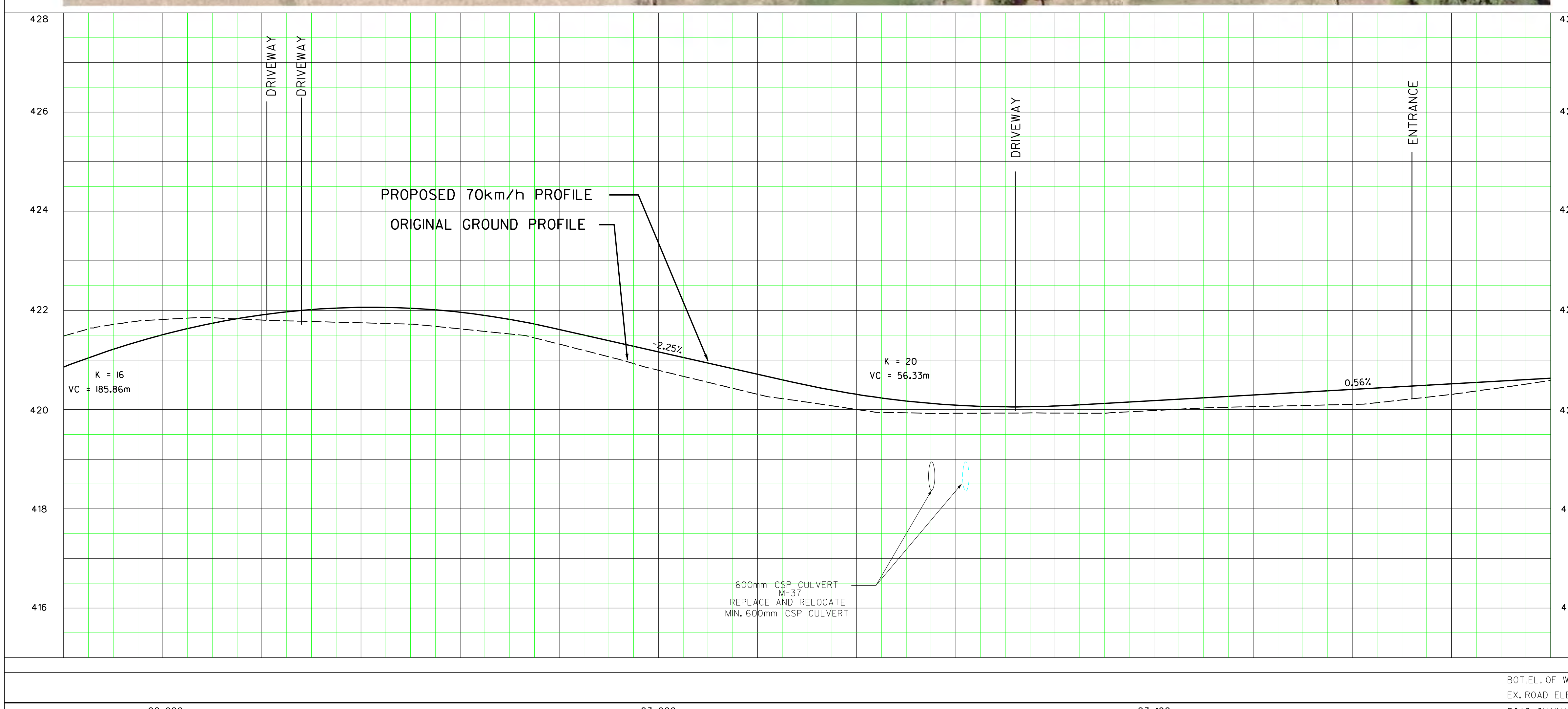
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 22+580 to STA 22+880)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 9 of 21	Plan No. -D



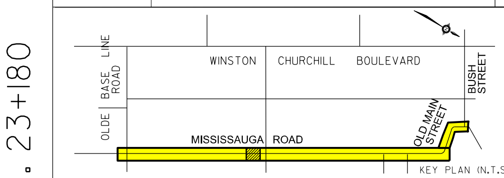


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
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- HERITAGE STONE WALL
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- EXISTING CENTRE LINE
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- PROPOSED EDGE OF ASPHALT
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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

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ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
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PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

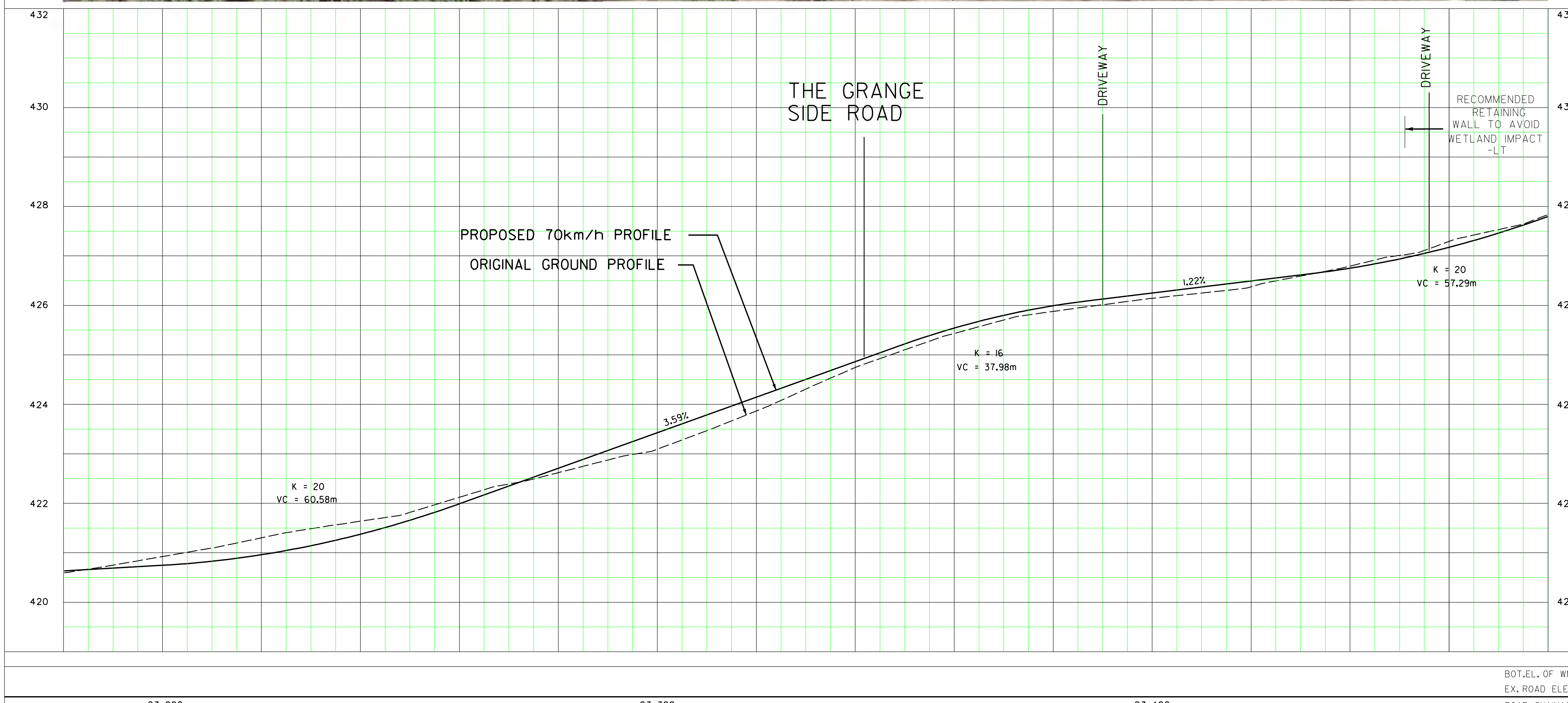
Region of Peel
Working for you

MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 22+880 to STA 23+180)

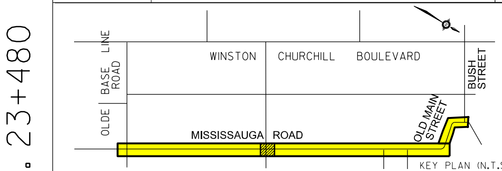
NEW CONSTRUCTION

CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 10 of 21	Plan No. -D



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



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- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
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- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

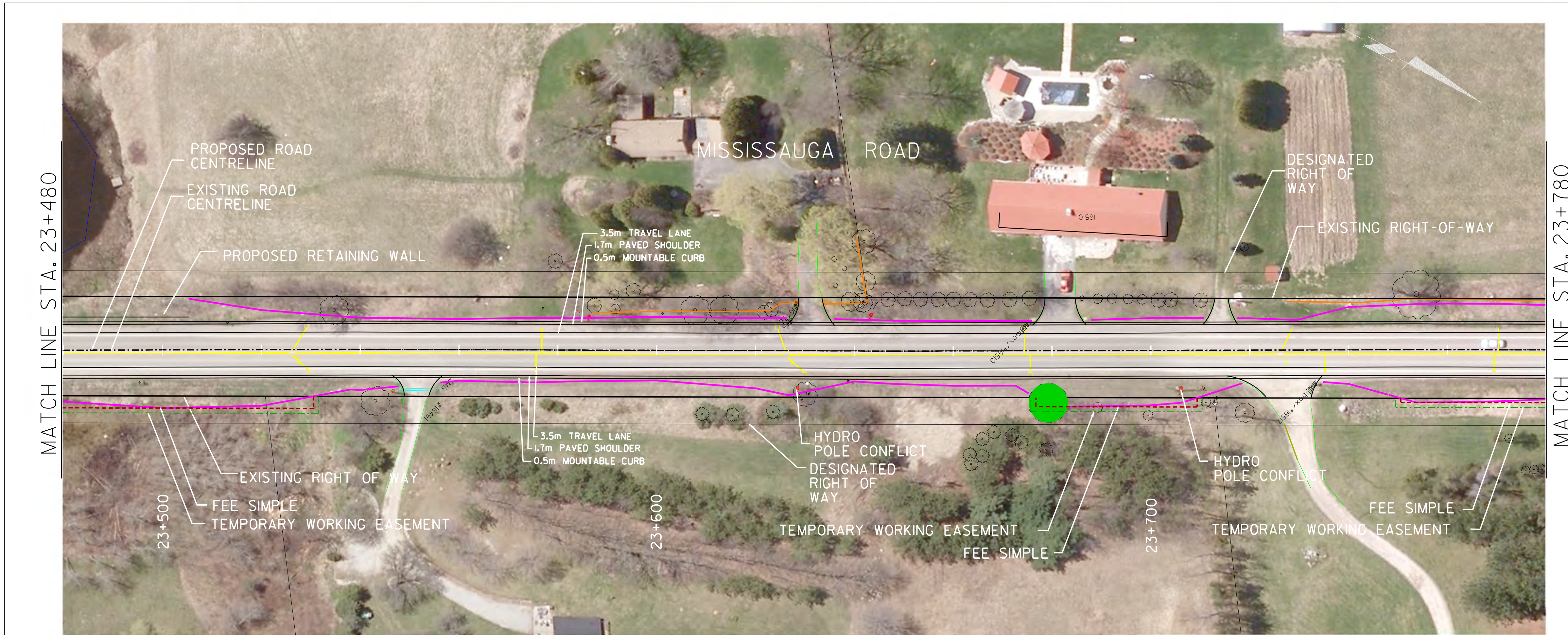
Region of Peel
Working for you

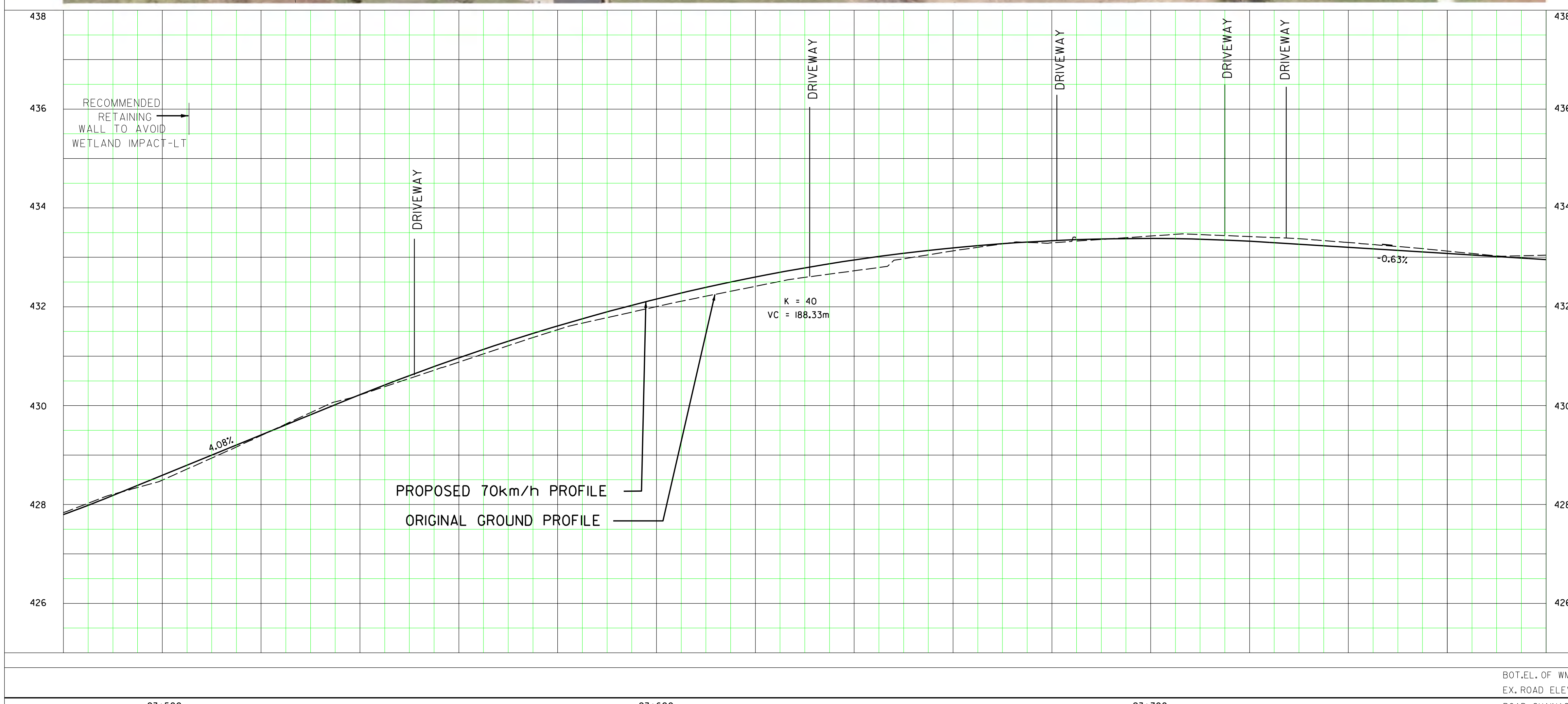
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 23+180 to STA 23+480)

NEW CONSTRUCTION

CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 11 of 21	Plan No. -D





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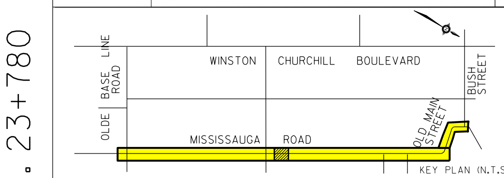
REVISIONS

DATE	DETAILS	INIT.



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10m 0 10 20 30m HORIZONTAL SCALE

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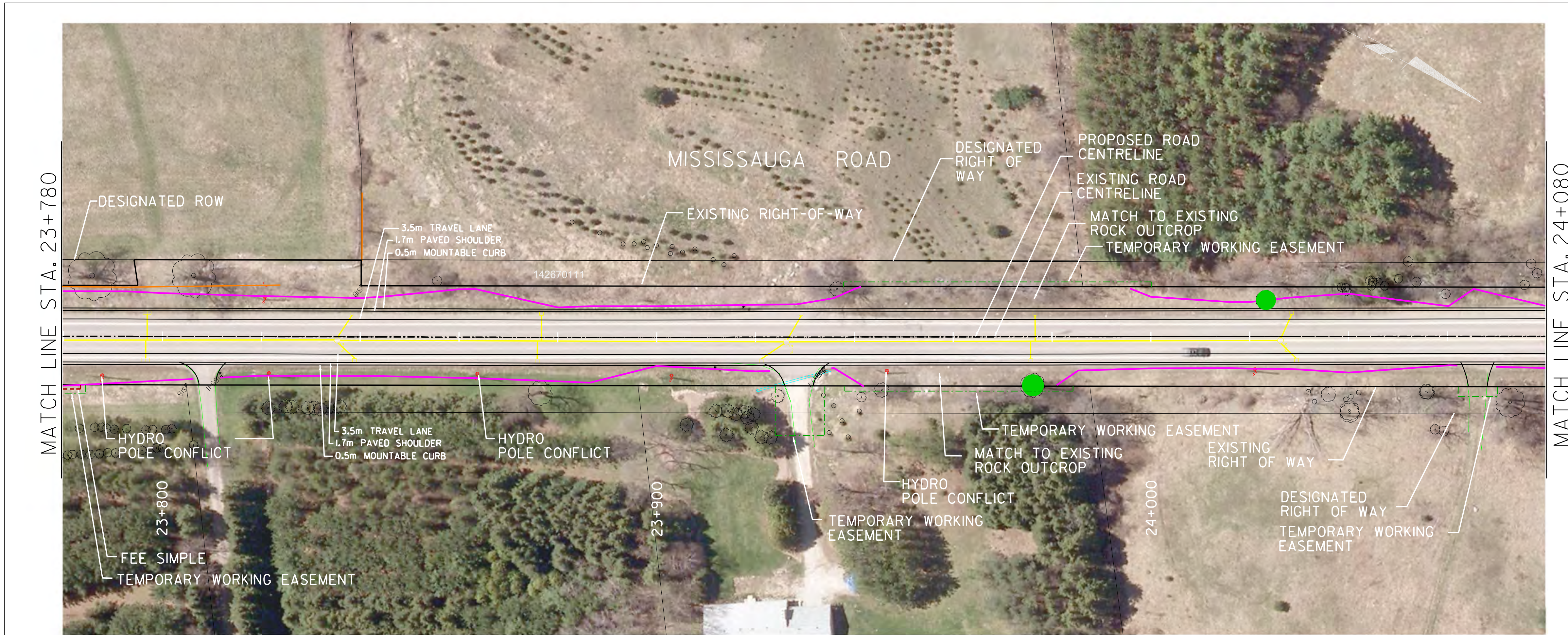
Region of Peel
Working for you

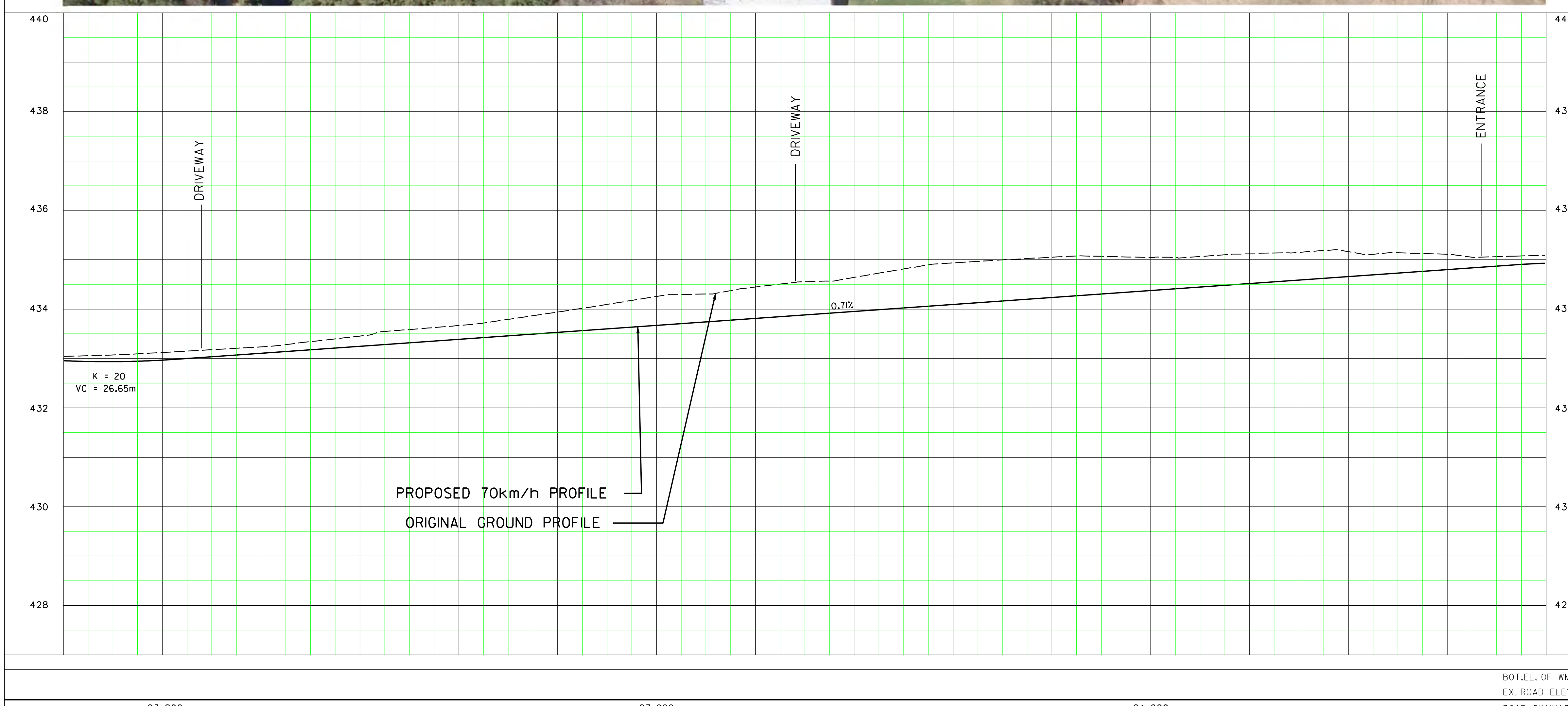
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 23+480 to STA 23+780)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 12 of 21	Plan No. -D



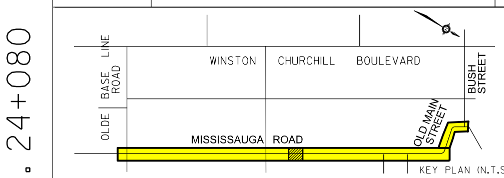


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

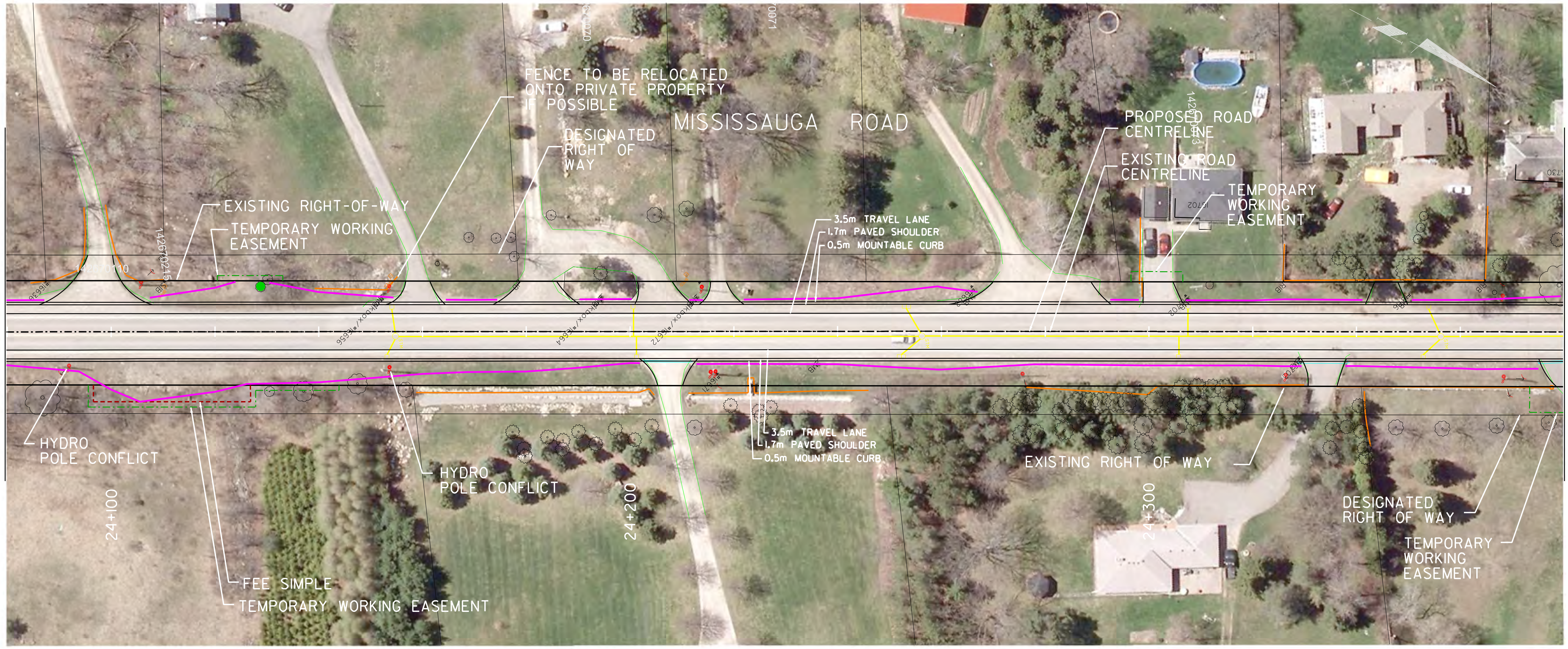
Region of Peel
Working for you

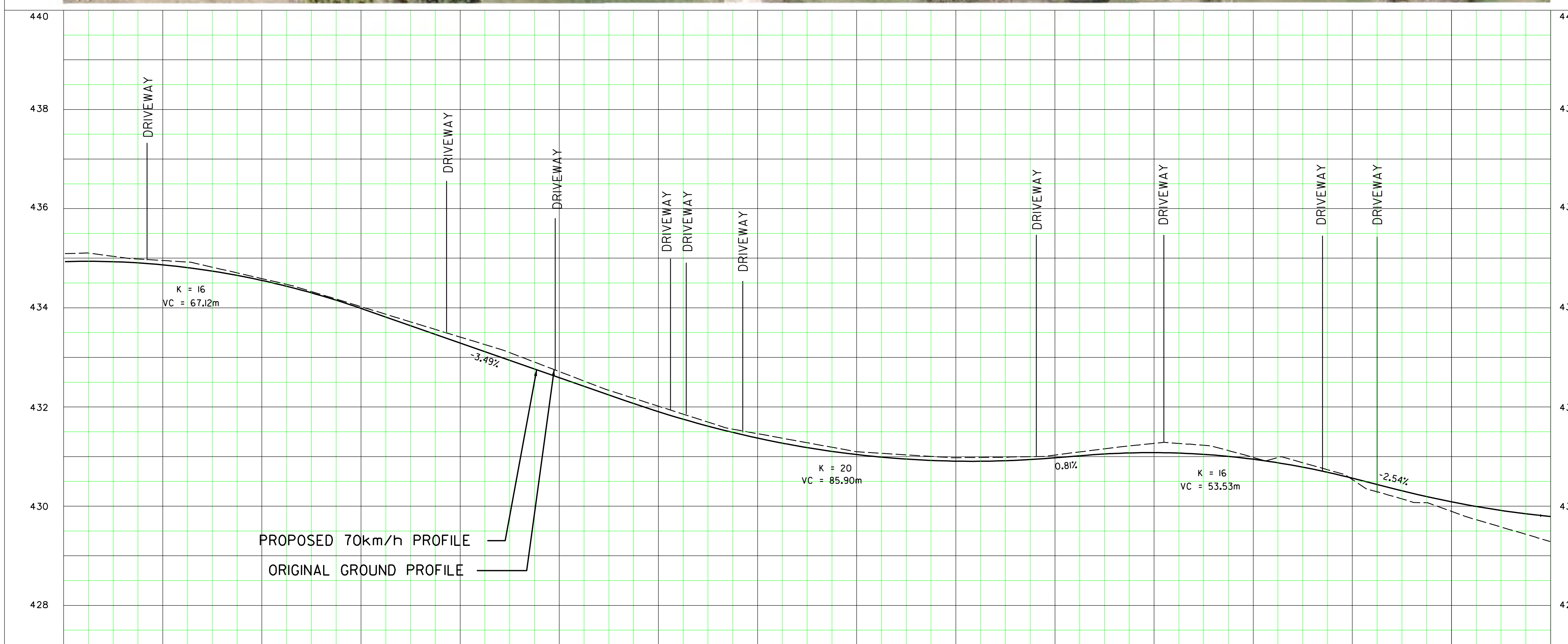
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 23+780 to STA 24+080)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 13 of 21	Plan No. -D





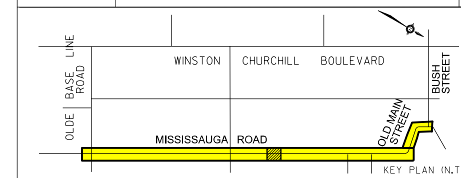
BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	24+100 · 24+200 · 24+300

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
TEMPORARY WORKING EASEMENT
FENCE/GUIDE RAIL
CULTURALLY SIGNIFICANT FENCE
HERITAGE STONE WALL
PROPOSED CENTRE LINE
EXISTING CENTRE LINE
PROPOSED EDGE OF PAVEMENT
PROPOSED EDGE OF ASPHALT
EXISTING RIGHT OF WAY
DESIGNATED RIGHT OF WAY
EXISTING CULVERT
DITCH GRADING
PROPOSED STORM SEWER
PROPOSED CATCHBASIN
TRAFFIC SIGN
HP HYDRO POLE
VEGETATION REMOVALS

NOTES

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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

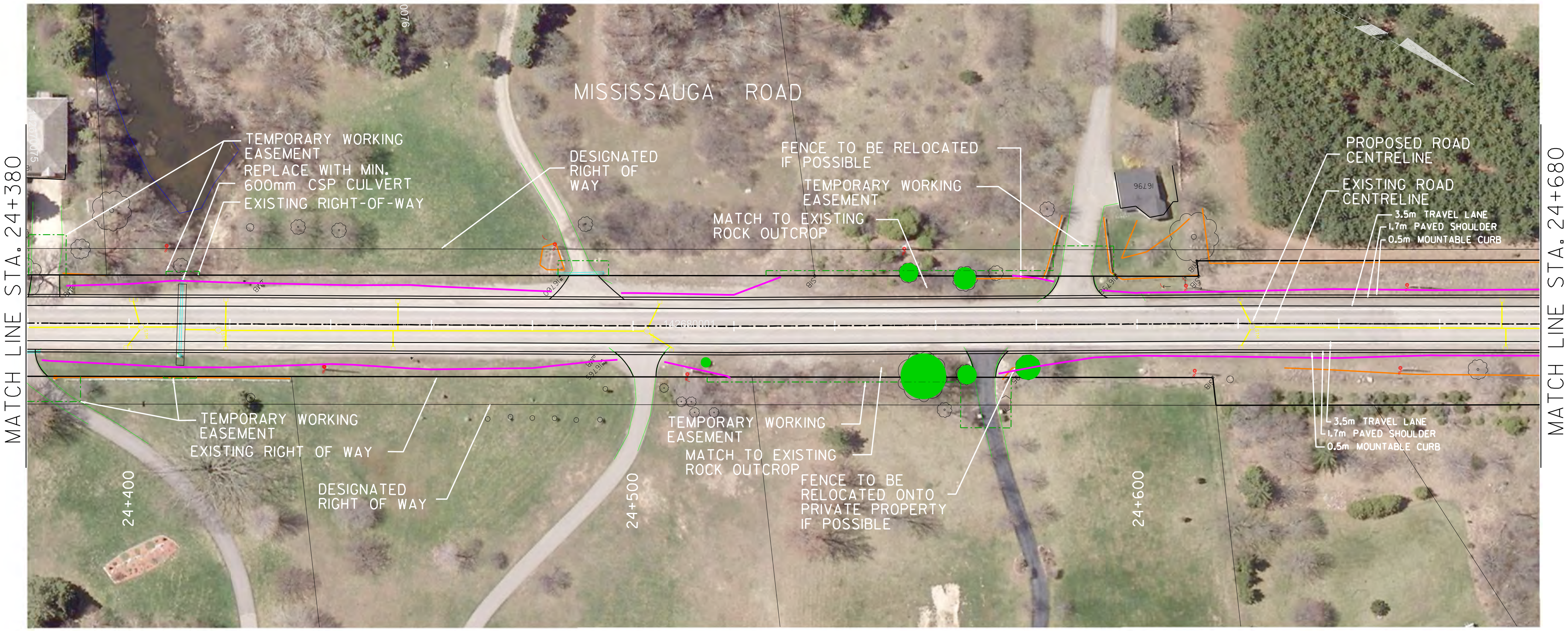
Region of Peel
Working for you

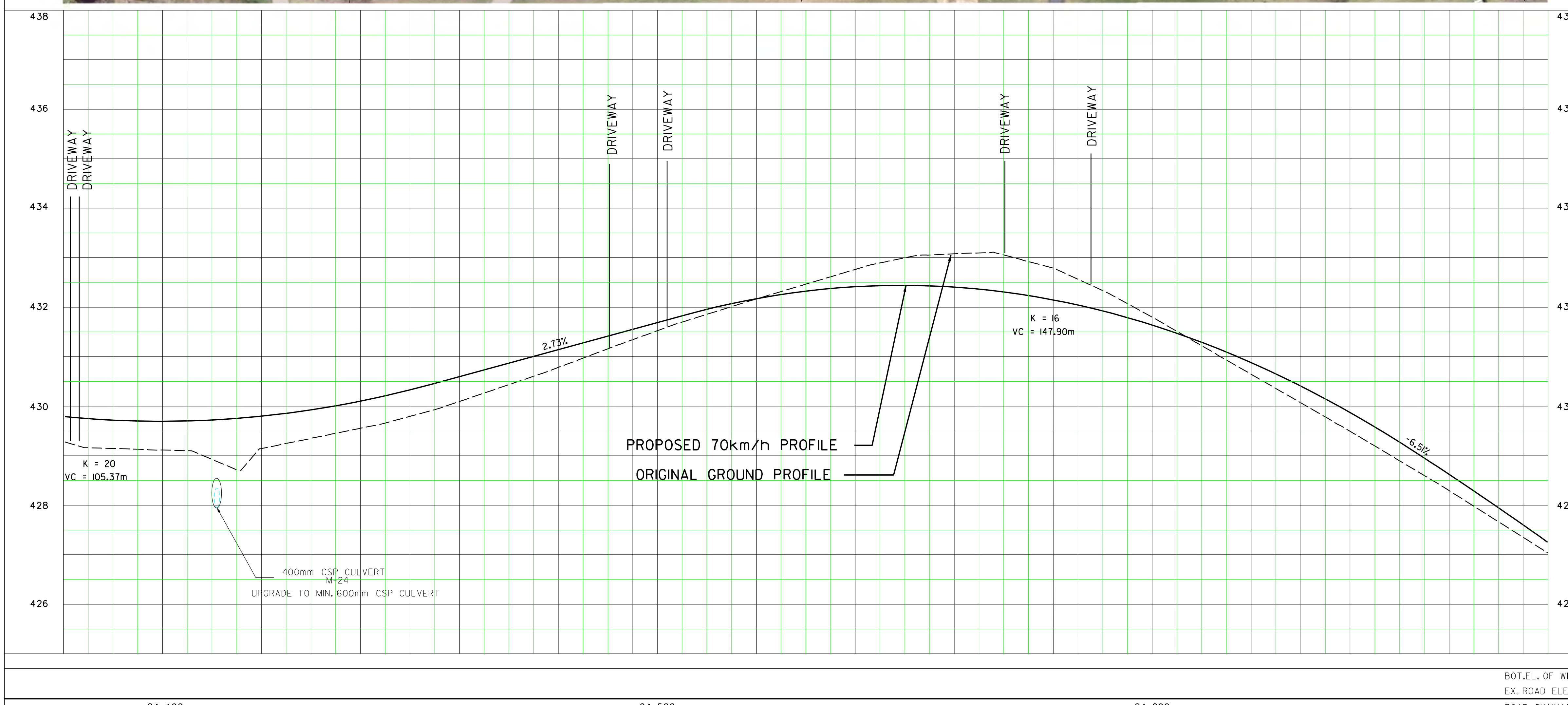
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 24+080 to STA 24+380)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 14 of 21	Plan No. -D





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.

KEY PLAN (N.T.S.)

LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
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- HERITAGE STONE WALL
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- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
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Approved by ____ ____ ____ ____ ____

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FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

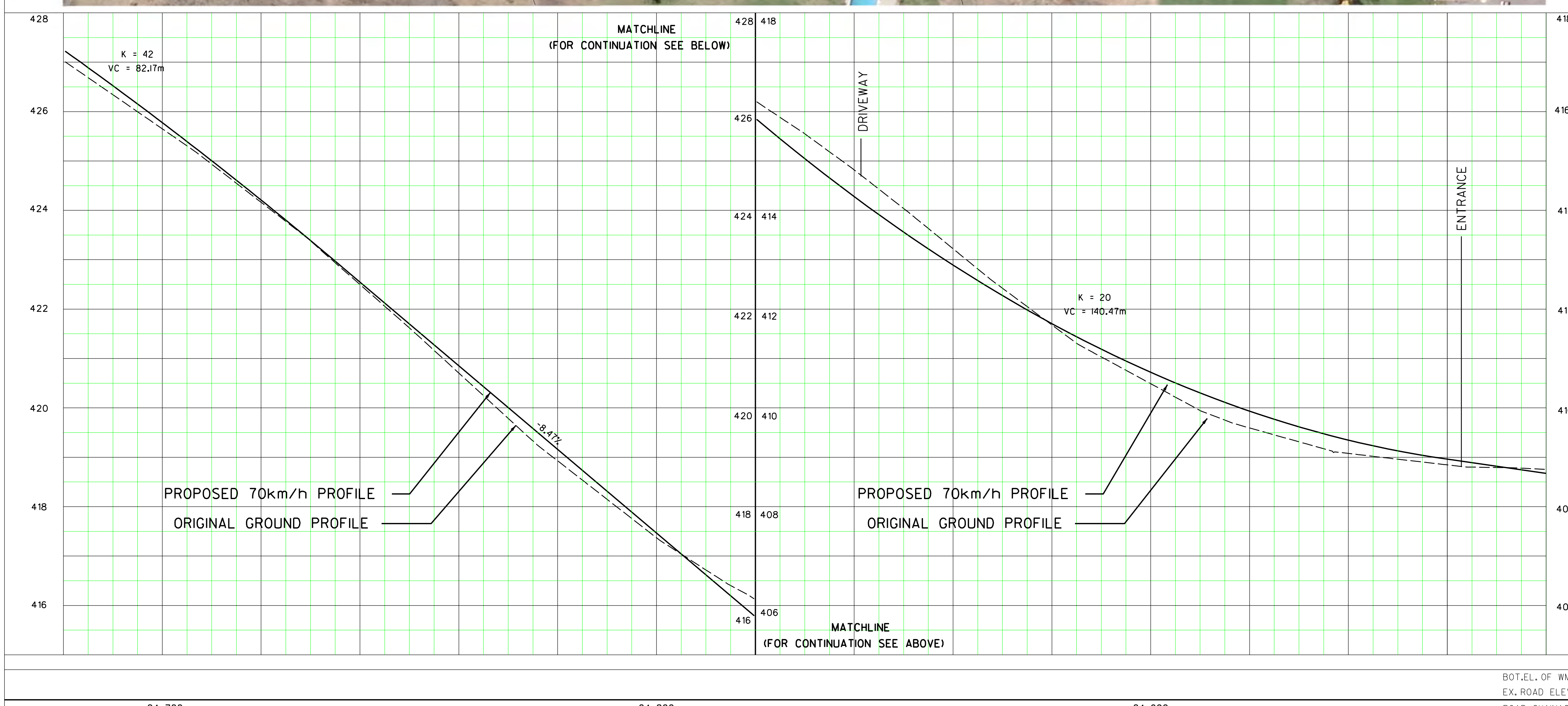
Region of Peel
Working for you

MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 24+380 to STA 24+680)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 15 of 21	Plan No. -D



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SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
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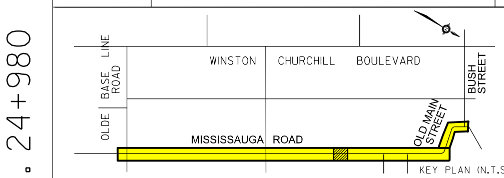
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

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ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
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PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

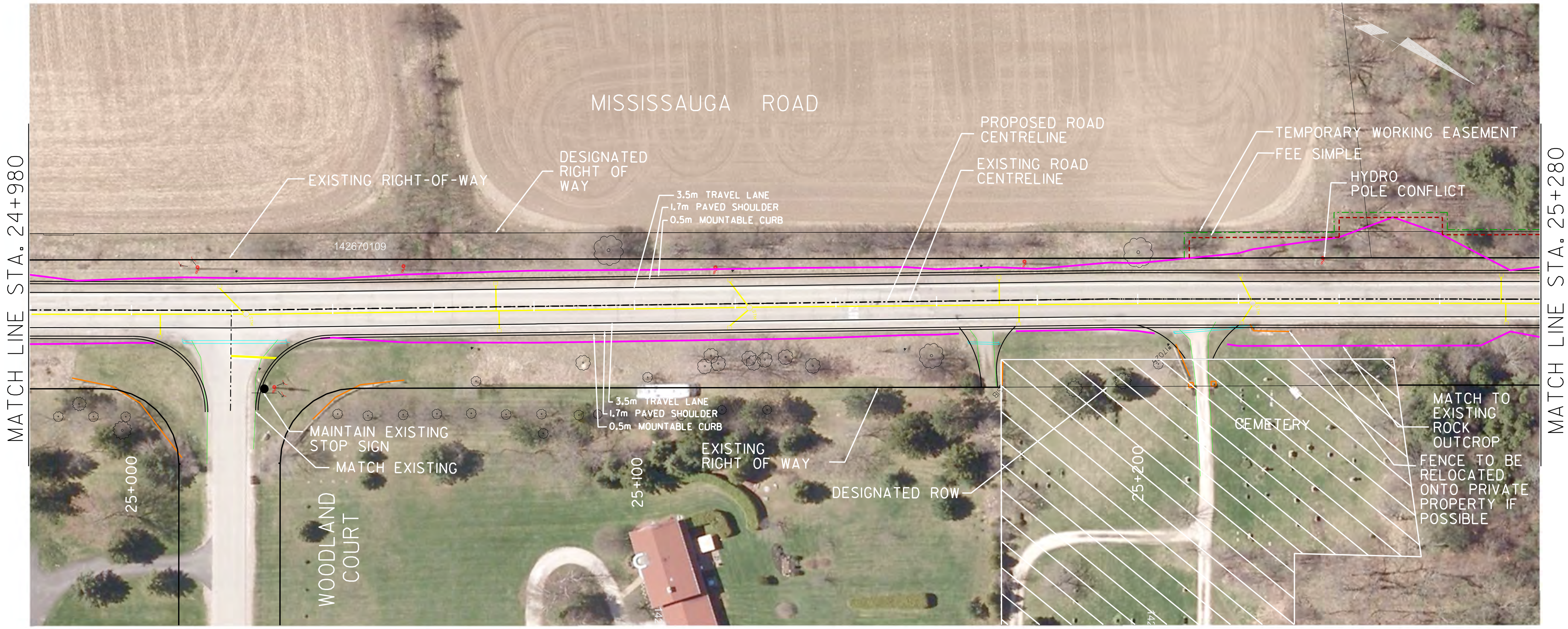
Region of Peel
Working for you

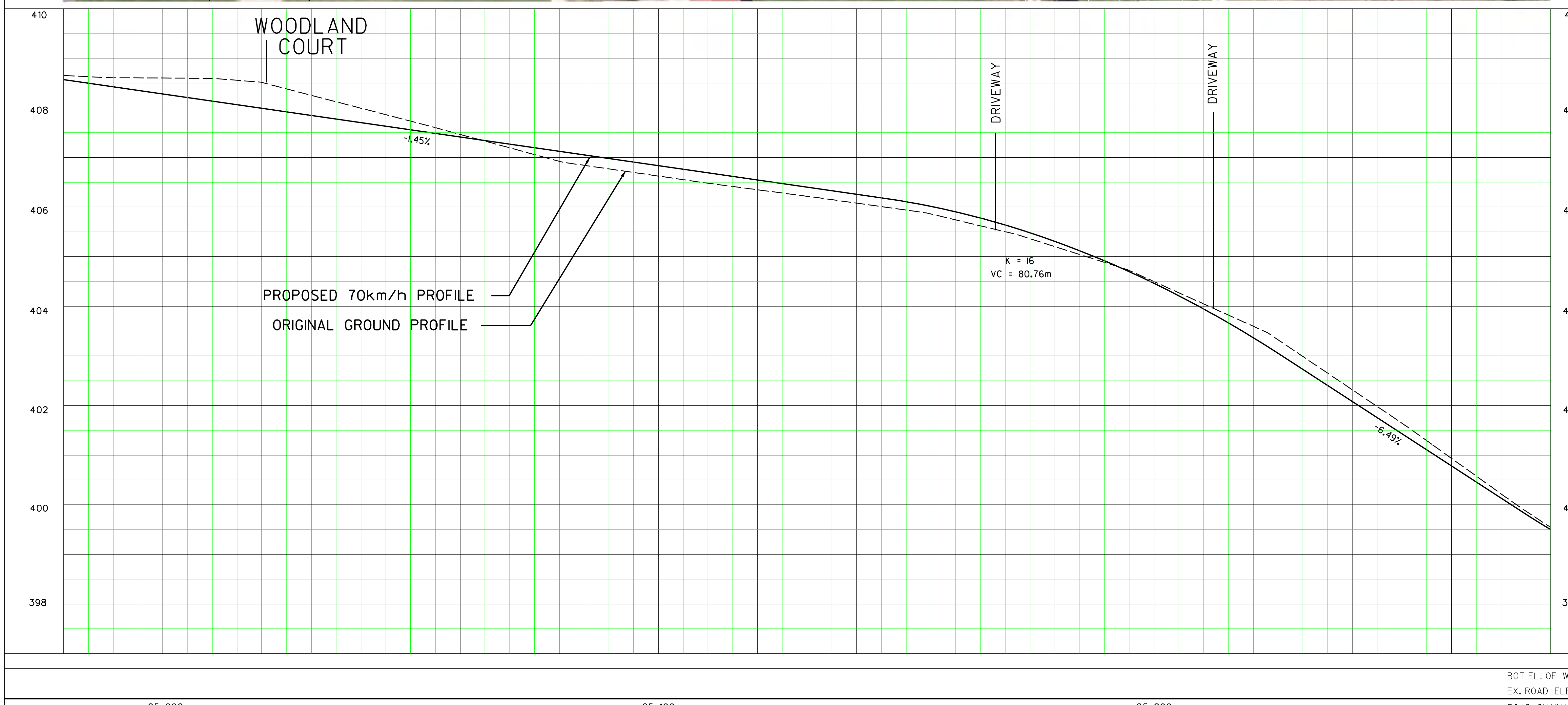
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 24+680 to STA 24+980)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 16 of 21	Plan No. -D



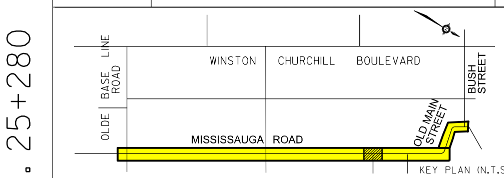


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:
- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
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- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

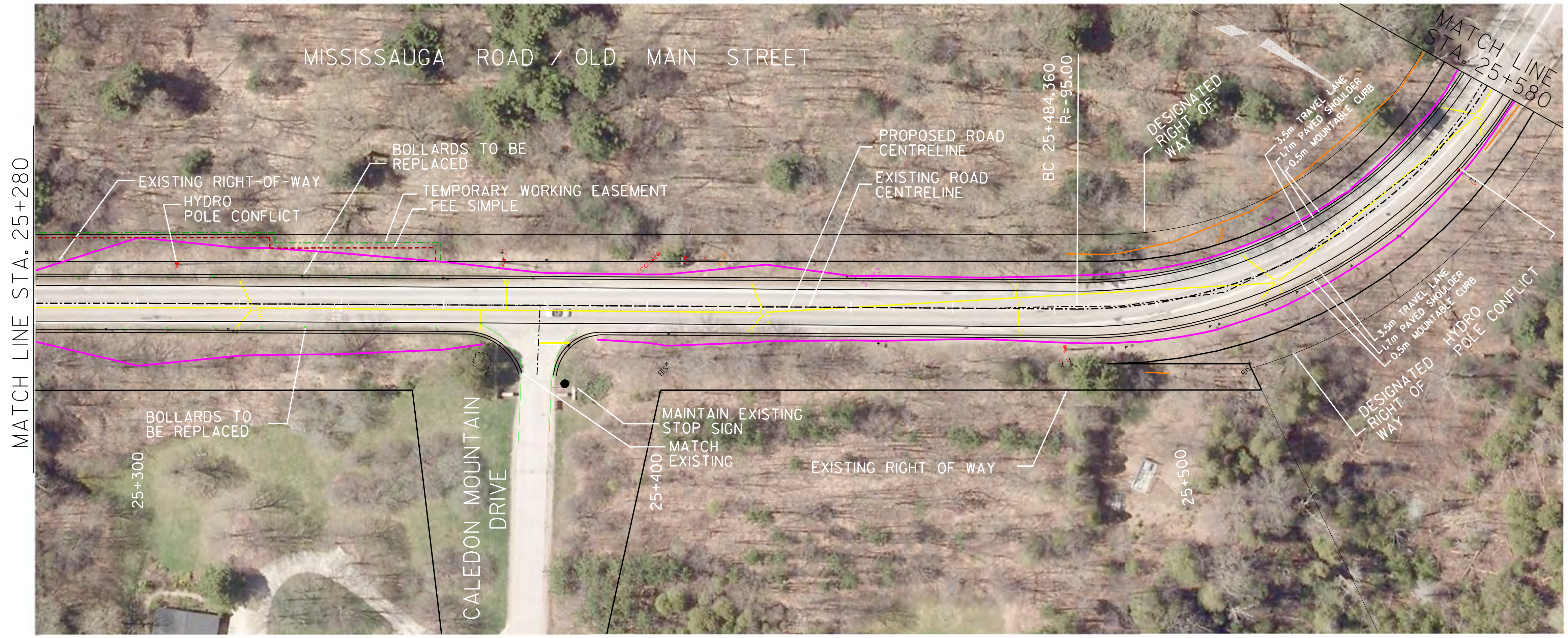
Region of Peel
Working for you

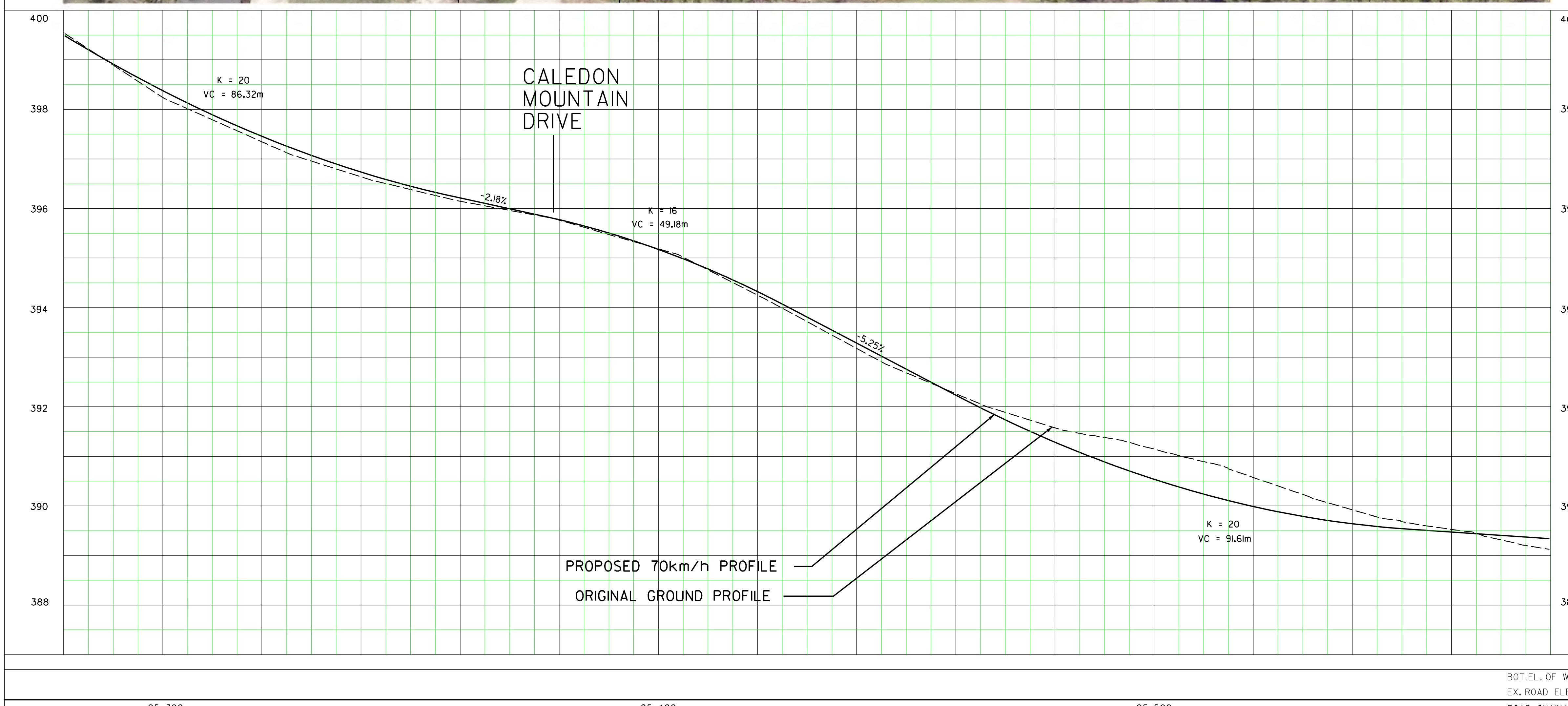
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 24+980 to STA 25+280)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 17 of 21	Plan No. -D





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
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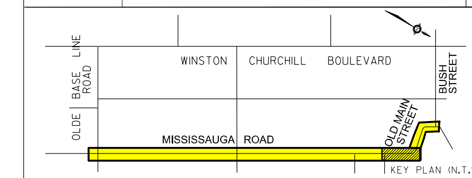
REVISIONS

DATE	DETAILS	INIT.



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- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

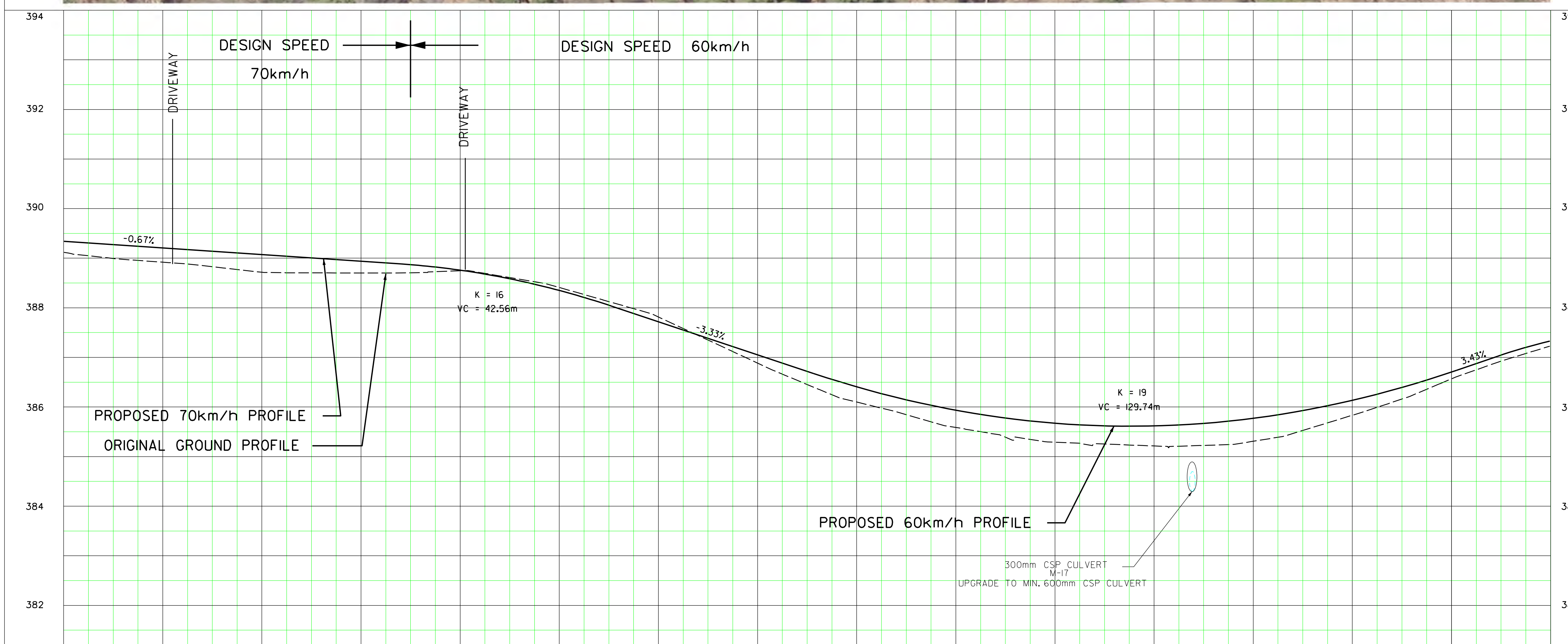
Region of Peel
Working for you

MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 25+280 to STA 25+580)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 18 of 21	Plan No. -D



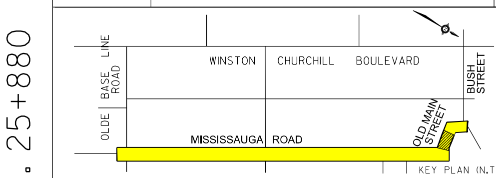
BOT.EL. OF WM.			
EX. ROAD ELEV.			
ROAD CHAINAGE	25+600	25+700	25+800

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

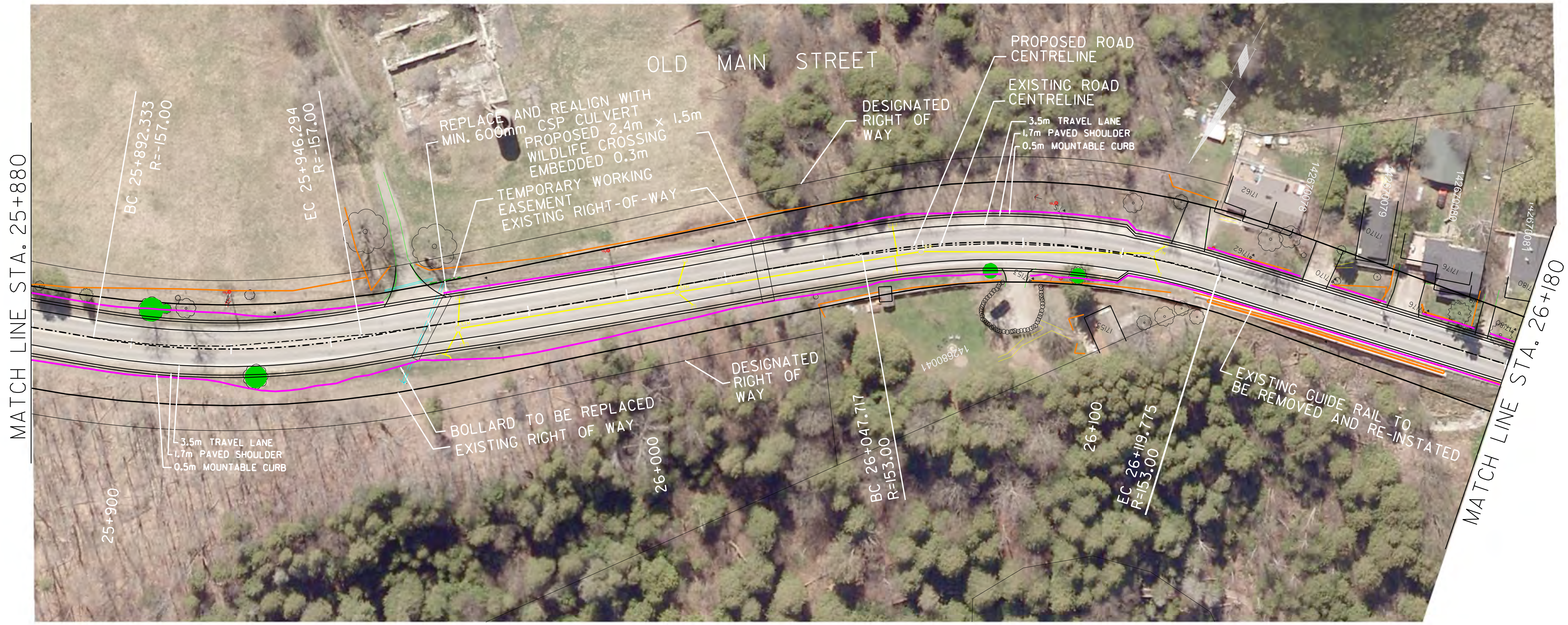
Region of Peel
Working for you

MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 25+580 to STA 25+880)

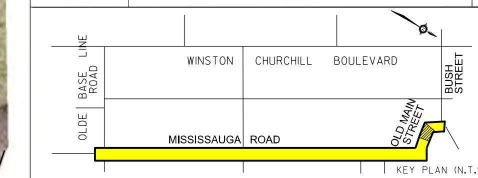
NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 19 of 21	Plan No. -D



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



LEGEND:

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- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
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- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

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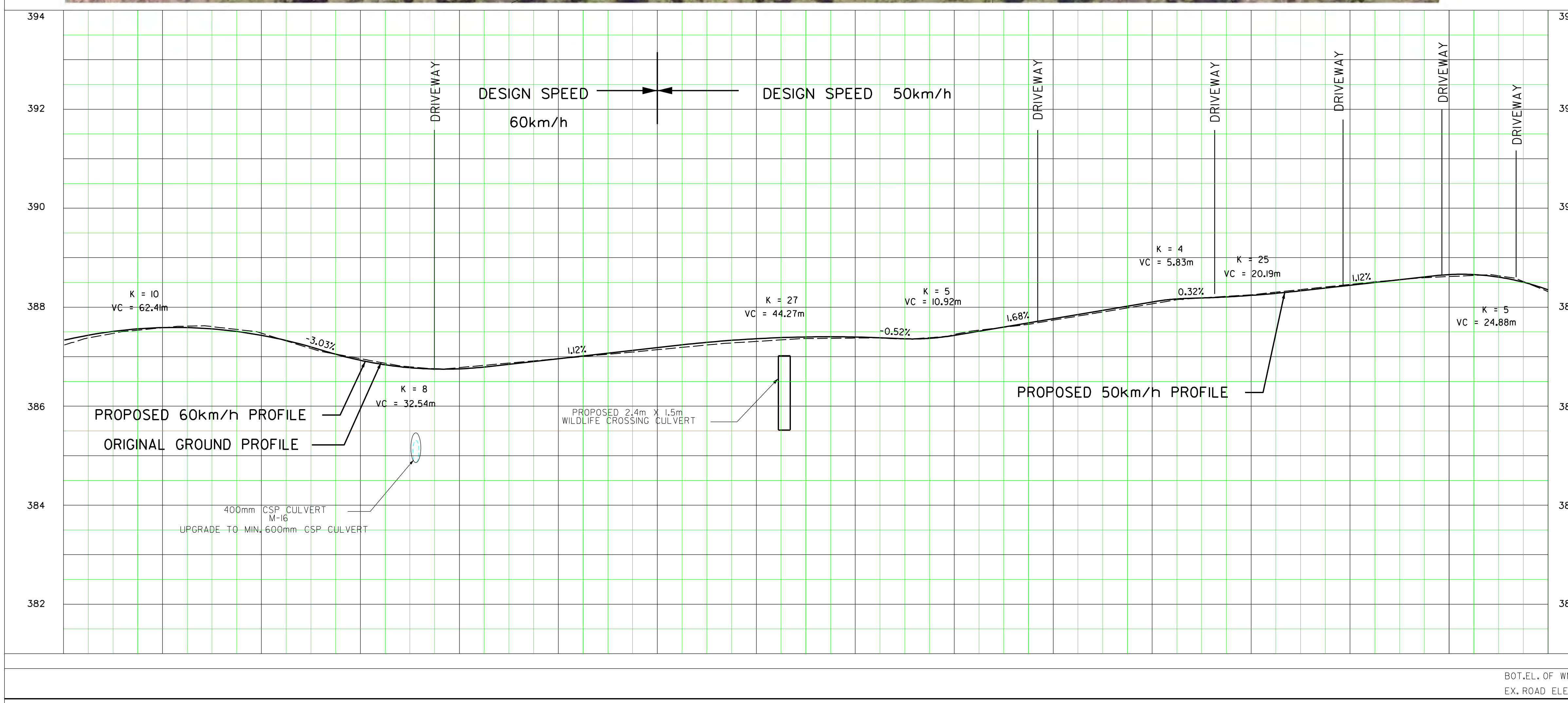

General Notes

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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

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FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 25+880 to STA 26+180)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 20 of 21	Plan No. -D

8.3 Impacts and Mitigation

The proposed cross-section, horizontal and vertical alignment designs aim to minimize impacts to adjacent lands and features, including naturally sensitive areas, vegetation, culturally significant fences and stone walls, buildings, and properties outside the road right-of-way. However, in order to accommodate all road users and bring the road up to standards for its role and function within the Regional road network, some impacts will need to be mitigated, as described below.

8.3.1 Summary of Identified Concerns and Mitigation Measures

Impacts along Mississauga Road / Old Main Street (as identified in the preliminary design plates in **Section 8.2.8**.) and potential mitigation measures include:

- Grading impacts along the corridor can be mitigated by modifying the grading slope (in accordance with geotechnical recommendations), or in some cases considering a retaining wall or other type of soil retention feature.
- Impacts to sensitive natural features, including wetlands, have been mitigated by using a semi-rural cross-section to reduce the grading footprint. Where this cross-section resulted in significant grading impacts to natural features, particularly beyond the existing road right-of-way, a retaining wall (approximately 50 metres long and 2 metres in height) is proposed to mitigate impacts (for example, in proximity to the wetland at Station 23+460 to 23+510, on the west side). Tree removals will be required at various locations. In some cases, grading can be modified to minimize impacts and reduce the number of tree removals. Natural environment impacts and recommended mitigation measures are summarized in **Table 42**. Additional details are included in Natural Heritage report (**Appendix B**).
- A wildlife passage culvert is proposed at Station 20+685, where sensitive amphibian species are present and a high number of amphibian road crossings and mortality have been observed. Wildlife passage culvert details are to be confirmed during detailed design.
- The extent of impacts to cedar and stone fence lines along Mississauga Road / Old Main Street will require further review during detailed design. Where impacts to cedar rail fencing (also referred to as culturally significant fencing) and heritage stone walls, the following recommendations should be considered, in order of preference:
  - Where technically possible, make further adjustments to the profile, cross-section and grading limits of the proposed road improvements to avoid directly impacting the cedar rail fencing and the heritage stone walls.
  - If direct impacts are unavoidable, document and relocate cedar rail fencing and heritage stone walls further back on to the property in advance of construction activities. Prior to relocation, these resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a relocation plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to relocate and re-use the resource.

  - Where relocation is not possible for structural or other technical reasons, document and salvage cedar rail fencing and heritage stone walls in advance of construction activities. These resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a salvage plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to salvage the resource.
  - Complete a cultural heritage landscape documentation report to document the roadscapes in advance of construction activities.
- In cases where cultural heritage resources are subject to indirect impacts, appropriate mitigation measures may include the introduction of landscape designs and vegetative elements to screen the disruptive aspects of the proposed road improvements. Where features such as private signs, fences, etc. encroach onto the road right-of-way, they should be relocated onto private property, if possible. If further assessment determines that it is not feasible to relocate the features, an encroachment agreement with the Region would be required.
- Where the right-of-way is constrained by existing rock outcrops, grading at a 2:1 slope to match existing ground would result in significant impacts, as grading would be extensive. At these locations, it is proposed to grade to the rock outcrop within the right-of-way only as required to accommodate the road platform and satisfy roadway clearance zone requirements. Beyond this, rock outcrops are proposed to be matched/remain.
- Impacts to Melville Cemetery (Station 21+895 to 21+965) and Greenlaw Cemetery (Station 23+350 to 23+390) have been avoided by using a semi-rural cross-section to minimize the grading footprint. Impacts to Belfountain-Blair Cemetery (Station 25+170 to 25+250) have also been avoided by using a semi-rural cross-section to minimize the grading footprint. At this location, however, the right-of-way is further constrained by an existing rock outcrop, and mitigation measures as described above are proposed to contain impacts to within the existing road right-of-way. Some traffic signs and bollards will need to be relocated, as described in **Section 8.2.7**.
- Some guiderails at the Mississauga Road / Olde Base Line Road intersection will need to be relocated to accommodate the new road platform. The guiderail on the south-west corner is proposed to be shortened or relocated to improve sightlines for vehicles travelling westbound on Olde Base Line Road as they approach the intersection.
- Some hydro poles are currently located within or in close proximity to the proposed road platform and will need to be relocated. Clearance zone requirements and utility guidelines should be followed. Hydro pole conflicts identified in the design plates are to be confirmed during detailed design. Permanent aerial easements and potential vegetation removals as a result of hydro pole relocation are to be identified through the development of utility relocation design.
- Property acquisition will be required at some locations, as described in **Section 8.3.2**. In some cases, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations), or considering a retaining wall or other type of soil retention feature to minimize the amount of property acquisition required.

- Where driveways are to be regraded to accommodate vertical profile and cross-section modifications, temporary working easements will be required and are to be confirmed during detailed design.
- During detailed design, opportunities to reduce grading impacts (such as realignment of the road centreline, reducing profile adjustments, retaining walls or other types of soil retention features, etc.) should be considered at the following location:
  - Between Station 20+650 and 20+730 (east and west sides)
- Due to insufficient survey coverage, the extent of impacts and potential mitigation measures at the following location will require further review during detailed design:
  - Station 20+650 – 20+725 (west side)
- If construction extends beyond the disturbed ROW, a Stage 2 archaeological assessment is recommended on any lands along the study corridor where there is potential for archaeological sites (as identified in **Appendix C.1)**, in accordance with Draft Standards and Guidelines for Consultant Archaeologists (MCL 2009).
- Prior to any land-disturbing activities adjacent to a cemetery, a Stage 3 archaeological assessment should be conducted, in accordance with Draft Standards and Guidelines for Consultant Archaeologists (MCL 2009), to confirm the presence or absence of unmarked graves beyond the limits of the fence. This work will involve the removal of the topsoil with a Gradall followed by the shovel shining of the exposed surfaces and subsequent inspection for grave shafts.
- Should the proposed work extend beyond the current study area, further Stage 1 assessment must be conducted to determine archaeological potential of the surrounding lands.
- In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.
- No permanent noise and air quality impacts are anticipated as a result of the proposed road improvements, as no additional travel lanes will be provided and traffic is not expected to increase significantly. During construction, best management practices (such as the application of non-chloride dust suppressants) are to be applied to mitigate any air quality impacts caused by construction dust.
- If soil removed during construction is determined to be contaminated, the disposal of contaminated soil is to be consistent with Part XV.1 of the Environmental Protection Act and Ontario Regulation 153/04, Records of Site Condition, which detail the requirements related to site assessment and clean up.
- Water supply wells within or in close proximity to the study area may be affected by road construction, either because of construction activities or, later, due to additional or more proximate road salt application. Prior to construction, it is recommended to confirm which wells are used domestically, to ensure that affected well owners will continue to have water supplies of appropriate quality and in adequate quantities, and to ensure that any work done on affected wells or any replacement wells is done pursuant to O. Reg. 903, Wells (pursuant to the Ontario Water Resources Act).

All of these impacts and potential mitigation measures are to be confirmed during detailed design. Temporary construction impacts should also be reviewed and confirmed during detailed design.

Table 42: Summary of Natural Heritage Impacts and Recommended Mitigation – Mississauga Road / Old Main Street

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Vegetation/habitat removal	▪ The majority of areas to be directly impacted by site grading and vegetation removal are culturally influenced. No significant encroachment into Significant Woodland/ESAs/ANSIs are anticipated. ▪ Grading limits are to be maintained outside of tree driplines to the extent feasible. ▪ Tree protection measures will be implemented as detailed within a Tree Management Plan to be developed during the detailed design stage. ▪ Restoration/enhancement plantings along adjacent natural feature boundaries will help mitigate and buffer negative impacts associated with the proposed undertaking. ▪ Road grading limits should be maintained outside of wetland boundaries, such as through the use of retaining walls. ▪ Protective fencing should be established around regionally significant plant species during construction to avoid impacts; where avoidance is not possible, regionally significant plant species should be relocated to suitable areas of habitat restoration, where feasible. All transplanted individuals must be monitored prior to at least one year prior to their relocation to ensure proper re-establishment.	▪ No significant impact	▪ Detailed tree inventory and protection measures to be determined as part of a Tree Management Plan ▪ Visual impact assessment to be undertaken, where necessary, to evaluate the impact of vegetation removal. ▪ Vegetation Restoration Planting Plan and/or Woodland Edge Management Plan to be developed ▪ Detailed three-season surveys are to be completed during the detailed design stage to identify and map regionally significant plant species within the study area. ▪ Tree inventory work completed during Detailed Design should include inventories for snags and cavity trees to assess potential for impacts to Little Brown Myotis habitat. ▪ Follow-up surveys should be implemented to verify the presence of, and potential for impact to the following Candidate Significant Wildlife Habitat types: • Snake hibernacula • Bat maternal roosts • Habitat for significant odonate species ▪ Wetland boundaries to be accurately mapped and reviewed by agencies, where they occur adjacent to proposed road construction limits
Construction-stage impacts to crossing Jefferson Salamanders and other amphibians	▪ A permit under Section 17(2)(c) of the Endangered Species Act may be required where the proposed undertaking may cause impact to regulated habitat for Jefferson Salamander ▪ Avoid construction during peak amphibian movement period of March 15 – April 30. ▪ Provide construction personnel with materials to assist in the identification of Jefferson Salamanders. If any potential Jefferson Salamanders are observed, all work is to stop until the individual leaves the work zone and the OMNR has been notified.	▪ No significant impact	▪ Strategies to minimize impact and provide Overall Benefit to Jefferson Salamander to be determined in development of ESA "C" permit application ▪ Construction Sightings Protocol to be developed
Jefferson Salamander and general amphibian road mortality and habitat fragmentation	▪ A wildlife passage culvert has been proposed near station 20+700. One additional wildlife passage near station 20+400 is recommended to further mitigate potential for Jefferson Salamander and general amphibian road mortality and habitat fragmentation. ▪ Funnel fencing is to be installed on either side of each wildlife passage opening according to design plans established during the detailed design stage. ▪ Suitable ground substrates and cover objects should be established within around the openings of the wildlife passage to enhance their attractiveness to wildlife. ▪ Road signs alerting motorists to the potential for amphibian crossings should be considered at significant amphibian crossing locations along the study area ROW.	▪ No significant impact	▪ Effectiveness monitoring of wildlife passage and funnel fencing to be completed as detailed in a Post-Construction Monitoring Plan developed in conjunction with applicable agencies ▪ Appropriate road sign locations to be determined in consultation with agencies, municipality ▪ Wildlife road mortality mitigation approaches will be further discussed at the detailed design stage in consultation with MNR. It is recommended to undertake a more detailed analysis of area of impact within the regulated habitat for Jefferson Salamander at the detailed design stage. This information will be used to complete an Avoidance Alternatives Form.

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Deer/motor vehicle collisions	▪ Road signs alerting motorists to the potential for deer crossings should be considered at significant crossing locations along the study area ROW. ▪ Snow banks should be removed by snow plows in winter to increase visibility for both crossing deer and motorists. ▪ An increase in the annual sustainable deer hunt for the study area vicinity should be explored with OMNR as a means to control local deer populations.	▪ No significant impact	▪ Appropriate road sign locations to be determined in consultation with agencies, municipality
Impacts to Fish and Fish Habitat	▪ Concrete open-bottom culverts and/or increases in the diameter of replacement culverts have been recommended. ▪ All in-water work should occur during dry and/or low flow conditions to avoid or minimize impact to fish and fish habitat within and downstream of the construction site. ▪ Specific timing windows are to be determined in consultation with the OMNR and DFO. ▪ Where feasible, culvert replacements should comprise arch/open bottom culverts to provide better fish habitat, connectivity, and improve the potential for groundwater inputs. ▪ Where impacts to fish and fish habitat may occur, a DFO Fisheries Act Authorization may be required. ▪ Any fish that may be caught within areas impounded and de-watered for in-water construction activities should be captured and relocated prior to construction.	▪ No significant impact	▪ Where necessary, fish and wildlife salvage plans should be created for watercourse areas to be de-watered for in-water construction work.
Bird nesting disruption and avoidance, and active nest destruction	▪ Time vegetation removal activities to occur outside the typical bird breeding season (May 1 – July 31) ▪ If vegetation removal must occur during the bird breeding season, retain an avian biologist to survey for active nests just prior to vegetation removal activities	▪ No significant impact	
Wildlife avoidance of the area, and other impacts associated with construction	▪ Restrict the daily timing of construction activities to between 7:00 am and 7:00 pm. ▪ Moisten bare dirt surfaces with water to limit impacts caused by dust. ▪ Direct night-time lighting away from adjacent natural features. ▪ These construction-related impacts are expected to be temporary, minimal and localized.	▪ No significant impact	
Damage or other disturbance to the adjacent natural features	▪ Clearly demarcate the limits of construction with silt fencing or brightly coloured snow fencing around the limits of the construction zone.	▪ No significant impact	
Erosion and sedimentation	▪ A Sediment and Erosion Control Plan should be developed and implemented. ▪ Install silt fencing along the boundaries of the construction zone, inspect on a regular basis, remove accumulated sediment as needed and immediately replace any damaged fencing. ▪ Construction activities should be timed to occur outside of seasonally wet periods, during heavy rain, or during periods of rapid snowmelt.	▪ No significant impact	▪ Sediment and Erosion Control Plan to be developed.
Alterations to hydrological regime of watercourses and wetlands	▪ Increased stormwater runoff associated with increased areas of impervious surface are not anticipated to cause significant increases to natural feature hydrological inputs, due to the relatively small hydrological contributions provided by road surfaces versus surrounding areas of catchment. ▪ Replacement culverts must be properly sized to prevent increases or decreases in hydrological flow to wetland features, particularly those wetlands that provide significant habitat for Jefferson salamander, western chorus frog, or where they provide significant amphibian breeding habitat. ▪ Any upgrades to culverts that provide flow between wetlands will be maintained at existing culvert invert elevations in order to maintain wetland levels. ▪ In semi-rural sections where subsurface drainage systems are proposed, the incorporation of trench plugs will be required to minimize groundwater interception. These should be employed in the vicinity of all wetlands.	▪ No significant impact	

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Impacts to water quality of watercourses and wetlands	▪ Treatment trains comprising OGS units and grassed swales are designed to provide an Enhanced (Level 1) level of water quality treatment to intercepted stormwater runoff. ▪ Where only one component (OGS unit or grassed swale) has been proposed, water quality improvements are anticipated over existing conditions. ▪ Treated pavement area significantly exceeds the area of new pavement proposed for the study area, representing a 101% increase in treated pavement area. ▪ At a minimum, the most sensitive natural features (i.e., PSWs, including Jefferson salamander breeding habitat, fish habitat) should receive an Enhanced level of water quality treatment. ▪ Construction machinery should arrive on-site in a clean state and should be refueled and washed at least 30 m away from permanent watercourses or wetlands. ▪ A Spill Response Plan should be developed and implemented as necessary during site construction. ▪ Water removal required for in-water construction de-watering purposes must be adequately filtered prior to discharge into the receiving watercourse, and monitored for pertinent water quality parameters, following established protocols and standards.	▪ No significant impact	▪ A water quality monitoring program may be considered within the framework of a Post-Construction Monitoring Program to be determined in consultation with the applicable agencies

8.3.2 Property Requirements

The proposed design attempts to minimize property requirements. Potential property acquisition (fee simple takings) and temporary working easements as a result of the proposed design are shown on the plates and summarized in **Table 43**. Although the Region of Peel Official Plan identifies wider designated right-of way widths at some locations, property acquisition as a result of the proposed design is only identified where required for the proposed improvements. Temporary working easements are based on a 1 metre buffer around grading, and 2.5 metre buffer around culverts and storm sewers.

Table 43: Potential Property Acquisition along Mississauga Road / Old Main Street

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
North-west corner of Olde Base Line Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
North-east corner of Olde Base Line Road intersection (area to complete daylighting triangle)	20 m^2	
Station 20+673 to 20+723 (east side, grading)		60 m^2
Station 20+673 to 20+723 (east side, grading)	165 m^2	
Station 21+333 to 21+341 (west side, driveway)		25 m^2
Station 21+364 to 21+372 (west side, driveway)		20 m^2
Station 22+000 to 22+010 (west side, driveway)		30 m^2
Station 22+106 to 22+121 (west side, driveway)		60 m^2
Station 22+194 to 22+242 (west side, grading / culvert)		70 m^2
Station 22+211 to 22+223 (east side, culvert)		20 m^2
Station 22+271 to 22+279 (east side, driveway)		80 m^2
Station 22+328 to 22+406 (east side, driveway / grading)		190 m^2
Station 22+357 to 22+367 (west side, driveway)		150 m^2
Station 22+448 to 22+458 (east side, driveway)		40 m^2
Station 22+693 to 22+772 (east side, grading)	130 m^2	
Station 22+693 to 22+772 (east side, grading)		80 m^2
Station 22+817 to 22+857 (east side, grading)		45 m^2
Station 22+831 to 22+864 (west side, grading)		35 m^2
Station 22+925 to 22+932 (west side, driveway)		15 m^2
Station 23+044 to 23+051 (west side, culvert)		5 m^2
Station 23+148 to 23+155 (west side, driveway)		20 m^2
South-west corner of The Grange Side Road intersection (15 m x 15 m standard daylighting	115 m^2	

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
triangle)		
South-east corner of The Grange Side Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
North-east corner of The Grange Side Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
Station 23+466 to 23+530 (east side, grading)		70 m^2
Station 23+466 to 23+530 (east side, grading)	150 m^2	
Station 23+675 to 23+710 (east side, grading)		80 m^2
Station 23+675 to 23+710 (east side, grading)	70 m^2	
Station 23+750 to 23+785 (east side, grading)		40 m^2
Station 23+750 to 23+785 (east side, grading)	30 m^2	
Station 23+924 to 23+934 (east side, driveway)		100 m^2
Station 23+938 to 23+984 (east side, grading)		50 m^2
Station 23+938 to 24+000 (west side, grading)		60 m^2
Station 24+062 to 24+070 (east side, driveway)		20 m^2
Station 24+095 to 24+148 (east side, grading)		55 m^2
Station 24+095 to 24+148 (east side grading)	100 m^2	
Station 24+120 to 24+133 (west side, grading)		15 m^2
Station 24+297 to 24+307 (west side, driveway)		20 m^2
Station 24+380 to 24+387 (west side, driveway)		55 m^2
Station 24+374 to 24+391 (east side, driveway)		85 m^2
Station 24+407 to 24+414 (west side, culvert)		5 m^2
Station 24+407 to 24+414 (east side, culvert)		5 m^2
Station 24+485 to 24+495 (west side, driveway)		30 m^2
Station 24+515 to 24+575 (east side, driveway / grading)		150 m^2
Station 24+526 to 24+596 (west side, driveway / grading)		135 m^2
Station 24+836 to 24+848 (west side, driveway)		85 m^2
Station 24+898 to 24+924 (west side, grading)		25 m^2
Station 25+208 to 25+360 (west side, grading)		335 m^2
Station 25+208 to 25+360 (west side, grading)	680 m^2	
Station 25+598 to 25+608 (north side, driveway)		20 m^2
Station 25+959 to 25+967 (south side, culvert)		5 m^2

As described in **Section 8.3.1**, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations) to reduce the amount of area required, or in some cases considering a retaining wall or other type of soil retention feature. Property and easement requirements identified in this section and shown on the design plates are preliminary and are to be confirmed during detailed design.

9. BELFOUNTAIN VILLAGE

9.1 Identification and Evaluation of Alternative Design Concepts

This section discusses the different design alternatives considered for the portion of the study area within the Belfountain Village. This includes Mississauga Road / Old Main Street between approximately 580 metres north / west of Caledon Mountain Drive and Bush Street, and Bush Street between approximately 150 metres east of Shaws Creek Road and Mississauga Road / Old Main Street.

9.1.1 Belfountain Village Cross-Section Options

Alternative cross-section options were considered for each of the roads in the study area. Some options greatly differ from other options in terms of cross-section elements/widths and overall ROW required, while other alternatives consist of modifications to options that were considered earlier in the process to make them a more desirable alternative. Therefore, some cross-section options were screened out earlier in the process and others were only evaluated for the specific road segment where they best apply. All cross-section options considered during this study are included in **Appendix V**. The vehicle zone illustrated in the cross-sections refers to the general purpose travel lane, and the two terms are interchangeable. The most feasible options considered for the Belfountain Village include:

- **Option 1:** Do Nothing (Existing Rural Conditions): 3.2-3.7 metre wide travel lanes and partially paved shoulders (**Figure 68**)
- **Option 2:** 9.3 metre Platform Semi-Rural Road with Sidewalk: 3.3 metre wide travel lane, 1.7 metre wide sidewalk on one side, 0.5 metre mountable curb, and underground infrastructure (**Figure 69**)
- **Option 3:** 9.3 metre Platform Semi-Rural Road with Paved Shoulder: 3.3 metre wide travel lane, 1.7 metre wide paved shoulder on one side, 0.5 metre mountable curb, and underground infrastructure (**Figure 70**)
- **Option 4:** 9.3 metre Platform Semi-Rural Road with Paved Buffer: 3.3 metre wide travel lane, 0.85 metre wide paved buffer on both sides, 0.5 metre mountable curb, and underground infrastructure (**Figure 71**)
- **Option 5:** 10.6 metre Platform Semi-Rural Road with Multi-Use Trail: 3.3 metre wide travel lane, 3.0 metre wide multi-use trail on one side, 0.5 metre mountable curb, and underground infrastructure (**Figure 72**)
- **Option 6:** 11.7 metre Platform Semi-Rural Road with Sidewalk and Parking: 3.3 metre wide travel lane, 1.7 metre wide sidewalk on one side, 2.4 metre wide parking on other side, 0.5 metre mountable curb, and underground infrastructure (**Figure 73**)

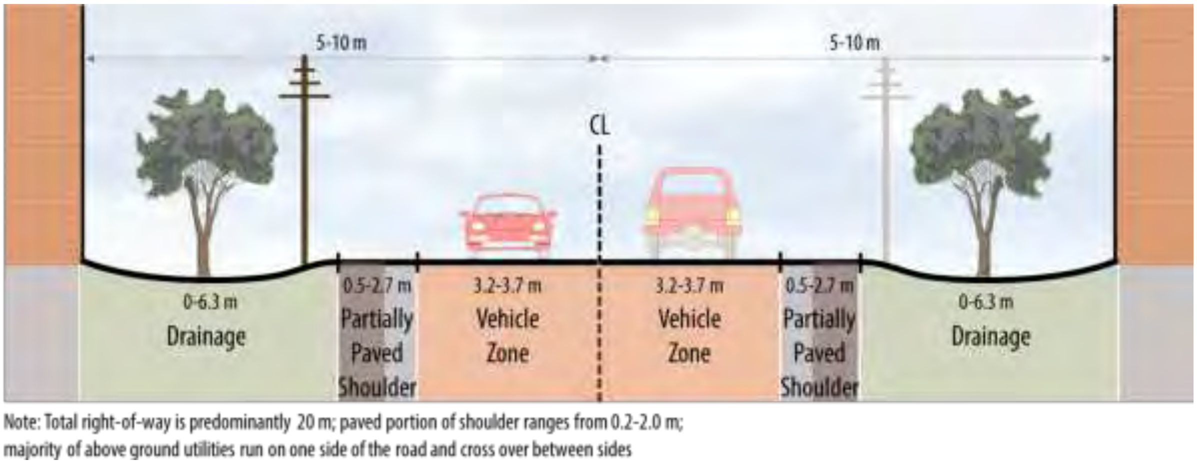


Figure 68: Option 1 - Do Nothing Option – Existing Conditions through Village

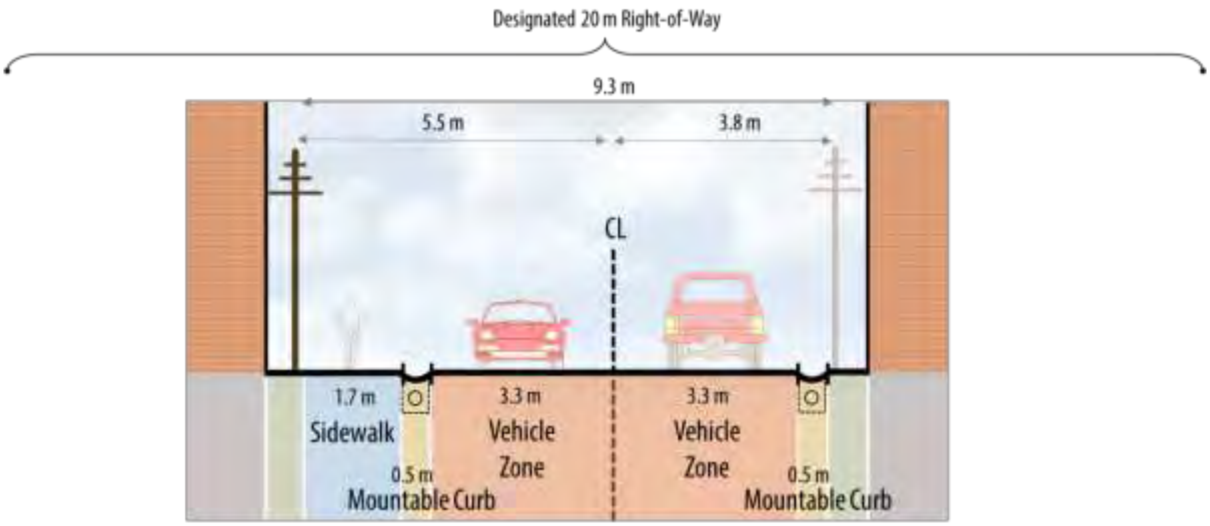


Figure 69: Option 2 - 9.3 m Platform Semi-Rural Option with Sidewalk Considered for Village

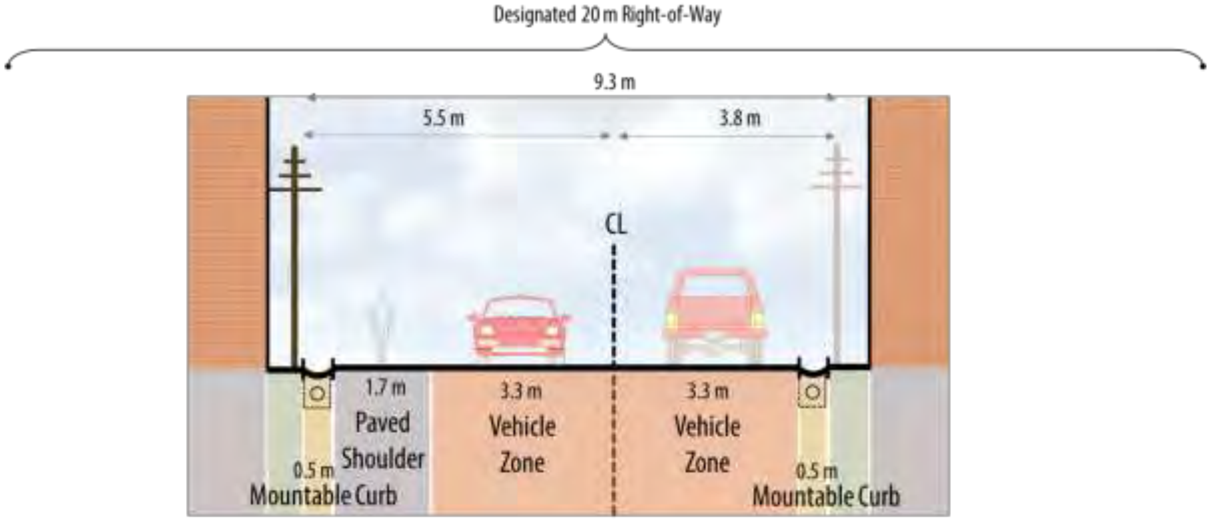


Figure 70: Option 3 - 9.3 m Platform Semi-Rural Option with Paved Shoulder Considered for Village

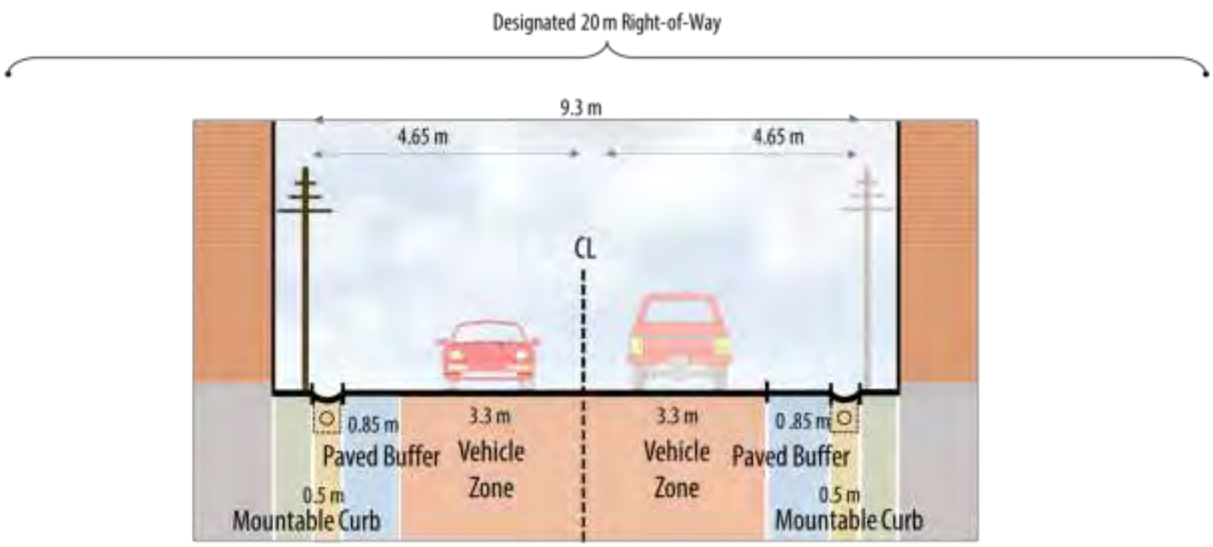


Figure 71: Option 4 - 9.3 m Platform Semi-Rural Option with Paved Buffer Considered for Village

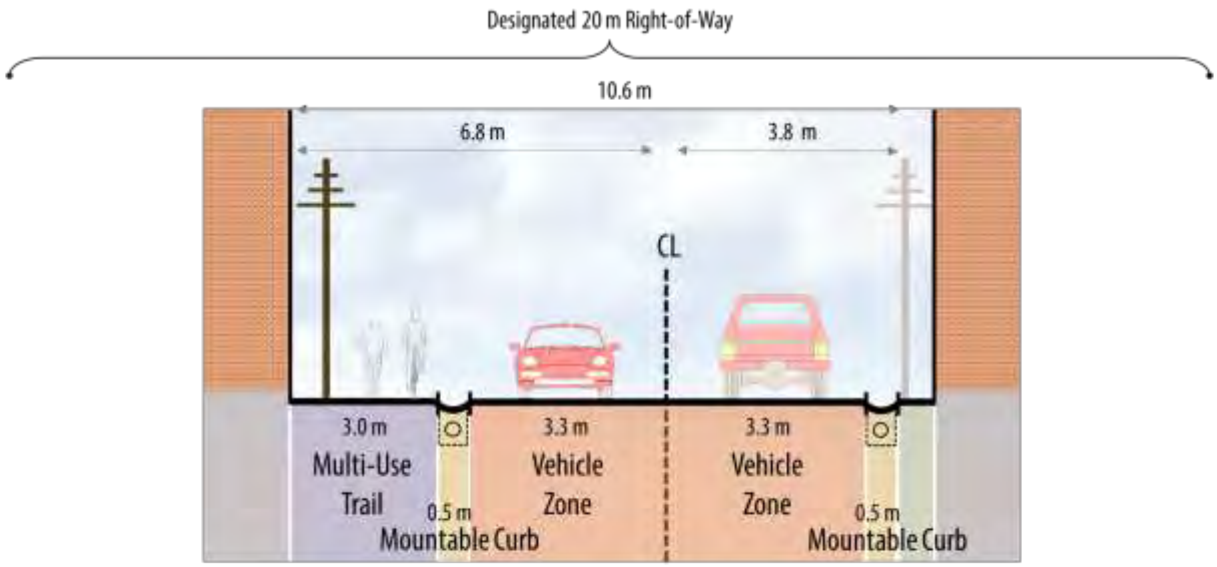


Figure 72: Option 5 - 10.6 m Platform Semi-Rural Option with Multi-Use Trail Considered for Village

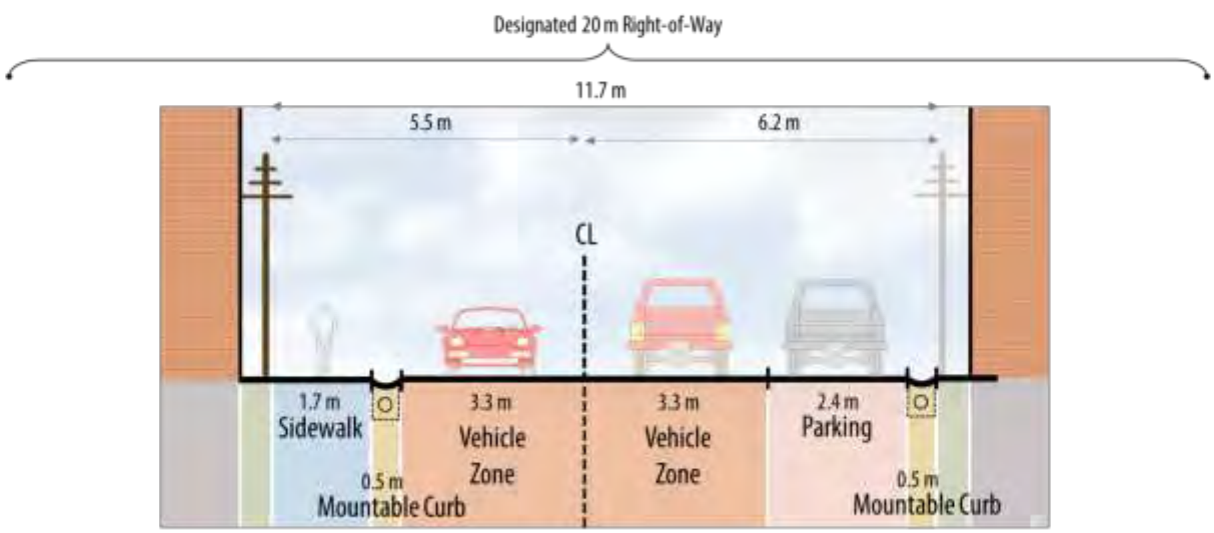


Figure 73: Option 6 - 11.7 m Platform Semi-Rural Option with Sidewalk and Parking Considered for Village

The evaluation for the above noted options is shown in **Table 44**.

Table 44: Belfountain Village Cross-Section Option Evaluation

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Rural Character							
Maintains rural character and countryside scenic quality	• Retains existing character within Village of Belfountain	• Some changes to existing character within Village of Belfountain with a more urbanized cross-section	• Some changes to existing character within Village of Belfountain with a more urbanized cross-section	• Some changes to existing character within Village of Belfountain with a more urbanized cross-section	• Some changes to existing character within Village of Belfountain with a more urbanized cross-section	• Some changes to existing character within Village of Belfountain with a more urbanized cross-section	• Option 1 preferred
Transportation							
Geometric alignment	• N/A	• N/A	• N/A	• N/A	• N/A	• N/A	• No difference
Traffic operations	• Vehicular capacity limited by all road users sharing 1 travel lane in each direction with partially paved shoulders • Conflicts between motorized vehicles and cyclists/pedestrians	• Reduced delays due to provision of separate pedestrian facility • Reduced conflicts between motorized vehicles and pedestrians due to provision of separate sidewalk	• Reduced delays due to provision of separate paved shoulder • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Partially reduced delays due to provision of separate buffer shoulder of sub-standard width • Partially reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved buffer of sub-standard width	• Reduced delays due to provision of separate multi-use trail • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate multi-use trail	• Reduced delays due to provision of separate pedestrian facility and parking facility • Reduced conflicts between motorized vehicles and pedestrians due to provision of separate sidewalk • Provision for on-street parking, without blocking travel lanes	• Options 2, 3, 5, 6 preferred as they reduce conflicts between different road users with separate facilities that meet design standards
Accommodation of motorists	• One 3.2-3.7 m travel lane in each direction	• One 3.3 m travel lane in each direction	• One 3.3 m travel lane in each direction	• One 3.3 m travel lane in each direction	• One 3.3 m travel lane in each direction	• One 3.3 m travel lane in each direction	• Options 2, 3, 4, 5, 6 preferred as travel lane width meets design standards
Accommodation of trucks	• 3.2-3.7 m paved travel lane, with partially paved shoulders available, but shared with all road users • Load restriction on Old Main Street and Bush Street	• 3.3 m paved travel lane available; shared with all road users other than pedestrians • 1.7 m sidewalk separated by mountable curb provides separation from pedestrians • Existing load restriction on Old Main Street and Bush Street to remain	• 3.3 m paved travel lane available • 1.7 m paved shoulder provides separation from other road users • Existing load restriction on Old Main Street and Bush Street to remain	• 3.3 m paved travel lane available • 0.85 m paved buffer of sub-standard width provides some separation from other road users • Existing load restriction on Old Main Street and Bush Street to remain	• 3.3 m paved travel lane available • 3.0 m multi-use trail separated by mountable curb provides separation from other road users • Existing load restriction on Old Main Street and Bush Street to remain	• 3.3 m paved travel lane available; shared with all road users other than pedestrians • 1.7 m sidewalk separated by mountable curb provides separation from pedestrians • Existing load restriction on Old Main Street and Bush Street to remain	• Options 2, 3, 5, 6 preferred as they reduce conflicts between different road users with separate facilities that meet design standards

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	**Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk**	**Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder**	**Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer**	**Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail**	**Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking**	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Accommodation of farm vehicles	• 3.2-3.7 m paved travel lane, with partially paved shoulders available, but shared with all road users	• 3.8 m of pavement available, but shared with motorized vehicles and cyclists • Separation from pedestrians through sidewalk separated by mountable curb	• 3.8-5.5 m of pavement available, but shared with all road users • Separation from other road users through paved shoulder	• 4.65 m of pavement available, but shared with all road users • Some separation from other road users through paved buffer of sub-standard width	• 3.8 m of pavement available, but shared with motorized vehicles • Separation from cyclists/pedestrians through multi-use trail separated by mountable curb	• 3.3-3.8 m of pavement available, but shared with motorized vehicles and cyclists • 6.2 m of pavement available when no vehicles are parked on parking zone • Separation from pedestrians through sidewalk separated by mountable curb	• Options 3, 5 preferred as they provide the widest paved area while also reducing conflicts between different road users with separate facilities that meet design standards • Otherwise Options 2, 4, 6 preferred as they provide separation from pedestrians
Accommodation of cyclists	• No separate facility to accommodate cyclists • Cyclists share the road or use partially paved shoulders where available	• No separate facility to accommodate cyclists • Cyclists share the road	• 1.7 m paved shoulder available on one side of road	• 0.85 m paved buffer of sub-standard width available • Cyclists will encroach on travel lanes	• 3.0 m multi-use trail available on one side of road • Multi-use trail separated from other road users by mountable curb	• No separate facility to accommodate cyclists • Cyclists share the road	• Options 3, 5 preferred as a separate cycling facility is provided
Accommodation of pedestrians	• No separate facility to accommodate pedestrians • Pedestrians share the road or use partially paved shoulders where available • Minimal streetscaping	• 1.7 m sidewalk available on one side of road • Pedestrian facility separated from other road users by mountable curb • Opportunities for streetscaping	• 1.7 m paved shoulder available on one side of road • Opportunities for streetscaping	• 0.85 m paved buffer of sub-standard width available • Opportunities for streetscaping	• 3.0 m multi-use trail available on one side of road • Multi-use trail separated from other road users by mountable curb • Opportunities for streetscaping	• 1.7 m sidewalk available on one side of road • Pedestrian facility separated from other road users by mountable curb • Opportunities for streetscaping	• Options 2, 5, 6 preferred as a separate pedestrian facility is provided, separated from other road users • Otherwise Option 3 preferred as it reduces conflicts between different road users with paved shoulder width that meets design standards
Accommodation of horses	• 3.2-3.7 m paved travel lane, with partially paved shoulders available, but shared with all road users	• 3.3 m paved travel lane available	• 3.3 m paved travel lane available • 1.7 m paved shoulder available on one side of road	• 3.3 m paved travel lane, and 0.85 m paved buffer of sub-standard width available	• 3.3 m paved travel lane available • 3.0 m multi-use trail available on one side of road	• 3.3 m paved travel lane available	• Options 3, 5 preferred as they provide the widest paved area while also reducing conflicts between different road users • Otherwise Options 2, 4, 6 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Safety	• Conflicts between motorized vehicles and cyclists/pedestrians • Conflicts between moving vehicles and vehicles parked on-street	• Reduced conflicts between motorized vehicles and pedestrians due to provision of separate sidewalk on one side of road, separated by mountable curb • Conflicts between motorized vehicles and cyclists • Conflicts between moving vehicles and vehicles parked on-street	• Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder on one side of road • Paved shoulder is not separated from travel lanes by mountable curb • Conflicts between moving vehicles and vehicles parked on-street	• Partially reduced conflicts between motorized vehicles and cyclists/ pedestrians due to provision of separate paved buffer of sub-standard width • Conflicts between moving vehicles and vehicles parked on-street	• Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate multi-use trail separated by mountable curb • Conflicts between moving vehicles and vehicles parked on-street	• Reduced conflicts between motorized vehicles and pedestrians due to provision of separate sidewalk on one side of road, separated by mountable curb • Conflicts between motorized vehicles and cyclists • Eliminated conflicts between moving vehicles and vehicles parked on-street due to provision of parking facilities	• Options 3, 5, 6 preferred as they provide separated cycling and/or pedestrian and/or parking facilities that meet design standards, minimizing conflicts between different road users
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Options 2, 3, 4, 5, 6 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction	• Pavement reconstruction	• Pavement reconstruction	• Pavement reconstruction	• Pavement reconstruction	• Options 2, 3, 4, 5, 6 preferred
Socio-Economic Environment							
Residential properties	• No impacts	• Cross-section within existing ROW, minimizing impacts • Potential driveway and property impacts due to modification of roadway platform	• Cross-section within existing ROW, minimizing impacts • Potential driveway and property impacts due to modification of roadway platform	• Cross-section within existing ROW, minimizing impacts • Potential driveway and property impacts due to modification of roadway platform	• Cross-section extends beyond available space in existing ROW in some narrow constrained locations • Potential driveway and property impacts due to modification of and accommodation of wider roadway platform	• Cross-section extends beyond available space in existing ROW in some narrow constrained locations • Potential driveway and property impacts due to modification of and accommodation of wider roadway platform	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 3, 4 preferred as there is less potential impact due to narrower roadway platform compared to Options 5, 6
Farm operations	• N/A	• N/A	• N/A	• N/A	• N/A	• N/A	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Businesses	• No impacts • Limited public parking available only with small lots, and on narrow partially paved shoulders	• Potential driveway and property impacts due to modification of roadway platform • Streetscaping opportunities enhance attractiveness of the Village	• Potential driveway and property impacts due to modification of roadway platform • Streetscaping opportunities enhance attractiveness of the Village	• Potential driveway and property impacts due to modification of roadway platform • Streetscaping opportunities enhance attractiveness of the Village	• Cross-section extends beyond available space in existing ROW in some narrow constrained locations • Potential driveway and property impacts due to modification of and accommodation of wider roadway platform • Streetscaping opportunities enhance attractiveness of the Village	• Cross-section extends beyond available space in existing ROW in some narrow constrained locations • Potential driveway and property impacts due to modification of and accommodation of wider roadway platform • Provision of on-street parking on one side of road • Streetscaping opportunities enhance attractiveness of the Village	• Option 1 preferred as there are no impacts, although limited parking available • Otherwise, Options 6 preferred due to provision of on-street parking
Archaeological resources	• No impacts	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform; more so than other options, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform; more so than other options, which may require additional assessment	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 3, 4 preferred as there is less potential impact due to narrower roadway platform than Options 5, 6
Built and cultural heritage resources	• No impacts	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform; more so than other options, which may require additional assessment	• No anticipated impacts • Potential minor impacts at constrained locations within existing ROW due to modification of roadway platform; more so than other options, which may require additional assessment	• Option 1 preferred as there are no impacts • Otherwise, Options 2, 3, 4 preferred as there is less potential impact due to narrower roadway platform than Options 5, 6
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Option 1 preferred as there are no impacts

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Natural Environment							
Terrestrial habitat	• No impacts	• Not anticipated to cause significant negative impact through natural feature encroachment • Removal of some individual trees may be required • North end of ROW through and outside village occurs adjacent to Credit Forks ANSI, Credit Forks-Devil's Pulpit ESA; no significant natural feature encroachment anticipated • No significant terrestrial habitat removal anticipated	• Not anticipated to cause significant negative impact through natural feature encroachment • Removal of some individual trees may be required • North end of ROW through and outside village occurs adjacent to Credit Forks ANSI, Credit Forks-Devil's Pulpit ESA; no significant natural feature encroachment anticipated • No significant terrestrial habitat removal anticipated	• Not anticipated to cause significant negative impact through natural feature encroachment • Removal of some individual trees may be required • North end of ROW through and outside village occurs adjacent to Credit Forks ANSI, Credit Forks-Devil's Pulpit ESA; no significant natural feature encroachment anticipated • No significant terrestrial habitat removal anticipated	• Not anticipated to cause significant negative impact through natural feature encroachment • Removal of some individual trees may be required; more so than Options 2, 3 and 4 • North end of ROW through and outside village occurs adjacent to Credit Forks ANSI, Credit Forks-Devil's Pulpit ESA; no significant natural feature encroachment anticipated • No significant terrestrial habitat removal anticipated	• Greatest potential for adjacent natural feature encroachment, outside built up areas, among Options • Removal of some individual trees may be required • Greatest potential for encroachment into adjacent Credit Forks ANSI, Credit Forks-Devil's Pulpit ESA north of the village • Greatest potential for terrestrial habitat removal among Options	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Options 2, 3 and 4 are preferred as they require the least potential site grading, and potential for terrestrial feature impacts, among Options
Aquatic environment	• No impacts	• 4 culvert crossings, 2 of which (culverts 2 and 3) convey watercourses; some potential for impact to aquatic features if culvert replacements required due to road improvements • Potential impact to direct fish habitat associated with Trib. A to West Credit River, conveyed by culvert 2, and to indirect habitat associated with Trib. B to West Credit River, conveyed by culvert 3 • Provides potential habitat for Brook Trout;	• 4 culvert crossings, 2 of which (culverts 2 and 3) convey watercourses; some potential for impact to aquatic features if culvert replacements required due to road improvements • Potential impact to direct fish habitat associated with Trib. A to West Credit River, conveyed by culvert 2, and to indirect habitat associated with Trib. B to West Credit River, conveyed by culvert 3 • Provides potential habitat for Brook Trout; groundwater	• 4 culvert crossings, 2 of which (culverts 2 and 3) convey watercourses; some potential for impact to aquatic features if culvert replacements required due to road improvements • Potential impact to direct fish habitat associated with Trib. A to West Credit River, conveyed by culvert 2, and to indirect habitat associated with Trib. B to West Credit River, conveyed by culvert 3 • Provides potential habitat for Brook Trout;	• 4 culvert crossings, 2 of which (culverts 2 and 3) convey watercourses; some potential for impact to aquatic features if culvert replacements required due to road improvements; more so than Options 2, 3 and 4 • Potential impact to direct fish habitat associated with Trib. A to West Credit River, conveyed by culvert 2, and to indirect habitat associated with Trib. B to West Credit River, conveyed by culvert 3	• 4 culvert crossings, 2 of which (culverts 2 and 3) convey watercourses; greatest potential for impact to aquatic features due to wider road platform, if culvert replacements required • Potential impact to direct fish habitat associated with Trib. A to West Credit River, conveyed by culvert 2, and to indirect habitat associated with Trib. B to West Credit River, conveyed by culvert 3 • Provides potential habitat for	• Option 1 is preferred as it avoids potential impacts to aquatic features and habitat • Otherwise, Options 2, 3 and 4 are preferred as they are least likely to require potential changes to existing culverts and additional in-water work due to narrower road platform compared to Options 5 and 6, and are less likely to negatively impact significant groundwater seepage areas adjacent to Bush Street

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
		groundwater influence observed • Trib A. to West Credit River is known Brook Trout habitat and is a sensitive coldwater stream with groundwater influences • Potential for impact, due to any potential site grading, to significant groundwater seepages located immediately west of Shaws Creek Road north of Bush Street; these seepages provide inflow to adjacent wetland supporting significant amphibian breeding habitat	influence observed • Trib A. to West Credit River is known Brook Trout habitat and is a sensitive coldwater stream with groundwater influences • Potential for impact, due to any potential site grading, to significant groundwater seepages located immediately west of Shaws Creek Road north of Bush Street; these seepages provide inflow to adjacent wetland supporting significant amphibian breeding habitat	groundwater influence observed • Trib A. to West Credit River is known Brook Trout habitat and is a sensitive coldwater stream with groundwater influences • Potential for impact, due to any potential site grading, to significant groundwater seepages located immediately west of Shaws Creek Road north of Bush Street; these seepages provide inflow to adjacent wetland supporting significant amphibian breeding habitat	• Provides potential habitat for Brook Trout; groundwater influence observed • Trib A. to West Credit River is known Brook Trout habitat and is a sensitive coldwater stream with groundwater influences • Potential for impact, due to any potential site grading, to significant groundwater seepages located immediately west of Shaws Creek Road north of Bush Street more so than Options 2, 3 and 4; these seepages provide inflow to adjacent wetland supporting significant amphibian breeding habitat	Brook Trout; groundwater influence observed • Trib A. to West Credit River is known Brook Trout habitat and is a sensitive coldwater stream with groundwater influences • Potential for impact, due to any potential site grading, to significant groundwater seepages located immediately west of Shaws Creek Road north of Bush Street; these seepages provide inflow to adjacent wetland supporting significant amphibian breeding habitat; greatest potential for impact among Options due to wider road platform and site grading	
Wetlands and watercourses	• No impacts	• Some wetland habitat occurs near the ROW outside and within the village; no wetlands designated PSW • No impacts to nearby wetlands anticipated; wetlands are set back from ROW behind residential properties	• Some wetland habitat occurs near the ROW outside and within the village; no wetlands designated PSW • No impacts to nearby wetlands anticipated; wetlands are set back from ROW behind residential properties	• Some wetland habitat occurs near the ROW outside and within the village; no wetlands designated PSW • No impacts to nearby wetlands anticipated; wetlands are set back from ROW behind residential properties	• Some wetland habitat occurs near the ROW outside and within the village; no wetlands designated PSW • No impacts to nearby wetlands anticipated; wetlands are set back from ROW behind residential properties	• Some wetland habitat occurs near the ROW outside and within the village; no wetlands designated PSW • No impacts to nearby wetlands anticipated; wetlands are set back from ROW behind residential properties	• No difference
Species at risk	• No impacts	• Occurs within Jefferson Salamander regulated habitat; potential Jefferson	• Occurs within Jefferson Salamander regulated habitat; potential Jefferson	• Occurs within Jefferson Salamander regulated habitat; potential Jefferson	• Occurs within Jefferson Salamander regulated habitat; potential Jefferson	• Occurs within Jefferson Salamander regulated habitat; potential Jefferson	• Option 1 is preferred as it avoids impacts to regulated Jefferson Salamander habitat and potential

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	**Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk**	**Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder**	**Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer**	**Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail**	**Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking**	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
		Salamander breeding pond located within the village but set-back from the ROW behind a residential property and not anticipated to be impacted • Potential for Jefferson Salamander road mortality; least potential for road mortality impact among Options due to narrowest proposed paved surface for motor vehicle use; significant crossing impacts not anticipated across sidewalk • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent trees; habitat may be directly impacted by tree removals • Chimney Swift known to nest within the village and forage in the surrounding area; no habitat impacts anticipated • Three Butternuts occur outside the existing ROW north of Caledon Mountain Drive; not expected to be impacted by proposed Options	Salamander breeding pond located within the village but set-back from the ROW behind a residential property and not anticipated to be impacted • Potential for Jefferson Salamander road mortality; somewhat greater potential for road mortality impact than Option 2 due to paved shoulder, but less than Option 6 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent trees; habitat may be directly impacted by tree removals • Chimney Swift known to nest within the village and forage in the surrounding area; no habitat impacts anticipated • Three Butternuts occur outside the existing ROW north of Caledon Mountain Drive; not expected to be impacted by proposed Options	Salamander breeding pond located within the village but set-back from the ROW behind a residential property and not anticipated to be impacted • Potential for Jefferson Salamander road mortality; somewhat greater potential for road mortality impact than Option 2 due to paved buffers, but less than Option 6 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent trees; habitat may be directly impacted by tree removals • Chimney Swift known to nest within the village and forage in the surrounding area; no habitat impacts anticipated • Three Butternuts occur outside the existing ROW north of Caledon Mountain Drive; not expected to be impacted by proposed Options	Salamander breeding pond located within the village but set-back from the ROW behind a residential property and not anticipated to be impacted • Potential for Jefferson Salamander road mortality; likely negligible increase in potential for road mortality impact versus Option 2 due to incorporation of multi-use trail, but less than Option 6 • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent trees; habitat may be directly impacted by tree removals • Chimney Swift known to nest within the village and forage in the surrounding area; no habitat impacts anticipated • Three Butternuts occur outside the existing ROW north of Caledon Mountain Drive; not expected to be impacted by proposed Options	Salamander breeding pond located within the village but set-back from the ROW behind a residential property and not anticipated to be impacted • Greatest potential for Jefferson Salamander road mortality due to widest area of paved surface for motor vehicle use • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent trees; habitat may be directly impacted by tree removals • Chimney Swift known to nest within the village and forage in the surrounding area; no habitat impacts anticipated • Three Butternuts occur outside the existing ROW north of Caledon Mountain Drive; not expected to be impacted by proposed Options	impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 2 is preferred as it incorporates the narrowest width of paved surface for motor vehicle use, decreasing the potential for Jefferson Salamander road mortality

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No significant impact to Northern Flying Squirrel habitat anticipated through tree removal • Proposed Options anticipated to maintain existing suitable gap across ROW to permit Northern Flying Squirrels to glide from one side to the other • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • No significant impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern anticipated • Known habitat for Western Chorus Frog not anticipated to be impacted as it is set back from the ROW behind a residential property	• No significant impact to Northern Flying Squirrel habitat anticipated through tree removal • Proposed Options anticipated to maintain existing suitable gap across ROW to permit Northern Flying Squirrels to glide from one side to the other • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • No significant impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern anticipated • Known habitat for Western Chorus Frog not anticipated to be impacted as it is set back from the ROW behind a residential property	• No significant impact to Northern Flying Squirrel habitat anticipated through tree removal • Proposed Options anticipated to maintain existing suitable gap across ROW to permit Northern Flying Squirrels to glide from one side to the other • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • No significant impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern anticipated • Known habitat for Western Chorus Frog not anticipated to be impacted as it is set back from the ROW behind a residential property	• No significant impact to Northern Flying Squirrel habitat anticipated through tree removal • Proposed Options anticipated to maintain existing suitable gap across ROW to permit Northern Flying Squirrels to glide from one side to the other • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • No significant impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern anticipated • Known habitat for Western Chorus Frog not anticipated to be impacted as it is set back from the ROW behind a residential property	• No significant impact to Northern Flying Squirrel habitat anticipated through tree removal • Proposed Options anticipated to maintain existing suitable gap across ROW to permit Northern Flying Squirrels to glide from one side to the other • No significant impact anticipated to potential Hooded Warbler habitat in woodlands • No significant impact to potential habitat (e.g. wetlands, watercourses) for Odonate species of conservation concern anticipated • Known habitat for Western Chorus Frog not anticipated to be impacted as it is set back from the ROW behind a residential property	• Option 1 is preferred as it avoids impacts to habitat for Northern Flying Squirrel and Western Chorus Frog, and potential habitat for species of conservation concern Odonates • Otherwise, although all Options likely present negligible impact potential, Options 2, 3 and 4 are preferred as they may require the least amount of adjacent natural feature encroachment immediately north and south of the village due to a narrower platform compared to Options 5 and 6

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • Potential road mortality impacts to crossing amphibians; however, least potential among Options due to narrowest proposed paved surface for motor vehicle use; significant crossing impacts not anticipated across sidewalk	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • Potential road mortality impacts to crossing amphibians; somewhat greater potential for road mortality impact than Option 2 due to paved shoulder potentially used by motor vehicles, but less anticipated impacts than Options 5 or 6	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • Potential road mortality impacts to crossing amphibians; somewhat greater potential for road mortality impact than Option 2 due to paved buffer potentially used by motor vehicles, but less anticipated impacts than Options 5 or 6	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • Potential road mortality impacts to crossing amphibians; likely negligible increase in potential for road mortality impact versus Option 2 due to incorporation of multi-use trail, but less than Option 6	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • Greatest potential for amphibian road mortality due to widest area of paved surface for motor vehicle use	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 2 is preferred as it incorporates the narrowest width of paved surface for motor vehicle use, decreasing the potential for amphibian road mortality
Stormwater management	• No impacts	• Improved stormwater drainage system	• Improved stormwater drainage system	• Improved stormwater drainage system	• Improved stormwater drainage system	• Improved stormwater drainage system	• Options 2, 3, 4, 5, and 6 preferred as they incorporate improved drainage systems over current conditions
Natural hazards	• No impacts	• ROW occurs adjacent to West Credit River valley; crosses regulated habitat for wetlands and/or watercourses	• ROW occurs adjacent to West Credit River valley; crosses regulated habitat for wetlands and/or watercourses	• ROW occurs adjacent to West Credit River valley; crosses regulated habitat for wetlands and/or watercourses	• ROW occurs adjacent to West Credit River valley; crosses regulated habitat for wetlands and/or watercourses	• ROW occurs adjacent to West Credit River valley; crosses regulated habitat for wetlands and/or watercourses	• Option 1 is preferred at it avoids potential impacts to natural valley features and regulated watercourses and/or wetlands

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk	Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder	Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer	Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail	Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
Niagara Escarpment impacts	• No impacts	• Occurs adjacent to Escarpment Natural Area in localized areas; no significant impacts anticipated • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Occurs adjacent to Escarpment Natural Area in localized areas; no significant impacts anticipated • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Occurs adjacent to Escarpment Natural Area in localized areas; no significant impacts anticipated • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Occurs adjacent to Escarpment Natural Area in localized areas; potential for encroachment into adjacent to Escarpment Natural Area due to wider platform compared to Options 2, 3, and 4 • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Greatest potential for encroachment into adjacent to Escarpment Natural Area • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Option 1 is preferred as it avoids impacts to Niagara Escarpment Plan policy protection areas and regulated habitat • Otherwise, Options 2, 3 and 4 are preferred as they may require the least amount of adjacent encroachment into adjacent Escarpment Natural Area
Capital Costs							
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost from modification of roadway platform, semi-rural cross-section, and underground infrastructure	• Higher construction cost from modification of roadway platform, semi-rural cross-section, and underground infrastructure	• Higher construction cost from modification of roadway platform, semi-rural cross-section, and underground infrastructure	• Highest construction cost from modification of wider roadway platform, semi-rural cross-section, and underground infrastructure	• Highest construction cost from modification of widest roadway platform, semi-rural cross-section, and underground infrastructure	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• No property acquisition anticipated; potential impacts to features within ROW and easements may be required for localized improvements	• No property acquisition anticipated; potential impacts to features within ROW and easements may be required for localized improvements	• No property acquisition anticipated; potential impacts to features within ROW and easements may be required for localized improvements	• No property acquisition anticipated; potential impacts to features within ROW and easements may be required for localized improvements, particularly in narrow constrained locations	• No property acquisition anticipated; potential impacts to features within ROW and easements may be required for localized improvements, particularly in narrow constrained locations	• Options 1 results in the least property acquisition • Otherwise, Options 2, 3, and 4 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Belfountain Village Cross-Section Options						EVALUATION
	Option 1: Do Nothing	**Option 2: 9.3 m Platform Semi-Rural Road With Sidewalk**	**Option 3: 9.3 m Platform Semi-Rural Road With Paved Shoulder**	**Option 4: 9.3 m Platform Semi-Rural Road With Paved Buffer**	**Option 5: 10.6 m Platform Semi-Rural Road With Multi-Use Trail**	**Option 6: 11.7 m Platform Semi-Rural Road With Sidewalk and Parking**	
Option Description	• 10-20 m ROW, predominantly 20 m • 3.2-3.7 m wide travel lane • 0.5-2.7 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 1.7 m wide paved shoulder on one side • 0.5 m mountable curb	• 9.3 m typical ROW • 3.3 m wide travel lane • 0.85 m wide paved buffer on both sides • 0.5 m mountable curb	• 10.6 m typical ROW • 3.3 m wide travel lane • 3.0 m wide multi-use trail on one side • 0.5 m mountable curb	• 11.7 m typical ROW • 3.3 m wide travel lane • 1.7 m wide sidewalk on one side • 2.4 m parking on other side • 0.5 m mountable curb	
OVERALL							
		• Option 2 preferred on Bush Street between Old Main Street and Shaws Creek Road • Sidewalk provided on south side of road, providing pedestrian connection between Village and school • Character of the Village is retained, better accommodates and reduces conflicts between road users, while minimizing property and natural environment impacts	• Option 3 preferred on Old Main Street between Community Centre and north/west of Caledon Mountain Drive • Paved shoulder on one side of road provides continuity with paved shoulders to the east along Mississauga Road • Character of the Village is retained, better accommodates and reduces conflicts between road users, while minimizing property and natural environment impacts			• Option 6 preferred on Old Main Street between Bush Street and Community Centre • Reduced conflicts between road users through pedestrian sidewalk, and dedicated on-street parking facility • Character of the Village is retained, better accommodates and reduces conflicts between road users, while minimizing property and natural environment impacts	

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, the 9.3 metre platform semi-rural cross-section with sidewalk (Option 2) is preferred for Bush Street between approximately 150 metres east of Shaws Creek Road and Mississauga Road / Old Main Street; the 11.7 metre platform semi-rural cross-section with sidewalk and parking (Option 6) is preferred between Bush Street and the Belfountain Community Centre; and the 9.3 metre platform semi-rural cross-section with paved shoulder (Option 3) is preferred between the Belfountain Community Centre and approximately 580 metres north/west of Caledon Mountain Drive.

9.1.2 Belfountain Village Profile Options

The right-of-way though Belfountain Village is narrow and highly constrained compared to other segments of the study area, with buildings, fences, vegetation, and other features within the road right-of-way. Any profile adjustments would therefore result in significant impacts to these features and adjacent properties. In addition, the existing posted speed limit through this segment (proposed to remain at 40 km/h) is lower than the remainder of the study area roads. Therefore, the proposed design through the village generally follows the existing road profile, and no additional profile options have been evaluated.

9.2 Belfountain Village Preferred Design Concept

The preferred designs were chosen with consideration to environmental impacts, cultural heritage impacts, safety, aesthetics, drainage, entrance access and property impacts, and capital construction and maintenance costs. This section presents the preferred designs that best incorporate these parameters. Consultation with agencies and the public, as discussed in **Section 2**, helped arrive at the preferred designs discussed in this section.

9.2.1 Design Criteria for the Belfountain Village

The following outlines the design criteria for Belfountain Village, based on different design speed options considered. Although a higher (60 km/h) design speed is desired, in order to accommodate all road users while minimizing impacts to the study area features and surrounding landscape, the project-specific design standards are based on a lower (50 km/h) design speed.

	PRESENT CONDITIONS	**PROJECT** DESIGN STANDARDS	**DESIRED** DESIGN STANDARDS	REFERENCE
HIGHWAY CLASSIFICATION	RAU 50	UAU 50	UAU 60	
MINIMUM STOPPING SIGHT DISTANCE	N/A	60-65 m	75-85 m	(TAC – page 1.2.5.4 Table 1.2.5.3)
MIN. EQUIV. VERTICAL CURVE (WITH ILLUMINATION)[9]	N/A	6-7 - CREST 5-6 –SAG (Comfort)	10-13 - CREST 8-9 –SAG (Comfort)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MIN. EQUIV. VERTICAL CURVE (WITHOUT ILLUMINATION)[10]	N/A	6-7 - CREST 11-12 –SAG (Headlight Control)	10-13 - CREST 15-18 –SAG (Headlight Control)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MAXIMUM GRADIENT	N/A	8-10%	8-10%	(To reflect prevailing conditions and maintain existing rural character)
MINIMUM CURVATURE	N/A	90 m	130 m	(TAC – page 2.1.2.13 Table 2.1.2.6)
SUPERELEVATION (ON CURVE)	N/A	6%	6%	(TAC – page 2.1.2.3)
LANE WIDTH	3.2-3.7 m – thru	3.3-3.7 m	3.3-3.7 m	(TAC – page 2.2.2.1 Table 2.2.2.1)
PEDESTRIAN ZONE	N/A	1.5 m min	1.5 m min	(Region of Peel's Road Characterization Study, Rural Main Street with 20 m ROW)
BICYCLE ZONE	N/A	1.5 m min	1.5 m min	(Region of Peel's Road Characterization Study, Rural Main Street with 20 m ROW)
GREEN ZONE	N/A	2.0 m min	2.0 m min	(Region of Peel's Road Characterization Study, Rural Main Street with 20 m ROW)
SPLASH STRIP	N/A	1.0 m	1.0 m	(Region of Peel's Road Characterization Study, Rural Main Street with 20 m ROW)
SHOULDER WIDTH ON SIGNED BICYCLE ROUTE	Varies (0.5-2.7 m)	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	(OTM BOOK 18 Table 4.2)
R.O.W. WIDTH	10 m - 20 m			
DESIGN SPEED		50 km/h	60 km/h	
POSTED SPEED	40 km/h	40 km/h	50 km/h	

NOTE 1: CROSS-SECTION ELEMENT WIDTHS MAY CHANGE DEPENDING ON AVAILABLE ROW WIDTHS
NOTE 2: ALTHOUGH HIGHER DESIGN SPEEDS ARE DESIRABLE, THEY MAY NOT BE ACHIEVABLE DUE TO EXISTING TERRAIN AND CONSTRAINTS, AS THEIR RESULTING IMPACTS WOULD BE SIGNIFICANT. THEREFORE, LOWER DESIGN SPEEDS HAVE BEEN SELECTED AS THE PROJECT DESIGN STANDARDS FOR THIS SEGMENT.

[9] Applies only at some locations
[10] Applies for the majority of the study area

9.2.2 Typical Cross Section

Due to a narrow and highly constrained right-of-way, and to minimize grading impacts to adjacent properties and features, a semi-rural cross-section is proposed through the Belfountain Village, with different cross-section variations for different segments.

On Bush Street, the proposed cross-section consists of one 3.3 metre wide travel lane (vehicle zone) in each direction, with a 0.5 metre mountable curb on each side of the road and a 1.7 metre wide sidewalk on the south side to connect to the Belfountain Elementary School on Shaws Creek Road south of Bush. This cross-section is illustrated in **Figure 74**. 0.3 metre rounding and a 2:1 slope then match to existing ground on either side of the road, although extensive grading is not required. Drainage is addressed through underground infrastructure (refer to **Section 9.2.6** for more details). For consistency, this cross-section will start at Shaws Creek Road (just west of the Belfountain Village study limits) and end at Mississauga Road / Old Main Street, where it connects to another semi-rural cross-section.

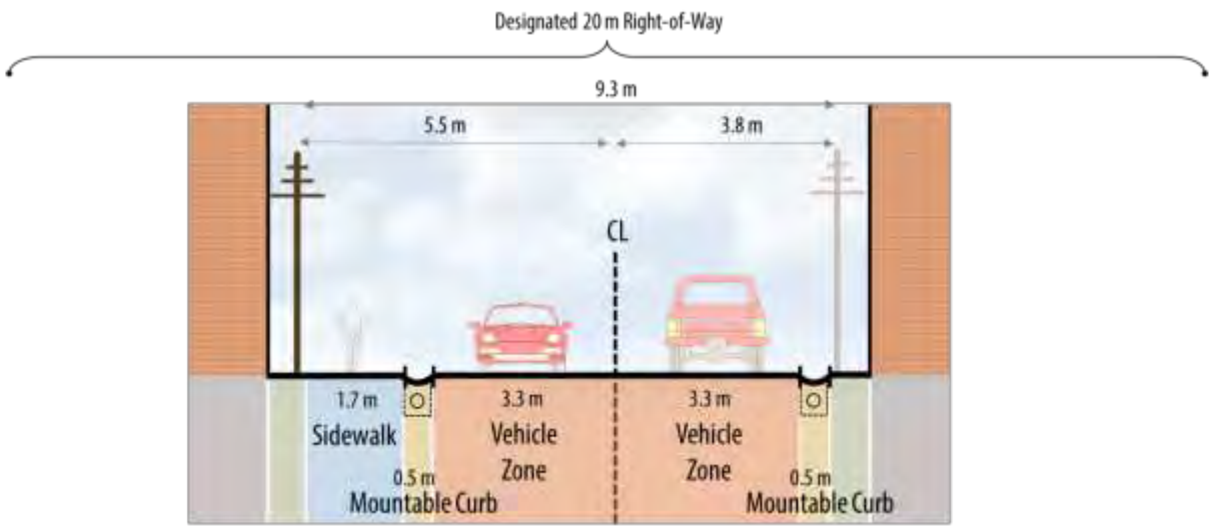


Figure 74: 9.3 m Platform Semi-Rural Cross-Section with Sidewalk for Belfountain Village (Shaws Creek Rd. to Mississauga Rd. / Old Main St.)

Between Bush Street and the Belfountain Community Centre, the proposed cross-section consists of one 3.3 metre wide travel lane (vehicle zone) in each direction, with 2.4 metre wide on-street parking on the east side and a 0.5 metre mountable curb on each side of the road. A 1.7 metre wide sidewalk on the west side connects to the sidewalk on the south side of Bush Street. This cross-section is illustrated in **Figure 75**. 0.3 metre rounding and a 2:1 slope then match to existing ground on either side of the road, although extensive grading is not required. Drainage is addressed through underground infrastructure (refer to **Section 9.2.6** for more details). This cross-section connects to another semi-rural cross-section east of the Community Centre.

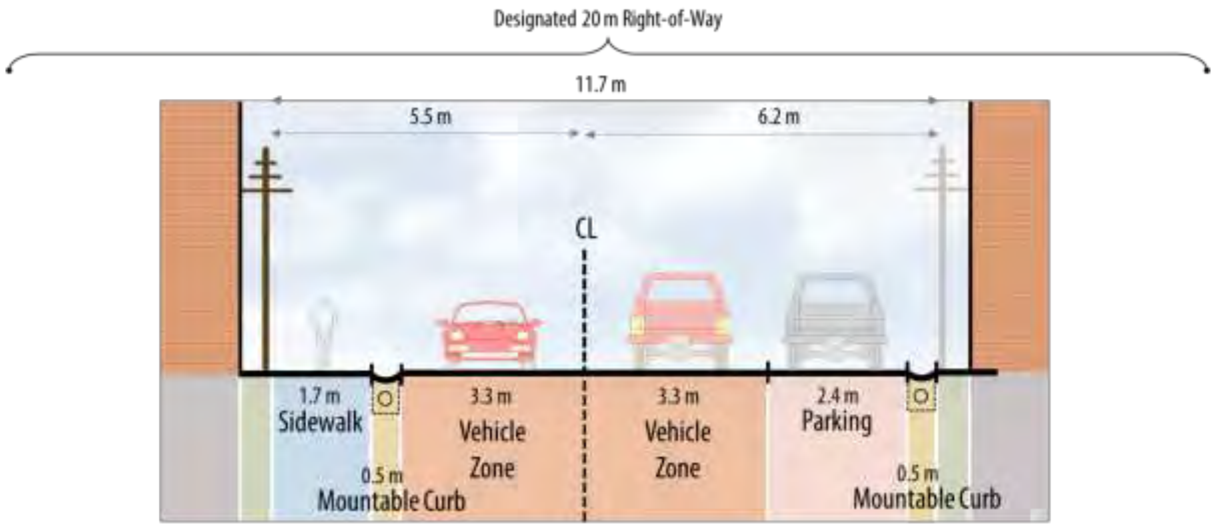


Figure 75: 11.7 m Platform Semi-Rural Cross-Section with Sidewalk and Parking for Belfountain Village (Bush St. to Community Centre)

Between the Belfountain Community Centre and north/west of Caledon Mountain Drive, the proposed cross-section consists of one 3.3 metre wide travel lane (vehicle zone) in each direction, with a 1.7 metre wide paved shoulder on the south side and a 0.5 metre mountable curb on each side of the road. This cross-section is illustrated in **Figure 76**. 0.3 metre rounding and a 2:1 slope then match to existing ground on either side of the road, although extensive grading is not required. Drainage is addressed through underground infrastructure (refer to **Section 9.2.6** for more details).

At the pinch point just east of the Community Centre, where the right-of-way is highly constrained by a retaining wall / guiderail on the north side, and buildings, fences and other features on the south side, the paved shoulder width is proposed to be reduced as required to minimize impacts. East of the pinch point, where the right-of-way is less constrained, it is proposed to introduce a paved shoulder on the north side as well and widen the travel lanes to 3.5 metres to transition to a cross-section consistent to that proposed south of Caledon Mountain Drive.

Opportunities to use alternative construction materials throughout the study area for curbs and other roadway elements, to maintain the rural character of the study area, can be reviewed during detailed design. These may include, for example, using dark coloured curbs to blend in with the asphalt and make them less noticeable.

Design cross-sections at an interval of 20 metres are included in **Appendix W**.

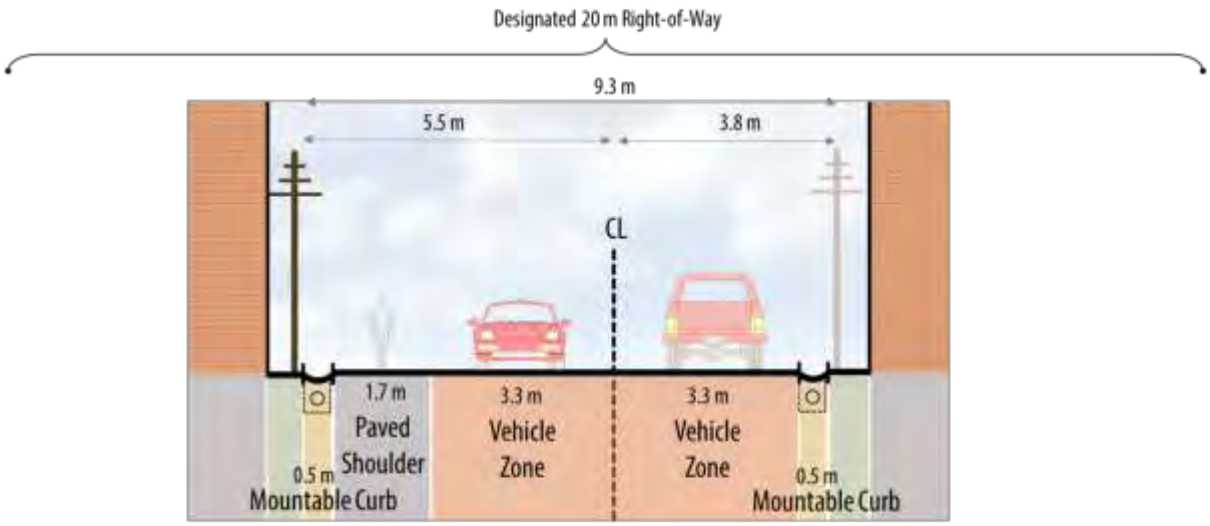


Figure 76: 9.3 m Platform Semi-Rural Cross-Section with Paved Shoulder for Belfountain Village (Community Centre to north/west of Caledon Mountain Drive)

9.2.3 Horizontal Alignment

The proposed design with a 50 km/h design speed generally follows the existing road centreline with the exception of a slight realignment to the north between Stations 11+975 and 12+100 to minimize impacts and avoid property acquisition on the south side.

The proposed horizontal alignment is illustrated on the plates in **Section 9.2.8**.

9.2.4 Vertical Alignment

As mentioned in **Section 9.1.2**, due to the narrow and highly constrained right-of-way though Belfountain Village and the low proposed posted speed limit, the proposed design generally follows the existing road profile and accommodates a 50 km/h design speed. The proposed vertical profile aims to minimize impacts to existing entrances and driveways, and to reduce grading impacts to adjacent properties and features. This vertical alignment was chosen to match the existing road profile wherever possible, while at the same time improving any existing substandard grades and vertical curves to meet the geometric standards required for the class of the road to the extent possible, as per the design criteria in **Section 9.2.1**.

The proposed vertical profile and reduction in posted speed limit will provide sufficient stopping sight distance. The effect of grade on stopping sight distance at driveways was also assessed for the proposed vertical profile. In general, sufficient stopping sight distance is provided, or where the resulting stopping sight distance is deficient, conditions are improved compared to the exiting road profile.

The proposed vertical alignment is illustrated on the plates in **Section 9.2.8**.

9.2.5 Geotechnical

As discussed in **Section 4.7**, existing pavement along Mississauga Road / Old Main Street and Bush Street, through the Belfountain Village, is generally in good condition. Based on existing conditions, the general pavement structure below is recommended through Belfountain Village:

- HMA: 125 mm
  - 50 mm HL-1 or Superpave 12.5 FC1 surface course
  - 75 mm HL-8 or Superpave 19 Binder Course
- Granular A: 150 mm
- Granular B: 400 mm

Terraprobe provided geotechnical recommendations based on a preliminary profile that HDR did not have access to at the time of writing this report. These preliminary recommendations are shown in **Table 45** for the portion of Mississauga Road / Old Man Street through Belfountain Village, and in **Table 46** for the portion of Bush Street through Belfountain Village. The preliminary recommendations for Bush Street are based on the vertical profile being raised, and where a grade raise cannot be accommodated, full depth reconstruction should be considered.

Table 45: General Pavement Recommendations for Mississauga Road / Old Main Street through Belfountain Village

Mississauga Road / Old Main Street Rehabilitation (Sta. 42+100 to Sta. 43+060)*			
Full Depth Reconstruction	**Full Depth Asphalt Replacement**	**Cold In Place Pulverization (CIP)**	**Remarks**
	42 + 100 – 42 + 680	42 + 100 – 42 + 680 (Mill 20 mm)	Only Gran A to be used for Grade Raise
42 + 680 – 42 + 755			
	42 + 755 – 42 + 815	42 + 755 – 42 + 815 (Mill 20 mm)	Only Gran A to be used for Grade Raise
42 + 815 + 42 + 850			
	42 + 850 – 42 + 950	42 + 850 – 42 + 950 (Mill 20 mm)	Only Gran A to be used for Grade Raise
42 + 950 – 42 + 965			
	42 + 965 – 43 + 040	42 + 965 – 43 + 040 (Mill 20 mm)	Only Gran A to be used for Grade Raise
43 + 040 – 43 + 060			

* Stationing is based on Terraprobe report, and differs from HDR station numbers. Terraprobe's Station 43+030 corresponds to HDR's 26+473, at the intersection of Old Main Street and Bush Street.

Table 46: General Pavement Recommendations for Bush Street through Belfountain Village

Bush Street Rehabilitation (Sta. 1+420 to Sta. 2+070)*				
Treatment	**Other Treatments**	**Full Depth Asphalt Replacement**	**Cold In Place Pulverization**	**Remarks****
Sta. 1+420 to Sta. 2+070		Remove asphalt full depth. Compact existing granular then place and compact Granular A to achieve design profile of HMA/Base interface. Repave with 125 mm HMA	Mill existing HMA to 125 mm thick (mill 45 mm). Pulverize and blend 125 mm HMA with 125 mm of unbound granular then grade and compact Rap/Granular Blend. Raise grade to achieve design profile of HMA/Base interface by placing and compacting Granular A. Pave with 125 mm HMA	Construction costs will govern which option is chosen (Region to choose preferred option)

* Stationing is based on Terraprobe report, and differs from HDR station numbers. Terraprobe's Station 2+070 corresponds to HDR's 12+117, at the intersection of Bush Street and Old Main Street.
** This recommendation is based on the vertical profile being raised, and where a grade raise cannot be accommodated, full depth reconstruction should be considered.

However, geotechnical design recommendations will vary based on the vertical alignment design and the typical cross-section to be applied, as proposed in this study:

- Where the vertical alignment is proposed to follow the existing ground profile, the above geotechnical recommendations apply
- Where vertical alignment modifications are proposed, full-depth pavement reconstruction will be required as pavement elevation will vary from existing
- Where a semi-rural cross-section applies, full-depth pavement reconstruction will be required to accommodate underground infrastructure
- Where a rural cross-section applies, the above recommendations based on vertical alignment should be followed

Therefore, based on the proposed cross-section and vertical alignment designs, full-depth pavement reconstruction is proposed for Mississauga Road / Old Main Street between approximately 580 metres north/west of Caledon Mountain Drive and Bush Street, and for Bush Street between Shaws Creek Road and Mississauga Road / Old Main Street.

More details on the geotechnical assessment and pavement structure recommendations can be found in **Appendix U.1**.

9.2.6 Drainage

The preliminary stormwater management plan is designed to prevent impacts from the future roadway configuration by using available technologies and opportunities to achieve the highest degree of control possible given the constraints of the study corridor. The following design elements are recommended as part of the proposed roadway improvements:

1. Based on the findings of the culvert condition assessment, the hydraulic capacity assessments, the geomorphology assessment as well as Peel Region's criteria for minimum culvert opening requirements, it is recommended to replace or upgrade 31 transverse culvert crossings within the project limits (two of which are through the Belfountain Village). In each case, the existing culvert crossings will be replaced by a pipe or concrete open bottom box culvert. Additional hydraulic analysis for non-watercourse crossings along Mississauga Road/Old Main Street and Bush Street will be required to finalize culvert crossing sizes.
2. No culvert crossing extensions are required to accommodate the proposed roadway improvements along this segment, as all the culvert crossings need to be replaced/upgraded due to their existing condition or substandard hydraulic capacity.
3. Surface water takings will be required where culvert replacement/upgrades are proposed. The water quantity/quality monitoring program will be developed during detailed design, at the time the Permit to Take Water (PTTW) application is submitted.
4. Where the roadway improvements recommend the provision of a semi-rural roadway cross-section, a subsurface drainage system is recommended for inclusion into the roadway cross-section. The subsurface drainage system will consist of a series of catchbasins, storm sewers and subdrains which will collect and convey both the granular base material and surface runoff and discharge to existing drainage outlets. The storm sewers shall be sized to accommodate a 10 year return period event, using a minimum inlet time of 15 minutes as per Region of Peel design standards. The design of the sewers will need to take into account any drainage from roadway boulevard areas as well as drainage external to the roadway right-of-way. Effort has been made to ensure that existing drainage patterns and locations are maintained throughout the various roadway corridors. A conceptual storm system layout is illustrated on the preliminary design plates in **Section 9.2.8**.
5. Where the proposed roadway improvements include a modification to a semi-rural cross-section, the requirement to maintain, relocate or remove entrance/driveway culverts should be examined during the detailed design phase. It is foreseeable that some culverts will no longer provide a drainage function under a semi-rural condition. In some instances however, external runoff from adjacent lands may need to be intercepted due to grade differences between roadway and adjacent properties. Where this occurs, appropriate ditch and culvert systems may need to be employed at driveway entrance locations to allow for conveyance of runoff to appropriate drainage outlets.
6. The principal features of the project's stormwater management system are the provision of oil-grit separator units to provide water quality control. A total of 14 OGS units are proposed throughout the study area (two of which are through the Belfountain Village) providing a total collective area for stormwater treatment of 5.56 ha. Water quality

criteria will be met at each OGS location based on Enhanced (Level 1) protection as outlined in the MOE Stormwater Management Practices Manual.
7. Existing roadside ditches will be re-graded to flat-bottom swale systems (grassed swales), where possible, to provide additional water quality benefits within the project limits. It is recommended that during detailed design, the proposed grassed swale areas are reviewed for their effectiveness in meeting the MOE criteria for flowrate, velocity and contributing area.
8. It is noted that runoff from existing roadways do not provide any quality control. The incorporation of OGS and grassed swale systems will provide a net improvement to the quality of storm runoff within the project limits.
9. Erosion and sediment control measures should be implemented and monitored through the construction period. Construction activity should be conducted during periods that are least likely to result in in-stream impacts to fish habitat.
10. As part of the upgrades to Culvert 14 on Old Main Street, a review of potential erosion concerns downstream of the culvert crossing should be undertaken to ensure that channel stability is maintained and potential impacts to adjacent properties/dwellings is abated.

More details on the proposed stormwater management plan can be found in **Appendix R.3**.

9.2.7 Traffic Controls

The proposed design accommodates a 50 km/h design speed and 40 km/h posted speed limit. It is therefore recommended to retain the 40 km/h posted speed limit through Belfountain Village.

Stop control at all intersections is proposed to remain as per existing conditions, with all-way stop control at the intersection of Bush Street and Mississauga Road / Old Main Street.

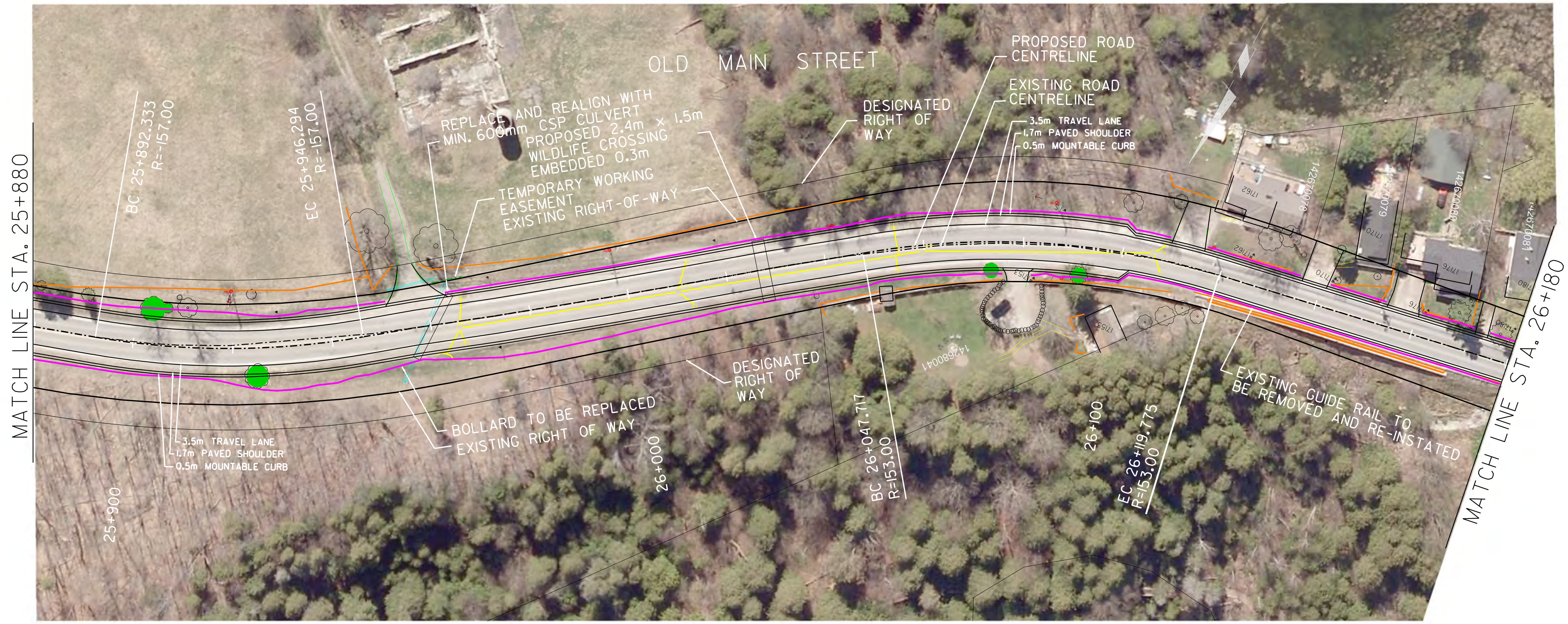
Illumination is proposed to remain as per existing conditions.

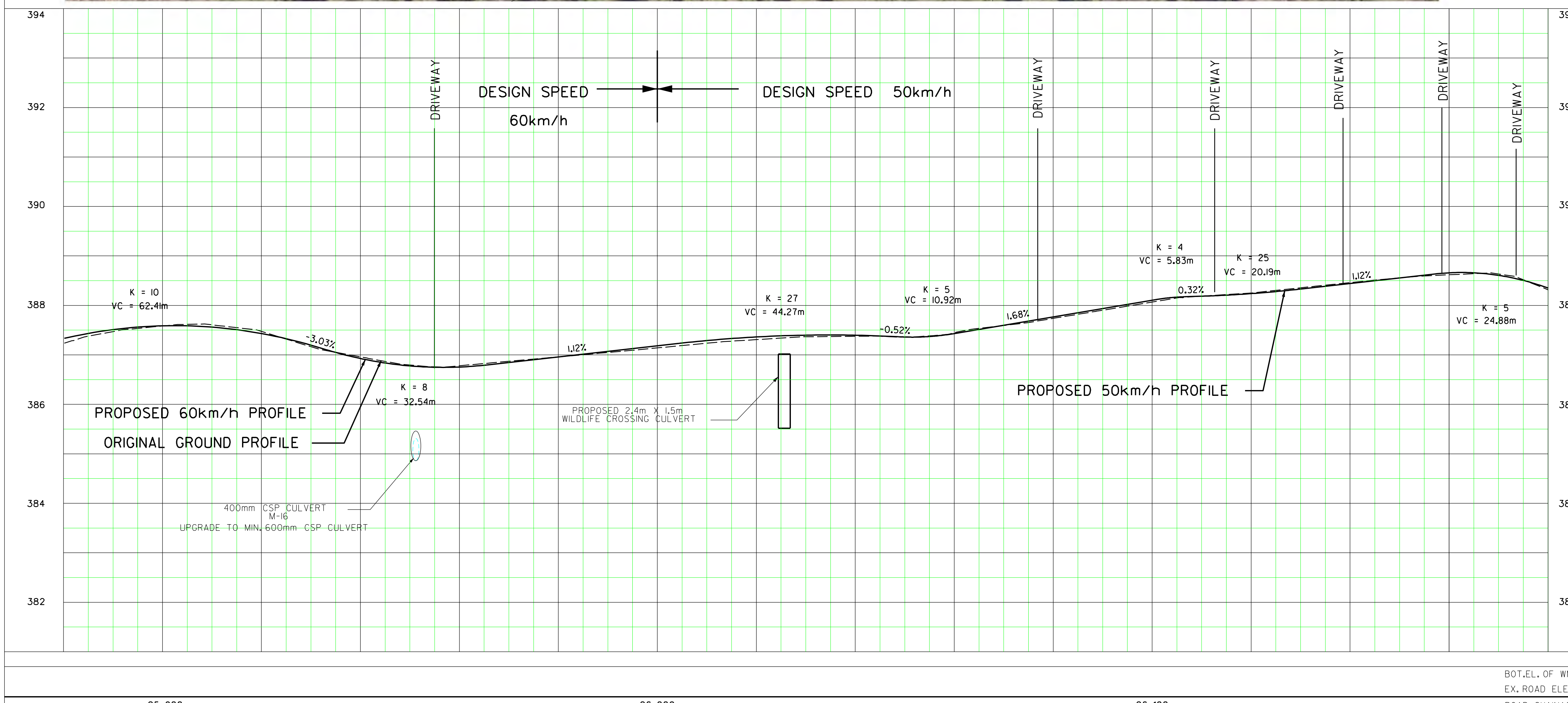
Some signs and bollards will need to be relocated to accommodate the new road platform. Locations are to be confirmed during detailed design. Roadway protection systems, such as guiderails, are to be considered where significant profile adjustments are proposed. This also needs to be reviewed during detailed design.

Existing truck and load restrictions along Bush Street and Mississauga Road / Old Main Street are proposed to remain.

9.2.8 Design Plates

The following pages contain plan and profile plates illustrating the proposed design for Bush Street and Mississauga Road / Old Main Street through the Belfountain Village.



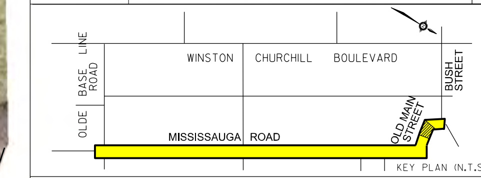


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

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General Notes

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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

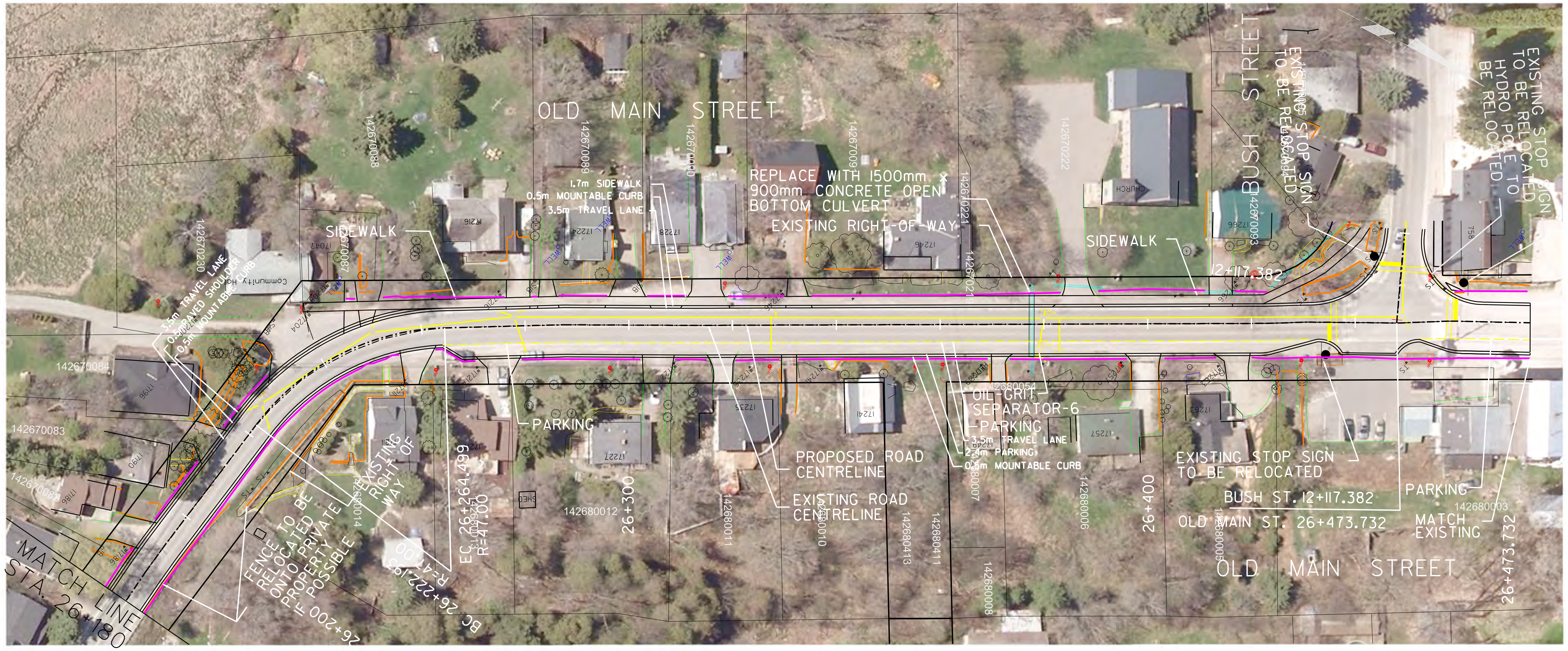
Region of Peel
Working for you

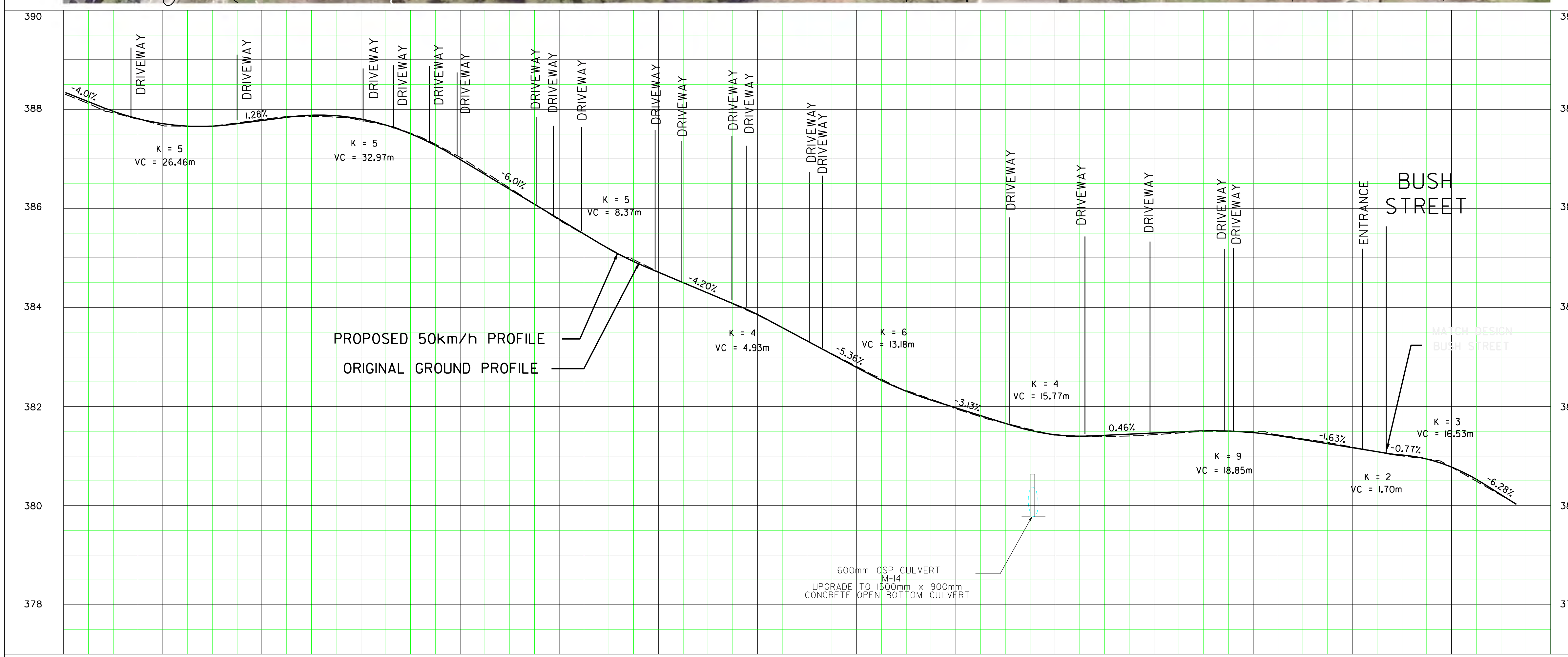
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 25+880 to STA 26+180)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 20 of 21	Plan No. -D





BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	26+200 · 26+300 · 26+400

SERVICE DATA

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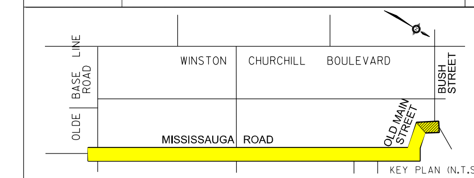
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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Designed by ______ Chkd.______

Approved by ______

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel

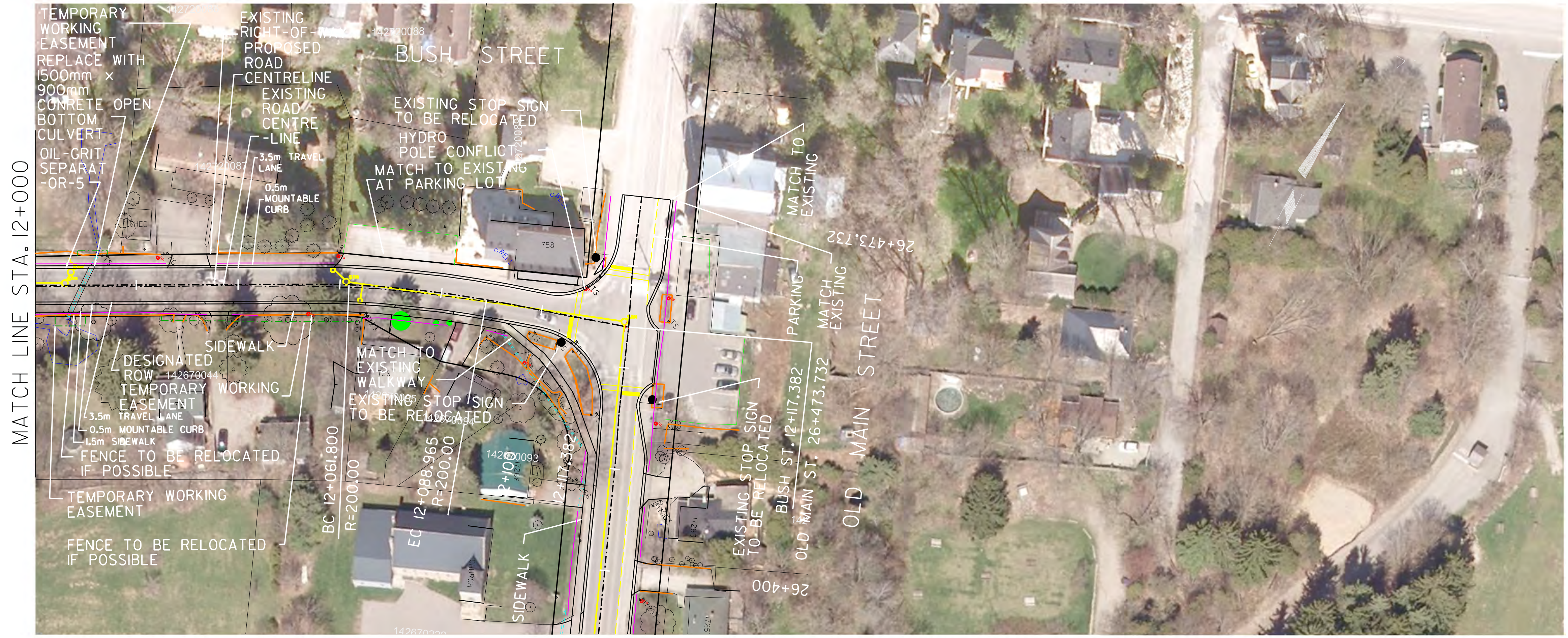
Working for you

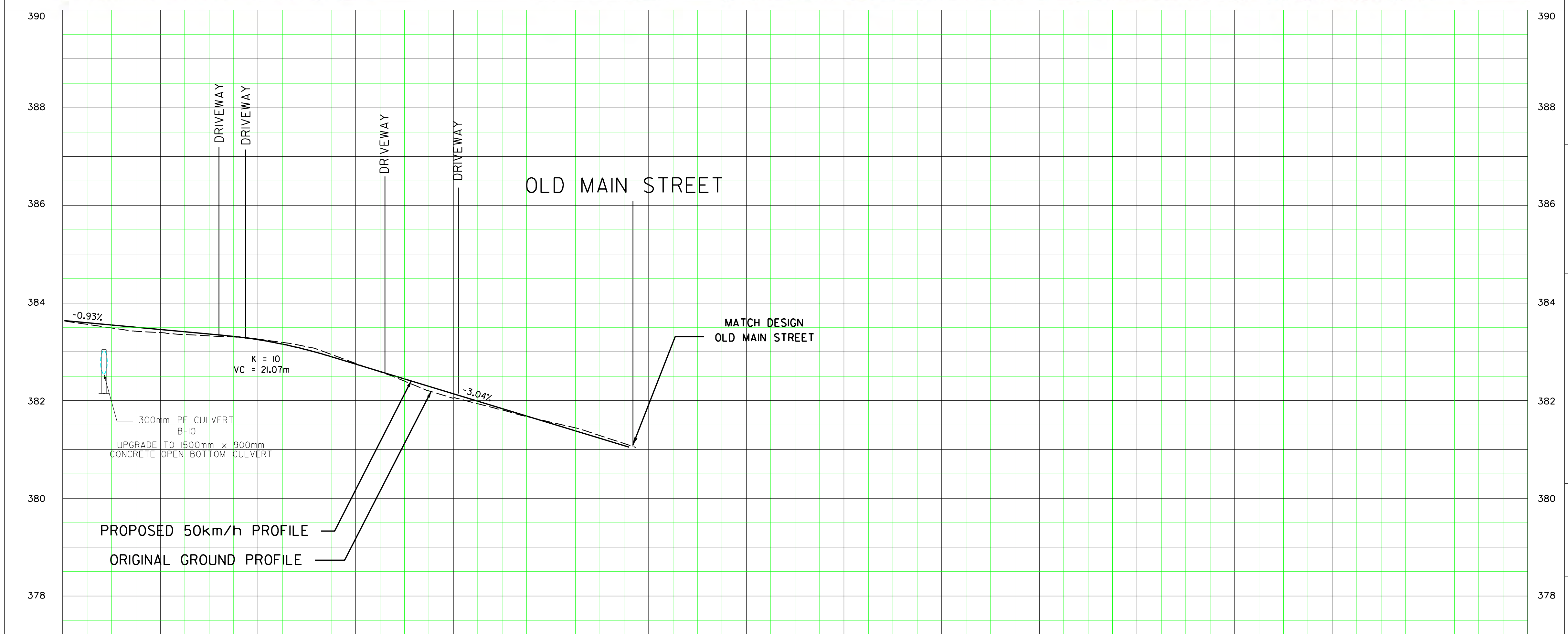
MISSISSAUGA ROAD/ OLD MAIN STREET

(FROM STA 26+180 to STA 26+480)

NEW CONSTRUCTION

CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 21 of 21	Plan No. -D





BOT.EL. OF WM.
EX. ROAD ELEV.
ROAD CHAINAGE 12+000 12+100 12+200

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.

OLDE BASE LINE ROAD — WINSTON CHURCHILL BOULEVARD — MISSISSAUGA ROAD — OLD MAIN STREET — BUSH STREET

KEY PLAN (N.T.S.)

LEGEND:
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Designed by Chkd. Approved by

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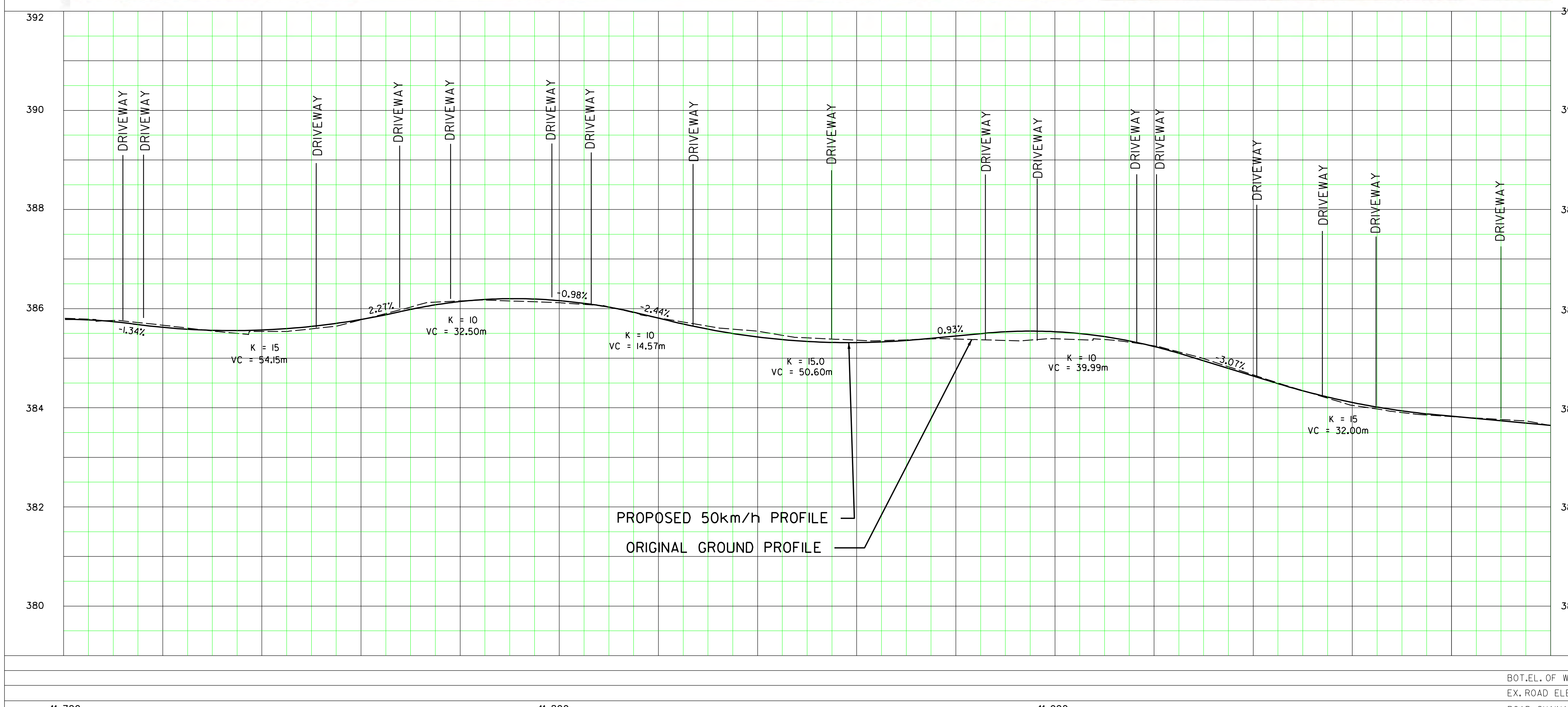
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE
1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

BUSH STREET
(FROM STA 12+000 to STA 12+117)
NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 8 of 8	Plan No. -D



SERVICE DATA

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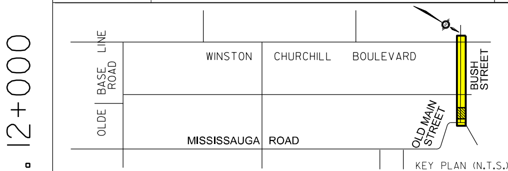
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

BUSH STREET

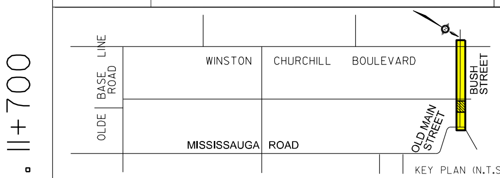
(FROM STA 11+700 to STA 12+000)

NEW CONSTRUCTION

CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 7 of 8	Plan No. -D

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES

1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
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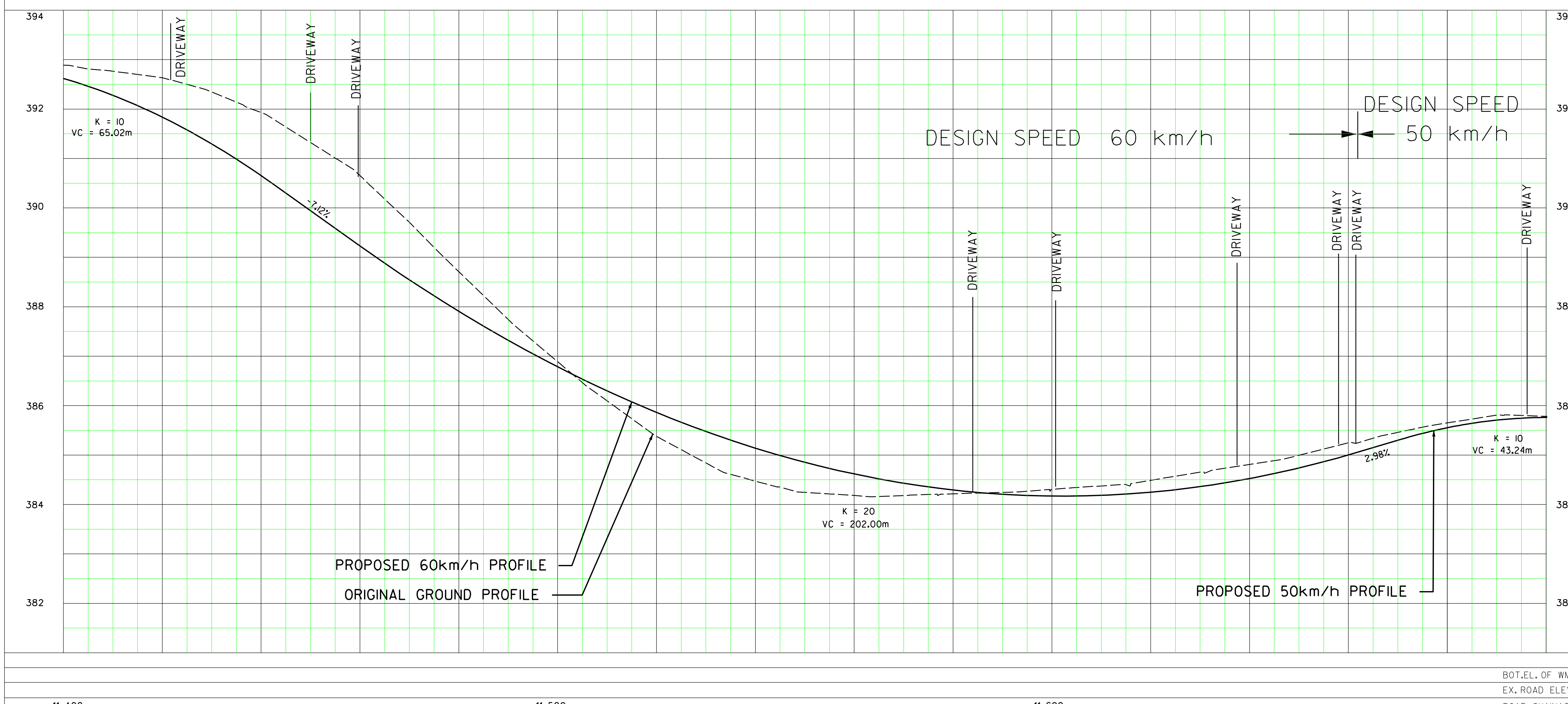

General Notes

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Designed by	Approved by
Chkd.	

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel

Working for you

BUSH STREET

(FROM STA 11+400 to STA 11+700)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 6 of 8	Plan No. -D

9.3 Impacts and Mitigation

The proposed cross-section, horizontal and vertical alignment designs aim to minimize impacts to adjacent lands and features, including naturally sensitive areas, vegetation, culturally significant fences and stone walls, buildings, and properties outside the road right-of-way. However, in order to accommodate all road users and bring the road up to standards for its role and function within the Regional road network, some impacts will need to be mitigated, as described below.

9.3.1 Summary of Identified Concerns and Mitigation Measures

Impacts along Bush Street and Mississauga Road / Old Main Street, through Belfountain Village (as identified in the preliminary design plates in **Section 9.2.8**.) and potential mitigation measures include:

- Grading impacts along the corridor can be mitigated by modifying the grading slope (in accordance with geotechnical recommendations), or in some cases considering a retaining wall or other type of soil retention feature.
- Impacts to sensitive natural features have been mitigated by using a semi-rural cross-section to reduce the grading footprint. Tree removals will be required at various locations. In some cases, grading can be modified to minimize impacts and reduce the number of tree removals. Natural environment impacts and recommended mitigation measures are summarized in **Table 47**. Additional details are included in Natural Heritage report (**Appendix B**).
- Between Stations 11+475 and 11+585, where there is an existing guiderail and steep slope on the north side, adjacent to a waterbody, it is proposed to match to the existing slope, maintaining or replacing the existing guiderail, to avoid extensive grading impacts to the waterbody and adjacent lands and features. Guiderails and other roadway protection systems are to be reviewed during detailed design, as described in **Section 9.2.7**.
- A wildlife passage culvert is proposed at Station 26+025, where sensitive amphibian species are present and a high number of amphibian road crossings and mortality have been observed. Wildlife passage culvert details are to be confirmed during detailed design.
- The extent of impacts to cedar and stone fence lines along Belfountain Village will require further review during detailed design. Where impacts to cedar rail fencing (also referred to as culturally significant fencing) and heritage stone walls, the following recommendations should be considered, in order of preference:
  - Where technically possible, make further adjustments to the profile, cross-section and grading limits of the proposed road improvements to avoid directly impacting the cedar rail fencing and the heritage stone walls.
  - If direct impacts are unavoidable, document and relocate cedar rail fencing and heritage stone walls further back on to the property in advance of construction activities. Prior to relocation, these resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a relocation plan

which would lay out the actions and qualifications required and responsibilities of stakeholders in order to relocate and re-use the resource.
- Where relocation is not possible for structural or other technical reasons, document and salvage cedar rail fencing and heritage stone walls in advance of construction activities. These resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a salvage plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to salvage the resource.
- Complete a cultural heritage landscape documentation report to document the roadscapes in advance of construction activities.

- In cases where cultural heritage resources are subject to indirect impacts, appropriate mitigation measures may include the introduction of landscape designs and vegetative elements to screen the disruptive aspects of the proposed road improvements. Where features such as private signs, fences, etc. encroach onto the road right-of-way, they should be relocated onto private property, if possible. If further assessment determines that it is not feasible to relocate the features, an encroachment agreement with the Region would be required. Some traffic signs and bollards will need to be relocated, as described in **Section 9.2.7**.
- Some hydro poles are currently located within or in close proximity to the proposed road platform and will need to be relocated. Clearance zone requirements and utility guidelines should be followed. Hydro pole conflicts identified in the design plates are to be confirmed during detailed design. Permanent aerial easements and potential vegetation removals as a result of hydro pole relocation are to be identified through the development of utility relocation design.
- Property acquisition have been mitigated by using a modified semi-rural cross-section to best fit each road segment within the Belfountain Village, and by shifting the road centreline on Bush Street slightly to the north between Stations 11+975 and 12+100. Although property acquisition through Belfountain Village is not anticipated, temporary working easements will be required at some locations, as described in **Section 9.3.2.**
- Where driveways are to be regraded to accommodate vertical profile and cross-section modifications, temporary working easements will be required and are to be confirmed during detailed design.
- If construction extends beyond the disturbed ROW, a Stage 2 archaeological assessment is recommended on any lands along the study corridor where there is potential for archaeological sites (as identified in **Appendix C.1)**, in accordance with Draft Standards and Guidelines for Consultant Archaeologists (MCL 2009).
- Should the proposed work extend beyond the current study area, further Stage 1 assessment must be conducted to determine archaeological potential of the surrounding lands.
- In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.
- No permanent noise and air quality impacts are anticipated as a result of the proposed road improvements, as no additional travel lanes will be provided and traffic is not

expected to increase significantly. During construction, best management practices (such as the application of non-chloride dust suppressants) are to be applied to mitigate any air quality impacts caused by construction dust.

- If soil removed during construction is determined to be contaminated, the disposal of contaminated soil is to be consistent with Part XV.1 of the Environmental Protection Act and Ontario Regulation 153/04, Records of Site Condition, which detail the requirements related to site assessment and clean up.
- Water supply wells within or in close proximity to the study area may be affected by road construction, either because of construction activities or, later, due to additional or more proximate road salt application. Prior to construction, it is recommended to confirm which wells are used domestically, to ensure that affected well owners will continue to have water supplies of appropriate quality and in adequate quantities, and to ensure that any work done on affected wells or any replacement wells is done pursuant to O. Reg. 903, Wells (pursuant to the Ontario Water Resources Act).

All of these impacts and potential mitigation measures are to be confirmed during detailed design. Temporary construction impacts should also be reviewed and confirmed during detailed design.

Table 47: Summary of Natural Heritage Impacts and Recommended Mitigation – Belfountain Village

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Vegetation/habitat removal	▪ The majority of areas to be directly impacted by site grading and vegetation removal are culturally influenced. No significant encroachment into Significant Woodland/ESAs/ANSIs are anticipated. ▪ Protective fencing should be established around regionally significant plant species during construction to avoid impacts; where avoidance is not possible, regionally significant plant species should be relocated to suitable areas of habitat restoration, where feasible. All transplanted individuals must be monitored prior to at least one year prior to their relocation to ensure proper re-establishment.	▪ No significant impact	▪ Detailed tree inventory and protection measures to be determined as part of a Tree Management Plan ▪ Visual impact assessment to be undertaken, where necessary, to evaluate the impact of vegetation removal. ▪ Detailed three-season surveys are to be completed during the detailed design stage to identify and map regionally significant plant species within the study area. ▪ Tree inventory work completed during Detailed Design should include inventories for snags and cavity trees to assess potential for impacts to Little Brown Myotis habitat. ▪ Follow-up surveys should be implemented to verify the presence of, and potential for impact to the following Candidate Significant Wildlife Habitat types: • Snake hibernacula • Bat maternal roosts • Habitat for significant odonate species
Construction-stage impacts to crossing Jefferson Salamanders and other amphibians	▪ A permit under Section 17(2)(c) of the Endangered Species Act may be required where the proposed undertaking may cause impact to regulated habitat for Jefferson Salamander ▪ Avoid construction during peak amphibian movement period of March 15 – April 30. ▪ Provide construction personnel with materials to assist in the identification of Jefferson Salamanders. If any potential Jefferson Salamanders are observed, all work is to stop until the individual leaves the work zone and the OMNR has been notified.	▪ No significant impact	▪ Strategies to minimize impact and provide Overall Benefit to Jefferson Salamander to be determined in development of ESA “C” permit application ▪ Construction Sightings Protocol to be developed
Jefferson Salamander and general amphibian road mortality and habitat fragmentation	▪ A wildlife passage culvert has been proposed near station 26+000. It is recommended that this wildlife passage be situated as close as possible to the existing, documented amphibian crossing location. ▪ Funnel fencing is to be installed on either side of each wildlife passage opening according to design plans established during the detailed design stage. ▪ Suitable ground substrates and cover objects should be established within around the openings of the wildlife passage to enhance their attractiveness to wildlife.	▪ No significant impact	▪ Effectiveness monitoring of wildlife passage and funnel fencing to be completed as detailed in a Post-Construction Monitoring Plan developed in conjunction with applicable agencies ▪ Wildlife road mortality mitigation approaches will be further discussed at the detailed design stage in consultation with MNR. It is recommended to undertake a more detailed analysis of area of impact within the regulated habitat for Jefferson Salamander at the detailed design stage. This information will be used to complete an Avoidance Alternatives Form.
Impacts to Fish and Fish Habitat	▪ Concrete open-bottom culverts and/or increases in the diameter of replacement culverts have been recommended. ▪ All in-water work should occur during dry and/or low flow conditions to avoid or minimize impact to fish and fish habitat within and downstream of the construction site. ▪ Specific timing windows are to be determined in consultation with the OMNR and DFO. ▪ Where feasible, culvert replacements should comprise arch/open bottom culverts to provide better fish habitat, connectivity, and improve the potential for groundwater inputs. ▪ Where impacts to fish and fish habitat may occur, a DFO Fisheries Act Authorization may be required. ▪ Any fish that may be caught within areas impounded and de-watered for in-water construction activities should be captured and relocated prior to construction.	▪ No significant impact	▪ Where necessary, fish and wildlife salvage plans should be created for watercourse areas to be de-watered for in-water construction work.
Bird nesting disruption and avoidance, and active nest destruction	▪ Time vegetation removal activities to occur outside the typical bird breeding season (May 1 – July 31) ▪ If vegetation removal must occur during the bird breeding season, retain an avian biologist to survey for active nests just prior to vegetation removal activities	▪ No significant impact	

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Wildlife avoidance of the area, and other impacts associated with construction	▪ Restrict the daily timing of construction activities to between 7:00 am and 7:00 pm. ▪ Moisten bare dirt surfaces with water to limit impacts caused by dust. ▪ Direct night-time lighting away from adjacent natural features. ▪ These construction-related impacts are expected to be temporary, minimal and localized.	▪ No significant impact	
Deer/motor vehicle collisions	▪ Snow banks should be removed by snow plows in winter to increase visibility for both crossing deer and motorists. ▪ An increase in the annual sustainable deer hunt for the study area vicinity should be explored with OMNR as a means to control local deer populations.	▪ No significant impact	
Damage or other disturbance to the adjacent natural features	▪ Clearly demarcate the limits of construction with silt fencing or brightly coloured snow fencing around the limits of the construction zone.	▪ No significant impact	
Erosion and sedimentation	▪ A Sediment and Erosion Control Plan should be developed and implemented. ▪ Install silt fencing along the boundaries of the construction zone, inspect on a regular basis, remove accumulated sediment as needed and immediately replace any damaged fencing. ▪ Construction activities should be timed to occur outside of seasonally wet periods, during heavy rain, or during periods of rapid snowmelt.	▪ No significant impact	▪ Sediment and Erosion Control Plan to be developed.
Alterations to hydrological regime of watercourses and wetlands	▪ Increased stormwater runoff associated with increased areas of impervious surface are not anticipated to cause significant increases to natural feature hydrological inputs, due to the relatively small hydrological contributions provided by road surfaces versus surrounding areas of catchment. ▪ Replacement culverts must be properly sized to prevent increases or decreases in hydrological flow to wetland features, particularly those wetlands that provide significant habitat for Jefferson salamander, western chorus frog, or where they provide significant amphibian breeding habitat. ▪ Any upgrades to culverts that provide flow between wetlands will be maintained at existing culvert invert elevations in order to maintain wetland levels. ▪ In semi-rural sections where subsurface drainage systems are proposed, the incorporation of trench plugs will be required to minimize groundwater interception. These should be employed in the vicinity of all wetlands.	▪ No significant impact	
Impacts to water quality of watercourses and wetlands	▪ Treatment trains comprising OGS units and grassed swales are designed to provide an Enhanced (Level 1) level of water quality treatment to intercepted stormwater runoff. ▪ Where only one component (OGS unit or grassed swale) has been proposed, water quality improvements are anticipated over existing conditions. ▪ Treated pavement area significantly exceeds the area of new pavement proposed for the study area, representing a 101% increase in treated pavement area. ▪ At a minimum, the most sensitive natural features (i.e., PSWs, including Jefferson salamander breeding habitat, fish habitat) should receive an Enhanced level of water quality treatment. ▪ Construction machinery should arrive on-site in a clean state and should be refueled and washed at least 30 m away from permanent watercourses or wetlands. ▪ A Spill Response Plan should be developed and implemented as necessary during site construction. ▪ Water removal required for in-water construction de-watering purposes must be adequately filtered prior to discharge into the receiving watercourse, and monitored for pertinent water quality parameters, following established protocols and standards.	▪ No significant impact	▪ A water quality monitoring program may be considered within the framework of a Post-Construction Monitoring Program to be determined in consultation with the applicable agencies

9.3.2 Property Requirements

The proposed design through the Belfountain Village does not result in any areas of anticipated property acquisition (fee simple takings). However, temporary working easements may be required as summarized in **Table 48**. Temporary working easements are based on a 1 metre buffer around grading, and 2.5 metre buffer around culverts and storm sewers.

Table 48: Potential Property Acquisition through Belfountain Village

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
11+418 to 11+426 (north side, driveway)		35 m^2
11+435 to 11+466 (south side, driveway / grading)		225 m^2
11+453 to 11+468 (north side, driveway)		305 m^2
12+004 to 12+010 (south side, culvert)		15 m^2
12+008 to 12+014 (north side, culvert)		5 m^2
12+025 to 12+065 (south side, grading)		80 m^2

As with other locations, potential property and easement requirements identified in this section and shown on the design plates are preliminary and are to be confirmed during detailed design.

10. BUSH STREET

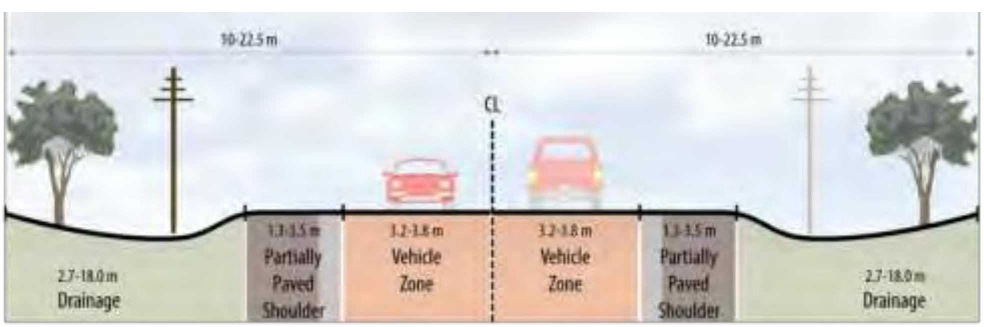
10.1 Identification and Evaluation of Alternative Design Concepts

This section discusses the different design alternatives considered for Bush Street between Winston Churchill Boulevard and approximately 150 metres east of Shaws Creek Road. The segment between east of Shaws Creek Road and Old Main Street is discussed in **Section 9**. For intersection options considered at Bush Street / Winston Churchill Boulevard refer to **Section 11.4**.

10.1.1 Bush Street Cross-Section Options

Alternative cross-section options were considered for each of the roads in the study area. Some options greatly differ from other options in terms of cross-section elements/widths and overall ROW required, while other alternatives consist of modifications to options that were considered earlier in the process to make them a more desirable alternative. Therefore, some cross-section options were screened out earlier in the process and others were only evaluated for the specific road segment where they best apply. All cross-section options considered during this study are included in **Appendix V**. The vehicle zone illustrated in the cross-sections refers to the general purpose travel lane, and the two terms are interchangeable. The most feasible options considered for Bush Street include:

- **Option 1:** Do Nothing (Existing Rural Conditions): 3.2-3.8 metre wide travel lanes and partially paved shoulders (**Figure 77**)
- **Option 2:** 14 metre Platform Rural Road: 3.5 metre wide travel lane, 1.0 metre wide paved buffer, 2.0 metre wide paved shoulder, and adequate ditches (**Figure 78**)
- **Option 3:** 11.4 metre Platform Rural Road: 3.5 metre wide travel lane, 1.7 metre wide paved shoulder, and adequate ditches (**Figure 79**)



Note: Total right-of-way is predominantly 30 m; paved portion of shoulder ranges from 0.2-1.5 m; majority of above ground utilities run on north side of the road and crosses over between sides

Figure 77: Option 1 - Do Nothing Option – Existing Conditions on Bush Street

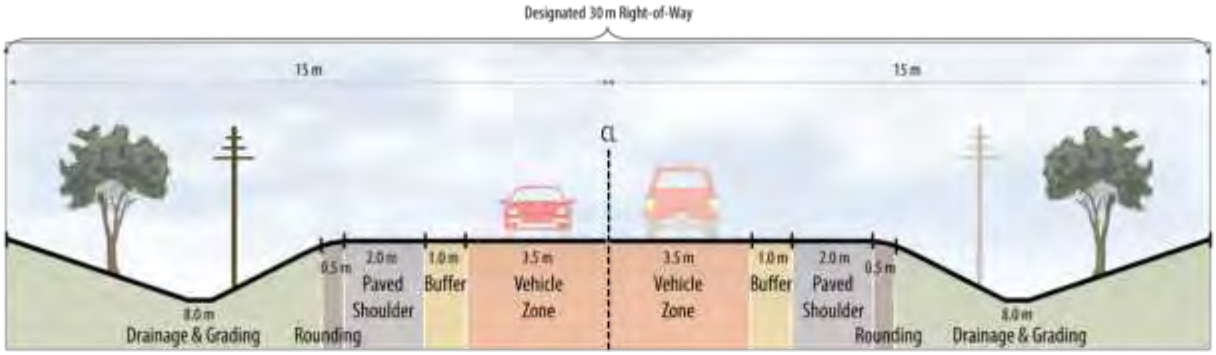


Figure 78: Option 2 - 14 m Platform Rural Option Considered for Bush Street

Figure 79: Option 3 - 11.4 m Platform Rural Option Considered for Bush Street

The evaluation for the above noted options is shown in **Table 49**.

Table 49: Bush Street Cross-Section Option Evaluation

EVALUATION CRITERIA	Bush Street Cross-Section Options			EVALUATION
	Option 1: Do Nothing	**Option 2: 14 m Platform Rural Road**	**Option 3: 11.4 m Platform Rural Road**	
Option Description	• 20-45 m ROW, predominantly 30 m • 3.2-3.8 m wide travel lane • 1.3-3.5 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	
Rural Character				
Maintains rural character and countryside scenic quality	• Retains rural character	• Retains rural character	• Retains rural character	• No difference
Transportation				
Geometric alignment	• N/A	• N/A	• N/A	• No difference
Traffic operations	• Vehicular capacity limited by all road users sharing 1 travel lane in each direction with partially paved shoulders • Conflicts between motorized vehicles and cyclists/pedestrians	• Reduced delays due to provision of separate paved shoulder • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate buffer and paved shoulder	• Reduced delays due to provision of separate paved shoulder • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Options 2, 3 preferred as they reduce conflicts between different road users
Accommodation of motorists	• One 3.2-3.8 m travel lane in each direction	• One 3.5 m travel lane in each direction	• One 3.5 m travel lane in each direction	• Options 2, 3 preferred as travel lane width meets design standards
Accommodation of trucks	• 3.2-3.8 m paved travel lane, with partially paved shoulders available, but shared with all road users • Load restriction on Bush Street	• 3.5 m paved travel lane available • 1.0 m buffer and 2.0 m paved shoulder provides separation from other road users • Existing load restriction on Bush Street to remain	• 3.5 m paved travel lane available • 1.7 m paved shoulder provides separation from other road users • Existing load restriction on Bush Street to remain	• Option 2 preferred as it reduces conflicts between different road users
Accommodation of farm vehicles	• 3.2-3.8 m paved travel lane, with partially paved shoulders available, but shared with all road users	• 6.5 m of pavement available, but shared with all road users • Separation with other road users through buffer and paved shoulder	• 5.2 m of pavement available, but shared with all road users • Separation with other road users through paved shoulder	• Option 2 preferred as it reduces conflicts between different road users
Accommodation of cyclists	• No separate facility to accommodate cyclists • Cyclists share the road or use partially paved shoulders where available	• 2.0 m paved shoulder available • 1.0 m paved buffer provides additional separation from motorized vehicles	• 1.7 m paved shoulder available	• Option 2 preferred as additional space is provided, and reduces conflicts between different road users
Accommodation of pedestrians	• No separate facility to accommodate pedestrians • Pedestrians use partially paved shoulders where available • Minimal streetscaping	• 2.0 m paved shoulder available • 1.0 m paved buffer provides additional separation from motorized vehicles • Opportunities for streetscaping	• 1.7 m paved shoulder available • Opportunities for streetscaping	• Option 2 preferred as additional space is provided, and reduces conflicts between different road users
Accommodation of horses	• 3.2-3.8 m paved travel lane, with partially paved shoulders available, but shared with all road users	▪ 3.5 m paved travel lane, 1.0 m paved buffer, and 2.0 m paved shoulder available	• 3.5 m paved travel lane and 1.7 m paved shoulder available	• Option 2 preferred as additional space is provided, and reduces conflicts between different road users
Safety	• Conflicts between motorized vehicles and cyclists/pedestrians	▪ Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder ▪ 1.0 m buffer provides separation between motorized vehicles and cyclists/pedestrians	• Reduced conflicts between motorized vehicles and cyclists/pedestrians due to provision of separate paved shoulder	• Option 2 is preferred as it provides a paved shoulder for cyclists and pedestrians with a buffer separating them from motorized vehicles, minimizing conflicts between different road users
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies through adequate ditches	• Designed to address drainage deficiencies through adequate ditches	• Options 2, 3 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Bush Street Cross-Section Options			EVALUATION
	Option 1: Do Nothing	**Option 2: 14 m Platform Rural Road**	**Option 3: 11.4 m Platform Rural Road**	
Option Description	• 20-45 m ROW, predominantly 30 m • 3.2-3.8 m wide travel lane • 1.3-3.5 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Options 2, 3 preferred
Socio-Economic Environment				
Residential properties	• No impacts	• Cross-section more likely to extend beyond existing ROW in some areas • Potential property acquisition required and driveway impacts due to increased roadway platform width and grading	• Cross-section might extend beyond existing ROW in some areas • Potential property acquisition and driveway impacts due to increased roadway platform width and grading; less than Option 2	• Option 1 preferred as there are no impacts • Otherwise, Option 3 preferred as there is less impact than Option 2
Farm operations	• No impacts	• Cross-section more likely to extend beyond existing ROW in some areas • Potential property acquisition required and driveway impacts due to increased roadway platform width and grading	• Cross-section might extend beyond existing ROW in some areas • Potential property acquisition and driveway impacts due to increased roadway platform width and grading; less than Option 2	• Option 1 preferred as there are no impacts • Otherwise, Option 3 preferred as there is less impact than Option 2
Businesses	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• Cross-section more likely to extend beyond existing ROW in some areas • Potential impacts beyond existing ROW due to increased roadway platform width and grading, which may require additional assessment	• Cross-section might extend beyond existing ROW in some areas • Potential impacts beyond existing ROW due to increased roadway platform width and grading, which may require additional assessment; less than Option 2	• Option 1 preferred as there are no impacts • Otherwise, Option 3 preferred as there is less impact than Option 2
Built and cultural heritage resources	• No impacts	• Cross-section more likely to extend beyond existing ROW in some areas • Potential impacts beyond existing ROW due to increased roadway platform width and grading, which may require additional assessment	• Cross-section might extend beyond existing ROW in some areas • Potential impacts beyond existing ROW due to increased roadway platform width and grading, which may require additional assessment; less than Option 2	• Option 1 preferred as there are no impacts • Otherwise, Option 3 preferred as there is less impact than Option 2
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction	• Moderate air, noise, vibration impacts during construction	• Option 1 preferred as there are no impacts
Natural Environment				
Terrestrial habitat	• No impacts	• Some encroachment into culturally influenced vegetation communities within ROW; somewhat more so than Option 3 • Removal of some individual trees may be required; somewhat more so than Option 3; part of Significant Woodland • No encroachment into ESA, ANSI; occurs within Greenbelt Natural Heritage System • May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction	• Some encroachment into culturally influenced vegetation communities within ROW; somewhat less so than Option 2 • Removal of some individual trees may be required; somewhat less so than Option 2; part of Significant Woodland • No encroachment into ESA, ANSI; occurs within Greenbelt Natural Heritage System • May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 3 is preferred over Option 2 due to lesser required encroachment into adjacent terrestrial natural features and habitat
Aquatic environment	• No impacts	• 1 culvert crossing – no associated watercourse • No fish habitat affected	• 1 culvert crossing – no associated watercourse • No fish habitat affected	• No difference
Wetlands and watercourses	• No impacts	• No wetlands impacted	• No wetlands impacted	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Bush Street Cross-Section Options			EVALUATION
	Option 1: Do Nothing	Option 2: 14 m Platform Rural Road	Option 3: 11.4 m Platform Rural Road	
Option Description	• 20-45 m ROW, predominantly 30 m • 3.2-3.8 m wide travel lane • 1.3-3.5 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	
Species at risk	• No impacts	• Barn Swallow foraging habitat in adjacent fields; no negative impact • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals if necessary; greater potential impact due to grading requirements than Option 3	• Barn Swallow foraging habitat in adjacent fields; no negative impact • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals if necessary; lesser potential impact due to grading requirements than Option 2	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 3 is preferred over Option 2 due to fewer tree removals required for grading, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands • No significant impact anticipated to potential Odonate species of conservation concern	• No significant impact anticipated to potential Hooded Warbler habitat in woodlands • No significant impact anticipated to potential Odonate species of conservation concern	• No difference
Wildlife movement corridors	• No impacts	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), more so than Option 3; no significant amphibian crossing locations affected	• May cause minor disturbance to deer corridor Significant Wildlife Habitat during construction; not anticipated to significantly impact deer crossings post-construction • ROW grading may provide minor improvement to deer visibility near roadside adjacent to woodlands; no significant change to deer visibility elsewhere along ROW where landscape mostly open currently • Widened travel surface may decrease crossing success of amphibians (crossing deterrence, mortality increase), somewhat less so than Option 2; no significant amphibian crossing locations affected	• Option 1 is preferred as it avoids potential disturbance to deer movement corridor Significant Wildlife Habitat and avoids potential impact to amphibian road crossing success • Otherwise, Option 3 is preferred over Option 2 because a narrower paved surface may increase the likelihood of amphibian crossing success
Stormwater management	• No impacts	• Increase in surface runoff due to widening of impervious surfaces, somewhat more so than Option 3 • Improved roadside drainage system	• Increase in surface runoff due to widening of impervious surfaces, somewhat less so than Option 2 • Improved roadside drainage system	• Options 3 is preferred as it incorporates improved drainage systems over current conditions but features less impervious surface than Option 2
Natural hazards	• No impacts	• Part of ROW occurs adjacent to West Credit River valley, small tributary valley	• Part of ROW occurs adjacent to West Credit River valley, small tributary valley	• Option 1 is preferred as it avoids potential impacts to natural valley features
Niagara Escarpment impacts	• No impacts	• Portion of ROW occurs within Escarpment Rural Area designation; no significant impacts anticipated	• Portion of ROW occurs within Escarpment Rural Area designation; no significant impacts anticipated	• No difference
Capital Costs				
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost from increased roadway platform width and grading	• Moderate construction cost from increased roadway platform width and grading, less than Option 2	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• Potential property acquisition anticipated in areas where grading extends beyond the existing ROW	• Potential property acquisition anticipated in areas where grading extends beyond the existing ROW; less than Option 2	• Options 1 results in no property acquisition anticipated

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Bush Street Cross-Section Options Option 1: Do Nothing	 Option 2: 14 m Platform Rural Road	 Option 3: 11.4 m Platform Rural Road	EVALUATION
Option Description	• 20-45 m ROW, predominantly 30 m • 3.2-3.8 m wide travel lane • 1.3-3.5 m wide partially paved shoulders • No dedicated bicycle facility • No dedicated pedestrian facility	• 30 m typical ROW • 3.5 m wide travel lane • 1.0 m wide paved buffer • 2.0 m wide paved shoulders	• 30 m typical ROW • 3.5 m wide travel lane • 1.7 m wide paved shoulders	
OVERALL				
			• Option 3 preferred as it retains the rural character of the road, better accommodates and reduces conflicts between all road users, while minimizing property and natural environment impacts	

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, the 11.4 metre platform rural cross-section (Option 3) is preferred for Bush Street between Winston Churchill Boulevard and approximately 150 metres east of Shaws Creek.

10.1.2 Bush Street Profile Options

Profile options were considered based on different design speeds. Generally, lower design speeds allow for the profile to remain closer to existing conditions. Higher design speeds, on the other hand, require more significant profile adjustments and therefore result in greater impacts to adjacent lands and features.

For Bush Street, profile options were considered for the following speeds:

- **Option 1:** Do Nothing (50-80 km/h existing posted speed)
- **Option 2:**80 km/h Design Speed (70 km/h Posted Speed)
- **Option 3:**60 km/h Design Speed (50 km/h Posted Speed)

The evaluation for the above noted options is included in **Table 50** for the segment between Winston Churchill Boulevard and Shaws Creek Road (where the current posted speed is 80 km/h) and **Table 51** for the segment between Shaws Creek Road and approximately 150 metres east of Shaws Creek Road (where the current posted speed is 50 km/h).

Table 50: Bush Street Profile Option Evaluation – Winston Churchill Boulevard to Shaws Creek Road

EVALUATION CRITERIA	Bush Street Vertical Alignment Options		EVALUATION
	Option 1: Do Nothing 80 km/h Posted Speed	Option 2: 80 km/h Design Speed 70 km/h Posted Speed	
Option Description	• 80 km/h posted speed from Winston Churchill Boulevard to Shaws Creek Road	• 80 km/h design speed from Winston Churchill Boulevard to Shaws Creek Road • 70 km/h posted speed from Winston Churchill Boulevard to Shaws Creek Road	
Rural Character			
Maintains rural character and countryside scenic quality	• Retains rural character	• Minor vertical alignment modifications retain rural character	• No difference
Transportation			
Geometric alignment	• Vertical alignment consists of rolling profile with some moderate crests/sags throughout • Flat segments provide inadequate drainage	• Vertical alignment slightly modifies some of the crests/sags, and introduces a moderate crest for adequate drainage between 10+500 and 10+800	• Option 2 preferred
Traffic operations	• Sightlines generally provide adequate visibility for posted speed limit • Motorists exceed posted speed limits by 10 km/h	• Slightly increased travel time due to decrease in posted speed limit • Adequate visibility provided as vertical alignment accommodates proposed posted speed limit • Requires motorists to reduce speeds below existing speed limit by 10 km/h	• Option 2 preferred as visibility meets design standards
Accommodation of motorists	• Rolling profile with some moderate crests/sags is generally a suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited visibility of vertical alignment at some locations, and vehicles exceeding posted speed limits	• Slight modifications to profile improve movement and travel along corridor • Reduced conflicts with all other road users due to adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Option 2 preferred as reduced speed limit and slightly smoother profile improves travel along corridor, improves visibility, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with some moderate crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited visibility of vertical alignment at some locations, and vehicles exceeding posted speed limits • Load restriction on Bush Street	• Smoother profile improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits • Existing load restriction on Bush Street to remain	• Option 2 preferred as reduced speed limit and slightly smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with some moderate crests/sags is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited visibility of vertical alignment at some locations, and vehicles exceeding posted speed limits	• Smoother profile improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Option 2 preferred as reduced speed limit and slightly smoother profile improves travel along corridor, improves visibility, and reduces conflicts with all other road users
Accommodation of cyclists	• Rolling profile with some moderate crests/sags is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited visibility of vertical alignment at some locations, and vehicles exceeding posted speed limits	• Smoother profile improves movement and travel along corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Option 2 preferred as reduced speed limit and slightly smoother profile enhances environment, and reduces conflicts with all other road users
Accommodation of pedestrians	• Rolling profile with some moderate crests/sags is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited visibility of vertical alignment at some locations, and vehicles exceeding posted speed limits	• Smoother profile improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Option 2 preferred as reduced speed limit and slightly smoother profile enhances environment, and reduces conflicts with all other road users
Accommodation of horses	• Rolling profile with some moderate crests/sags is a less suitable environment for horses • Conflicts with motorized vehicles due to limited visibility of vertical alignment at some locations, and vehicles exceeding posted speed limits	• Smoother profile improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate reduced posted speed limits	• Option 2 preferred as reduced speed limit and slightly smoother profile enhances environment, and reduces conflicts with all other road users

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Bush Street Vertical Alignment Options Option 1: Do Nothing 80 km/h Posted Speed	Bush Street Vertical Alignment Options Option 2: 80 km/h Design Speed 70 km/h Posted Speed	EVALUATION
Option Description	• 80 km/h posted speed from Winston Churchill Boulevard to Shaws Creek Road	• 80 km/h design speed from Winston Churchill Boulevard to Shaws Creek Road • 70 km/h posted speed from Winston Churchill Boulevard to Shaws Creek Road	
Safety	• Vertical alignment provides sufficient visibility for 80 km/h design speed at some locations • Posted speed matches design speed • Limited visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians at some locations	• Vertical alignment provides sufficient visibility for the proposed 70 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Option 2 preferred as vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies based on cross-section options	• Option 2 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Option 2 preferred
Socio-Economic Environment			
Residential properties	• No impacts	• Potential minor impacts to properties, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 2 preferred as impacts to properties and driveways are minimal, while visibility is improved
Farm operations	• No impacts	• Potential minor impacts to properties, if grading extends beyond existing ROW • Grading impacts affecting driveways is negligible (approximately 0.5 m or less) • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 2 preferred as impacts to properties and driveways are minimal, while visibility is improved
Businesses	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts • Potential archaeological impacts if grading extends beyond existing ROW (not likely)	• No difference
Built and cultural heritage resources	• No impacts	• No anticipated impacts • Potential built and cultural heritage impacts if grading extends beyond existing ROW (not likely)	• No difference
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are minimal impacts
Natural Environment			
Terrestrial habitat	• No impacts	• Potential for minor encroachment into adjacent culturally-influenced vegetation communities just west of Shaws Creek Rd; no negative impacts anticipated. • Removal of some individual trees may be required due to limited site grading. • No encroachment into ESA, ANSI; occurs within Greenbelt Natural Heritage System	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat. •
Aquatic environment	• No impacts	• No impacts	• No difference
Wetlands and watercourses	• No impacts	• No impacts	• No difference
Species at risk	• No impacts	• Barn Swallow foraging habitat in adjacent fields; no negative impact • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals if necessary.	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat. •
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No impacts	• No difference
Wildlife movement corridors	• No impacts	• May cause minor disturbance to amphibian crossing activities during construction; post-construction, not anticipated to cause significant negative impacts to crossing success over current conditions.	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Bush Street Vertical Alignment Options		EVALUATION
	Option 1: Do Nothing 80 km/h Posted Speed	**Option 2: 80 km/h Design Speed 70 km/h Posted Speed**	
Option Description	• 80 km/h posted speed from Winston Churchill Boulevard to Shaws Creek Road	• 80 km/h design speed from Winston Churchill Boulevard to Shaws Creek Road • 70 km/h posted speed from Winston Churchill Boulevard to Shaws Creek Road	
Stormwater management	• No impacts	• Improved stormwater drainage systems. • Negligible increase surface runoff due to impervious surface cover.	• Option 2 is preferred as it incorporates improved stormwater drainage than Option 1 while not resulting in substantial increases in impervious surface
Natural hazards	• No impacts	• No impacts	• No difference
Niagara Escarpment impacts	• No impacts	• Portion of ROW occurs within Escarpment Rural Area designation; no significant impacts anticipated.	• No difference
Capital Costs			
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• No anticipated property acquisition • Potential property acquisition would be required if grading extends beyond existing ROW, potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL			
		• Option 2 preferred as the slightly improved vertical alignment meets design standards for the proposed posted speed limit (lower than existing posted speed limit), and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts	

Legend:

Preferred	Less Preferred	Least Preferred

Table 51: Bush Street Profile Option Evaluation – Shaws Creek Road to approximately 150 metres east of Shaws Creek Road

EVALUATION CRITERIA	Bush Street Vertical Alignment Options: Option 1: Do Nothing 50 km/h Posted Speed	Bush Street Vertical Alignment Options: Option 3: 60 km/h Design Speed 50 km/h Posted Speed	EVALUATION
Option Description	• 50 km/h posted speed from Shaws Creek Road to 150 metres east of Shaws Creek Road	• 60 km/h design speed from Shaws Creek Road to 150 metres east of Shaws Creek Road • 50 km/h posted speed from Shaws Creek Road to 150 metres east of Shaws Creek Road	
Rural Character			
Maintains rural character and countryside scenic quality	• Retains rural character	• Vertical alignment modifications result in some changes to rural character	• Option 1 preferred
Transportation			
Geometric alignment	• Vertical alignment consists of rolling profile with a moderate crest/sag	• Vertical alignment moderately flattens the moderate crest/sag	• Option 2 preferred due to smoother vertical alignment
Traffic operations	• Limited visibility due to limited sightlines of rolling vertical alignment • Conflicts between all road users due to limited visibility along vertical profile • Motorists exceed posted speed limits by 15 km/h	• Similar travel time due to maintained existing posted speed limit • Improved and adequate visibility as vertical alignment accommodates proposed posted speed limit • Reduced conflicts between all road users due to improved visibility	• Option 2 preferred as visibility is improved to meet design standards, and conflicts are reduced between all road users
Accommodation of motorists	• Rolling profile with a moderate crest/sag is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited visibility of vertical alignment • Conflicts with all other road users due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with a moderately flattened crest/sag improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as moderately smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of trucks	• Rolling profile with a moderate crest/sag is a less suitable environment for movement and travel along corridor • Braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to limited visibility of vertical alignment • Conflicts with all other road users due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits • Load restriction on Bush Street	• Smoother profile with a moderately flattened crest/sag improves movement and travel along corridor • Reduced braking and conflicts with other vehicles on the road, and vehicles on intersecting roads/driveways due to improved and adequate visibility of vertical alignment • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits • Existing load restriction on Bush Street applies	• Option 2 preferred as moderately smoother profile improves travel along corridor, improves visibility, reduces braking, and reduces conflicts with all other road users
Accommodation of farm vehicles	• Rolling profile with a moderate crest/sag is a less suitable environment for movement and travel along corridor • Conflicts with all other road users due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with a moderately flattened crest/sag improves movement and travel along corridor • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as moderately smoother profile improves travel along corridor, improves visibility, and reduces conflicts with all other road users
Accommodation of cyclists	• Rolling profile with a moderate crest/sag is a less suitable environment for cyclists • Conflicts with motorized vehicles due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with a moderately flattened crest/sag improves movement and travel along the corridor, and enhances environment for cyclists • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as moderately smoother profile enhances environment, and reduces conflicts with all other road users
Accommodation of pedestrians	• Rolling profile with a moderate crest/sag is a less suitable environment for pedestrians • Conflicts with motorized vehicles due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with a moderately flattened crest/sag improves movement and travel along corridor, and enhances environment for pedestrians • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as moderately smoother profile enhances environment, and reduces conflicts with all other road users
Accommodation of horses	• Rolling profile with a moderate crest/sag is a less suitable environment for horses • Conflicts with motorized vehicles due to limited visibility of vertical alignment, and vehicles exceeding posted speed limits	• Smoother profile with a moderately flattened crest/sag improves movement and travel along corridor, and enhances environment for horses • Reduced conflicts with all other road users due to improved and adequate visibility of vertical alignment, designed to accommodate existing posted speed limits	• Option 2 preferred as moderately smoother profile enhances environment, and reduces conflicts with all other road users

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Bush Street Vertical Alignment Options Option 1: Do Nothing 50 km/h Posted Speed	Option 3: 60 km/h Design Speed 50 km/h Posted Speed	EVALUATION
Option Description	• 50 km/h posted speed from Shaws Creek Road to 150 metres east of Shaws Creek Road	• 60 km/h design speed from Shaws Creek Road to 150 metres east of Shaws Creek Road • 50 km/h posted speed from Shaws Creek Road to 150 metres east of Shaws Creek Road	
Safety	• Vertical alignment provides sufficient visibility for 50 km/h design speed at some locations • Posted speed matches design speed • Limited and sub-standard visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Vertical alignment provides sufficient visibility for the proposed 50 km/h posted speed • Improved and adequate visibility for motorists to see other vehicles on the road, vehicles on intersecting roads and residential driveways, and cyclists/pedestrians	• Option 2 preferred as vertical alignment meets design standards of proposed posted speed limits, reduces conflicts between all road users, and improves overall safety
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies through adequate ditches	• Option 2 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Option 2 preferred
Socio-Economic Environment			
Residential properties	• No impacts	• Potential moderate impacts to properties, if grading extends beyond existing ROW • Grading impacts moderately affect 3 driveways, to be lowered by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts
Farm operations	• No impacts	• Potential moderate impacts to properties, if grading extends beyond existing ROW • Grading impacts moderately affect 3 driveways, to be lowered by approximately 0.5 m or greater • Improved visibility of vehicles entering and existing driveways and intersections throughout corridor	• Option 1 preferred as there are no impacts
Businesses	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts • Potential archaeological impacts if grading extends beyond existing ROW	• Option 1 preferred
Built and cultural heritage resources	• No impacts	• Potential impacts to cultural heritage landscape (farm complex including wooden fence) east of Shaws Creek Road on the south side, if grading extends beyond existing ROW	• Option 1 preferred as there are no impacts
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Moderate air, noise, vibration impacts during construction • Reduced air, noise, vibration impacts due to fewer vehicles braking and accelerating throughout corridor	• Option 1 preferred as there are no impacts
Natural Environment			
Terrestrial habitat	• No impacts	• Some encroachment into adjacent culturally-influenced vegetation communities • Removal of some individual trees may be required due to site grading • No encroachment into ESA, ANSI; occurs within Greenbelt Natural Heritage System	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat
Aquatic environment	• No impacts	• No impacts	• No difference
Wetlands and watercourses	• No impacts	• No impacts	• No difference
Species at risk	• No impacts	• Requires encroachment into Jefferson Salamander regulated habitat • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; habitat may be directly impacted by tree removals if necessary	• Option 1 is preferred as it avoids impacts to Jefferson Salamander regulated habitat and potential impacts to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No impacts	• No difference
Wildlife movement corridors	• No impacts	• May cause minor disturbance to amphibian crossing activities during construction. • Grading requirements may remove roadside vegetation that provides cover to crossing amphibians, thereby increasing potential for crossing deterrence or vulnerability to predation.	• Option 1 is preferred as it avoids potential impacts to amphibian crossing success.

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Bush Street Vertical Alignment Options		EVALUATION
	Option 1: Do Nothing 50 km/h Posted Speed	**Option 3: 60 km/h Design Speed 50 km/h Posted Speed**	
Option Description	• 50 km/h posted speed from Shaws Creek Road to 150 metres east of Shaws Creek Road	• 60 km/h design speed from Shaws Creek Road to 150 metres east of Shaws Creek Road • 50 km/h posted speed from Shaws Creek Road to 150 metres east of Shaws Creek Road	
Stormwater management	• No impacts	• Improved stormwater drainage system	• Option 2 is preferred as it incorporates improved stormwater drainage.
Natural hazards	• No impacts	• No impacts	• No difference
Niagara Escarpment impacts	• No impacts	• Portion of ROW occurs within Escarpment Rural Area designation; no significant impacts anticipated.	• No difference
Capital Costs			
Construction costs	• Low construction cost due to minimal construction work required	• Higher construction cost due to cut and fill required for profile modifications	• Option 1 results in lowest construction cost
Property acquisition	• No property acquisition required	• Potential property acquisition required if grading extends beyond existing ROW, potential easements may be required for localized improvements	• Options 1 results in no property acquisition anticipated
OVERALL			
		• Option 3 preferred as the improved vertical alignment meets design standards for the proposed posted speed limit (same as existing posted speed limit), and addresses sightline and safety issues for all road users, while minimizing socio-economic, and natural environmental impacts	

Legend:

Preferred	Less Preferred	Least Preferred

Based on the preceding evaluation, an 80 km/h design speed (70 km/h posted speed) profile (Option 2) is preferred for Bush Street between Winston Churchill Boulevard and Shaws Creek Road, and a 60 km/h design speed (50 km/h posted speed) profile (Option 3) is preferred for Bush Street between Shaws Creek Road and approximately 150 metres east of Shaws Creek Road.

10.2 Bush Street Preferred Design Concept

The preferred designs were chosen with consideration to environmental impacts, cultural heritage impacts, safety, aesthetics, drainage, entrance access and property impacts, and capital construction and maintenance costs. This section presents the preferred designs that best incorporate these parameters. Consultation with agencies and the public, as discussed in **Section 2**, helped arrive at the preferred designs discussed in this section.

10.2.1 Design Criteria for Bush Street

The following outlines the design criteria for Bush Street, based on different design speed options considered. Although a higher (90 km/h) design speed is desired, in order to accommodate all road users while minimizing impacts to the study area features and surrounding landscape, the project-specific design standards are based on a lower (60/80 km/h) design speed.

	PRESENT CONDITIONS	DESIGN STANDARDS	**PROJECT** DESIGN STANDARDS (for segment from west of Shaws Creek to the Village, excluding the Village)	**PROJECT** DESIGN STANDARDS (for segment from WCB to west of Shaws Creek)	**DESIRED** DESIGN STANDARDS	REFERENCE
HIGHWAY CLASSIFICATION	RAU 50/60/90	RAU 50	RAU 60	RAU 80	RAU 90	
MINIMUM STOPPING SIGHT DISTANCE	N/A	60-65 m	75-85 m	115-140 m	130-170 m	(TAC – page 1.2.5.4 Table 1.2.5.3)
MIN. EQUIV. VERTICAL CURVE (WITH ILLUMINATION)[11]	N/A	6-7 - CREST 5-6 –SAG (Comfort)	10-13 - CREST 8-9 –SAG (Comfort)	24-36 - CREST 12-16 –SAG (Comfort)	32-53 - CREST 15-20 –SAG (Comfort)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MIN. EQUIV. VERTICAL CURVE (WITHOUT ILLUMINATION)[12]	N/A	6-7 - CREST 11-12 –SAG (Headlight Control)	10-13 - CREST 15-18 –SAG (Headlight Control)	24-36 - CREST 25-32 –SAG (Headlight Control)	32-53- CREST 30-40 –SAG (Headlight Control)	(TAC – page 2.1.3.6 Table 2.1.3.2) (TAC-Page 2.1.3.9. Table 2.1.3.4)
MAXIMUM GRADIENT	N/A	8-10%	8-10%	8-10%	8-10%	(To reflect prevailing conditions and maintain existing rural character)
MINIMUM CURVATURE	N/A	90 m	130 m	250 m	340 m	(TAC – page 2.1.2.13 Table 2.1.2.6)
SUPERELEVATION (ON CURVE)	N/A	6%	6%	6%	6%	(TAC – page 2.1.2.3)
LANE WIDTH	3.2-3.8 m – thru	3.3-3.7 m	3.3-3.7 m	3.5-3.7 m	3.5-3.7 m	(TAC – page 2.2.2.1 Table 2.2.2.1)
SHOULDER WIDTH	Varies (1.3 – 3.5 m)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	1.50 m min (Paved) 2.0 m (Unpaved)	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
SHOULDER WIDTH ON SIGNED BICYCLE ROUTE	Varies (1.3 – 3.5 m)	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	2.0 m desirable 1.2 m minimum	(OTM BOOK 18 Table 4.2)
DRAINAGE ZONE	Varies (m – m)	8.0 m	8.0 m	8.0 m	8.0 m	(Region of Peel's Road Characterization Study, Rural Road with 30 m ROW)
R.O.W. WIDTH	20 m - 45 m					
DESIGN SPEED		50 km/h	60 km/h	80 km/h	90 km/h	
POSTED SPEED	40/50/80 km/h	40 km/h	50 km/h	70 km/h	80 km/h	

NOTE 1: CROSS-SECTION ELEMENT WIDTHS MAY CHANGE DEPENDING ON AVAILABLE ROW WIDTHS
NOTE 2: ALTHOUGH HIGHER DESIGN SPEEDS ARE DESIRABLE, THEY MAY NOT BE ACHIEVABLE DUE TO EXISTING TERRAIN AND CONSTRAINTS, AS THEIR RESULTING IMPACTS WOULD BE SIGNIFICANT. THEREFORE, LOWER DESIGN SPEEDS HAVE BEEN SELECTED AS THE PROJECT DESIGN STANDARDS FOR THIS SEGMENT.

[11] Applies only at some locations
[12] Applies for the majority of the study area

10.2.2 Typical Cross Section

Due to a wider available right-of-way along Bush Street, a rural cross-section can be accommodated and is therefore proposed for the majority of the corridor, between Stations 10+000 (Winston Churchill Boulevard) and 11+125, and between Stations 11+220 and 11+365 (Shaws Creek Road). This cross-section consists of one 3.5 metre wide travel lane (vehicle zone) in each direction, with a 1.7 metre wide paved shoulder to accommodate active transportation and 0.5 metre rounding on each side of the road. Drainage is addressed through ditches with 2:1 slopes on either side (refer to **Section 10.2.6** for more details). This cross-section connects to a rural cross-section at Winston Churchill Boulevard.

Figure 80: 11.4 m Platform Rural Cross-Section for Bush Street

Between Stations 11+125 and 11+220, where there is a steep slope and an existing guiderail on either side of the road, the proposed design will match to existing conditions. The road platform (including one 3.5 metre travel lane or vehicle zone in each direction and 1.7 metre paved shoulder on each side of the road) will fit between the existing guiderails, and drainage will follow existing conditions, with water flowing down the steep slopes on either side of the road. No mountable curb is proposed through this segment.

East of Shaws Creek, a transition to a semi-rural cross-section is proposed for continuity with the cross-section through the Belfountain Village (refer to **Section 9.2.2**).

Opportunities to use alternative construction materials throughout the study area for curbs and other roadway elements, to maintain the rural character of the study area, can be reviewed during detailed design. These may include, for example, using dark coloured curbs to blend in with the asphalt and make them less noticeable.

Design cross-sections at an interval of 20 metres are included in **Appendix W**.

10.2.3 Horizontal Alignment

The proposed design with a 60-80 km/h design speed recommends a shift to the south between Stations 10+175 and 11+160 to centre roadway within the existing right-of-way and minimize impacts to culturally significant fence and avoid property acquisition on the north side. At all other locations, the proposed design closely follows the existing road centreline.

The proposed horizontal alignment is illustrated on the plates in **Section 10.2.8**.

10.2.4 Vertical Alignment

The proposed vertical alignment accommodates a 60-80 km/h design speed. Between Winston Churchill Boulevard and Shaws Creek Road, the proposed design follows an 80 km/h design speed. East of Shaws Creek Road, towards the village, the design follows a 60 km/h design speed to accommodate the existing 50 km/h posted speed limit. This vertical alignment was chosen to match the existing road profile wherever possible, while at the same time improving any existing substandard grades and vertical curves to meet the geometric standards required for the class of the road, as per the design criteria in **Section 10.2.1**. The vertical profile also aims to minimize impacts to existing entrances and driveways, and to reduce grading impacts to adjacent properties and features.

Crest and sag curves throughout Bush Street will have a minimum K value of 24 and 25, respectively, for the 80 km/h design speed section, and a minimum K value of 10 and 15, respectively, for the 60 km/h design speed section. This will satisfy the stopping and comfort requirement for a design speed of 60-80 km/h. A minimum gradient of 0.5% allows for proper drainage, and a maximum gradient of 7% maintains existing rural character.

The proposed vertical profile and reduction in posted speed limit will provide sufficient stopping sight distance. The effect of grade on stopping sight distance at driveways was also assessed for the proposed vertical profile. In general, sufficient stopping sight distance is provided, or where the resulting stopping sight distance is deficient, conditions are improved compared to the exiting road profile.

The proposed vertical alignment is illustrated on the plates in **Section 10.2.8**.

10.2.5 Geotechnical

As discussed in **Section 4.7**, existing pavement along Bush Street is generally in good condition. Based on existing conditions, the general pavement structure below is recommended for Bush Street:

- HMA: 125 mm
  - 50 mm HL-1 or Superpave 12.5 FC1 surface course
  - 75 mm HL-8 or Superpave 19 Binder Course
- Granular A: 150 mm
- Granular B: 400 mm

Terraprobe provided the geotechnical recommendations shown in **Table 52** based on a preliminary profile that HDR did not have access to at the time of writing this report. These preliminary recommendations are based on the vertical profile being raised, and where a grade raise cannot be accommodated, full depth reconstruction should be considered.

Table 52: General Pavement Recommendations for Bush Street

Bush Street Rehabilitation (Sta. -0+044 to Sta. 2+070)*				
Treatment	**Other Treatments**	**Full Depth Asphalt Replacement**	**Cold In Place Pulverization**	**Remarks****
Sta. -0+044 to Sta. 0+000	Mill 50 mm and Repave with 50 mm HMA	Remove asphalt full depth. Compact existing granular then place and compact Granular A as required to achieve design profile of HMA/Base interface. Repave with 125 mm HMA		Recommend Full Depth Asphalt Replacement
Sta. 0+000 to Sta. 0+450		Remove asphalt full depth. Compact existing granular then place and compact Granular A to achieve design profile of HMA/Base interface. Repave with 125 mm HMA	Mill existing HMA to 125 mm thick (mill 30 mm). Pulverize and blend 125 mm HMA with 125 mm of unbound granular then grade and compact Rap/Granular Blend. Raise grade to achieve design profile of HMA/Base interface by placing and compacting Granular A. Pave with 125 mm HMA	Construction costs will govern which option is chosen (Region to choose preferred option)
Sta. 0+450 to Sta. 0+950		Remove asphalt full depth. Compact existing granular then place and compact Granular A to achieve design profile of HMA/Base interface. Repave with 125 mm HMA	Mill existing HMA to 125 mm thick (mill 180 mm). Pulverize and blend 125 mm HMA with 125 mm of unbound granular then grade and compact Rap/Granular Blend. Raise grade to achieve design profile of HMA/Base interface by placing and compacting Granular A. Pave with 125 mm HMA	Construction costs will govern which option is chosen (Region to choose preferred option)
Sta. 0+950 to Sta. 1+350		Remove asphalt full depth. Compact existing granular then place and compact Granular A to achieve design profile of HMA/Base interface. Repave with 125 mm HMA	Mill existing HMA to 125 mm thick (mill 45 mm). Pulverize and blend 125 mm HMA with 125 mm of unbound granular then grade and compact Rap/Granular Blend. Raise grade to achieve design profile of HMA/Base interface by placing and compacting Granular A. Pave with 125 mm HMA	Construction costs will govern which option is chosen (Region to choose preferred option)

Bush Street Rehabilitation (Sta. -0+044 to Sta. 2+070)*				
Treatment	**Other Treatments**	**Full Depth Asphalt Replacement**	**Cold In Place Pulverization**	**Remarks****
Sta. 1+350 to Sta. 1+420	Full depth reconstruction (125 mm HMA, 150 Gran A and 400 Gran B)			
Sta. 1+420 to Sta. 2+070		Remove asphalt full depth. Compact existing granular then place and compact Granular A to achieve design profile of HMA/Base interface. Repave with 125 mm HMA	Mill existing HMA to 125 mm thick (mill 45 mm). Pulverize and blend 125 mm HMA with 125 mm of unbound granular then grade and compact Rap/Granular Blend. Raise grade to achieve design profile of HMA/Base interface by placing and compacting Granular A. Pave with 125 mm HMA	Construction costs will govern which option is chosen (Region to choose preferred option)

* Stationing is based on Terraprobe report, and differs from HDR station numbers. Terraprobe's Station 0+000 corresponds to HDR's 10+031, at the east jog of the Bush Street and Winston Churchill Boulevard intersection.
** This recommendation is based on the vertical profile being raised for most of the alignment, and where a grade raise cannot be accommodated, full depth reconstruction should be considered.

However, geotechnical design recommendations will vary based on the vertical alignment design and the typical cross-section to be applied, as proposed in this study:

- Where the vertical alignment is proposed to follow the existing ground profile, the above geotechnical recommendations apply
- Where vertical alignment modifications are proposed, full-depth pavement reconstruction will be required as pavement elevation will vary from existing
- Where a semi-rural cross-section applies, full-depth pavement reconstruction will be required to accommodate underground infrastructure
- Where a rural cross-section applies, the above recommendations based on vertical alignment should be followed

Therefore, based on the proposed cross-section and vertical alignment designs, full-depth pavement reconstruction is proposed for Bush Street between Winston Churchill Boulevard and east of Shaws Creek Road.

More details on the geotechnical assessment and pavement structure recommendations can be found in **Appendix U.1**.

10.2.6 Drainage

The preliminary stormwater management plan is designed to prevent impacts from the future roadway configuration by using available technologies and opportunities to achieve the highest degree of control possible given the constraints of the study corridor. The following design elements are recommended as part of the proposed roadway improvements:

1. Based on the findings of the culvert condition assessment, the hydraulic capacity assessments, the geomorphology assessment as well as Peel Region's criteria for minimum culvert opening requirements, it is recommended to replace or upgrade 31 transverse culvert crossings within the project limits (none of which are along Bush Street). In each case, the existing culvert crossings will be replaced by a pipe or concrete open bottom box culvert. Additional hydraulic analysis for non-watercourse crossings along Mississauga Road/Old Main Street and Bush Street will be required to finalize culvert crossing sizes.
2. No culvert crossing extensions are required to accommodate the proposed roadway improvements along this segment.
3. In addition, along Bush Street it is recommended to maintain one culvert crossing.
4. Surface water takings will be required where culvert replacement/upgrades are proposed. The water quantity/quality monitoring program will be developed during detailed design, at the time the Permit to Take Water (PTTW) application is submitted.
5. Where the roadway improvements recommend the provision of a semi-rural roadway cross-section, a subsurface drainage system is recommended for inclusion into the roadway cross-section. The subsurface drainage system will consist of a series of catchbasins, storm sewers and subdrains which will collect and convey both the granular base material and surface runoff and discharge to existing drainage outlets. The storm sewers shall be sized to accommodate a 10 year return period event, using a minimum inlet time of 15 minutes as per Region of Peel design standards. The design of the sewers will need to take into account any drainage from roadway boulevard areas as well as drainage external to the roadway right-of-way. Effort has been made to ensure that existing drainage patterns and locations are maintained throughout the various roadway corridors. A conceptual storm system layout is illustrated on the preliminary design plates in **Section 10.2.8**.
6. Where the proposed roadway improvements include a modification to a semi-rural cross-section, the requirement to maintain, relocate or remove entrance/driveway culverts should be examined during the detailed design phase. It is foreseeable that some culverts will no longer provide a drainage function under a semi-rural condition. In some instances however, external runoff from adjacent lands may need to be intercepted due to grade differences between roadway and adjacent properties. Where this occurs, appropriate ditch and culvert systems may need to be employed at driveway entrance locations to allow for conveyance of runoff to appropriate drainage outlets.
7. The principal features of the project's stormwater management system are the provision of oil-grit separator units to provide water quality control. A total of 14 OGS units are proposed throughout the study area (none of which are along Bush Street) providing a total collective area for stormwater treatment of 5.56 ha. Water quality criteria will be

met at each OGS location based on Enhanced (Level 1) protection as outlined in the MOE Stormwater Management Practices Manual.

8. Existing roadside ditches will be re-graded to flat-bottom swale systems (grassed swales), where possible, to provide additional water quality benefits within the project limits. It is recommended that during detailed design, the proposed grassed swale areas are reviewed for their effectiveness in meeting the MOE criteria for flowrate, velocity and contributing area.
9. It is noted that runoff from existing roadways do not provide any quality control. The incorporation of OGS and grassed swale systems will provide a net improvement to the quality of storm runoff within the project limits.
10. Erosion and sediment control measures should be implemented and monitored through the construction period. Construction activity should be conducted during periods that are least likely to result in in-stream impacts to fish habitat.

More details on the proposed stormwater management plan can be found in **Appendix R.3**.

10.2.7 Traffic Controls

The proposed design accommodates a 60-80 km/h design speed and 50-70 km/h posted speed limit. Between Winston Churchill Boulevard and approximately 100 metres west of Shaws Creek Road, it is recommended to lower the posted speed from 80 km/h to 70 km/h. Between just west of Shaws Creek Road and approximately 150 metres east of Shaws Creek Road, it is recommended to retain the 50 km/h posted speed limit as a transition into the Belfountain Village, where the posted speed limit is proposed to remain at 40 km/h.

Stop control at all intersections is proposed to remain as per existing conditions. No additional all-way stop control is proposed at any intersections along this section of Bush Street.

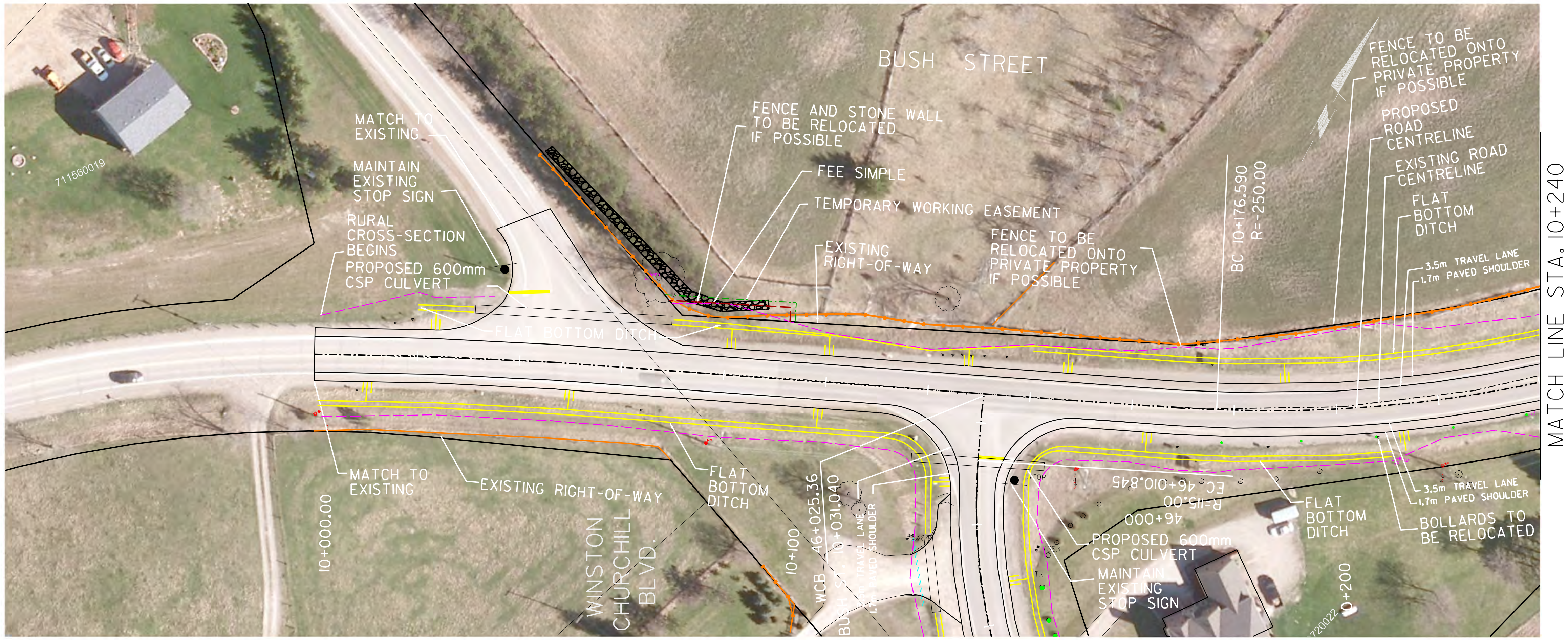
Illumination is proposed to remain as per existing conditions.

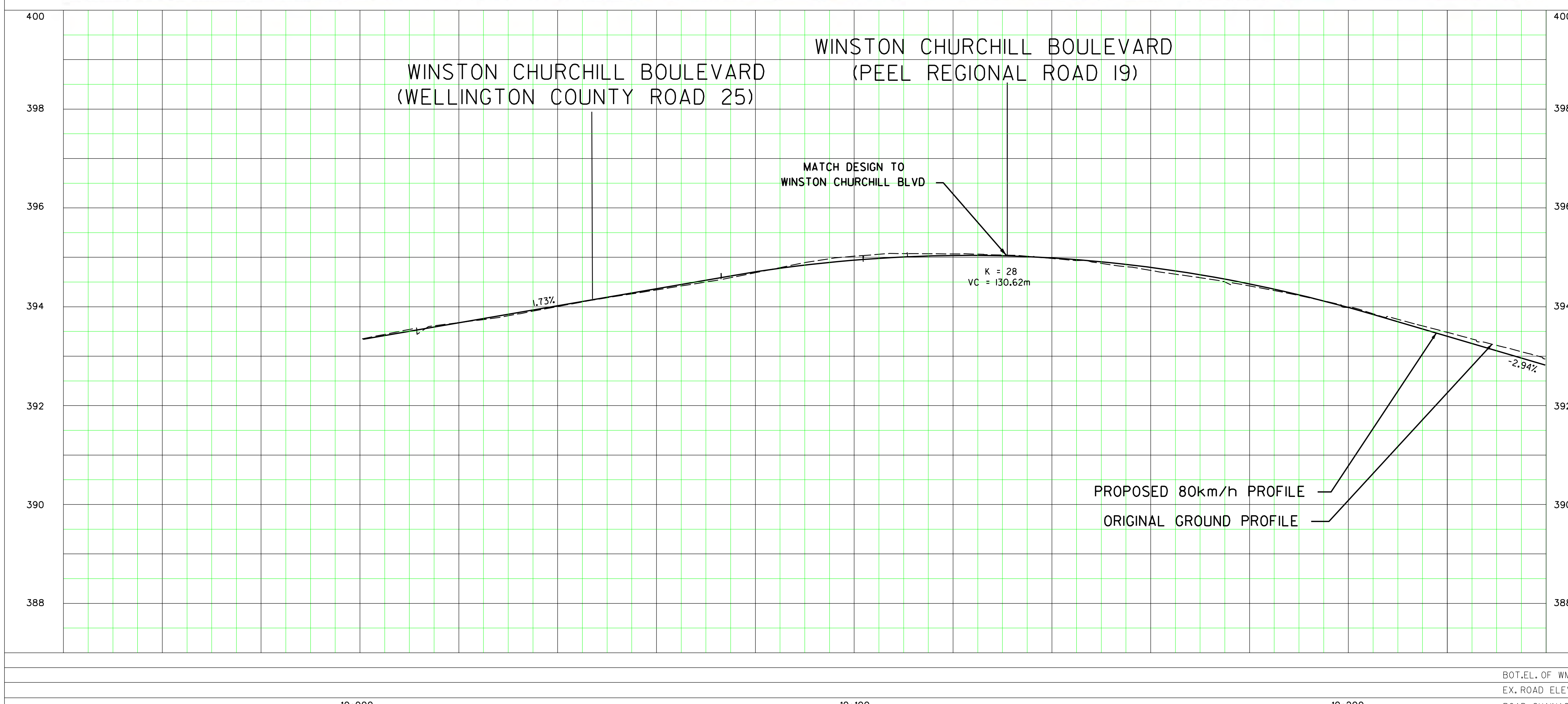
Some signs and bollards will need to be relocated to accommodate the new road platform. Locations are to be confirmed during detailed design. Roadway protection systems, such as guiderails, are to be considered where significant profile adjustments are proposed. This also needs to be reviewed during detailed design.

Existing truck and load restrictions along Bush Street are proposed to remain.

10.2.8 Design Plates

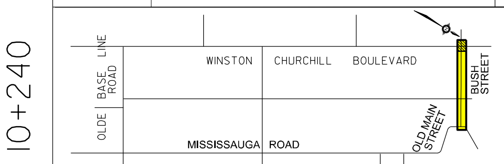
The following pages contain plan and profile plates illustrating the proposed design for Bush Street.





SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS		
DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND:
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- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
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- PROPOSED CATCHBASIN
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General Notes

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B.M. No. Elev.

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Designed by
Chkd.

Approved by

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

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CABLE TELEVISION/FIBREOPTIC PROVIDERS:
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ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

Region of Peel
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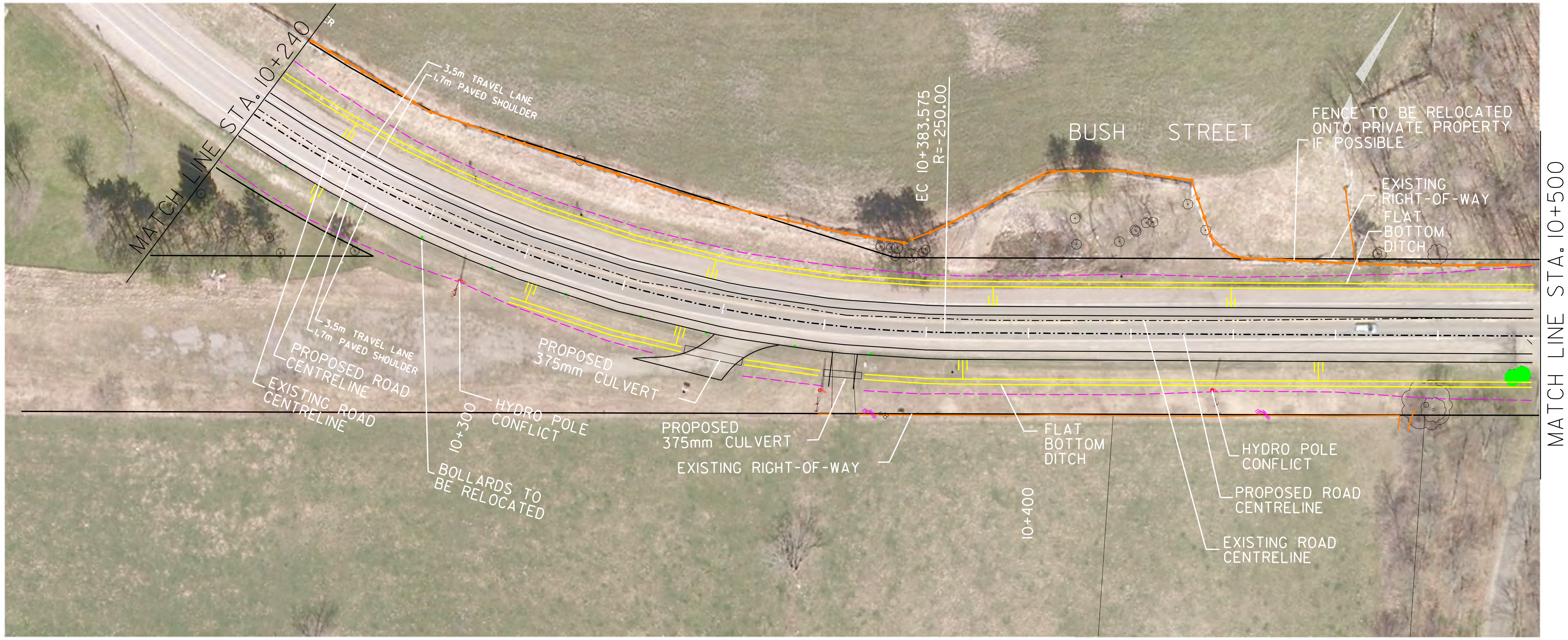
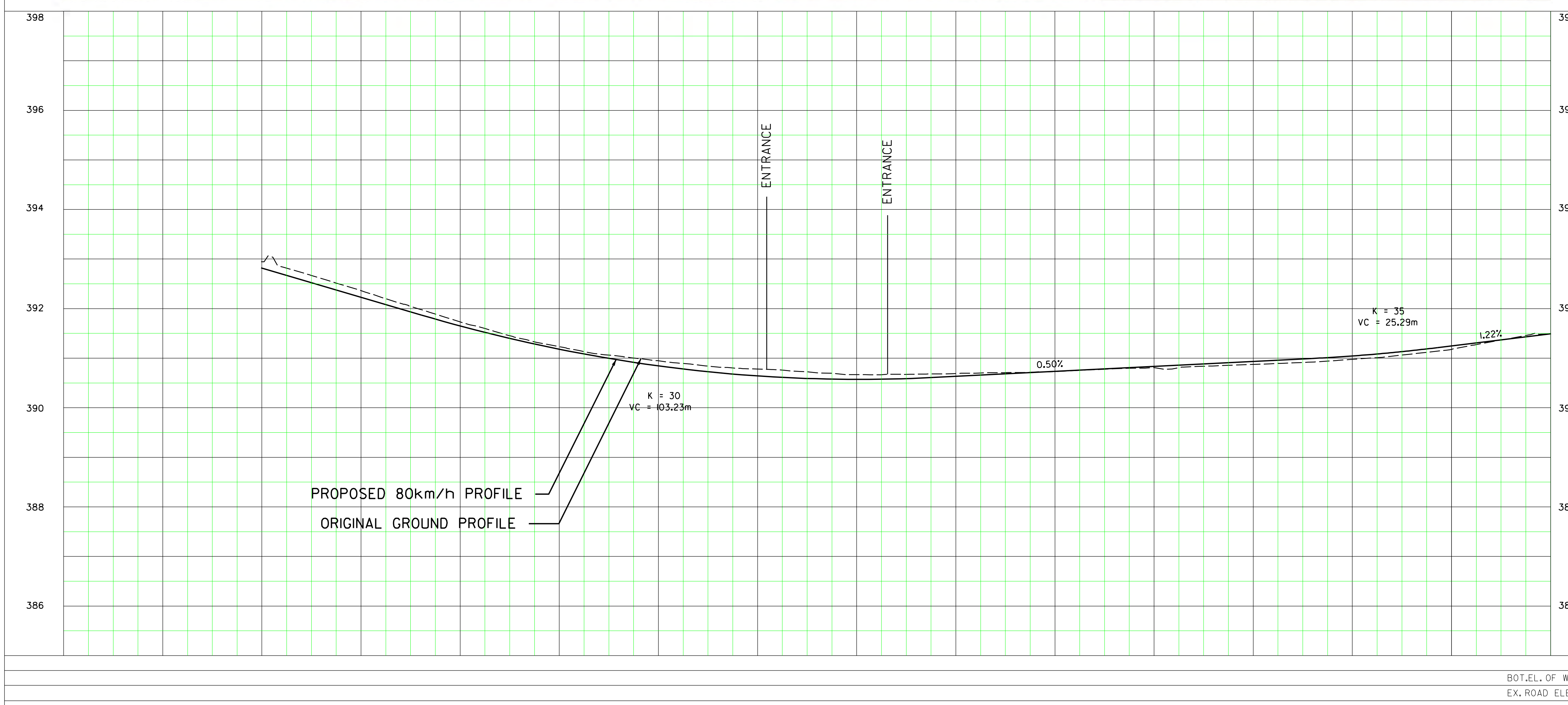
BUSH STREET

(FROM STA 10+000 to STA 10+240)

NEW CONSTRUCTION

CAD Area	Area x-x	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 1 of 8	Plan No. -D





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
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TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
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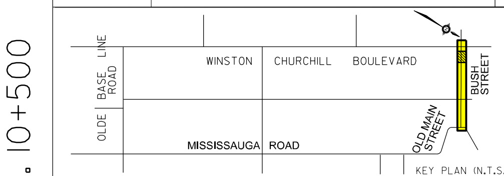
REVISIONS

DATE	DETAILS	INIT.



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Designed by Chkd.

Approved by

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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

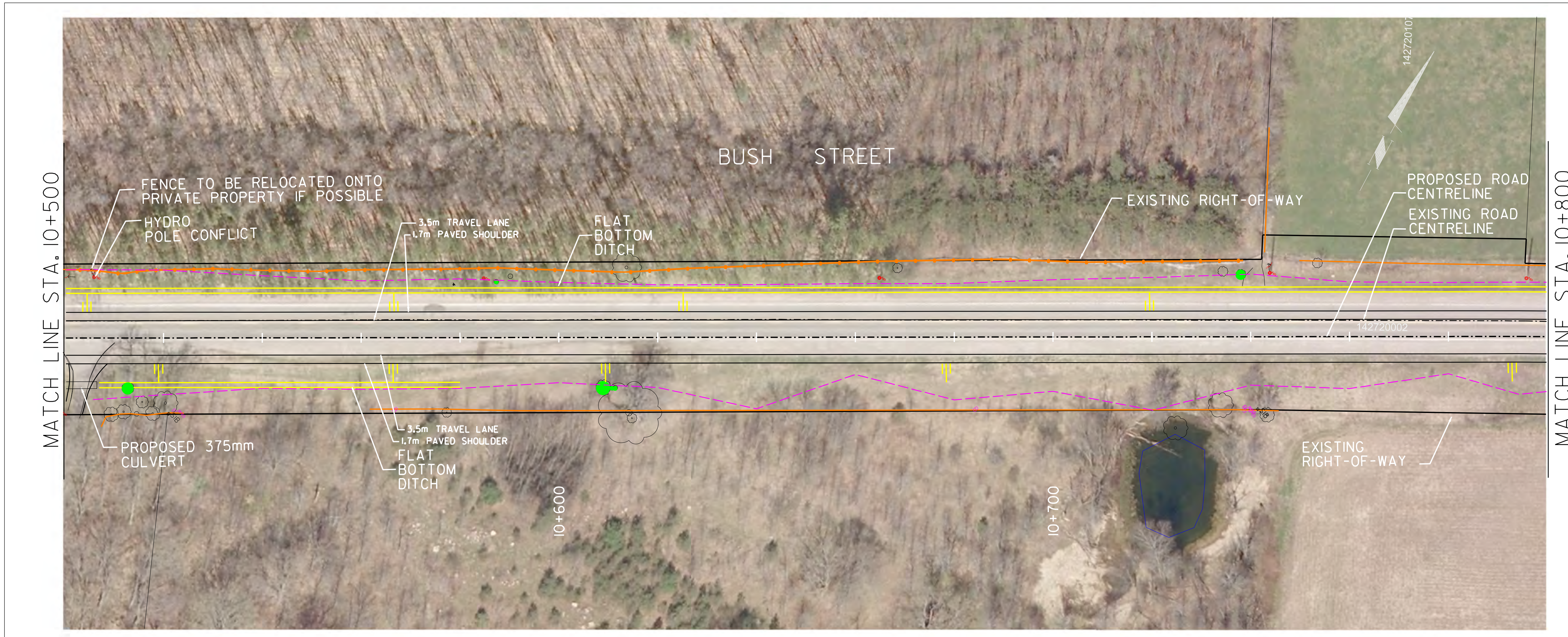
Region of Peel
Working for you

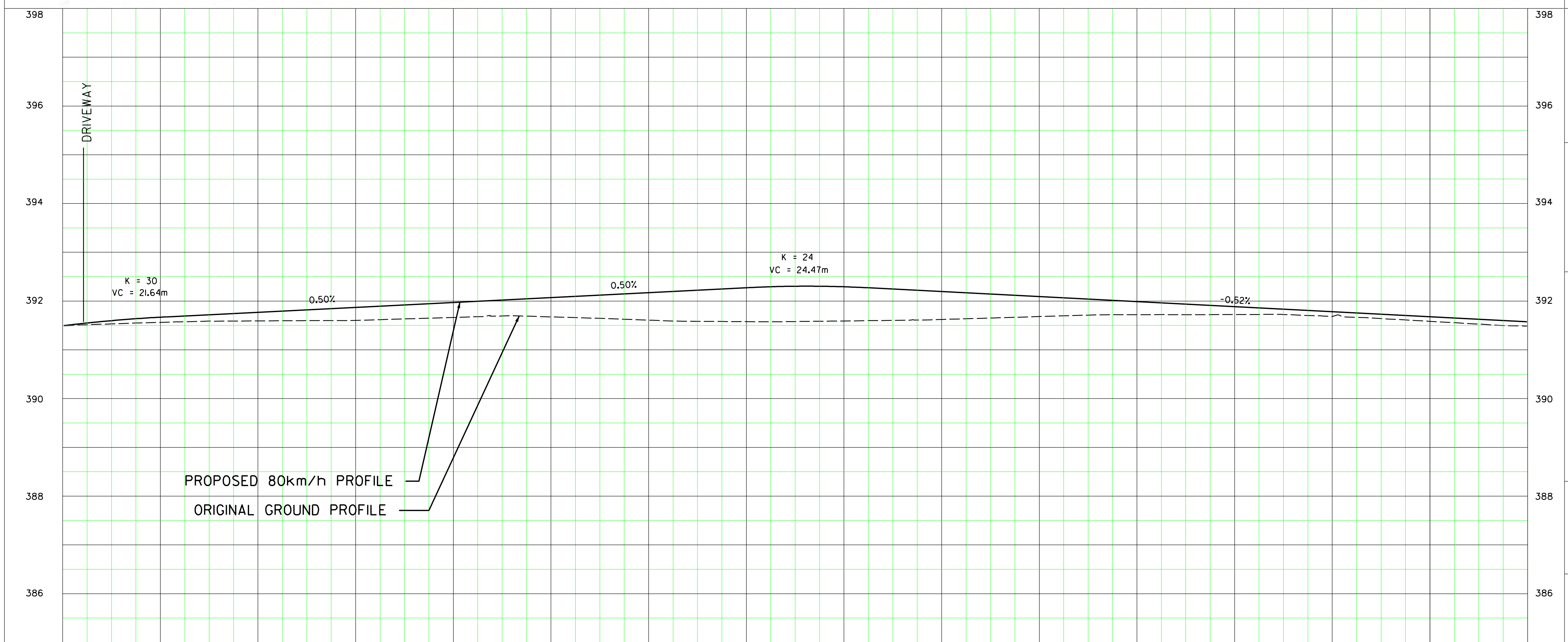
BUSH STREET

(FROM STA 10+240 to STA 10+500)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 2 of 8	Plan No. -D





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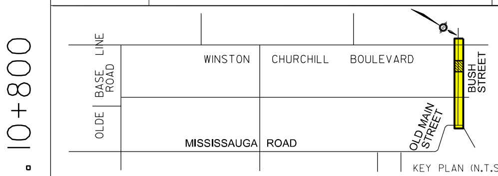

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

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10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

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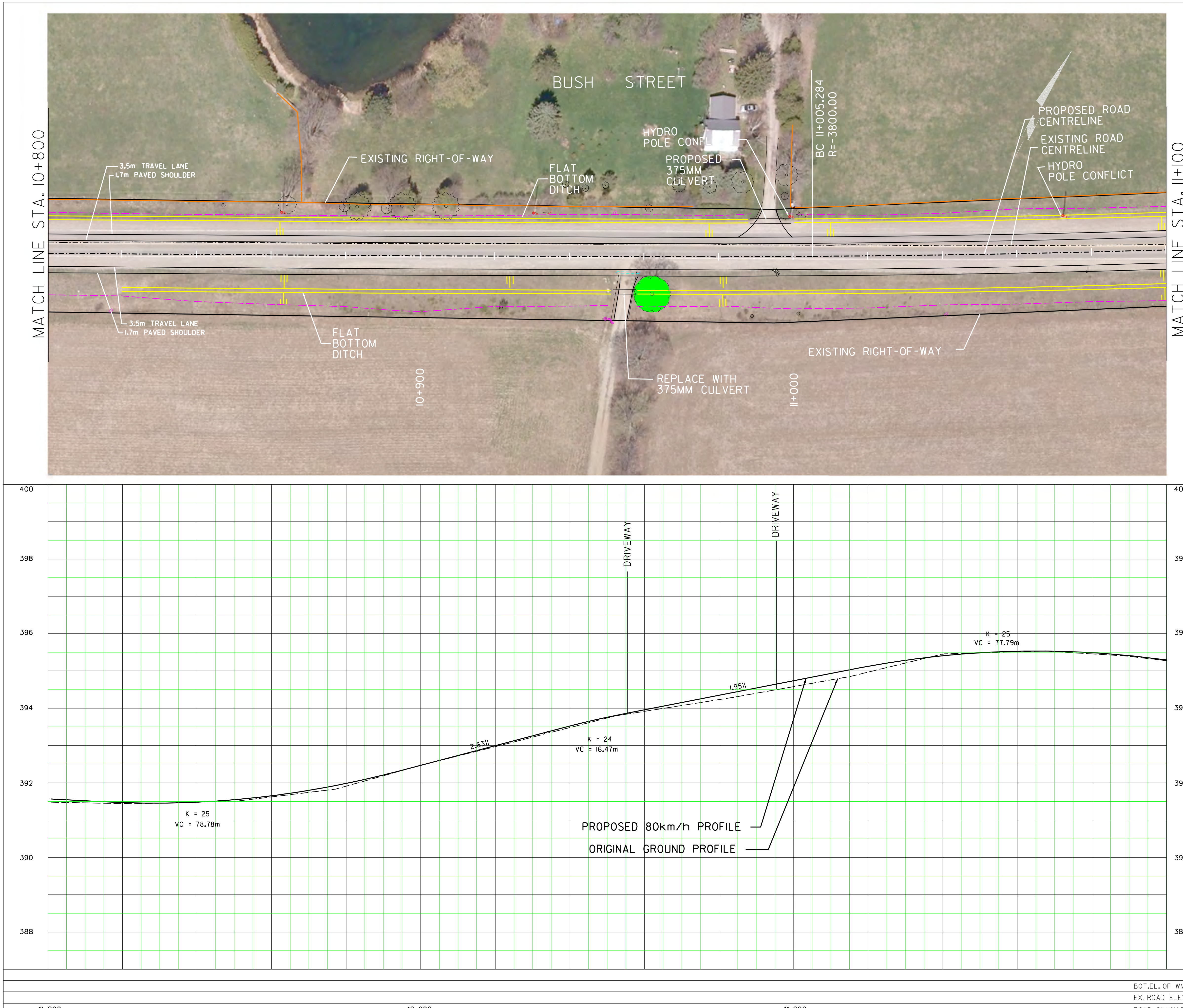
BUSH STREET

(FROM STA 10+500 to STA 10+800)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 3 of 8	Plan No. -D

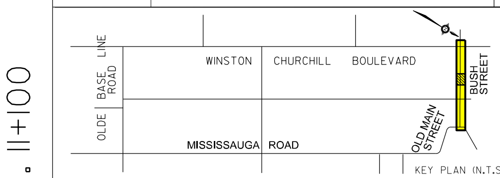


SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



KEY PLAN (N.T.S.)

LEGEND:

- PROPOSED GRADING LIMIT (RURAL CROSS SECTION)
- PROPOSED GRADING LIMIT (SEMI-RURAL CROSS SECTION)
- PROPOSED PROPERTY LINE (FEE SIMPLE TAKING)
- TEMPORARY WORKING EASEMENT
- FENCE/GUIDE RAIL
- CULTURALLY SIGNIFICANT FENCE
- HERITAGE STONE WALL
- PROPOSED CENTRE LINE
- EXISTING CENTRE LINE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED EDGE OF ASPHALT
- EXISTING RIGHT OF WAY
- DESIGNATED RIGHT OF WAY
- EXISTING CULVERT
- DITCH GRADING
- PROPOSED STORM SEWER
- PROPOSED CATCHBASIN
- TRAFFIC SIGN
- HP HYDRO POLE
- VEGETATION REMOVALS

NOTES
1. DRIVEWAYS TO BE REGRADED AS REQUIRED. TEMPORARY WORKING EASEMENTS WILL BE REQUIRED WHERE DRIVEWAYS ARE TO BE REGRADED.
2. HYDRO POLE CONFLICTS TO BE CONFIRMED DURING DETAILED DESIGN. PERMANENT AERIAL EASEMENTS AND POTENTIAL VEGETATION REMOVAL AS A RESULT OF HYDRO POLE RELOCATION TO BE CONFIRMED DURING DETAILED DESIGN.
3. REMOVAL OR REPLACEMENT OF DRIVEWAY CULVERTS IN SEMI-RURAL CROSS-SECTIONS TO BE REVIEWED DURING DETAILED DESIGN.
4. WHERE NECESSARY AND IF POSSIBLE, FENCING, PRIVATE SIGNS, ETC. TO BE RELOCATED OFF OF THE ROAD RIGHT-OF-WAY ONTO PRIVATE PROPERTY.
5. PROPERTY REQUIREMENTS ARE APPROXIMATE AND SUBJECT TO REFINEMENT DURING DETAILED DESIGN

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

B.M. No. Elev.

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

Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE

1m 0 1 2 3m VERTICAL SCALE

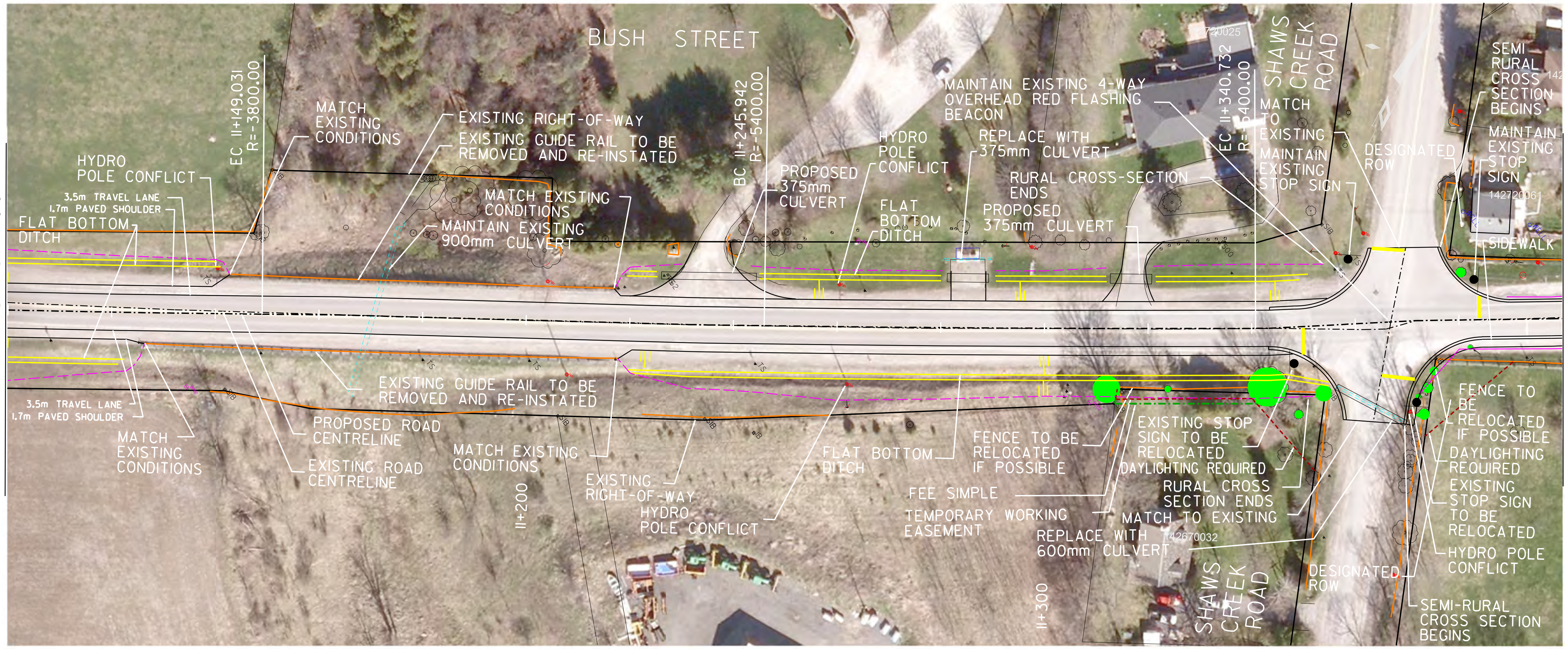
Region of Peel
Working for you

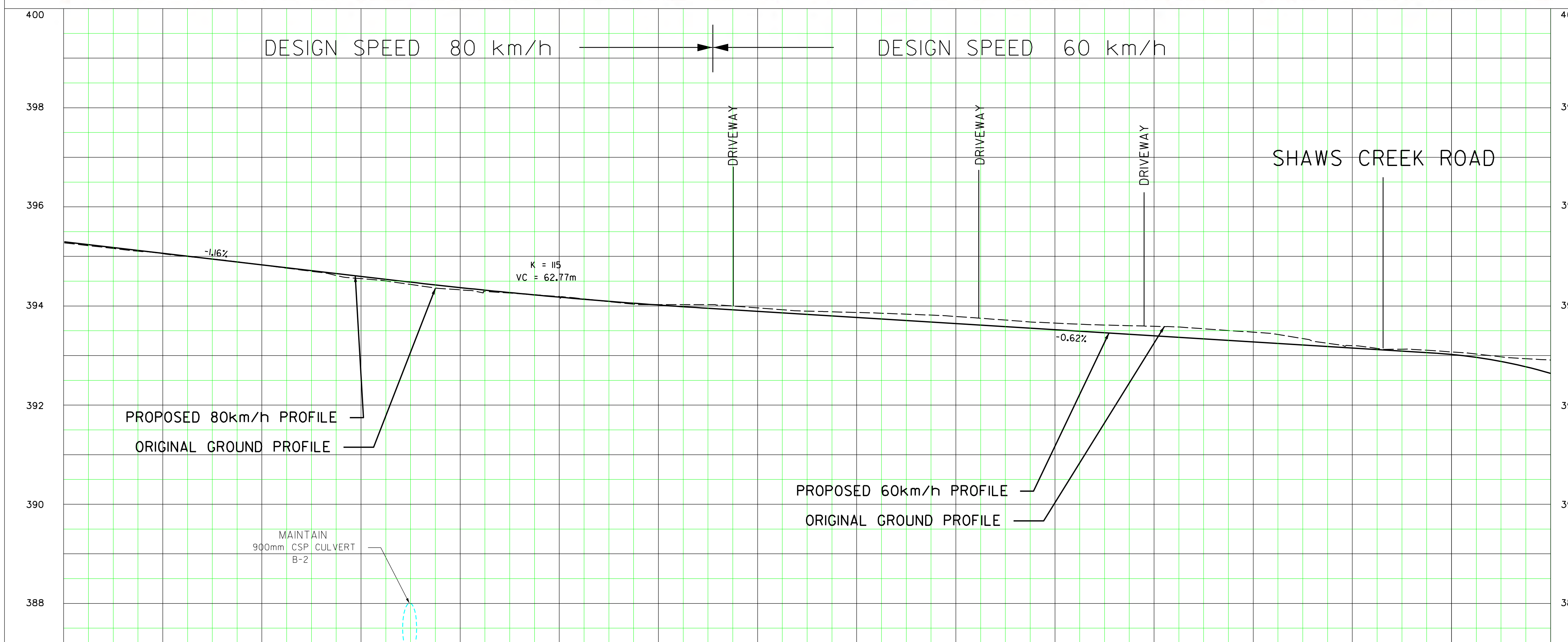
BUSH STREET

(FROM STA 10+800 to STA 11+100)

NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 4 of 8	Plan No. -D





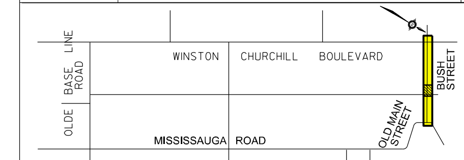
BOT.EL. OF WM.	
EX. ROAD ELEV.	
ROAD CHAINAGE	11+100 · 11+200 · 11+300

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.



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B.M. No. Elev.

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Designed by ____ ____ ____ ____ Chkd.____

Approved by ____ ____ ____ ____ ____

NOTICE TO CONTRACTOR
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BELL CANADA
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HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m HORIZONTAL SCALE
1m 0 1 2 3m VERTICAL SCALE

Region of Peel
Working for you

BUSH STREET
(FROM STA 11+100 to STA 11+400)
NEW CONSTRUCTION

CAD Area	Area X-X	Project No. XX-XXX
Checked by	Drawn by JM	
Date JUNE 6, 2014	Sheet 5 of 8	Plan No. -D

10.3 Impacts and Mitigation

The proposed cross-section, horizontal and vertical alignment designs aim to minimize impacts to adjacent lands and features, including naturally sensitive areas, vegetation, culturally significant fences and stone walls, buildings, and properties outside the road right-of-way. However, in order to accommodate all road users and bring the road up to standards for its role and function within the Regional road network, some impacts will need to be mitigated, as described below.

10.3.1 Summary of Identified Concerns and Mitigation Measures

Impacts along Bush Street (as identified in the preliminary design plates in **Section 10.2.8**.) and potential mitigation measures include:

- Grading impacts along the corridor can be mitigated by modifying the grading slope (in accordance with geotechnical recommendations), or in some cases considering a retaining wall or other type of soil retention feature.
- Impacts to sensitive natural features on the north side have been mitigated by realigning the road centreline at some locations, and matching existing conditions at the existing guiderail between Stations 11+125 and 11+220 to avoid an extensive grading footprint at this location. Tree removals will be required at various locations. In some cases, grading can be modified to minimize impacts and reduce the number of tree removals. Natural environment impacts and recommended mitigation measures are summarized in **Table 53**. Additional details are included in Natural Heritage report (**Appendix B**).Impacts to culturally significant fence on the north side have been mitigated by shifting the road to the south between Stations 10+175 and 11+160. The extent of impacts to other cedar and stone fence lines along Bush Street will require further review during detailed design. Where impacts to cedar rail fencing (also referred to as culturally significant fencing) and heritage stone walls, the following recommendations should be considered, in order of preference:
  - Where technically possible, make further adjustments to the profile, cross-section and grading limits of the proposed road improvements to avoid directly impacting the cedar rail fencing and the heritage stone walls.
  - If direct impacts are unavoidable, document and relocate cedar rail fencing and heritage stone walls further back on to the property in advance of construction activities. Prior to relocation, these resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a relocation plan which would lay out the actions and qualifications required and responsibilities of stakeholders in order to relocate and re-use the resource.
  - Where relocation is not possible for structural or other technical reasons, document and salvage cedar rail fencing and heritage stone walls in advance of construction activities. These resources should be subject to photographic documentation and compilation of a cultural heritage documentation report. In addition, such a mitigation strategy would include development of a salvage plan which would lay out the

actions and qualifications required and responsibilities of stakeholders in order to salvage the resource.
  - Complete a cultural heritage landscape documentation report to document the roadscapes in advance of construction activities.
- In cases where cultural heritage resources are subject to indirect impacts, appropriate mitigation measures may include the introduction of landscape designs and vegetative elements to screen the disruptive aspects of the proposed road improvements.
- Where features such as private signs, fences, etc. encroach onto the road right-of-way, they should be relocated onto private property, if possible. If further assessment determines that it is not feasible to relocate the features, an encroachment agreement with the Region would be required. Some traffic signs and bollards will need to be relocated, as described in **Section 10.2.7**.
- Some hydro poles are currently located within or in close proximity to the proposed road platform and will need to be relocated. Clearance zone requirements and utility guidelines should be followed. Hydro pole conflicts identified in the design plates are to be confirmed during detailed design. Permanent aerial easements and potential vegetation removals as a result of hydro pole relocation are to be identified through the development of utility relocation design.
- Property acquisition will be required at some locations, as described in **Section 10.3.2**. In some cases, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations), or considering a retaining wall or other type of soil retention feature to minimize the amount of property acquisition required.
- Where driveways are to be regraded to accommodate vertical profile and cross-section modifications, temporary working easements will be required and are to be confirmed during detailed design.
- If construction extends beyond the disturbed ROW, a Stage 2 archaeological assessment is recommended on any lands along the study corridor where there is potential for archaeological sites (as identified in **Appendix C.1)**, in accordance with Draft Standards and Guidelines for Consultant Archaeologists (MCL 2009).
- Should the proposed work extend beyond the current study area, further Stage 1 assessment must be conducted to determine archaeological potential of the surrounding lands.
- In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the Ministry of Tourism, Culture and Sport should be immediately notified.
- No permanent noise and air quality impacts are anticipated as a result of the proposed road improvements, as no additional travel lanes will be provided and traffic is not expected to increase significantly. During construction, best management practices (such as the application of non-chloride dust suppressants) are to be applied to mitigate any air quality impacts caused by construction dust.
- If soil removed during construction is determined to be contaminated, the disposal of contaminated soil is to be consistent with Part XV.1 of the Environmental Protection Act and Ontario Regulation 153/04, Records of Site Condition, which detail the requirements related to site assessment and clean up.

- Water supply wells within or in close proximity to the study area may be affected by road construction, either because of construction activities or, later, due to additional or more proximate road salt application. Prior to construction, it is recommended to confirm which wells are used domestically, to ensure that affected well owners will continue to have water supplies of appropriate quality and in adequate quantities, and to ensure that any work done on affected wells or any replacement wells is done pursuant to O. Reg. 903, Wells (pursuant to the Ontario Water Resources Act).

All of these impacts and potential mitigation measures are to be confirmed during detailed design. Temporary construction impacts should also be reviewed and confirmed during detailed design.

Table 53: Summary of Natural Heritage Impacts and Recommended Mitigation – Bush Street

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Vegetation/habitat removal	▪ The majority of areas to be directly impacted by site grading and vegetation removal are culturally influenced. ▪ Protective fencing should be established around regionally significant plant species during construction to avoid impacts; where avoidance is not possible, regionally significant plant species should be relocated to suitable areas of habitat restoration, where feasible. All transplanted individuals must be monitored prior to at least one year prior to their relocation to ensure proper re-establishment.	▪ No significant impact	▪ Detailed tree inventory and protection measures to be determined as part of a Tree Management Plan ▪ Visual impact assessment to be undertaken, where necessary, to evaluate the impact of vegetation removal. ▪ Detailed three-season surveys are to be completed during the detailed design stage to identify and map regionally significant plant species within the study area. ▪ Tree inventory work completed during Detailed Design should include inventories for snags and cavity trees to assess potential for impacts to Little Brown Myotis habitat. ▪ Follow-up surveys should be implemented to verify the presence of, and potential for impact to the following Candidate Significant Wildlife Habitat types: • Snake hibernacula • Bat maternal roosts • Habitat for significant odonate species
Construction-stage impacts to crossing Jefferson Salamanders and other amphibians	▪ A permit under Section 17(2)(c) of the Endangered Species Act may be required where the proposed undertaking may cause impact to regulated habitat for Jefferson Salamander ▪ Provide construction personnel with materials to assist in the identification of Jefferson Salamanders. If any potential Jefferson Salamanders are observed, all work is to stop until the individual leaves the work zone and the OMNR has been notified.	▪ No significant impact	▪ Strategies to minimize impact and provide Overall Benefit to Jefferson Salamander to be determined in development of ESA “C” permit application ▪ Construction Sightings Protocol to be developed
Bird nesting disruption and avoidance, and active nest destruction	▪ Time vegetation removal activities to occur outside the typical bird breeding season (May 1 – July 31) ▪ If vegetation removal must occur during the bird breeding season, retain an avian biologist to survey for active nests just prior to vegetation removal activities	▪ No significant impact	
Wildlife avoidance of the area, and other impacts associated with construction	▪ Restrict the daily timing of construction activities to between 7:00 am and 7:00 pm. ▪ Moisten bare dirt surfaces with water to limit impacts caused by dust. ▪ Direct night-time lighting away from adjacent natural features. ▪ These construction-related impacts are expected to be temporary, minimal and localized.	▪ No significant impact	
Deer/motor vehicle collisions	▪ Snow banks should be removed by snow plows in winter to increase visibility for both crossing deer and motorists. ▪ An increase in the annual sustainable deer hunt for the study area vicinity should be explored with OMNR as a means to control local deer populations.	▪ No significant impact	
Impacts to fish and fish habitat	▪ All in-water work should occur during dry and/or low flow conditions to avoid or minimize impact to fish and fish habitat within and downstream of the construction site. ▪ Specific timing windows are to be determined in consultation with the OMNR and DFO. ▪ Where feasible, culvert replacements should comprise arch/open bottom culverts to provide better fish habitat, connectivity, and improve the potential for groundwater inputs. ▪ Where impacts to fish and fish habitat may occur, a DFO Fisheries Act Authorization may be required. ▪ Any fish that may be caught within areas impounded and de-watered for in-water construction activities should be captured and relocated prior to construction.	▪ No significant impact	▪ Where necessary, fish and wildlife salvage plans should be created for watercourse areas to be de-watered for in-water construction work.
Damage or other disturbance to the adjacent natural features	▪ Clearly demarcate the limits of construction with silt fencing or brightly coloured snow fencing around the limits of the construction zone.	▪ No significant impact	

Potential Impact	Recommended Mitigation Measure(s)	Potential Residual Impact	Detailed Design Stage Recommendations
Erosion and sedimentation	▪ A Sediment and Erosion Control Plan should be developed and implemented. ▪ Install silt fencing along the boundaries of the construction zone, inspect on a regular basis, remove accumulated sediment as needed and immediately replace any damaged fencing. ▪ Construction activities should be timed to occur outside of seasonally wet periods, during heavy rain, or during periods of rapid snowmelt.	▪ No significant impact	▪ Sediment and Erosion Control Plan to be developed.
Alterations to hydrological regime of watercourses and wetlands	▪ Increased stormwater runoff associated with increased areas of impervious surface are not anticipated to cause significant increases to natural feature hydrological inputs, due to the relatively small hydrological contributions provided by road surfaces versus surrounding areas of catchment. ▪ Replacement culverts must be properly sized to prevent increases or decreases in hydrological flow to wetland features, particularly those wetlands that provide significant habitat for Jefferson salamander, western chorus frog, or where they provide significant amphibian breeding habitat. ▪ Any upgrades to culverts that provide flow between wetlands will be maintained at existing culvert invert elevations in order to maintain wetland levels. ▪ In semi-rural sections where subsurface drainage systems are proposed, the incorporation of trench plugs will be required to minimize groundwater interception. These should be employed in the vicinity of all wetlands.	▪ No significant impact	
Impacts to water quality of watercourses and wetlands	▪ Treatment trains comprising OGS units and grassed swales are designed to provide an Enhanced (Level 1) level of water quality treatment to intercepted stormwater runoff. ▪ Where only one component (OGS unit or grassed swale) has been proposed, water quality improvements are anticipated over existing conditions. ▪ Treated pavement area significantly exceeds the area of new pavement proposed for the study area, representing a 101% increase in treated pavement area. ▪ At a minimum, the most sensitive natural features (i.e., PSWs, including Jefferson salamander breeding habitat, fish habitat) should receive an Enhanced level of water quality treatment. ▪ Construction machinery should arrive on-site in a clean state and should be refueled and washed at least 30 m away from permanent watercourses or wetlands. ▪ A Spill Response Plan should be developed and implemented as necessary during site construction. ▪ Water removal required for in-water construction de-watering purposes must be adequately filtered prior to discharge into the receiving watercourse, and monitored for pertinent water quality parameters, following established protocols and standards.	▪ No significant impact	▪ A water quality monitoring program may be considered within the framework of a Post-Construction Monitoring Program to be determined in consultation with the applicable agencies

10.3.2 Property Requirements

The proposed design attempts to minimize property requirements. Potential property acquisition (fee simple takings) and temporary working easements as a result of the proposed design are shown on the plates and summarized in **Table 54**. Although the Region of Peel Official Plan identifies wider designated right-of way widths at some locations, property acquisition as a result of the proposed design is only identified where required for the proposed improvements. Temporary working easements are based on a 1 metre buffer around grading, and 2.5 metre buffer around culverts and storm sewers.

Table 54: Potential Property Acquisition along Bush Street

Location and Description of Property Requirement	Approximate Area Required	
	Fee Simple Taking	Temporary Working Easement
10+068 to 10+094 (north side, grading)		30 m^2
10+068 to 10+094 (north side, grading)	65 m^2	
11+313 to 11+340 (south side, grading)	60 m^2	
11+313 to 11+340 (south side, grading)		60 m^2
South-west corner of Shaws Creek Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	
South-east corner of Shaws Creek Road intersection (15 m x 15 m standard daylighting triangle)	115 m^2	

As described in **Section 10.3.1**, property acquisition can be mitigated through permanent easements, modifications to grading slopes (in accordance with geotechnical recommendations) to reduce the amount of area required, or in some cases considering a retaining wall or other type of soil retention feature. Property and easement requirements identified in this section and shown on the design plates are preliminary and are to be confirmed during detailed design.

11. IDENTIFICATION AND EVALUATION OF INTERSECTION OPTIONS

The following sections identify and evaluate the options considered for the four main intersections in the study area. Where minor roads intersect the roads being studied, existing intersection concepts are proposed to remain and the proposed designs are to match to existing conditions.

11.1 Winston Churchill Boulevard / Olde Base Line Road Intersection Options

The following options were assessed for the Winston Churchill Boulevard / Olde Base Line Road intersection:

- **Option 1:** Do Nothing (three-legged intersection with stop control on Olde Base Line Road only)
- **Option 2:** Operational Improvements including All-Way Stop Control (three-legged intersection with stop control on Winston Churchill Boulevard and Olde Base Line Road, with a combination of operational improvements such as improved signage, reduced speed limits, and removal of vegetation)
- **Option 3:** Lane Realignment and All-Way Stop Control (three-legged intersection with stop control on Winston Churchill Boulevard and Olde Base Line Road, and realignment of all approaches on Winston Churchill Boulevard, as per completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road; illustrated in **Figure 81**)
- **Option 4:** Single-lane roundabout with three approaches (illustrated in **Figure 82**)

The evaluation for the above noted options is included in **Table 55**.

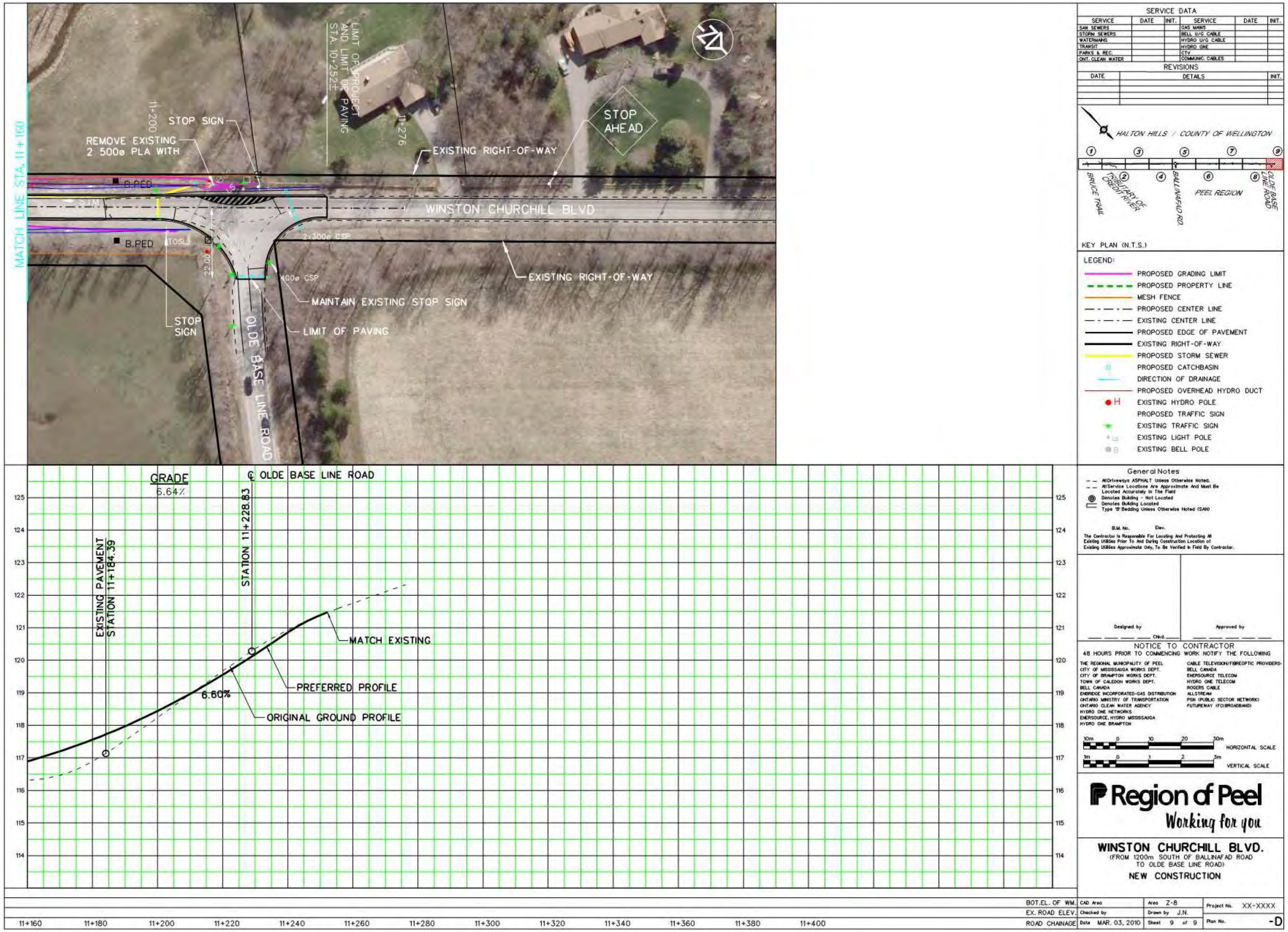

Figure 81: Proposed design as per completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road

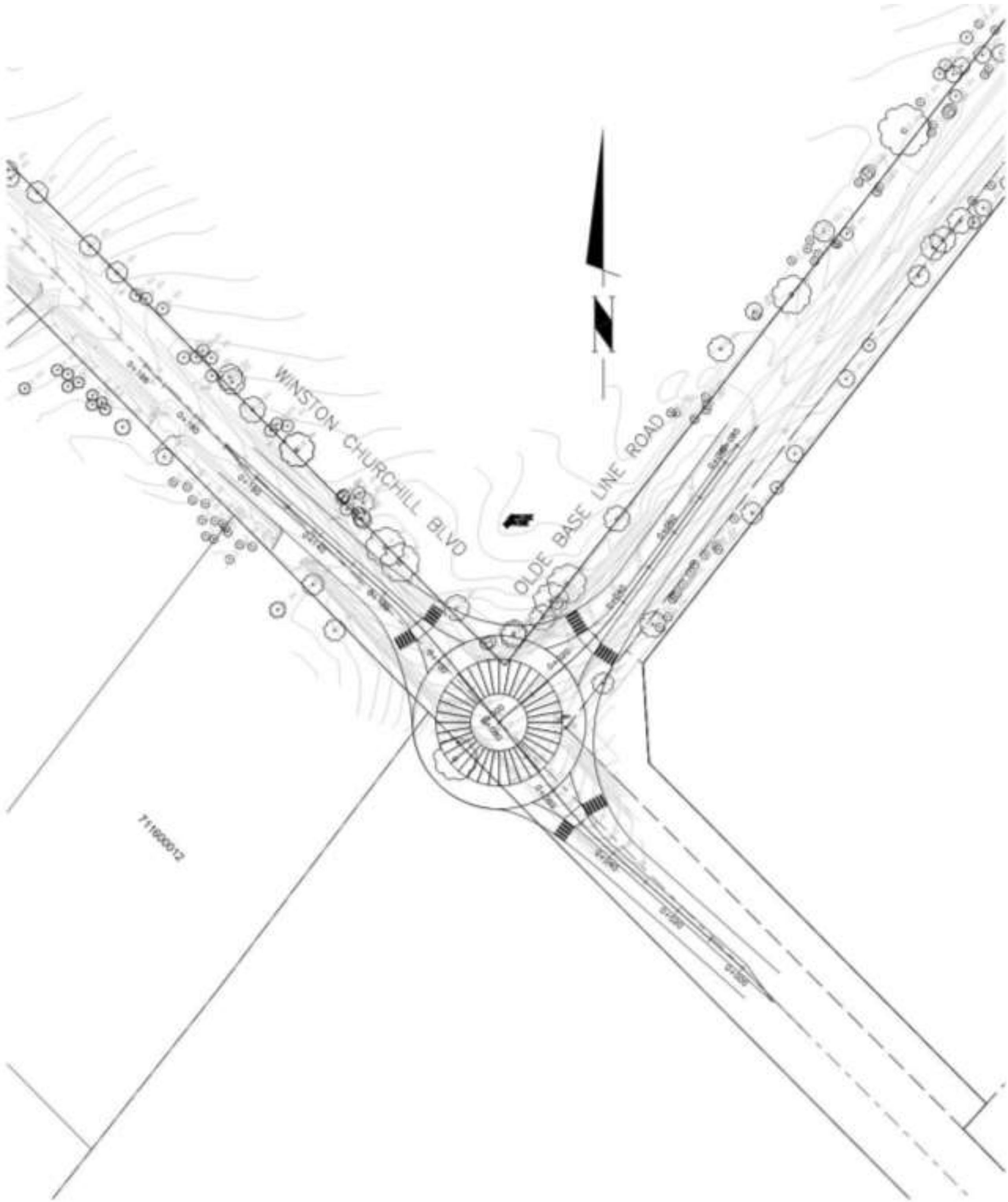

Figure 82: Winston Churchill Boulevard / Olde Base Line Road Roundabout Concept

Table 55: Winston Churchill Boulevard / Olde Base Line Road Intersection Option Evaluation

EVALUATION CRITERIA	Winston Churchill Boulevard and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including All-Way Stop Control**	**Option 3: Lane Realignment and All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Three-legged intersection • No stop control on Winston Churchill Boulevard • Stop control on Olde Base Line Road	• Three-legged-intersection • All-way stop control • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Three-legged-intersection • All-way stop control • Realignment of all approaches on Winston Churchill Boulevard • Design based on completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road	• Implementation of single-lane roundabout with three approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Rural Character					
Maintains rural character and countryside scenic quality	• Retains rural character	• Retains rural character	• Retains rural character	• Significant changes to rural character and countryside scenic quality with a more urbanized intersection	• Options 1, 2, 3 preferred
Transportation					
Geometric alignment	• Horizontal alignment unchanged • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment unchanged • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment adjusted on Winston Churchill Boulevard approaches; curvilinear design is not ideal for through traffic on Winston Churchill Boulevard • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment adjusted to accommodate roundabout design • Vertical alignment flattened out to accommodate roundabout design	• Options 1, 2, 4 preferred, but all options meet design standards
Traffic operations	• Traffic priority on Winston Churchill Boulevard; no delay to motorists • Slight delay to motorists on Olde Base Line Road due to stop control	• All approaches have equal priority • Increased overall delay on all approaches • Slightly reduced vehicular capacity on Winston Churchill Boulevard, and slightly increased capacity on Olde Base Line Road • Reduced speeds on all approaches • Reduced conflicts between approaches • All-way stop improves overall traffic operations • Intersection does not meet warrant for all-way stop control based on the minimum volume warrant (arterial and major roads), and the collision warrant, but may be warranted to improve sightlines south of the intersection • All-way stop control proposed in completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road	• All approaches have equal priority • Increased overall delay on all approaches • Slightly reduced vehicular capacity on Winston Churchill Boulevard, and slightly increased capacity on Olde Base Line Road • Reduced speeds on all approaches • Reduced conflicts between approaches • All-way stop improves overall traffic operations • Curvilinear lane alignment at intersection may cause driver confusion and deviation from travel lanes • Intersection does not meet warrant for all-way stop control based on the minimum volume warrant (arterial and major roads), and the collision warrant, but may be warranted to improve sightlines south of the intersection • Lane realignment and all-way stop control proposed in completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road	• All approaches have equal priority • Reduced overall delay on all approaches • Increased overall vehicular capacity of intersection • Reduced speeds on all approaches • Intersection meets warrants for roundabout implementation	• Option 4 preferred
Accommodation of motorists	• One lane on each approach, with all movements permitted based on intersection configuration	• One lane on each approach, with all movements permitted based on intersection configuration	• One lane on each approach, with all movements permitted based on intersection configuration	• One lane on all approaches	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including All-Way Stop Control**	**Option 3: Lane Realignment and All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Three-legged intersection • No stop control on Winston Churchill Boulevard • Stop control on Olde Base Line Road	• Three-legged-intersection • All-way stop control • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Three-legged-intersection • All-way stop control • Realignment of all approaches on Winston Churchill Boulevard • Design based on completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road	• Implementation of single-lane roundabout with three approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Accommodation of trucks	• One lane on each approach, with all movements permitted based on intersection configuration • Truck restriction on Olde Base Line Road, and load restriction on Winston Churchill Boulevard	• One lane on each approach, with all movements permitted based on intersection configuration • Existing truck restriction on Olde Base Line Road, and load restriction on Winston Churchill Boulevard to remain	• One lane on each approach, with all movements permitted based on intersection configuration • Existing truck restriction on Olde Base Line Road, and load restriction on Winston Churchill Boulevard to remain • Curvilinear lane alignment at intersection may cause driver confusion and deviation from travel lanes	• One lane on all approaches • Truck apron accommodates larger vehicles • Existing truck restriction on Olde Base Line Road, and load restriction on Winston Churchill Boulevard to remain	• Options 1, 2, 4 preferred
Accommodation of farm vehicles	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Partially paved shoulders available on all approaches, but shared with all road users	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Additional paved shoulder width depending on varying cross-section options • Curvilinear lane alignment at intersection may cause driver confusion and deviation from travel lanes	• One lane on all approaches, shared with all other road users • Truck apron accommodates farm vehicles	• Options 2, 4 preferred
Accommodation of cyclists	• No separate facility to accommodate cyclists • Cyclists share the available lanes or use partially paved shoulders where available	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Availability of separate cycling facility depends on varying cross-section options	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Availability of separate cycling facility depends on varying cross-section options	• No separate facility to accommodate cyclists • One lane on all approaches, shared with all other road users • Cyclists can dismount and use the marked crossing facilities	• Options 2, 3 preferred
Accommodation of pedestrians	• No separate facility to accommodate pedestrians • Pedestrians use partially paved shoulders where available • Pedestrians yield to vehicles and wait for safe gap to cross Winston Churchill Boulevard, and may cross at stop control on Olde Base Line Road	• Availability of separate pedestrian facility depends on varying cross-section options • Pedestrians may cross at stop control on all approaches	• Availability of separate pedestrian facility depends on varying cross-section options • Pedestrians may cross at stop control on all approaches	• No separate facility to accommodate pedestrians • One lane on all approaches, shared with all other road users • Pedestrians yield to vehicles and wait for safe gap to cross all approaches and the marked crossing facilities	• Options 2, 3 preferred
Accommodation of horses	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Partially paved shoulders available on all approaches, but shared with all road users	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One lane on all approaches, shared with all other road users • Marked crossing facilities available	• Options 1, 2, 3 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including All-Way Stop Control**	**Option 3: Lane Realignment and All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Three-legged intersection • No stop control on Winston Churchill Boulevard • Stop control on Olde Base Line Road	• Three-legged-intersection • All-way stop control • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Three-legged-intersection • All-way stop control • Realignment of all approaches on Winston Churchill Boulevard • Design based on completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road	• Implementation of single-lane roundabout with three approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Safety	• Absence of traffic control on Winston Churchill Boulevard increases possibility of speeding • Intersection control is susceptible to more-severe angle and turning movement collisions within intersection • Intersection control is susceptible to less-severe rear-end collisions on stop controlled approaches on Olde Base Line Road • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross Winston Churchill Boulevard • Limited visibility for motorists on the Olde Base Line Road approach due to vegetation	• All-way stop control reduces possibility of speeding on all approaches • Intersection control is less susceptible to more-severe angle and turning movement collisions within intersection • Intersection control is slightly more susceptible to less-severe rear-end collisions on all approaches • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to all-way stop control • Improved visibility for motorists on the Olde Base Line Road approach due to removal of vegetation	• All-way stop control reduces possibility of speeding on all approaches • Intersection control is less susceptible to more-severe angle and turning movement collisions within intersection • Intersection control is slightly more susceptible to less-severe rear-end collisions on all approaches • Curvilinear intersection alignment is more susceptible to less-severe sideswipe collisions on all approaches • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to all-way stop control • Improved visibility for motorists on the Olde Base Line Road approach due to removal of vegetation	• Roundabout design reduces vehicular speeds on all approaches • Roundabout eliminates more-severe angle and turning movement collisions within intersection • Roundabout is slightly more susceptible to less-severe rear-end and sideswipe collisions on all approaches and within roundabout • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross all approaches • Reduced number of conflict points between all road users on all approaches • Improved visibility for motorists on all approaches due to horizontal and vertical alignment modifications	• Option 4 preferred
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies through adequate ditches or underground infrastructure based on cross-section options	• Designed to address drainage deficiencies through adequate ditches or underground infrastructure based on cross-section options	• Designed to address drainage deficiencies through underground infrastructure	• Options 2, 3, 4 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction	• Options 2, 3, 4 preferred
Socio-Economic Environment					
Residential properties	• No impacts	• Potential minor maintenance/removal of vegetation on residential property	• Minor maintenance/removal of vegetation on residential property	• Property acquisition required, with potential residential and driveway impacts	• Option 1 preferred
Farm operations	• No impacts	• Potential minor maintenance/removal of vegetation on farm land	• Minor maintenance/removal of vegetation on farm land	• Property acquisition required, with potential farm operations impacts	• Option 1 preferred
Businesses	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts	• No anticipated impacts	• Potential impacts beyond existing ROW, which may require additional assessment	• Options 1, 2, 3 preferred
Built and cultural heritage resources	• No impacts	• No anticipated impacts	• No anticipated impacts	• Potential impacts beyond existing ROW, which may require additional assessment	• Options 1, 2, 3 preferred
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Some air, noise, vibration impacts during minor construction • Increased air, noise, vibration impacts due to more vehicles braking and accelerating	• Some air, noise, vibration impacts during minor construction • Increased air, noise, vibration impacts due to more vehicles braking and accelerating	• Moderate air, noise, vibration impacts during construction • Increased air, noise, vibration impacts due to more vehicles braking and accelerating	• Option 1 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including All-Way Stop Control**	**Option 3: Lane Realignment and All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Three-legged intersection • No stop control on Winston Churchill Boulevard • Stop control on Olde Base Line Road	• Three-legged-intersection • All-way stop control • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Three-legged-intersection • All-way stop control • Realignment of all approaches on Winston Churchill Boulevard • Design based on completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road	• Implementation of single-lane roundabout with three approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Natural Environment					
Terrestrial habitat	• No impacts	• Minor impacts to adjacent cultural vegetation communities due to required grading based on cross-section options; no significant impacts anticipated • Some tree removal required to improve sightlines	• Direct impacts to adjacent culturally influenced vegetation communities due to required grading based on cross-section options; more so than Option 2 but less than Option 4 • Some tree removal required to improve sightlines, more so than Option 2 but less than Option 4	• Greatest direct impact to adjacent culturally influenced vegetation communities and terrestrial habitat removal due to larger footprint and required grading • Greatest amount of tree removal required due to more extensive site grading.	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 2 is preferred due to smaller direct impacts to adjacent terrestrial natural features and habitat
Aquatic environment	• No impacts	• Intersection development area encompasses 2 culverts (numbers 26, 27); however, no associated watercourses or fish habitat • Potential for indirect construction-related impacts to nearby tributary of Rogers Creek, south of Winston Churchill Blvd	• Intersection development area encompasses 2 culverts (numbers 26, 27); however, no associated watercourses or fish habitat • Potential for indirect construction-related impacts to nearby tributary of Rogers Creek, south of Winston Churchill Blvd	• Intersection development area encompasses 2 culverts (numbers 26, 27); however, no associated watercourses or fish habitat • Potential for indirect construction-related impacts to nearby tributary of Rogers Creek, south of Winston Churchill Blvd	• No difference
Wetlands and watercourses	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Species at risk	• No impacts	• Little Brown Myotis and Tricolored Bat known from the area; habitat may be directly impacted through required tree removal; less so than other Options	• Little Brown Myotis and Tricolored Bat known from the area; habitat may be directly impacted through required tree removal, more so than Option 2 but less than Option 4	• Greatest impact to potential habitat for Little Brown Myotis and Tricolored Bat known due to larger footprint and required tree removals	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 2 is preferred due to fewer tree removals required, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Minor grading requirements based on cross-section options may cause encroachment into potential habitat for species of conservation concern Odonates; less so than other Options	• Minor grading requirements based on cross-section options may cause encroachment into potential habitat for species of conservation concern Odonates; more so than Option 2 but less than Option 4	• Greatest impact to potential habitat for species of conservation concern Odonates (e.g. wet areas, roadside ditches) due to larger footprint and more extensive site grading requirements	• Option 1 is preferred as it avoids potential impacts to species of conservation concern Odonate habitat • Otherwise, Option 2 is preferred due to smaller direct impacts to potential habitat of species of conservation concern Odonates

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including All-Way Stop Control**	**Option 3: Lane Realignment and All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Three-legged intersection • No stop control on Winston Churchill Boulevard • Stop control on Olde Base Line Road	• Three-legged-intersection • All-way stop control • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Three-legged-intersection • All-way stop control • Realignment of all approaches on Winston Churchill Boulevard • Design based on completed EA and current detailed design for Winston Churchill Boulevard south of Olde Base Line Road	• Implementation of single-lane roundabout with three approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Wildlife movement corridors	• No impacts	• May cause temporary disturbance to amphibian movements during construction; not anticipated to significantly impact amphibian crossings post-construction over current conditions • Reduced speeds from all approaches to intersection may reduce amphibian mortality through motorist avoidance	• May cause temporary disturbance to amphibian movements during construction; not anticipated to significantly impact amphibian crossings post-construction over current conditions • Reduced speeds from all approaches to intersection may reduce amphibian mortality through motorist avoidance	• May cause temporary disturbance to amphibian movements during construction • Post-construction, amphibians potentially more likely to avoid crossing larger roundabout; instead will cross narrower adjacent ROW; not anticipated to significantly impact amphibian crossings over current conditions. However, amphibians attempting to cross through the roundabout at higher risk of mortality • Reduced speeds approaching roundabout may reduce amphibian mortality through motorist avoidance	• Option 1 is preferred as it avoids impacts to amphibian movements across the ROW at this location • Otherwise, Option 3 is preferred as it does not increase road surface area versus Option 2 but slows traffic down along both road corridors, allowing for potential motorist avoidances of crossing amphibians
Stormwater management	• No impacts	• Improved stormwater drainage system • No significant increase in surface water runoff	• Improved stormwater drainage system • No significant increase in surface water runoff	• Improved stormwater drainage system • Increase in surface water runoff due to increase in impervious surface area	• Options 2 and 3 are preferred as they incorporate improved drainage systems over current conditions but features less impervious surface than Option 4
Natural hazards	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Niagara Escarpment impacts	• No impacts	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No difference
Capital Costs					
Construction costs	• Low construction cost due to minimal construction work required	• Low construction cost due to minimal construction work required	• Moderate construction cost due to alignment modifications, and larger paved area	• Higher construction cost due to alignment modifications, urbanized elements, and larger paved area	• Options 1 and 2 result in lowest construction cost
Property acquisition	• No property acquisition required	• No property acquisition required	• No property acquisition required	• Property acquisition required as roundabout extends beyond the existing ROW	• Options 1, 2, 3 results in no property acquisition anticipated
OVERALL					
		• Option 2 preferred as it addresses operational and safety issues in a cost effective manner, while minimizing socio-economic, and natural environment impacts			

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, operational improvements including all-way stop control (Option 2) are preferred for the intersection of Winston Churchill Boulevard and Olde Base Line Road.

11.2 Mississauga Road / Olde Base Line Road Intersection Options

The following options were assessed for the Mississauga Road / Olde Base Line Road intersection:

- **Option 1:** Do Nothing (four-legged intersection with stop control on Olde Base Line Road only)
- **Option 2:** Operational Improvements including Stop Control on Olde Base Line Road (four-legged intersection with stop control on Olde Base Line Road only, with a combination of operational improvements such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner)
- **Option 3:** Operational Improvements including All-Way Stop Control (four-legged intersection with stop control on Mississauga Road and Olde Base Line Road, with a combination of operational improvements such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner)
- **Option 4:** Single-lane roundabout with four approaches (illustrated in **Figure 83**)

The evaluation for the above noted options is included in **Table 56**.

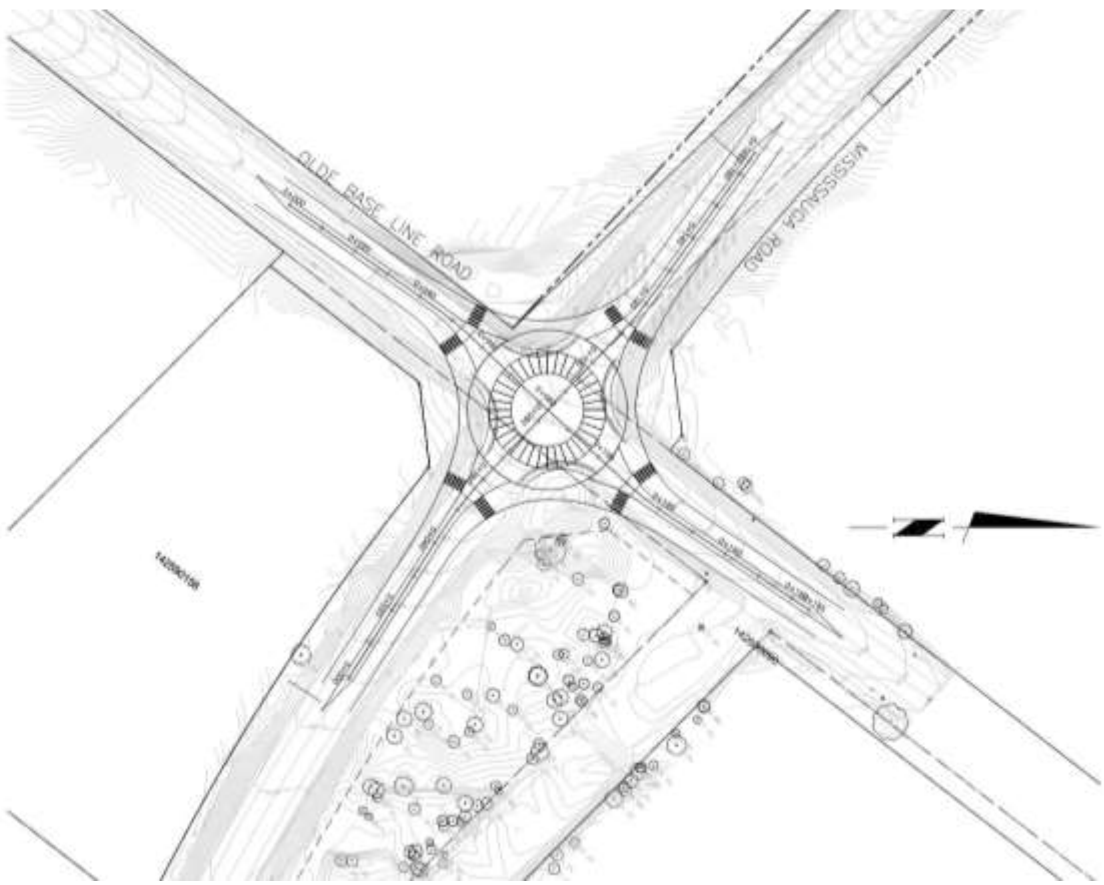

Figure 83: Mississauga Road / Olde Base Line Road Roundabout Concept

Table 56: Mississauga Road / Olde Base Line Road Intersection Option Evaluation

EVALUATION CRITERIA	Mississauga Road and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including Stop Control on Olde Base Line Road**	**Option 3: Operational Improvements including All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Four-legged intersection • All-way stop control • 4-way overhead red flashing beacon • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Implementation of single-lane roundabout with four approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Rural Character					
Maintains rural character and countryside scenic quality	• Retains rural character	• Retains rural character	• Retains rural character	• Significant changes to rural character and countryside scenic quality with a more urbanized intersection	• Options 1, 2, 3 preferred
Transportation					
Geometric alignment	• Horizontal alignment unchanged • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment unchanged • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment unchanged • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment adjusted to accommodate roundabout design • Vertical alignment flattened out to accommodate roundabout design	• No difference, as all options meet design standards
Traffic operations	• Traffic priority on Mississauga Road; no delay to motorists • Delay to motorists on Olde Base Line Road due to stop control	• Traffic priority on Mississauga Road; no delay to motorists • Delay to motorists on Olde Base Line Road due to stop control • Vehicular capacity of intersection is retained • Reduced speeds on all approaches	• All approaches have equal priority • Increased overall delay on all approaches • Slightly reduced vehicular capacity on Mississauga Road, and slightly increased capacity on Olde Base Line Road • Reduced speeds on all approaches • Reduced conflicts between approaches • All-way stop improves overall traffic operations • Intersection does not meet warrant for all-way stop control based on the minimum volume warrant (arterial and major roads), and the collision warrant	• All approaches have equal priority • Reduced overall delay on all approaches • Increased overall vehicular capacity of intersection • Reduced speeds on all approaches • Reduced conflicts between approaches • Intersection meets warrants for roundabout implementation	• Option 4 preferred
Accommodation of motorists	• One left-through-right lane on all approaches	• One left-through-right lane on all approaches	• One left-through-right lane on all approaches	• One lane on all approaches	• No difference
Accommodation of trucks	• One left-through-right lane on all approaches • Truck restrictions on Mississauga Road and Olde Base Line Road	• One left-through-right lane on all approaches • Existing truck restrictions on Mississauga Road and Olde Base Line Road to remain	• One left-through-right lane on all approaches • Existing truck restrictions on Mississauga Road and Olde Base Line Road to remain	• One lane on all approaches • Truck apron accommodates larger vehicles • Existing truck restrictions on Mississauga Road and Olde Base Line Road to remain	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road and Olde Base Line Road Intersection Options Option 1: Do Nothing Stop Control on Olde Base Line Road	Option 2: Operational Improvements including Stop Control on Olde Base Line Road	Option 3: Operational Improvements including All-Way Stop Control	Option 4: Roundabout	EVALUATION
Option Description	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Four-legged intersection • All-way stop control • 4-way overhead red flashing beacon • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Implementation of single-lane roundabout with four approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Accommodation of farm vehicles	• One left-through-right lane with partially paved shoulders available on all approaches, shared with all road users	• One left-through-right lane on all approaches, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One left-through-right lane on all approaches, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One lane on all approaches, shared with all other road users • Truck apron accommodates larger farm vehicles	• Options 2, 3, 4 preferred
Accommodation of cyclists	• No separate facility to accommodate cyclists • Cyclists share the available lanes or use partially paved shoulders where available	• One left-through-right lane on all approaches, shared with all other road users • Availability of separate cycling facility depends on varying cross-section options	• One left-through-right lane on all approaches, shared with all other road users • Availability of separate cycling facility depends on varying cross-section options	• No separate facility to accommodate cyclists • One lane on all approaches, shared with all other road users • Cyclists can dismount and use the marked crossing facilities	• Options 2, 3 preferred due to reduced conflicts between cyclists and other road users
Accommodation of pedestrians	• No separate facility to accommodate pedestrians • Pedestrians use partially paved shoulders where available • Pedestrians yield to vehicles and wait for safe gap to cross Mississauga Road, and may cross at stop control on Olde Base Line Road	• Availability of separate pedestrian facility depends on varying cross-section options • Pedestrians yield to vehicles and wait for safe gap to cross Mississauga Road, and may cross at stop control on Olde Base Line Road	• Availability of separate pedestrian facility depends on varying cross-section options • Pedestrians may cross at stop control on all approaches	• No separate facility to accommodate pedestrians • One lane on all approaches, shared with all other road users • Pedestrians yield to vehicles and wait for safe gap to cross all approaches and the marked crossing facilities	• Option 3 preferred
Accommodation of horses	• One left-through-right lane with partially paved shoulders available on all approaches, shared with all road users	• One left-through-right lane on all approaches, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One left-through-right lane on all approaches, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One lane on all approaches, shared with all other road users • Marked crossing facilities available	• Options 2, 3 preferred
Safety	• Absence of traffic control on Mississauga Road increases possibility of speeding • Intersection control is susceptible to more-severe angle and turning movement collisions within intersection • Intersection control is susceptible to less-severe rear-end collisions on stop controlled approaches on Olde Base Line Road • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross Mississauga Road • Limited visibility for motorists on Olde Base Line Road approaches due to vegetation and guiderail	• Absence of traffic control on Mississauga Road increases possibility of speeding • Intersection control is susceptible to more-severe angle and turning movement collisions within intersection • Intersection control is susceptible to less-severe rear-end collisions on stop controlled approaches on Olde Base Line Road • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross Mississauga Road • Improved visibility for motorists on the Olde Base Line Road approaches due to removal of vegetation and guiderail	• All-way stop control reduces possibility of speeding on all approaches • Intersection control is less susceptible to more-severe angle and turning movement collisions within intersection • Intersection control is slightly more susceptible to less-severe rear-end collisions on all approaches • Reduced conflicts between motorized vehicles and cyclists/pedestrians due to all-way stop control • Improved visibility for motorists on the Olde Base Line Road approaches due to removal of vegetation and guiderail	• Roundabout design reduces vehicular speeds on all approaches • Roundabout eliminates more-severe angle and turning movement collisions within intersection • Roundabout is slightly more susceptible to less-severe rear-end and sideswipe collisions on all approaches and within roundabout • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross all approaches • Reduced number of conflict points between all road users on all approaches • Improved visibility for motorists on all approaches due to horizontal and vertical alignment modifications	• Option 4 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road and Olde Base Line Road Intersection Options Option 1: Do Nothing Stop Control on Olde Base Line Road	Option 2: Operational Improvements including Stop Control on Olde Base Line Road	Option 3: Operational Improvements including All-Way Stop Control	Option 4: Roundabout	EVALUATION
Option Description	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Four-legged intersection • All-way stop control • 4-way overhead red flashing beacon • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Implementation of single-lane roundabout with four approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Stormwater quality and quantity	• Deficient drainage	• Design to address drainage deficiencies through adequate ditches or underground infrastructure based on cross-section options	• Design to address drainage deficiencies through adequate ditches or underground infrastructure based on cross-section options	• Design to address drainage deficiencies through underground infrastructure	• Options 2, 3, 4 preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction	• Options 2, 3, 4 preferred
Socio-Economic Environment					
Residential properties	• No impacts	• Potential minor maintenance/removal of vegetation on residential property	• Potential minor maintenance/removal of vegetation on residential property	• Property acquisition required, with potential residential and driveway impacts	• Option 1 preferred
Farm operations	• No impacts	• Potential minor maintenance/removal of vegetation on residential property	• Potential minor maintenance/removal of vegetation on farm land	• Property acquisition required, with potential farm operations impacts	• Option 1 preferred
Businesses	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Archaeological resources	• No impacts	• No anticipated impacts	• No anticipated impacts	• Potential impacts beyond existing ROW, which may require additional assessment	• Options 1, 2, 3 preferred
Built and cultural heritage resources	• No impacts	• No anticipated impacts	• No anticipated impacts	• Potential impacts beyond existing ROW, which may require additional assessment	• Options 1, 2, 3 preferred
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction	• Some air, noise, vibration impacts during minor construction • Increased air, noise, vibration impacts due to vehicles braking and accelerating	• Some air, noise, vibration impacts during minor construction • Increased air, noise, vibration impacts due to more vehicles braking and accelerating	• Moderate air, noise, vibration impacts during construction • Increased air, noise, vibration impacts due to more vehicles braking and accelerating	• Option 1 preferred
Natural Environment					
Terrestrial habitat	• No impacts	• Minor impacts to adjacent natural vegetation communities due to required grading based on cross-section options; no significant impacts anticipated • May require removal of some trees • Possible minor encroachment into Life Science ANSI (Caledon Mountain Slope Forest) and ESAs (Caledon Mountain, Grange Woods) • Requires minor areas of terrestrial habitat removal in areas to be graded, if necessary	• Minor impacts to adjacent natural vegetation communities due to required grading based on cross-section options; no significant impacts anticipated • May require removal of some trees • Possible minor encroachment into Life Science ANSI (Caledon Mountain Slope Forest) and ESAs (Caledon Mountain, Grange Woods) • Requires minor areas of terrestrial habitat removal in areas to be graded, if necessary	• Greatest amount of direct impact to adjacent natural vegetation communities due to larger footprint and required grading • May require removal of some trees • Possible encroachment into Life Science ANSI (Caledon Mountain Slope Forest) and ESAs (Caledon Mountain, Grange Woods) • Requires greatest amount of terrestrial habitat removal in areas to be graded	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 2 and 3 are preferred due to smaller direct impacts to adjacent terrestrial natural features and habitat

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including Stop Control on Olde Base Line Road**	**Option 3: Operational Improvements including All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Four-legged intersection • All-way stop control • 4-way overhead red flashing beacon • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Implementation of single-lane roundabout with four approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Aquatic environment	• No impacts	• Potential for indirect impacts to a watercourse crossing through the northeast side of the Mississauga Rd.-Olde Base Line Rd. intersection due to construction activities; this watercourse not evaluated as fish habitat • Less potential for impact caused by culvert replacement, in-water work through this Option	• Potential for indirect impacts to a watercourse crossing through the northeast side of the Mississauga Rd.-Olde Base Line Rd. intersection due to construction activities; this watercourse not evaluated as fish habitat • Less potential for impact caused by culvert replacement, in-water work through this Option	• Potential for indirect impacts to a watercourse crossing through the northeast side of the Mississauga Rd.-Olde Base Line Rd. intersection due to construction activities; this watercourse not evaluated as fish habitat • May require culvert replacement, in-water work	• Option 1 is preferred as it avoids potential for impact to adjacent aquatic features and habitat • Otherwise, Options 2 and 3 are preferred because they present the least potential for impact to nearby aquatic features and habitat
Wetlands and watercourses	• No impacts	• Potential for indirect impact to a component of the Caledon Mountain PSW complex on northwest intersection corner, and wetland on the southeast corner, due to construction activities • With Option 3, least potential for direct impact to adjacent wetland habitat among Options • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • With Option 3, least potential for impacts to amphibian breeding SWH due to grading requirements among Options.	• Potential for indirect impact to a component of the Caledon Mountain PSW complex on northwest intersection corner, and wetland on the southeast corner, due to construction activities • With Option 2, least potential for direct impact to adjacent wetland habitat among Options • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • With Option 2, least potential for impacts to amphibian breeding SWH due to grading requirements among Options.	• Potential for indirect impact to a component of the Caledon Mountain PSW complex on northwest intersection corner, and wetland on the southeast corner, due to construction activities • Most potential for direct impact to adjacent wetland habitat among Options • Potential impacts to hydrological balance of affected wetlands through grading and drainage works • Most potential for impacts to amphibian breeding SWH due to most extensive grading requirements among Options	• Option 1 is preferred as it avoids potential for impact to wetland features • Otherwise, Options 2 and 3 are preferred because they present the least potential for impact to adjacent wetlands features and habitat
Species at risk	• No impacts	• Occurs within Jefferson Salamander regulated habitat; potential for direct impact to regulated habitat; less so than Option 4 • May cause temporary disturbance to Jefferson Salamander movements during construction; not anticipated to significantly impact Jefferson Salamander crossings post-construction over current conditions • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; less potential for direct habitat impacts than Option 4, due to tree removals	• Occurs within Jefferson Salamander regulated habitat; potential for direct impact to regulated habitat; less so than Option 4 • May cause temporary disturbance to Jefferson Salamander movements during construction; not anticipated to significantly impact Jefferson Salamander crossings post-construction over current conditions • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; less potential for direct habitat impacts than Option 4, due to tree removals	• Occurs within Jefferson Salamander regulated habitat; greatest potential for direct impact to regulated habitat • May cause temporary disturbance to Jefferson Salamander movements during construction • Post-construction, Jefferson Salamander potentially more likely to avoid crossing larger roundabout; instead will cross narrower adjacent ROW; not anticipated to significantly impact Jefferson Salamander crossings over current conditions. However, Jefferson Salamanders attempting to cross	• Option 1 is preferred as it avoids impacts to Jefferson Salamander regulated habitat, and potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Options 2 and 3 are preferred due to less potential for impact to Jefferson Salamander regulated habitat, and due to fewer tree removals required, in turn presenting less potential for impact to Little Brown Myotis and Tricolored

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	Option 2: Operational Improvements including Stop Control on Olde Base Line Road	Option 3: Operational Improvements including All-Way Stop Control	Option 4: Roundabout	
Option Description	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Four-legged intersection • All-way stop control • 4-way overhead red flashing beacon • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Implementation of single-lane roundabout with four approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
				through the roundabout at higher risk of mortality • Little Brown Myotis and Tricolored Bat known from the area and may use adjacent woodlands; greatest potential for direct habitat impacts due to larger footprint and tree removals	Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• Less potential for direct impacts to Western Chorus Frog habitat than Option 4 due to limited site grading based on cross-section option • May cause temporary disturbance to Western Chorus Frog movements during construction; not anticipated to significantly impact crossings post-construction over current conditions • Reduction in posted speed limit approaching intersection and improved illumination may reduce the potential for Western Chorus Frog road mortality through motorist avoidance of crossing individuals • Minor grading requirements based on cross-section options may cause encroachment into potential habitat for species of conservation concern Odonates; less potential for impact than Option 4	• Less potential for direct impacts to Western Chorus Frog habitat than Option 4 due to limited site grading based on cross-section option • May cause temporary disturbance to Western Chorus Frog movements during construction; not anticipated to significantly impact crossings post-construction over current conditions • Reduction in posted speed limit approaching intersection and improved illumination may reduce the potential for Western Chorus Frog road mortality through motorist avoidance of crossing individuals • Minor grading requirements based on cross-section options may cause encroachment into potential habitat for species of conservation concern Odonates; less potential for impact than Option 4.	• Greatest potential for direct impacts to Western Chorus Frog habitat due to larger footprint and more extensive site grading requirements • May cause temporary disturbance to Western Chorus Frog movements during construction • Post-construction, Western Chorus Frogs potentially more likely to avoid crossing larger roundabout; instead will cross narrower adjacent ROW; not anticipated to significantly impact Chorus Frog crossings over current conditions. However, Western Chorus Frogs attempting to cross through the roundabout at higher risk of mortality • Reduction in posted speed limit approaching round-about and improved illumination may reduce the potential for Western Chorus Frog road mortality through motorist avoidance of crossing individuals • More extensive grading requirements may cause encroachment into potential habitat for species of conservation concern Odonates	• Option 1 is preferred as it avoids impacts to Western Chorus Frog habitat, and potential impacts to species of conservation concern Odonate habitat • Otherwise, Options 2 and 3 are preferred due to less potential for impact to Western Chorus Frog habitat and to potential habitat of species of conservation concern Odonates

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	Option 2: Operational Improvements including Stop Control on Olde Base Line Road	Option 3: Operational Improvements including All-Way Stop Control	Option 4: Roundabout	
Option Description	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Four-legged intersection • All-way stop control • 4-way overhead red flashing beacon • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Implementation of single-lane roundabout with four approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Wildlife movement corridors	• No impacts	• May cause temporary disturbance to amphibian movements during construction; not anticipated to significantly impact amphibian crossings post-construction over current conditions • Reduced posted speed limit and improved illumination may reduce amphibian mortality and deer-motor vehicle collisions through motorist avoidance • May cause minor disturbance to high-density deer movement corridor Significant Wildlife Habitat along Olde Baseline Rd. during construction; not anticipated to significantly impact deer crossings post-construction	• May cause temporary disturbance to amphibian movements during construction; not anticipated to significantly impact amphibian crossings post-construction over current conditions • Reduced posted speed limit and improved illumination may reduce amphibian mortality and deer-motor vehicle collisions through motorist avoidance; combination of reduced posted speed limits and motorist slow-down to come to full stop at intersection may result in greatest actual reductions in speed among Options • May cause minor disturbance to high-density deer movement corridor Significant Wildlife Habitat along Olde Baseline Rd. during construction; not anticipated to significantly impact deer crossings post-construction	• May cause temporary disturbance to amphibian movements during construction • Post-construction, amphibians potentially more likely to avoid crossing larger round-about; instead will cross narrower adjacent ROW; not anticipated to significantly impact amphibian crossings over current conditions. However, amphibians attempting to cross through the round-about at higher risk of mortality • Reduced posted speed limit and improved illumination may reduce amphibian mortality and deer-motor vehicle collisions through motorist avoidance; combination of reduced posted speed limits and motorist slow-down upon roundabout approach may result in greater actual reductions in speed than Option 2 • May cause minor disturbance to high-density deer movement corridor Significant Wildlife Habitat along Olde Baseline Rd. during construction; not anticipated to significantly impact deer crossings post-construction as deer are expected to avoid the roundabout	• Option 1 is preferred as it avoids impacts to amphibian movements across the ROW at this location • Otherwise, Option 3 is preferred as it may result in the greatest actual reductions in motor vehicle speeds approaching intersection from all 4 directions, requiring full stops
Stormwater management	• No impacts	• Improved stormwater drainage system • No significant increase in surface water runoff	• Improved stormwater drainage system • No significant increase in surface water runoff	• Improved stormwater drainage system • Increase in surface water runoff due to larger area of impervious surface area	• Options 2 and 3 are preferred as they incorporate improved drainage systems over current conditions but features less impervious surface than Option 4.
Natural hazards	• No impacts	• No impacts	• No impacts	• No impacts	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Mississauga Road and Olde Base Line Road Intersection Options				EVALUATION
	Option 1: Do Nothing Stop Control on Olde Base Line Road	**Option 2: Operational Improvements including Stop Control on Olde Base Line Road**	**Option 3: Operational Improvements including All-Way Stop Control**	**Option 4: Roundabout**	
Option Description	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road	• Four-legged intersection • No stop control on Mississauga Road • Stop control on Olde Base Line Road • 4-way overhead red/amber flashing beacon, with red beacons facing Olde Base Line Road, and amber beacons facing Mississauga Road • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Four-legged intersection • All-way stop control • 4-way overhead red flashing beacon • Combination of operational improvements, such as improved signage, reduced speed limits, removal of vegetation, and removal of guiderail on the southeast corner	• Implementation of single-lane roundabout with four approaches • Truck apron (mountable curb to accommodate larger vehicles) • Marked crossing facilities on all approaches • Illumination	
Niagara Escarpment impacts	• No impacts	• With Option 3, requires the least potential for direct impacts to natural features associated with Escarpment Natural Area and Escarpment Protection Area, due to possible site grading based on cross-section options • A plan amendment is required for proposed development within wetland areas or regulated habitat	• With Option 2, requires the least potential for direct impacts to natural features associated with Escarpment Natural Area and Escarpment Protection Area, due to possible site grading based on cross-section options • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Requires the greatest potential for direct impacts to natural features associated with Escarpment Natural Area and Escarpment Protection Area, due to more extensive site grading • A plan amendment is required for proposed development within wetland areas or regulated habitat	• Option 1 is preferred as it avoids impacts to Escarpment Natural Area and Escarpment Protection Area and regulated habitat • Otherwise, Options 2 and 3 are preferred as they present the least potential for encroachment into Escarpment Natural Area or Escarpment Protection Area
Capital Costs					
Construction costs	• Low construction cost due to minimal construction work required	• Low construction cost due to minimal construction work required	• Low construction cost due to minimal construction work required	• Higher construction cost due to alignment modifications, urbanized elements, and larger paved area	• Options 1, 2 and 3 result in lowest construction cost
Property acquisition	• No property acquisition required	• No property acquisition required	• No property acquisition required	• Property acquisition required as roundabout extends beyond the existing ROW	• Options 1, 2, 3 result in no property acquisition anticipated
OVERALL					
		• Option 2 preferred as it addresses operational and safety issues in a cost effective manner, while minimizing socio-economic, and natural environment impacts	• Option 3 preferred as it addresses operational and safety issues in a cost effective manner, while minimizing socio-economic, and natural environment impacts • However, intersection does not meet warrant for all-way stop control		

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, operational improvements including stop control on Olde Base Line Road (Option 2) are preferred for the intersection of Mississauga Road and Olde Base Line Road.

11.3 Old Main Street / Bush Street (Belfountain Village) Intersection Options

The Old Main Street / Bush Street intersection in the Belfountain Village is proposed to remain as per existing conditions, with all-way stop control and 40 km/h posted speeds on all approaches. A sidewalk on the south and west legs of the intersection will connect pedestrians with destinations like the Belfountain Elementary School and the Community Centre. For more details related to the Belfountain Village segment of the study area, refer to **Section 9**.

11.4 Bush Street / Winston Churchill Boulevard Intersection Options

The following options were assessed for the Bush Street / Winston Churchill Boulevard intersection:

- **Option 1:** Do Nothing (two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard and stop control on both Winston Churchill Boulevard approaches)
- **Option 2:** Operational Improvements including Stop Control on both Winston Churchill Boulevard approaches (two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard and stop control on both Winston Churchill Boulevard approaches, with a combination of operational improvements such as improved signage, reduced speed limits, and removal of vegetation)
- **Option 3:** Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard (single-lane roundabout with three approaches at south approach of jog intersection and existing configuration of three-legged stop control on north approach of jog intersection remains) (illustrated in **Figure 84**)
- **Option 4:** Roundabouts at Both Approaches of Winston Churchill Boulevard (two single-lane roundabouts with three approaches each, at existing north and south approaches of jog intersection) (illustrated in **Figure 85**)
- **Option 5:** Roundabout with jog realignment (jog realignment of north and south approaches of intersection with a single-lane roundabout with four approaches) (illustrated in **Figure 86**)

The evaluation for the above noted options is included in **Table 57**.

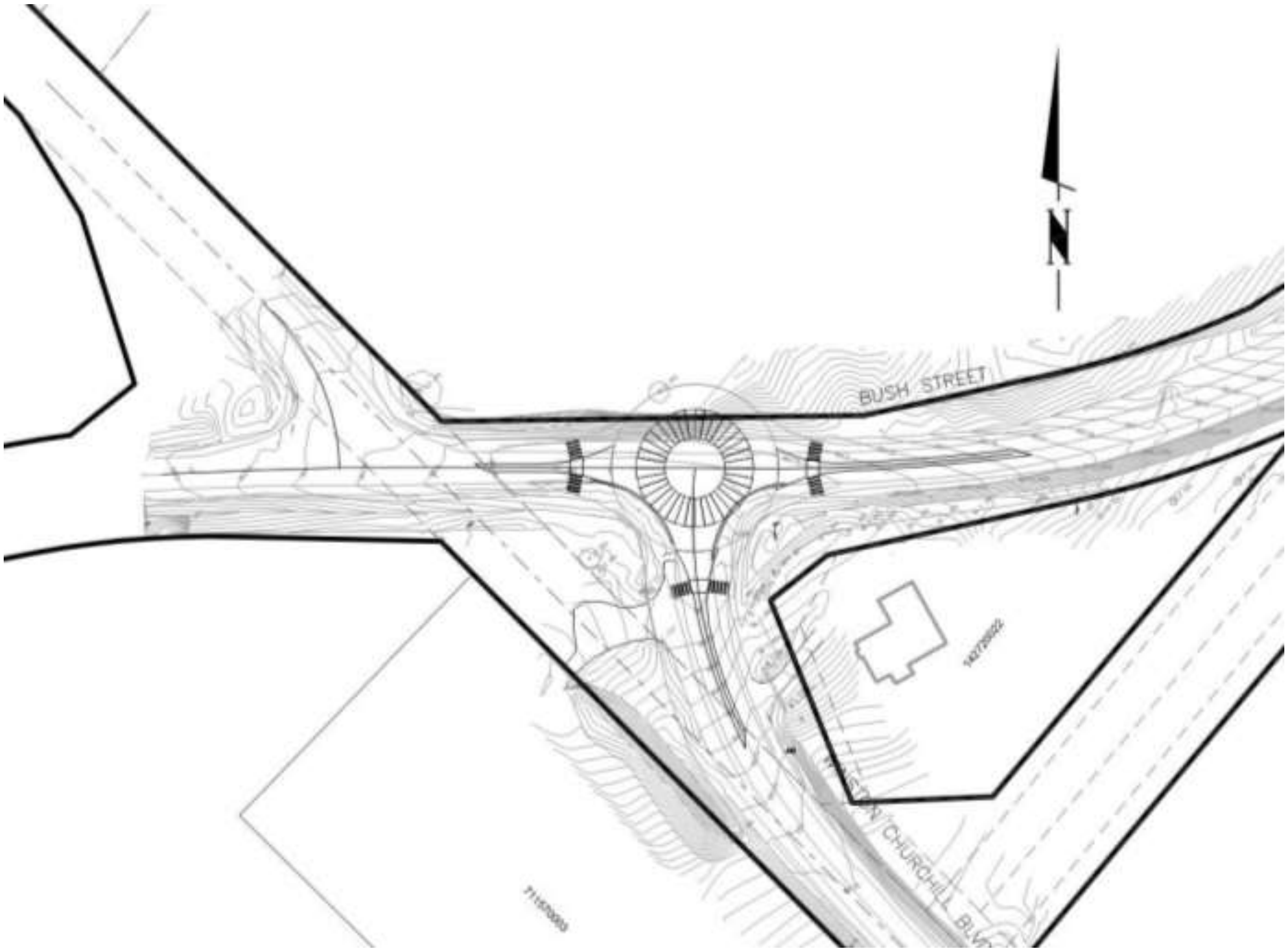

Figure 84: Bush Street / Winston Churchill Boulevard Roundabout Concept #1

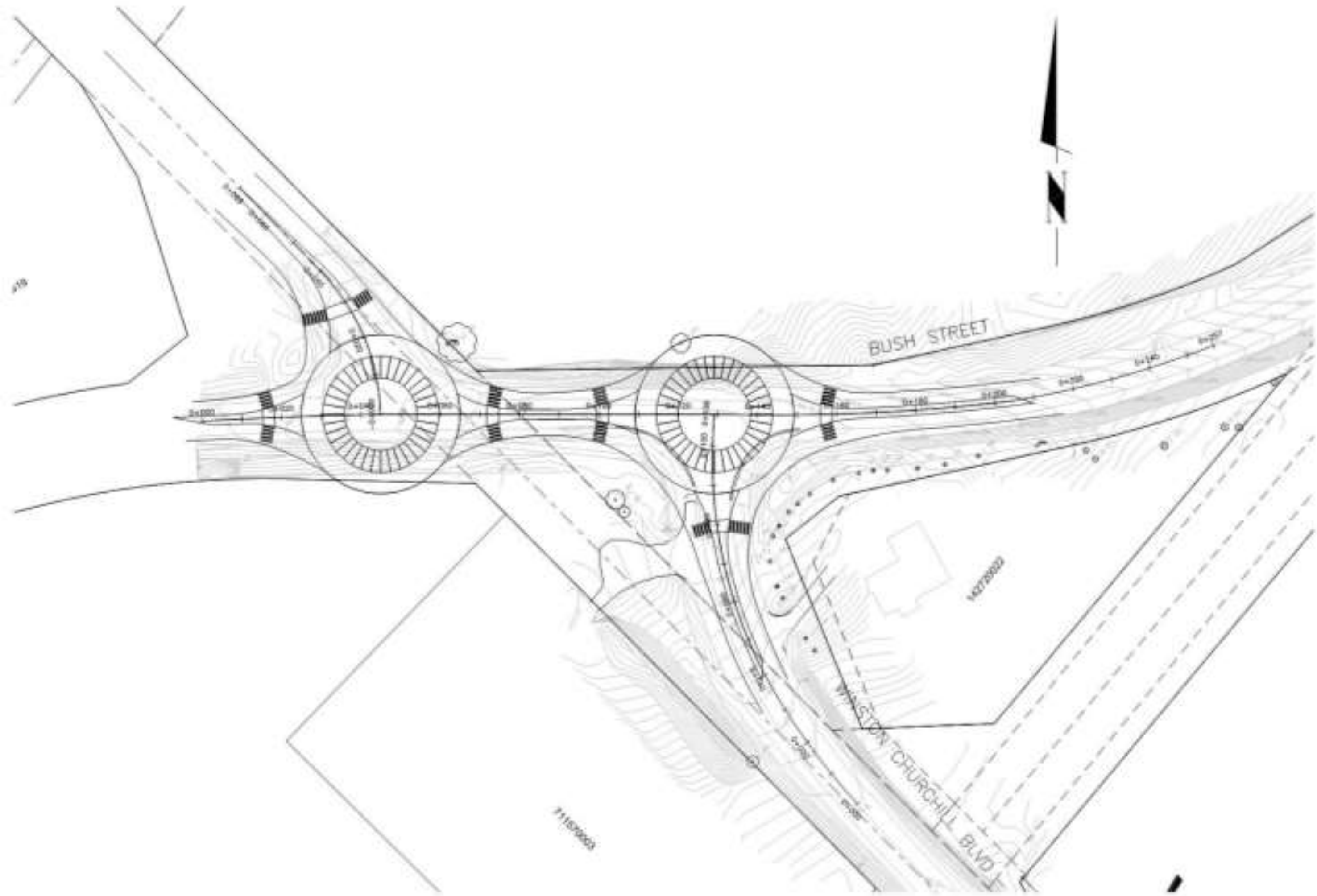

Figure 85: Bush Street / Winston Churchill Boulevard Roundabout Concept #2

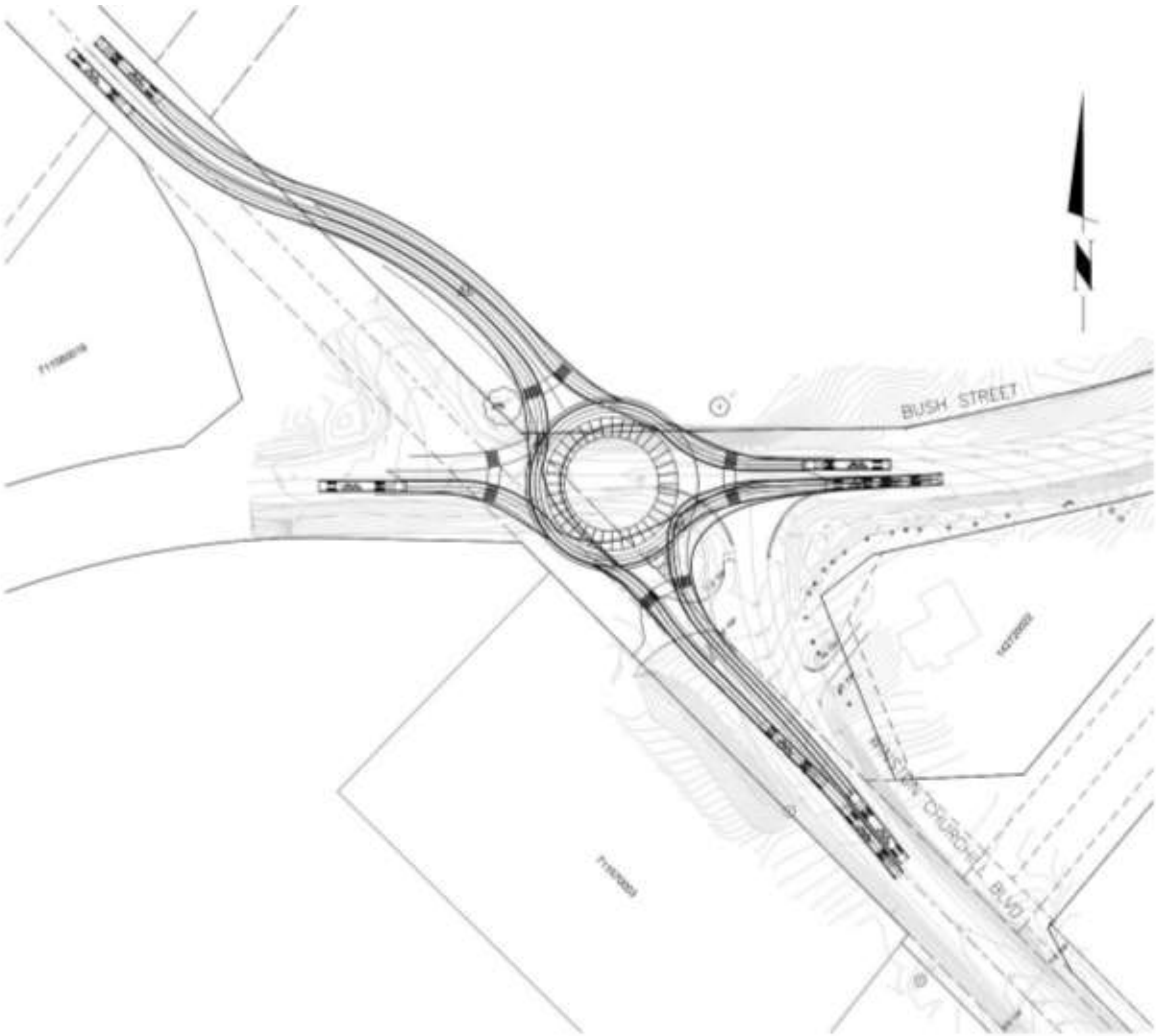

Figure 86: Bush Street / Winston Churchill Boulevard Roundabout Concept #3

Table 57: Bush Street / Winston Churchill Boulevard Intersection Option Evaluation

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches	Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard	Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard	Option 5: One Roundabout With Jog Realignment	
Option Description	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Implementation of single-lane roundabout with three approaches at south approach of jog intersection • Truck apron within roundabout • Marked crossing facilities on all approaches of roundabout • Existing configuration of three-legged stop control on north approach of jog intersection remains • Illumination	• Implementation of single-lane roundabouts with three approaches at both north and south approaches of jog intersection • Truck apron within both roundabouts • Marked crossing facilities on all approaches of both roundabouts • Illumination at both roundabouts	• Jog realignment of north and south approaches of intersection • Implementation of single-lane roundabout with four approaches • Truck apron • Marked crossing facilities on all approaches • Illumination	
Rural Character						
Maintains rural character and countryside scenic quality	• Retains rural character	• Retains rural character	• Significant changes to rural character and countryside scenic quality with a more urbanized intersection	• Significant changes to rural character and countryside scenic quality with a more urbanized intersection	• Significant changes to rural character and countryside scenic quality with a more urbanized intersection	• Options 1, 2, preferred
Transportation						
Geometric alignment	• Horizontal alignment unchanged • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment unchanged • Vertical alignment may be slightly modified to improve sight distances based on road profile options	• Horizontal alignment adjusted to accommodate roundabout design at south approach of jog intersection • Vertical alignment flattened out to accommodate roundabout design	• Horizontal alignment adjusted to accommodate roundabout design at both approaches • Vertical alignment flattened out to accommodate roundabout designs	• Horizontal alignment significantly modified to realign jog intersection and to accommodate roundabout design • Vertical alignment flattened out to accommodate roundabout design	• Option 5 preferred due to jog realignment, but all options meet design standards
Traffic operations	• Traffic priority on Bush Street; no delay to motorists • Delay to motorists on Winston Churchill Boulevard due to stop control • Jog intersection of north-south through traffic, requiring two turning movements for through vehicles on Winston Churchill Boulevard	• Traffic priority on Bush Street; no delay to motorists • Delay to motorists on Winston Churchill Boulevard due to stop control • Jog intersection of north-south through traffic, requiring two turning movements for through vehicles on Winston Churchill Boulevard • Vehicular capacity of intersection is retained	• All approaches have equal priority at south approach of jog intersection • At north approach of jog intersection, traffic priority on Bush Street with no delay to motorists; stop control on Winston Churchill Boulevard with delay to motorists • Jog intersection of north-south through traffic, requiring two turning movements for through vehicles on Winston Churchill Boulevard • Slightly reduced overall delay on all approaches • Slightly increased overall	• All approaches have equal priority at both roundabouts • Jog intersection of north-south through traffic, requiring two turning movements for through vehicles on Winston Churchill Boulevard • Slightly reduced overall delay on all approaches • Slightly increased overall vehicular capacity of intersection • Reduced speeds on all approaches • Intersection meets warrants for roundabout implementation	• All approaches have equal priority at roundabout • Elimination of jog of north-south through traffic, and elimination of two-turning movements for through vehicles on Winston Churchill Boulevard • Reduced overall delay on all approaches • Increased overall vehicular capacity of intersection • Reduced speeds on all approaches • Intersection meets warrants for roundabout implementation	• Option 5 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches	Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard	Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard	Option 5: One Roundabout With Jog Realignment	
Option Description	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Implementation of single-lane roundabout with three approaches at south approach of jog intersection • Truck apron within roundabout • Marked crossing facilities on all approaches of roundabout • Existing configuration of three-legged stop control on north approach of jog intersection remains • Illumination	• Implementation of single-lane roundabouts with three approaches at both north and south approaches of jog intersection • Truck apron within both roundabouts • Marked crossing facilities on all approaches of both roundabouts • Illumination at both roundabouts	• Jog realignment of north and south approaches of intersection • Implementation of single-lane roundabout with four approaches • Truck apron • Marked crossing facilities on all approaches • Illumination	
			vehicular capacity of intersection • Reduced speeds on all approaches • Intersection meets warrants for roundabout implementation			
Accommodation of motorists	• One lane on each approach, with all movements permitted based on intersection configuration	• One lane on each approach, with all movements permitted based on intersection configuration	• One lane on all approaches of roundabout at south approach of jog intersection • One lane on each approach of north approach of jog intersection, with all movements permitted based on intersection configuration	• One lane on all approaches of both roundabouts	• One lane on all approaches	• No difference
Accommodation of trucks	• One lane on each approach, with all movements permitted based on intersection configuration • Load restriction on Winston Churchill Boulevard and Bush Street	• One lane on each approach, with all movements permitted based on intersection configuration • Existing load restriction on Winston Churchill Boulevard and Bush Street to remain	• One lane on all approaches of roundabout at south approach of jog intersection • Truck apron accommodates larger vehicles • One lane on each approach of north approach of jog intersection, with all movements permitted based on intersection configuration • Existing load restriction on Winston Churchill Boulevard and Bush Street to remain	• One lane on all approaches of both roundabouts • Truck apron accommodates larger vehicles • Existing load restriction on Winston Churchill Boulevard and Bush Street to remain	• One lane on all approaches • Truck apron accommodates larger vehicles • Elimination of jog of north-south through traffic, and elimination of two-turning movements for through vehicles on Winston Churchill Boulevard • Existing load restriction on Winston Churchill Boulevard and Bush Street to remain	• Option 5 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches	Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard	Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard	Option 5: One Roundabout With Jog Realignment	
Option Description	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Implementation of single-lane roundabout with three approaches at south approach of jog intersection • Truck apron within roundabout • Marked crossing facilities on all approaches of roundabout • Existing configuration of three-legged stop control on north approach of jog intersection remains • Illumination	• Implementation of single-lane roundabouts with three approaches at both north and south approaches of jog intersection • Truck apron within both roundabouts • Marked crossing facilities on all approaches of both roundabouts • Illumination at both roundabouts	• Jog realignment of north and south approaches of intersection • Implementation of single-lane roundabout with four approaches • Truck apron • Marked crossing facilities on all approaches • Illumination	
Accommodation of farm vehicles	• One lane on each approach with partially paved shoulders, with all movements permitted based on intersection configuration, shared with all other road users	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One lane on all approaches of roundabout, shared with all other road users • Truck apron accommodates farm vehicles at roundabout • One lane on each approach of north approach of jog intersection, with all movements permitted based on intersection configuration, shared with all other road users	• One lane on all approaches of roundabouts, shared with all other road users • Truck apron accommodates farm vehicles	• One lane on all approaches, shared with all other road users • Truck apron accommodates farm vehicles • Elimination of jog of north-south through traffic, and elimination of two-turning movements for through vehicles on Winston Churchill Boulevard	• Options 2, 5 preferred
Accommodation of cyclists	• No separate facility to accommodate cyclists • Cyclists share the available lanes or use partially paved shoulders where available	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Availability of separate cycling facility depends on varying cross-section options	• No separate facility to accommodate cyclists at roundabout • One lane on all approaches of roundabout, shared with all other road users • Cyclists can dismount and use the marked crossing facilities • One lane on each approach of north approach of jog intersection, with all movements permitted based on intersection configuration, shared with all other road users	• No separate facility to accommodate cyclists at roundabouts • One lane on all approaches of roundabouts, shared with all other road users • Cyclists can dismount and use the marked crossing facilities	• No separate facility to accommodate cyclists at roundabout • One lane on all approaches of roundabout, shared with all other road users • Cyclists can dismount and use the marked crossing facilities	• Option 2 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	**Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches**	**Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard**	**Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard**	**Option 5: One Roundabout With Jog Realignment**	
Option Description	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Implementation of single-lane roundabout with three approaches at south approach of jog intersection • Truck apron within roundabout • Marked crossing facilities on all approaches of roundabout • Existing configuration of three-legged stop control on north approach of jog intersection remains • Illumination	• Implementation of single-lane roundabouts with three approaches at both north and south approaches of jog intersection • Truck apron within both roundabouts • Marked crossing facilities on all approaches of both roundabouts • Illumination at both roundabouts	• Jog realignment of north and south approaches of intersection • Implementation of single-lane roundabout with four approaches • Truck apron • Marked crossing facilities on all approaches • Illumination	
Accommodation of pedestrians	• No separate facility to accommodate pedestrians • Pedestrians use partially paved shoulders where available • Pedestrians yield to vehicles and wait for safe gap to cross Bush Street, and may cross at stop control on Winston Churchill Boulevard	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Availability of separate pedestrian facility depends on varying cross-section options • Pedestrians yield to vehicles and wait for safe gap to cross Bush Street, and may cross at stop control on Winston Churchill Boulevard	• No separate facility to accommodate pedestrians at roundabout • One lane on all approaches of roundabout, shared with all other road users • Pedestrians yield to vehicles and wait for safe gap to cross all approaches and the marked crossing facilities • One lane on each approach of north approach of jog intersection, with all movements permitted based on intersection configuration, shared with all other road users • No separate facility to accommodate pedestrians at north approach of jog intersection • Pedestrians use partially paved shoulders where available • Pedestrians yield to vehicles and wait for safe gap to cross Bush Street, and may cross at stop control on Winston Churchill Boulevard	• No separate facility to accommodate pedestrians at roundabouts • One lane on all approaches of roundabouts, shared with all other road users • Pedestrians yield to vehicles and wait for safe gap to cross all approaches and the marked crossing facilities	• No separate facility to accommodate pedestrians at roundabout • One lane on all approaches of roundabout, shared with all other road users • Pedestrians yield to vehicles and wait for safe gap to cross all approaches and the marked crossing facilities	• Option 2 preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	**Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches**	**Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard**	**Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard**	**Option 5: One Roundabout With Jog Realignment**	
Option Description	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Implementation of single-lane roundabout with three approaches at south approach of jog intersection • Truck apron within roundabout • Marked crossing facilities on all approaches of roundabout • Existing configuration of three-legged stop control on north approach of jog intersection remains • Illumination	• Implementation of single-lane roundabouts with three approaches at both north and south approaches of jog intersection • Truck apron within both roundabouts • Marked crossing facilities on all approaches of both roundabouts • Illumination at both roundabouts	• Jog realignment of north and south approaches of intersection • Implementation of single-lane roundabout with four approaches • Truck apron • Marked crossing facilities on all approaches • Illumination	
Accommodation of horses	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users	• One lane on each approach, with all movements permitted based on intersection configuration, shared with all other road users • Additional paved shoulder width depending on varying cross-section options	• One lane on all approaches of roundabout, shared with all other road users • Marked crossing facilities available at roundabout • One lane on each approach of north approach of jog intersection, with all movements permitted based on intersection configuration, shared with all other road users	• One lane on all approaches of roundabouts, shared with all other road users • Marked crossing facilities available	• One lane on all approaches, shared with all other road users • Marked crossing facilities available	• Option 2 is preferred
Safety	• Absence of traffic control on Bush Street increases possibility of speeding • Intersection control is susceptible to more-severe angle and turning movement collisions within both jog intersection • Intersection control is susceptible to less-severe rear-end collisions on stop controlled approaches on Winston Churchill Boulevard • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross Bush Street • Limited visibility for motorists on the Winston Churchill Boulevard approaches due to vegetation	• Absence of traffic control on Bush Street increases possibility of speeding • Intersection control is susceptible to more-severe angle and turning movement collisions within both jog intersection • Intersection control is susceptible to less-severe rear-end collisions on stop controlled approaches on Winston Churchill Boulevard • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross Bush Street • Improved visibility for motorists on the Winston Churchill Boulevard approaches due to removal of vegetation	• Roundabout design reduces vehicular speeds on all approaches, including at north approach of jog intersection • Roundabout eliminates more-severe angle and turning movement collisions within intersection • Roundabout is slightly more susceptible to less-severe rear-end and sideswipe collisions on all approaches and within roundabout • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross all approaches • Reduced number of conflict points between all road users on all	• Roundabout designs reduce vehicular speeds on all approaches • Roundabouts eliminate more-severe angle and turning movement collisions within intersection • Roundabouts are slightly more susceptible to less-severe rear-end and sideswipe collisions on all approaches and within roundabout • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross all approaches • Reduced number of conflict points between all road users on all approaches • Improved visibility for motorists	• Roundabout design reduces vehicular speeds on all approaches • Roundabout eliminates more-severe angle and turning movement collisions within intersection • Roundabout is slightly more susceptible to less-severe rear-end and sideswipe collisions on all approaches and within roundabout • Potential conflicts between motorized vehicles and cyclists/pedestrians as they wait for safe gap to cross all approaches • Reduced number of conflict points between all road users on all approaches • Improved visibility for motorists	• Option 5 is preferred

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	**Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches**	**Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard**	**Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard**	**Option 5: One Roundabout With Jog Realignment**	
Option Description	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches	• Two three-legged intersections, with jog between north and south approaches on Winston Churchill Boulevard • No stop control on Bush Street • Stop control on both Winston Churchill approaches • Combination of operational improvements, such as improved signage, reduced speed limits, and removal of vegetation	• Implementation of single-lane roundabout with three approaches at south approach of jog intersection • Truck apron within roundabout • Marked crossing facilities on all approaches of roundabout • Existing configuration of three-legged stop control on north approach of jog intersection remains • Illumination	• Implementation of single-lane roundabouts with three approaches at both north and south approaches of jog intersection • Truck apron within both roundabouts • Marked crossing facilities on all approaches of both roundabouts • Illumination at both roundabouts	• Jog realignment of north and south approaches of intersection • Implementation of single-lane roundabout with four approaches • Truck apron • Marked crossing facilities on all approaches • Illumination	
			approaches of roundabout • Improved visibility for motorists on all approaches due to horizontal and vertical alignment modifications • Stop control at north approach of jog intersection is susceptible to more-severe angle and turning movement collisions within both jog intersection • Stop control at north approach of jog intersection is susceptible to less-severe rear-end collisions on stop controlled approach	on all approaches due to horizontal and vertical alignment modifications	on all approaches due to horizontal and vertical alignment modifications • Eliminates jog through realignment	
Stormwater quality and quantity	• Deficient drainage	• Designed to address drainage deficiencies through adequate ditches or underground infrastructure based on cross-section options	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Designed to address drainage deficiencies through underground infrastructure	• Options 2, 3, 4, 5, preferred
Pavement	• Deficient pavement conditions	• Pavement reconstruction / rehabilitation as needed	• Pavement reconstruction	• Pavement reconstruction	• Pavement reconstruction	• Options 2, 3, 4, 5, preferred
Socio-Economic Environment						
Residential properties	• No impacts	• Potential minor maintenance/ removal of vegetation on residential property	• Property acquisition required, with potential residential and driveway impacts	• Property acquisition required, with potential residential and driveway impacts	• Property acquisition required, with potential residential and driveway impacts	• Option 1 preferred
Farm operations	• No impacts	• Potential minor maintenance/ removal of vegetation on farm land	• L Property and acquisition required, with potential farm operations impacts	• Property acquisition required, with potential farm operations impacts	• Property acquisition required, with potential farm operations impacts	• Option 1 preferred
Businesses	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	**Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches**	**Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard**	**Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard**	**Option 5: One Roundabout With Jog Realignment**	
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Archaeological resources	• No impacts	• No anticipated impacts	• Potential impacts beyond existing ROW, which may require additional assessment	• Potential impacts beyond existing ROW, which may require additional assessment	• Potential impacts beyond existing ROW, which may require additional assessment	• Options 1, 2 preferred
Built and cultural heritage resources	• No impacts	• No anticipated impacts	• Potential impacts beyond existing ROW, which may require additional assessment	• Potential impacts beyond existing ROW, which may require additional assessment	• Potential impacts beyond existing ROW, which may require additional assessment	• Options 1, 2 preferred
Air, noise, vibration impacts	• Minimal air, noise, vibration impacts during minor construction work	• Some air, noise, vibration impacts during minor construction work	• Moderate air, noise, vibration impacts during construction • Increased air, noise, vibration impacts due to more vehicles braking and accelerating	• Moderate air, noise, vibration impacts during construction • Increased air, noise, vibration impacts due to more vehicles braking and accelerating	• Moderate air, noise, vibration impacts during construction • Decreased air, noise, vibration impacts due to realignment of jog intersection and elimination of turning movements	• Option 1 preferred
Natural Environment						
Terrestrial habitat	• No impacts	• Minor encroachments into adjacent cultural vegetation communities due to required grading based on cross-section options; no significant impacts anticipated • Some tree removal required to improve sightlines	• Encroachments into adjacent cultural vegetation communities due to required grading; more so than Option 2 but less so than Options 4 or 5 • Some tree removal required to accommodate site grading	• Greatest required encroachment into adjacent cultural vegetation communities due to required grading • Greatest amount of tree removal required to accommodate site grading	• Encroachments into adjacent cultural vegetation communities due to required grading; more so than Options 2 or 3 but less so than Option 4 • Some tree removal required to accommodate site grading	• Option 1 is preferred as it avoids impacts to terrestrial features and habitat • Otherwise, Option 2 is preferred due to lesser required encroachment into adjacent terrestrial natural features and habitat
Aquatic environment	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Wetlands and watercourses	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	**Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches**	**Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard**	**Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard**	**Option 5: One Roundabout With Jog Realignment**	
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Species at risk	• No impacts	• Eastern Meadowlark breeding habitat in an adjacent field; no negative impact anticipated due to minor grading requirements based on cross-section options • Little Brown Myotis and Tricolored Bat known from the area; habitat may be directly impacted through required tree removal	• Eastern Meadowlark breeding habitat in an adjacent field; no negative impact anticipated due to grading requirements • Little Brown Myotis and Tricolored Bat known from the area; habitat may be directly impacted through required tree removal	• Eastern Meadowlark breeding habitat in an adjacent field; no negative impact anticipated due to grading requirements • Little Brown Myotis and Tricolored Bat known from the area; greatest potential for impact through required tree removal	• Eastern Meadowlark breeding habitat in an adjacent field; no negative impact anticipated due to grading requirements • Little Brown Myotis and Tricolored Bat known from the area; habitat may be directly impacted through required tree removal	• Option 1 is preferred as it avoids potential impacts to Little Brown Myotis and Tricolored Bat habitat • Otherwise, Option 2 is preferred due to fewer tree removals required, in turn presenting less potential for impact to Little Brown Myotis and Tricolored Bat habitat
Species of Conservation Concern and Regionally Significant Species	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Wildlife movement corridors	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Stormwater management	• No impacts	• Improved stormwater drainage system • No significant increase in surface water runoff	• Improved stormwater drainage system • Increased surface water runoff due to larger area of impervious surface	• Improved stormwater drainage system • Highest increase in surface water runoff due to largest area of impervious surface	• Improved stormwater drainage system • Increased surface water runoff due to larger area of impervious surface	• Options 2 is preferred as it incorporates improved drainage systems over current conditions but features less impervious surface than other Options
Natural hazards	• No impacts	• No impacts	• No impacts	• No impacts	• No impacts	• No difference
Niagara Escarpment impacts	• No impacts	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No impacts as outside of NEP designated areas and regulated habitat	• No difference
Capital Costs						
Construction costs	• Low construction cost due to minimal construction work required	• Low construction cost due to minimal construction work required	• Moderately higher construction cost from alignment modifications, urbanized elements, and larger paved area	• Significantly higher construction cost from alignment modifications, urbanized elements, and larger paved area	• Significantly higher construction cost from alignment modifications, urbanized elements, and larger paved area	• Options 1 and 2 result in lowest construction cost

Legend:

Preferred	Less Preferred	Least Preferred

EVALUATION CRITERIA	Winston Churchill Boulevard and Bush Street Intersection Options					EVALUATION
	Option 1: Do Nothing Stop Control on Both Winston Churchill Boulevard Approaches	**Option 2: Operational Improvements including Stop Control on Both Winston Churchill Boulevard Approaches**	**Option 3: Roundabout at South Approach of Winston Churchill Boulevard and Stop Control on North Approach of Winston Churchill Boulevard**	**Option 4: Roundabouts at Both Approaches of Winston Churchill Boulevard**	**Option 5: One Roundabout With Jog Realignment**	
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Property acquisition	• No property acquisition required	• No property acquisition required	• Property acquisition required as roundabout extends beyond the existing ROW; less so than other roundabout options	• Property acquisition required as roundabout extends beyond the existing ROW	• Property acquisition required as roundabout extends beyond the existing ROW	• Options 1 and 2 result in no property acquisition anticipated
OVERALL						
		• Option 2 preferred as it addresses operational and safety issues in a cost effective manner, while minimizing socio-economic, and natural environment impacts				

Legend:

Preferred	Less Preferred	Least Preferred

Based on the evaluation, operational improvements including stop control on both Winston Churchill Boulevard approaches (Option 2) are preferred for the intersection of Winston Churchill Boulevard and Bush Street.

12. SUMMARY OF RECOMMENDED DESIGNS

A summary of the recommended designs for each of the study area corridors is presented in **Table 58**.

Table 58: Summary of Recommended Design by Corridor

Corridor	Winston Churchill Boulevard (WCB)	Olde Base Line Road (OBL)	Mississauga Road/Old Main Street	Old Main Street and Bush Street (Belfountain Village)	Bush Street
Posted Speed Limit	60 km/h	50 km/h	60 km/h (with 50 km/h transition into Belfountain Village)	40 km/h	70 km/h (with 50 km/h transition into Belfountain Village)
Vertical Profile	Vertical alignment modifications proposed at some locations to meet standards for 70 km/h design speed (60 km/h posted speed)	Significant vertical alignment modifications to meet standards for 60 km/h design speed (50 km/h posted speed)	Vertical alignment modifications proposed at some locations to meet standards for 60-70 km/h design speed (50-60 km/h posted speed)	Vertical alignment to follow existing vertical profile	Vertical alignment modifications proposed at some locations to meet standards for 60-80 km/h design speed (50-70 km/h posted speed)
Cross-Section Elements	Majority of the corridor is semi-rural cross-section: ▪ One 3.5 metre travel lane (vehicle zone) in each direction ▪ 1.7 metre paved shoulder on either side of the road ▪ 0.5 metre mountable curb on either side of the road ▪ Underground drainage infrastructure Rural cross-section at some locations: ▪ Ditch on either side of the road instead of mountable curb/ underground infrastructure	Majority of the corridor is semi-rural cross-section: ▪ One 3.5 metre travel lane in each direction ▪ 1.7 metre paved shoulder on either side of the road ▪ 0.5 metre mountable curb on either side of the road ▪ Underground drainage infrastructure Rural cross-section at some locations: ▪ Ditch on either side of the road instead of mountable curb/ underground infrastructure	Semi-rural cross-section: ▪ One 3.5 metre travel lane in each direction ▪ 1.7 metre paved shoulder on either side of the road ▪ 0.5 metre mountable curb on either side of the road ▪ Underground drainage infrastructure	Semi-rural cross-section: ▪ One 3.3 metre travel lane in each direction ▪ 1.7 metre wide sidewalk on south/west side between Shaws Creek Rd and Belfountain Community Centre ▪ Paved shoulder of varying width on south side east of Belfountain Community Centre ▪ 2.4 metre wide parking on east side between Bush St. and Belfountain Community Centre ▪ 0.5 metre mountable curb on either side ▪ Underground drainage infrastructure	Rural cross-section: ▪ One 3.5 metre travel lane in each direction ▪ 1.7 metre paved shoulder on either side of the road ▪ Ditch on either side of the road
Truck Restrictions	Same as existing	Same as existing	Same as existing	Same as existing	Same as existing
Intersection Configuration	▪ All-way stop control at WCB/OBL ▪ WCB/Bush St intersection configuration to remain as per existing conditions (two three-legged intersections)	▪ All-way stop control at WCB/OBL ▪ OBL/ Mississauga Rd intersection configuration to remain as per existing conditions (stop control on OBL only)	▪ OBL/ Mississauga Rd intersection configuration to remain as per existing conditions (stop control on OBL only)	▪ Old Main St/ Bush St intersection configuration to remain as per existing conditions (all-way stop control)	▪ WCB/ Bush St intersection configuration to remain as per existing conditions(two three-legged intersections)

13. TIMING OF IMPLEMENTATION AND FUTURE COMMITMENTS

13.1 Project Schedule

As part of the Environmental Assessment process, this Environmental Study Report is to be filed with the Municipal Clerk and placed on the public record for at least 30 calendar days for review by the public and review agencies.

After the review period, provided that no Part II Orders are received, the Region may proceed to Phase 5 of the Class EA process, design and construction. Property acquisition and utility relocation will then be scheduled, followed by construction.

The general project timelines are shown in **Figure 87**.

Figure 87: Typical Project Timelines

13.1.1 Lapse of Time

According to the Municipal Class EA, “If the period of time from the filing of the Notice of Completion of ESR in the public record or the MOE’s denial of a Part II Order request(s), to the proposed commencement of construction for the project exceeds ten (10) years, the proponent shall review the planning and design process and the current environmental setting to ensure that the project and the mitigation measures are still valid given the current planning period. The review shall be recorded in an addendum to the ESR which shall be placed on the public record.”

Notice of Filing of Addendum shall be placed on the public record with the ESR, and shall be given to the public and review agencies, for a minimum 30-day public review period. The notice shall include the public’s right to request a Part II Order during the 30-day review period. If no Part II Order request is received the proponent is free to proceed with implementation and construction.

13.2 Preliminary Cost Estimate

Preliminary cost estimates for the recommended designs are summarized in **Table 59**. More details on the preliminary cost estimates for each corridor are provided in **Appendix X**.

Table 59: Preliminary Cost Estimates

Road Segment	**Cost ($ million)**
Winston Churchill Boulevard	11.0
Olde Base Line Road	5.0
Mississauga Road / Old Main Street (including Belfountain Village)	12.0
Bush Street (including Belfountain Village)	3.5
Total	31.5

13.3 Timing of Improvements

Timing of improvements is to be confirmed during detailed design. It is anticipated that implementation of improvements for Winston Churchill Boulevard and Olde Base Line Road will take place first, followed by Mississauga Road/Old Main Street and Bush Street.

13.4 Utility Relocation

The location and alignment of existing municipal services is to be confirmed during detailed design, which may result in changes to the identified utility impacts. Formal definition of impacts on utilities will be determined during detailed design. All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary. During detailed design, meetings will be held with utility companies as required where potential impacts to existing or future services are identified.

13.5 Commitments for Future Work

As per the June 20, 2014 meeting with CVC, the Region is committed to working with CVC to resolve or address their concerns prior to construction and implementation. These include:

- Hydraulic analysis for watercourse crossings along Mississauga Road/Old Main Street and Bush Street, to finalize culvert crossing sizes that meet CVC flow passage criteria.
- For culvert crossing WCB-17, which is now a CVC-designated watercourse, additional assessment is required to determine an appropriate size for an open-bottom concrete box culvert that meets CVC flow passage criteria and fluvial geomorphological considerations.
- For culvert crossings OBL-04 and OBL-08, additional assessment is required to determine the extent of impacts if overtopping of the road occurs during a Regional storm event.

- For culvert crossing WCB-09, and the watercourse running in the roadside ditch between approximately Station 41+880 and 42+230, additional assessment is required to determine the extent of impacts to the watercourse and adjacent properties.

The ESR identifies specific items to be reviewed and confirmed during detailed design, as designs are refined and grading limits are finalized. Items of particular interest to be confirmed include:

- Grading limits, impacts to features, and potential property requirements where survey coverage at the EA stage is not sufficient.
- Extent of impacts to natural features. This includes a detailed tree inventory; visual impact assessment to evaluate the impact of vegetation removal, where necessary; and detailed wetland boundary mapping, if required. Monitoring programs should also be developed during detailed design.
- Extent of impacts to cultural heritage features, particularly along Mississauga Road / Old Main Street and Bush Street, and where insufficient data was available at the EA stage regarding the exact location of specific features along Winston Churchill Boulevard and Olde Base Line Road.
- Extent of impacts to hydro poles and other utilities. Permanent aerial easements and potential vegetation removals as a result of hydro pole relocation are to be identified through the development of utility relocation design.
- Illumination warrants for Winston Churchill Boulevard at Sideroad 5 and Sideroad 10 intersections.
- Opportunities to reduce grading and watercourse impacts, such as realignment of the road centreline, reducing profile adjustments, channel realignment, retaining walls or other types of soil retention features, etc., particularly at the following locations:
    - Winston Churchill Boulevard between Station 41+880 and 42+230 (east and west sides)
    - Winston Churchill Boulevard between Station 44+260 and 44+320 (west side)
    - Winston Churchill Boulevard between Station 44+760 and 44+820 (east side)
    - Winston Churchill Boulevard between Station 44+880 and 45+190 (west side)
    - Winston Churchill Boulevard between Station 44+980 and 45+080 (east side)
    - Olde Base Line Road between Station 30+640 and 30+795 (north and south sides)
    - Olde Base Line Road between Station 31+895 and 32+020 (north and south sides)
    - Mississauga Road / Old Main Street between Station 20+650 and 20+730 (east and west sides)
- Property requirements throughout the study area, and opportunities to minimize fee simple takings.
- Residents and property owners shall be consulted further during the detailed design phase to review the design of the road adjacent to their properties, including driveway impacts.
- Opportunities to use alternative construction materials for curbs and other roadway elements, to maintain the rural character of the study area, should be reviewed. These may include, for example, using dark coloured curbs to blend in with the asphalt.
- For culvert WCB-14, as this crossing is no longer considered to be a CVC-designated watercourse, there is an opportunity to revert back to a regular CSP culvert.

- NEC, MNR, CVC, MOE, and other agencies and stakeholders shall be consulted further during the detailed design phase:
  - A Development Permit and potentially a plan amendment will be required from the NEC for the proposed works within the Niagara Escarpment Plan area.
  - MNR shall be further consulted at the detailed design stage to ensure habitats of species-at-risk are protected. Wildlife road mortality mitigation approaches will require further discussion in consultation with MNR. It is recommended to undertake a more detailed analysis of area of impact within the regulated habitat for Jefferson Salamander at the detailed design stage, as this information will be used to complete an Avoidance Alternatives Form. A permit from the MNR under the Ontario's Endangered Species Act will be required.
  - A permit under Ontario Regulation 160/06 will be required from CVC for any works within the CVC-regulated areas and watercourses.
  - A Permit to Take Water (PTTW) will be required for groundwater pumping in exceedance of 50,000 litres per day, as well as for surface water extraction and the active diversion of surface water flows by pumping. A monitoring program for discharge water quality and quantity, as well as a mitigation program, may need to be developed. Additional consultation with MOE is required at the detailed design stage.
- If the Orb development application is submitted during detailed design, the Region in conjunction with the Town of Caledon can examine property options for a possible trail connection.