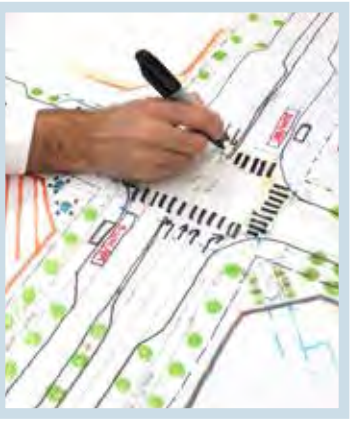
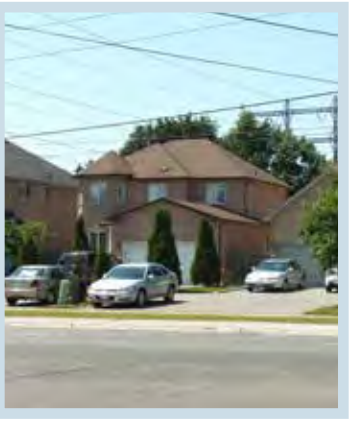
Region of Peel's Road Characterization Study

May 2013




Region of Peel
Working for you

Region of Peel's Road Characterization Study

Executive Summary





Region of Peel
Working for you

Forward

Within our dynamic and evolving Region, we recognize that Regional Roads add tremendous value to our communities. Our Regional Roads positively contribute to community identity, walkability, commerce, environmental function, and health in addition to meeting our mobility needs. It is our expectation that investments we make in our rights-of-way yield multiple community benefits.

The Regional road rights-of-way we develop, operate and maintain must accommodate various functions from moving freight long distances to supporting children crossing streets on the way to school to enhancing existing and emerging main streets. We must also consider how these rights-of-way impact our community character while providing access to land uses ranging from scenic and rural lands to successful neighbourhoods and main streets, industrial and aggregate extraction locations, and intensifying urban areas.

Through the process we have re-examined our approach to Regional road right-of-way design. Past values that resulted in “one-size-fits-all” roads primarily focused on motorists’ safety have evolved. Today, we offer a more balanced response to the needs of pedestrians, cyclists, transit users, motorists, and freight haulers within our limited rights-of-way. More importantly, we now acknowledge the needs and impacts to those stakeholders that depend on the right-of-way – including business owners, residents, schools, and other property owners. We recognize the benefits of integrating multiple transportation modes and treating our right-of-way as places for those passing through as well as those that remain in place.

We have worked with our partners in Caledon, Brampton, and Mississauga to create this Road Characterization Study as a step toward a more community responsive approach. We employed an inclusive process where we collectively considered the implications of various right-of-way treatments and access measures for our current conditions and future visions.

Our Transportation Division within the Public Works Department, as responsible stewards of public finances, offers this integrated approach as it continues to develop, maintain, and operate safe, cost effective and efficient roads for people living in our community and for those people passing through.

Dan Labrecque
Commissioner of Public Works

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Forward

Here in the Region of Peel, as in the rest of Canada, the greatest barrier to our living long, healthy and productive lives is the threat of chronic diseases, especially cardiovascular disease and diabetes. Currently, one in ten adults in Peel has diabetes and, if current trends continue, this will rise to one in six by 2026. Of equal concern is the future, when today's children reach middle age. Surveys of Peel's youth show an increasing prevalence of obesity and a widespread failure to meet even minimal standards of physical fitness.

These are not inexplicable trends which need to be mitigated, but a reflection of widespread changes in how people live their lives, which need to be understood and tackled at the root cause.

Efforts to make life more productive and convenient have succeeded in largely engineering physical effort out of our lives. Efforts to keep cars moving have succeeded in rendering all other modes of transportation less attractive.

Over a hundred years ago, public health and urban planners worked together to address the epidemics of infectious diseases by redesigning cities to support health. The result was the introduction of clean drinking water, sewer systems, and access to fresh air and sunlight. These innovations remain with us today, often unnoticed, and were responsible for a considerable portion of the increase in life expectancy witnessed over the last century and a half.

The current epidemic of chronic diseases also requires us to rethink how we design our cities and suburbs. While the challenge is admittedly large, the lessons of a hundred years ago show that such change is possible. The early successes demonstrated by New York City and others demonstrate the feasibility of achieving policy change to create communities more supportive of health. How we plan and support transportation for multiple users, including those walking and cycling, is integral to achieving health by design in Peel.

Arterial roads are vital to Peel's prosperity. This report shows that they can also be designed so that they are sensitive to, and indeed supportive of, neighbourhoods, main streets, complete streets, and all of the local land uses which the residents of Peel need to maximize their chances to enjoy good health. The report is a significant step towards a built environment which supports healthy living.

Dr. David Mowat
Medical Officer of Health
Peel Public Health

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Executive Summary

The Region of Peel is growing steadily in both population and traffic volume. This increased growth and development challenges all planners and engineers in growing communities to evaluate how the arterial roads best serve different users and functions. The Region's Transportation Division responded to this challenge by commissioning the Road Characterization Study (RCS) to plan and develop future Regional Roadways that respect multiple transportation modes and ensure that the Regional arterial transportation network considers all users, transportation options, health impacts, and local contexts, with an eye toward growth and intensification. 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.

The RCS process brought together multiple stakeholders to develop a set of designs that establish right-of-way priorities, meet multi-modal demands on the roadway, and support existing and, most importantly, future land use character. The new access control approach that was also a part of the RCS set out to:

- Use the opportunity of a new Access Control By-Law in a way that supports the evolving land use visions of our Area Municipalities.
- Support the existing and future ROW users (goods movement, transit, automobiles, cyclists, and pedestrians) while maintaining road safety and operation.
- Plan for development and intensification in some parts of the Region, as per the Regional Official Plan.
- Maintain the Region's Level of Service for traffic operations as the Region develops and evolves over time.
- Conform to existing technical guidelines.
- Support the creation of compact, walkable, and dense design through the addition of a finer grained network of streets.

Context and Project Parameters

The RCS is an implementation measure of the Long Range Transportation Plan (LRTP) recommended in 2012. In the LRTP, the RCS was identified as a process to examine the objectives, needs and intended functions of arterial roads owned by the Region. Understanding and prioritizing the competing demands for arterial road function, including access to development, goods movement, transit, pedestrian access, and active transportation facilities was a primary objective of the study. The outcome of this study was to characterize roads based on both their functionality and adjacent land use, while accounting for intensification and future development.

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Although the focus of this project is the Regional Road network, the Region recognizes the value of a process that includes seeking equitable solutions on corridors within multiple municipalities, and for this reason was a project parameter from the outset. The aim was to avoid piecemeal approaches and limit the potential for conflicting visions along the same corridor. This contributes to seamless and cohesive design and the coordinated use of transportation and planning dollars, which reflects positively on all jurisdictions. Cohesive transportation solutions can require more effort but often result in better outcomes that have broader acceptability and greater longevity.

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.

To have broad acceptance and be applicable, all cross sectional elements and access control measures adhere to current engineering standards and practices from across North America. To accomplish this objective, the cross sections and access control measures were developed following a review of best practices of current technical guidance in both Canada and the U.S.

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Process

A Context Sensitive Solutions (CSS) approach, which balances the local land use contexts and needs of stakeholders with roadway functionality and design, was used for this project. Also informing the process was the Complete Streets model that considers all modes of transportation when designing roads. The resulting illustrative cross sections support and promote the planning and design of safe, comfortable and convenient streets that balance the needs of pedestrians, motorists, cyclists, and transit users.

The RCS project was designed with extensive stakeholder engagement from the project kick-off through to the deliverable finalization stage. This inclusive approach was intended to foster the development of effective and equitable solutions for all stakeholders. The project team employed an innovative stakeholder engagement strategy that provided opportunities for meaningful input by facilitating partnerships, garnering support, and developing a fundamental understanding of technical subject matter relevant to project outcomes.

The process included group interviews and three workshops over multiple dates, and venues convenient to attendees, with staff and stakeholders from across the Region and from partnering agencies participating. Each workshop addressed different facets of the character and road designs that would later be taken into account when developing the final recommendations.

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Outcome

The RCS resulted in three deliverables; Section I – Process, Section II – Cross Sections, and Section III – Access Control. Section I summarizes the process and presents the road character map and matrix. Section II illustrates the roadway cross sections to be employed when considering changes to the Regional Municipality of Peel's road rights-of-way (ROW). The cross sections developed through this process are intended to serve as a starting point for designers when future Regional Roadway projects are undertaken. Section III, Access control provides a thorough understanding of the fundamentals of access management and lays out the new approach that will be employed in the Region's forthcoming Controlled Access By-Law.

The road typologies and matrix in Section I include Rural Road, Industrial Connector, Suburban Connector, Commercial Connector, Rural Main Street, and Urban Main Street. The cross sections reflect road typologies established through workshops with stakeholders and the Region's RCS steering committee. Section II, Illustrative Cross Sections, provides a cross section for each road type that identifies ranges of real estate required within the row to accommodate different users and functions of the road including pedestrians, cyclists, motor vehicles, utilities, landscaping, and drainage. These requirements are conceptual in nature and may need to be adjusted to respond to site specific conditions during the Environmental Assessment and detailed design phase.

Section III educates the reader on the principles of access management and outlines the Region's new approach to access control. Access control presents a complex challenge of the RCS and for this reason has been discussed in greater detail in the following section.

Access Control

The purpose of access control measures are to maintain the quality of traffic service on a controlled road, while at the same time providing efficient access to the surrounding properties. Access control actions, typically initiatives of agencies with responsibility for the arterial road (the Region, in this case) and municipalities with land use control, fall into two categories:

1. Actions to control (typically, limit) the number of access connections to the arterial, and the design of these connections, and;

2. Measures to form a network of local streets and connections adjacent to the arterial, and to link this network to the arterial (creating a finer grained street network).

Despite their shared function in carrying freight, transit and through traffic, the Region's arterials are bordered by areas of varying and evolving character. These differences are reflected in the RCS definition of different road character types. Historically, access control actions have been scaled to the road's functional classification, with greater emphasis

on such actions given to arterial roads (because of their importance for mobility) and with less attention given to collector and local streets. Typically in past access control practice, no distinctions were made as to the character of the roads (other than their functional class).The scope of access control measures depends on the road's functional class, reflecting the blend of mobility and property access intended for the road context. The roads addressed in the RCS are all classified as arterial and all of them are important for movement of through traffic (traffic with neither origin nor destination adjacent to the road).

To more effectively consider road character in our access control approach and to address growth and development over time we referenced block dimensions in other successful urban places. This approach reaffirmed that as land uses develop, intersection spacing should decrease. Our new access control approach aligns with the block dimensions of successful places; approximately 150 m x 75 m, closely corresponding to the existing block dimensions in Port Credit, Mississauga and downtown Brampton, among others.

Minimum Spacing Between (metres)	Rural Road	Industrial Connector	Suburban Connector	Commercial Connector	Rural Main Street	Urban Main Street
Full to Full	600	450	300	300	150	150
Full to Left-In/Right-In/Right-Out	ISR	225	150	150	75	75
Left-In/Right-In/Right-Out to Left-In/Right-In/Right-Out	ISR	225	150	150	75	75

Table 1: Median Opening Spacing (from RCS Section 3: Access Control, Table 2)

Legend: ISR – Individual Site Review

Note: Spacing measured from curb extension to curb extension (See Figures 24-26 in RCS Section 3). All spacing to be verified by a Transportation Impact Assessment and/or sightline analysis.

The 150 m dimension was used as the starting point for intersection spacing in an Urban Main Street environment and was doubled for Commercial and Suburban Connectors where the commercial uses are less dense and farther apart. Table 1 demonstrates the evolution of development in Peel and the intersection spacing associated with the anticipated growth if applied from left to right. Inherent in this approach is the assumption that Commercial Connectors, such as Mississauga Road, are the most likely of the road types to develop into Urban Main Streets; Suburban Connectors with rear-lotted residential uses between commercial nodes will evolve more slowly over time. Conversely, larger block sizes are typical of primarily Industrial and Rural Roads, and the need for increased access on the arterial is reduced. Just as it was assumed that some areas in Peel would intensify, some other areas in Peel, most notably in Caledon within the Greenbelt, are not expected to develop. This access control approach serves the needs of those areas as well.

Supporting the built form associated with land use character and increased intensification was a key challenge of the RCS. The result is access control that responds to development and the associated desire for reduced intersection spacing with the creation of a supporting network of streets.

There are numerous benefits to implementing access control measures, including increased safety, better traffic flow, and the economic benefits seen in increased land value provided through access. Highly connected networks benefit not only property owners by creating an enormous amount of commercially valuable municipal street frontage within a short distance of an arterial road but pedestrians and bicyclists by providing more than one route to a destination. The Region recognizes that access control impacts many other factors beyond the arterial Right-of-Way (ROW). Recognizing the impacts to land use, future development, pedestrian and bicycle activity, and our health encourages the continued partnership amongst stakeholders to realize a finer grained network of streets that contribute to making Peel a more liveable place.

Peel Region's new access control measures are at the forefront of current access control practice in North America because they recognize that not only functional class, but also the evolving land use character, is a key determinant in developing an access control approach to the road. The Region's access control measures will now respond to evolving land uses that need different spacing to support urban form or industrial functions necessary to meet provincial Places to Grow policies, while still being relevant in rural and scenic areas. Significantly, this allows for reduced access spacing in urbanizing areas if a redundant street network is provided to allow access from areas off of the arterial road and frequent driveway access is eliminated.

The Region now accepts that there is no one-size-fits-all access control measure applicable to all six road types. Rather, access control measures, while recognizing the primary importance of maintaining through traffic service, are individually fitted to the character of each of the six road types.

Recommendations

In addition to the deliverables, several recommendations were developed as part of the RCS process. These recommendations support the implementation of character based roadway designs and the creation of liveable places in Peel.

1. The Region should work with Area Municipalities to develop and align future land use maps with 15-30 year horizons so that Regional Roads can continue to be designed in a context sensitive manner with an understanding of future development in mind.
2. The Region should focus changes to Regional Roads in places where it is readily achievable, such as developing greenfields or intensification areas and make incremental modifications in locations where it will be difficult or unnecessary to change roadways in the near term.
3. The Region should focus on the co-creation of transportation solutions with the public and other stakeholders. Future roadway design projects should include consideration of tailored communication plans that are specific to the project area and: i. emphasize the leadership role of the Region; ii. be used as a public relations and education tool; and iii. recognize the impacts of budgets and the evolution of land use over time.
4. The Region should employ the flexibility found in roadway standards, through professional judgment, to meet community goals.
5. The Region should define its metrics of success for roadway design based on Quality of Service instead of only Level of Service as defined by a balanced and pragmatic approach to realizing its vision.
6. The Region should encourage public and stakeholder consultation early on in project development (i.e., during Phase 1 “Problem and Opportunity Definition” of Municipal Class Environmental Assessment (MCEA)) as well as during the development of alternatives.
7. The Region, in its review capacity, should continue to work with Area Municipalities to employ its Access Control By-law to shape land development projects to achieve Regional and local priorities in a holistic manner by creating network and consolidating cross-access easements when the opportunities arise.
8. The Region should consider a dispute resolution process for situations that may arise when staff recommendations are not acceptable to applicants. The process, led by Development Services as the provider of one window of service to all land development related matters within the Region, would coordinate key stakeholders with a focus on partnership and equitable solutions.

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Region of Peel's Road Characterization Study

Section 1: Process




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Working for you

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Cross Section Design Workshop - Day 1

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1.0 Introduction

The Region of Peel is growing steadily in both population and traffic volume. Heavy demand on the Region's arterial road network to move more cars efficiently has resulted in arterial street designs that do not balance the needs and expectations of surrounding communities.

The Region's Transportation Division commissioned the Road Characterization Study (RCS) as a more responsive method to plan and develop future Regional Roadways that respect multiple transportation modes and ensure that the Regional arterial transportation network considers all users, transportation options and local contexts.

The RCS process does not change the functional classification of the Regional arterial roads. All roads considered in the study remain under Regional control and remain functionally classified as arterial roads.

1.1 Study Method and Approach

A Context Sensitive Solutions (CSS) approach was used for this project. The CSS process balances local land use contexts and the needs of stakeholders with functional roadway design.

Guiding the process was the Complete Streets model that considers all modes of transportation when designing roads. The resulting illustrative cross sections support and promote the planning and design of safe, comfortable and convenient streets that balance the needs of motorists, pedestrians, cyclists, and transit users.

Cross Section Design Workshop - Day 2

Introduction

This project involved consulting with municipal stakeholders and multiple Regional staff members to develop solutions. The project team employed an innovative stakeholder engagement strategy that provided opportunities for meaningful input by: facilitating partnerships, garnering support, and developing a fundamental understanding of technical subject matter relevant to project outcomes, for the ultimate implementation of the designs.

The process included three workshops over multiple dates, and venues, with staff and stakeholders from across the Region and partnering agencies outside the Region. Each workshop addressed different facets of the character and road designs that would later be taken into account when developing the final recommendations.

In addition to the planned workshops, the Region participated in numerous additional discussions with local municipal staff and leadership that contributed to the project outcome. These discussions were helpful in clarifying project expectations and outcomes, and understanding the land use context and vision to which Regional Roads must respond.

Although the focus of this project is the Regional Road network, the Region recognized the value of a process that included seeking consensus on corridors within multiple municipalities, with the aim of avoiding piecemeal approaches and limiting the potential for conflicting visions along the same corridor. This contributes to seamless designs and to the coordinated use of transportation and planning dollars that reflect positively on all jurisdictions. Cohesive transportation solutions can require more effort but often result in better outcomes that have broader acceptability and greater longevity.

The intent of this process was to avoid prescriptive, one-size-fits-all road standards by developing a set of road types that respond to the future land use character of specific locations. The RCS prioritizes zones – pedestrian, bicycle, vehicle, parking, and green – within the rights-of-way. Subsequent work could include aesthetic and functional elements within the Regional rights-of-way such as street furnishings, lighting, plantings, pavement materials, etc. that support the comfort of all users.

1.2 Assumption and Considerations

The primary assumption of this document is that the character of the roadway will not affect or alter the arterial road functionality and, specifically, lane-capacity of the Regional network. The character, guided by the local area land uses and roadway size, will instead determine the preferred appearance and personality of the roadway.

Guiding this study were several key documents that included current Local, Regional and Provincial Policies and Official Plans as noted in section two of this report. Additional reports and studies that address multi-modal concerns and transportation needs, such as Goods Movement and Active Transportation policies, were also reviewed for a broader understanding of Regional policy positions.

To have broad acceptance, be applicable, and meet safety requirements, all cross sectional elements had to adhere to current engineering standards and practices from across North America. To accomplish this objective, the cross sections were developed in concert with the Transportation Association of Canada *(TAC) Geometric Design Guidelines* and the American Association of State Highway and Transportation Officials *(AASHTO) Geometric Design of Highways and Streets (Greenbook)*. Both manuals encourage the use of balanced and studied judgment that considers good design as well as cost and safety.

Village of Inglewood, Caledon

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2.0 Study Area Review

2.1 Existing Conditions and Background

A review of existing guiding documents was conducted along with a tour of Regional Roads to fully understand the policy framework and the diverse contexts within the Region. This understanding was combined with information gathered through one-on-one stakeholder interviews where Area Municipalities' staff members generously shared their knowledge and understanding of Regional Roads. The review, stakeholder meetings, and tours were undertaken to familiarize the project team with the Regional and Area Municipal transportation, land use, and access management contexts and conditions. As a result, the Region was able to piece together a non-binding Existing and Planned Land Use in Peel Map using data shared by Caledon, Brampton and Mississauga to aid the Road Characterization Study.

2.1.1 Recommendations

As a result of the review and tours, the following is recommended:

1. The Region should work with Area Municipalities to develop and align future land use maps so that Regional Roads can continue to be designed in a context sensitive manner.

Highway 50, Caledon

2. The Region should focus changes to Regional Roads in places where it is readily achievable, such as developing greenfields or intensification areas, and also make smaller, incremental modifications in locations where it will be challenging or unnecessary to change roadways in the near term.

3. The Region should emphasize that existing or proposed roadway standards provide flexibility and room for professional judgment.

2.2 Document Review

The documents reviewed have been grouped in two categories: governing documents and technical documents. Governing documents relate to policy or regulations that influence investments and planning. Technical documents focus on engineering direction and precedent in design.

Existing policy documents were reviewed to develop an understanding of:

- Applicability to the RCS process.
- Impact upon the development of road infrastructure.
- Flexibility in decision-making.

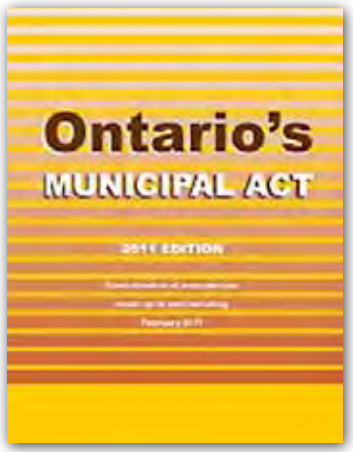
The following is a summary of relevant documents.

2.2.1 Governing Documents

The Planning Act (RSO 1990)
The Municipal Act (2001 – amended 2011)

Under the *Planning Act* (1.1.f) the Province recognizes the authority and accountability of municipal councils to make planning decisions, and is given, by way of the *Municipal Act*, to provide "*good government.*"(2) As part of this, upper and lower tier municipalities are given jurisdiction over non-provincial highways, streets, and lanes (26.5), as well as passenger transportation systems (public transit) (69.1).

Under this act, municipalities may acquire land for the purpose of widening (31.6). As well, upper tier municipalities are not responsible for the construction and maintenance of sidewalks on highways and it is the responsibility of the lower tier municipality unless otherwise agreed (55).



Provincial Policy Statement (PPS) (2005)

The *Provincial Policy Statement* is issued under the authority of Section 3 of the Planning Act (1990) and states that "*decisions affecting planning matters "shall be consistent with*" policy statements issued under the Act" (Part II).

The document provides guidance for all matters planning related. It promotes an integration of transportation and land use planning process to facilitate safe and energy efficient movement of people and goods. In particular, it directs that the transportation network should be a connected system – part of a continuous redundant network – that crosses Regional boundaries and is supported by mixed and compact land uses.

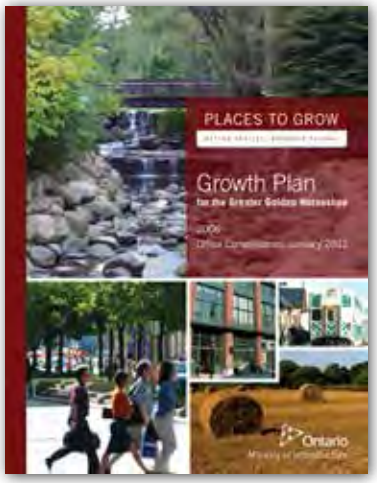
Places to Grow: Growth Plan for the Greater Golden Horseshoe (2006)

The Places to Grow: Growth Plan for the Greater Golden Horseshoe (Growth Plan) derives its authority from the Places to Grow Act (2004) (1.3), and follows the Provincial Policy Statement (PPS) which "*provides overall policy directions on matters of provincial interest related to land use and development*"(1.4)

The Growth Plan is a vision for the greater Region that advocates planning for the future growth of the area by building compact, efficient, and environmentally sensitive and sustainable development that also considers our future economic welfare. The plan gives priority to the movement of people through transit investment and active transport linkages and the effective movement of goods that support our economy.

The Big Move (2008)

The *Growth Plan* (3.2.3) also directs the creation and implementation of transportation infrastructure planning and investment. The result was the creation of the Regional Transportation Plan, titled *The Big Move*, which is under the Greater Toronto Transportation Authority Act, and gives Metrolinx "*the mandate to develop and implement an integrated multi-modal transportation plan for the GTHA.*"(pg. vi)



Study Area Review

The Big Move, follows the "*Growth Plan's directions that call for the transportation system to be planned and managed to provide connectivity among transportation modes*" (pg. 2) and seeks to address issues of traffic congestion that impacts both the social and economic health of the Region through transit initiatives. The document states that the less able and vulnerable must be considered when designing mobility networks, and stresses the need for planned Regional transit networks, active transportation expansion, and efficient roadway networks.

Ministry of Transportation Ontario (MTO), Transit Supportive Guidelines (2012)

MTO's *Transit Supportive Guidelines* provide land use and site plan level design and implementation fundamentals to create transit-friendly communities, both large and small, as supported by the Provincial Policy Statement. They advocate strategies such as the creation of road networks and corridors, protecting transit rights-of ways, encouraging compact urban development, and promoting land use development patterns that support transit use. The guide also suggests that "*creating transit-supportive communities demands that a better balance be achieved between all modes of transportation.*"(pg. 3)

Peel Healthy Development Index (HDI), (December 2009)

In 2005, Peel Public Health identified that "*sprawling, auto-oriented development patterns… are a potential cause of the high prevalence of obesity and low rates of physical activity in the region.*"(pg. 6) As a response, the Healthy Development Index looks at the linkages between physical activity and built environment, identifying seven elements that influence health including; density, service proximity, land use mix, street connectivity, aesthetics and human scale, road network and sidewalk character, and parking. These factors inform the evaluation index for assessing and scoring new development applications in the Region.

The report concludes that the development community has "*limited discretion regarding most of the healthy development measures*" (pg. 94) because many of these measures are specified in existing by-laws, zoning regulations, and other policies. It recommends that in addition to making a commitment to healthier urban development, the Region should adopt universal density targets and common density measures; integrate and simplify the redevelopment zoning and intensification process; and prioritize "*public health in both transportation and urban planning*" practices.

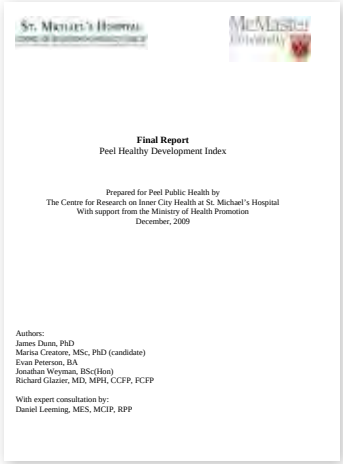
Region of Peel, Health Background Study: Development of a Health Background Study Framework, (May 27, 2011)

Building on the Peel HDI report of 2009, the goal of the Health Background Study (HBS) is to "*promote healthy, walkable communities.*"(User Guide pg. 2) This includes consideration for access to transit and non-motorized travel through the elements of; density, service proximity, land use mix, street connectivity, streetscape character, and parking. The document provides rationale, background information, and policy recommendations for integrating healthy design into communities and includes a 'healthy development' checklist for identifying, evaluating, and assessing new developments.

The Health Background Study: Implementation Strategy advocates creating a "*supportive legislative environment*" (2.1.1 pg. 3) across the Region and Area Municipalities, with clear objectives and measureable targets that do not negatively affect the approvals process. Additionally, the HBS suggests that clear communication, special training, and stakeholder assistance will "*demonstrate … commitment*" to the study and facilitate the process.

Report of the Air Quality Task Force to the Minister of the Environment: Southwest Greater Toronto Area, Oakville-Clarkson Airshed. Framework, (May 27, 2011)

The Southwest GTA Task Force on Air Quality (2010), concludes that fugitive dust emissions contribute to local air pollution and originate from on- and off-road vehicles, unpaved roads, and track-out from heavy duty vehicles, as well as storage piles in industrial and construction sites. As a result, the framework report encourages paving road shoulders to prevent dust entrainment and the tracking of materials into the roadway.


St. Michael's Hospital

McMaster University

Final Report
Peel Healthy Development Index

Prepared for Peel Public Health by
The Centre for Research on Inner City Health at St. Michael's Hospital
With support from the Ministry of Health Promotion
December, 2009

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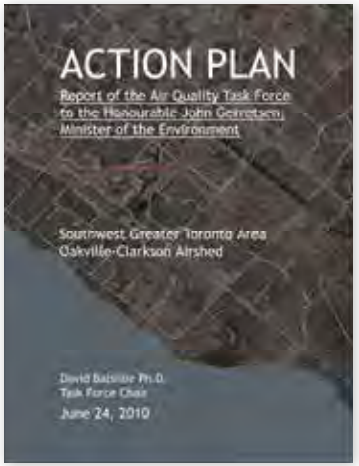


2.2.2 Official Plans and Transportation Reports

The Planning Act (Sec 2-14.2) and Provincial Policy Statement provide authority for the creation of Official Plans and transportation reports from the Region of Peel and each of its three Area Municipalities, the City of Mississauga, the City of Brampton and the Town of Caledon. As part of this, the Growth Plan for the Greater Golden Horseshoe states that municipalities "*will develop and implement through their Official Plans and other supporting documents, a strategy and policies to phase in and achieve intensification and the intensification target.*"(2.2.3.6)

Derived from the Growth Plan, The Big Move delivers the direction that Official Plans, Secondary Plans and municipal Transportation Master Plans should:

- Identify transit priority zones where transit priority measures will be put in place and …ensure the optimal function of transit operations. (1.14)
- Establish guidelines and model policies to help municipalities develop and implement TDM policies. (4.2)
- Identify, as per Schedules 1 and 2:
    - Regional rapid transit and highway networks. (7.10)
    - Potential or future gateway hubs and anchor hubs, and unique destinations that are important Regional activity centres and/or major trip generators. (7.14, 7.16)
    - Comply and implement the Growth Plan in regard to intensification corridors, density targets, and transit priority. (7.18)

The Official Plans and transportation reports from the Region of Peel and each of its three Area Municipalities have all identified that the area is growing at a great pace. They recognize that the Region will continue to encounter increased pressures of population growth, an aging demographic with increased mobility issues, and an increase in road congestion that they suggest cannot be addressed by simply adding more lanes to existing roads.

Goods movement has been identified as a vital part of the economic viability of the Region. The plans support a well-integrated system of freight via road, air or rail to contribute to Peel's long term vitality.

The plans acknowledge high auto dependence within the Region. The goal of the plans are to create the conditions that shift from single-occupant auto use to other forms of transportation. All of the municipalities indicate a desire to encourage and develop a strong and connected transit system that covers the various cities and town, connects the entire Region and the adjacent Regions.

Overall, the plans emphasize the need to increase density and promote smart growth in the Region. This must be reinforced by roadway design and construction. Various plans also note that much of the land in Caledon is governed by the Niagara Escarpment Plan, which focuses on minimizing transportation impacts to sensitive areas. Based

on current land use maps, municipalities are discussing land uses along the municipal boundary roads.

Key themes throughout the plans include:

- Allowing for the safe and efficient transportation of goods.
- Integrating pedestrian and bicycle transportation where possible.
- Creating a strong transit network.
- Planning and designing for dense communities and urban form that supports and encourages transit and active transportation use in order to mitigate carbon emissions and other environmental issues, promotes health, and reduces costs.

Region of Peel Official Plan (2012)

The purpose of the *Region of Peel Official Plan* is to "*Provide a holistic approach to planning through an overarching sustainable development framework that integrates environmental, social, economic and cultural imperatives*" (1.1) The plan seeks to enhance the quality of life within the Region by, among other things, reducing the effects of road congestion through dense, compact communities that support and encourage pedestrian, bicycle and transit uses as well as efficient roadway traffic. (5.9.8.) The Peel Official Plan states that the transportation system should also integrate land use and roadway design (5.9) with consideration of:

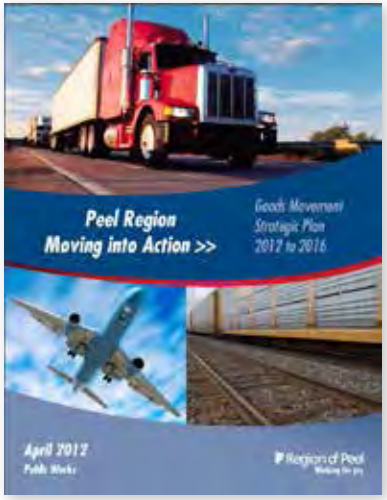
- An efficient and safe goods movement network, which includes roadway, rail and air systems to promote a strong economy. (5.9.7)
- Limit sprawl and development into rural areas through urban design that includes "*reduced setbacks, narrower lot sizes, reduced road allowance*." (5.8.3)
- Minimize impact on air quality and environmentally sensitive, hydrological and heritage areas through roadway design and a reduction of single-occupant vehicle use. (5.9.2)
- Support and promote, through urban design, fully accessible and integrated network of active modes of transportation, efficient transit and Transportation Demand Management (TDM) measures. (5.9.5)

Region of Peel Controlled Access By-Law (1977) (as amended in 1983, 1993, and 2012)

In addition to the Official Plan, the current *Region of Peel Controlled Access By-Law* states that all access on Regional Roads is controlled by the Region, with input and direction from staff and the Official Plan, and safety should not be compromised when considering design.

Peel Long Range Transportation Plan (2012)

Similar to the Official Plan, the *Peel Long Range Transportation Plan* encourages an integrated and multi-modal transportation system that seeks to curb urban sprawl and the associated negative impacts of roadway congestion as exemplified in the following excerpts:



- "*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.*"(pg. ii)
- "*Although area municipalities and the Region have built more roads and widened existing ones to accommodate the increase in traffic, these efforts cannot keep pace with demand*" (pg. 29)

The plan identifies the need to:

- Develop dense communities with high connectivity and continuous walkways in a manner that promotes walking, biking and transit uses and meets the needs of persons with disabilities and the aging population. (2.1.3.2)
- Manage traffic congestion to provide for a competitive and free flow of goods while also considering the needs of all users. (2.1.3.4)
- Reduce greenhouse gas emissions and runoff and promote healthy lifestyles through active transportation and multi-modal options. (2.1.3.1)
- Develop long term and stable funding options such as public-private partnerships and user-pay systems. (5.4)

Peel Region Goods Movement Strategic Plan (2012)
The Region of Peel's Active Transportation Study (2011)

Both the Region of Peel's *Active Transportation Study* and the *Peel Region Goods Movement Strategic Plan* build on the Peel Official Plan and Long Range Transportation Plan. Specifically the Active Transportation Study responds to the Region of Peel's Strategic Plan (2011-2014) that seeks to "*protect, enhance and restore*" the environment through the development of an active transportation network. Likewise, the Peel Region Goods Movement Strategic Plan seeks to support the economy through the safe and efficient movement of goods while balancing the needs of the natural environment and integrating into a larger multi-modal system.

Mississauga Official Plan (2011)

"*Transportation planning will complement environmental planning, land use planning and urban design*."(8.1)

The *City of Mississauga Official Plan* echoes many of the objectives cited in the Peel Region Long Range Transportation Plan and Official Plan. The City aspires to "*create a multi-modal transportation network for the movement of people and goods that supports more sustainable communities.*" (8.1) To achieve this, the document encourages the:

- The creation of compact and complete communities that include transit at major trip generating uses by key nodes, hubs, and destinations as well as "*strive to create a fine-grained system of roads*" to improve connectivity. (8.2.3) (8.2.2.3)
- Prioritization of the safe movement of goods over single-occupant vehicles in employment areas, supporting a vital component of economic health. (8.7)
- Reduction of transportation forms that generate greenhouse gas emissions and move to include environmentally sensitive transport and design options. (8.3)
- Link transit to local and Regional hubs, nodes, and destinations, as well as use TDM, carpooling and alternative work arrangements to reduce vehicle trips, as well as promote the "*integration of transportation facilities to maximize ... multi-modal travel.*"(8.5) (8.2.1.6)
- Use community design and integrate active transportation to enhance public health. (8.5)

Moving Mississauga: From Vision to Action (2011) - Mississauga's Interim Transportation Strategy

"*Use a context sensitive design approach to transportation decision making to enhance the connections between built-form, public realm, place-making and multi-modal transportation*" (2.0)

Mississauga's interim transportation strategy, *Moving Mississauga*, seeks to include land use and urban design in the overall transportation plan. The plan identifies the need to consider:

- The promotion of green infrastructure and compact and sustainable buildings that support transit use. (5.0)
- Developing a transportation network that supports local and Regional economic development while reducing road congestion. (7.1)

- The support for multi-modal modes of transportation that can help reduce environmental impacts, vehicle emissions, energy consumption, water contamination, noise issues and the urban heat island effect. (5.0)
- Pursuing transit initiatives and transit supportive land uses, and planning for cycling, pedestrian and transit, as well as auto and truck alternatives. (5.0)
- Putting people first by promoting safety, active transportation for improved public health, and complete and accessible sidewalks. (5.0)
- The development of benchmarks for the measurement of success and the consideration of new "*innovative*" approaches to financing such as public private partnerships, dedicated transit funding, and new service delivery models. (5.0)

Mississauga Cycling Master Plan, Sept. 2010

The *Mississauga Cycling Master Plan* is based on three goals; i) fostering cycling; ii) building integrated cycling network; and, iii) ensuring the safety of its network, for implementing a 20-year plan. The plan is guided by the Mississauga OP, the Provincial Policy Statement, and the Growth Plan for the Greater Golden Horseshoe. These documents promote healthy communities and a dense and efficient mix of land uses that support sustainable transportation options. Recommended design standards are based on best practices from around the world. In some cases, these standards exceed TAC for bicycling facilities.

Brampton Official Plan (2006)

The objectives are to "*work cooperatively with the neighbouring municipalities and the Region*" (pg. 4.4-3) as well as *"develop a balanced, integrated and accessible multi-modal transportation system.*" (pg. 4.4-2)

The *Brampton Official Plan* aligns with the general policies and recommendations of the Peel Regional Plans or the City of Mississauga Plans with regard to transportation. Brampton points to a comprehensive and effective transportation system which promotes transit use and multi-modal movement by:

- The use of higher density residential and employment areas along major corridors as well as encouraging windowed streets. (4.4.2.22) Windowed streets may not be in alignment with the RCS process as they are a response to hostile arterial roads.
- Supporting a comprehensive and cost effective multi-modal goods movement system that includes rail, road, and air systems. (4.4.1)
- Incorporating natural design elements like trees and landscaping into roadway design and mitigating adverse environmental effects on natural heritage features. (4.4.10)
- Establishing strong, comprehensive, and efficient public transit that also integrates existing rail and air networks for all residents, including persons with disabilities. (4.4.4)
- Creating a system that has sufficient walkways and access points for pedestrians and encourages cycling and walking to reduce auto dependency and achieve healthy living. (4.14.5)

Brampton Transportation and Transit Master Plan (2010)

"*Roadway congestion has become a fact of life and cannot be eliminated. The effects of congestion management measures, including modifications to intersection geometry, should minimize their impact on pedestrians, cyclists, and public transit and should support, not hinder the long-term vision for the corridor*." (pg. 82)

Following the Brampton Official Plan, the *Brampton Transportation and Transit Master Plan* encourages an integrated and efficient system for the development of a vibrant community and high quality of life. The plan will accomplish this by:

- Using higher density and compact urban form that supports walking, cycling, and transit use. (7.5)
- Providing access for goods movement near truck generating locations while also channeling the traffic away from residential and commercial areas. (7.8)
- Creating sustainable urban form that improves air quality by encouraging walking, cycling, and transit use. (7.9)
- Aggressively dedicate transit ways, as well as connect transit nodes with higher order transit corridors. (7.2-pg. 92)

- Providing safe, affordable and efficient mobility options as well as the removal of barriers to persons with disabilities. (7.6)
- Identifying secure and sustainable transit funding as well as identifying alternatives like federal and provincial programs that may be used for transit infrastructure. (9.0)

Brampton's PathWays Master Plan, June 2002

The *PathWays Master Plan* is a vision for connecting the city's open spaces. It illustrates a future connected network of pedestrian and cycling infrastructure across Brampton. The Master Plan, advocates the creation of pathways to support active transportation and recreation for walking, cycling, and in-line skating. Recommended design standards propose minimums that are consistent with or exceed TAC standards.

Caledon Official Plan (2008) with OPA226

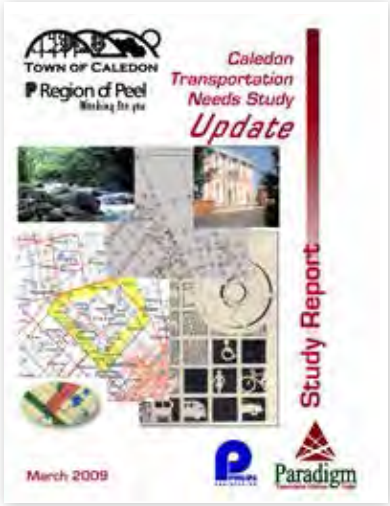
The *Caledon Official Plan* sees transportation as a system that serves land use and should allow for the safe and efficient passage of people and goods (5.9.1). In particular, due to the location and nature of the Town, the use of lands located within the Niagara Escarpment Area is governed by the *Niagara Escarpment Plan* (2012). To achieve their goals, the Official Plan identifies the need to:

- Design and locate roadways to meet traffic needs but limit change to the area. (5.9.2.l.)
- Provide for the safe and efficient movement of trucks through the area and encourage goods movement traffic onto high capacity arterial roadways. (5.9.12)
- Lands within the Niagara Escarpment Area that are defined as growth areas must be developed in a sustainable manner and minimize impact on the escarpment. This includes limiting impacts to natural areas in roadway design and facility expansion. (5.9.6.4)
- Support the future development of public transit. (5.9.7)
- Develop a network of bicycle and pedestrian facilities throughout the Town. (5.9.11)

Caledon Transportation Needs Study Update (2009)

As an update to the 2004 study, the *Caledon Transportation Needs Study* is an analysis of current road conditions and projects, and how to accommodate future traffic demands. The report states that:

- Truck travel is important but it must be limited or restricted from sensitive areas. (2.2) (the term "*sensitive areas*" is undefined)
- To reduce automobile traffic, the development of improved inter-Regional and local transit opportunities, and encourage carpool and GO Transit. (4.1)
- There is concern that heavy traffic on rural roadways, cause 'safety and nuisance' issues as well as increased congestion and environmental problems for the area. (pg. i)

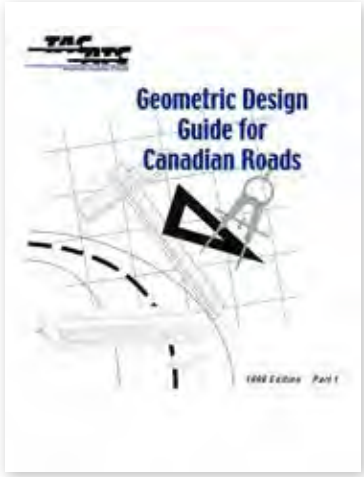


2.2.3 Technical Documents

The Transportation Association of Canada (TAC):
Geometric Design Guide for Canadian Roads (1999)
Bikeway Traffic Control Guidelines for Canada (Feb 2012)

TAC promotes "*safe, secure, effective and environmentally and financially sustainable transportation services in support of Canada's social and economic goals.*" It focuses on roadways and strategic linkages with other elements of the transportation system. It serves as a forum for sharing ideas and developing technical guidelines and illustrating best practices.

"*In urban areas, TAC's primary focus is on the movement of people, goods and services and the relationship with land use patterns.*" (Source: http://www.tac-atc.ca/english/about/index.cfm).



The *TAC/ATC Geometric Design Guide for Canadian Roads* provides a range of design criteria and options for roadways. In section 1.1.4.5 "*The Evolving Approach*", the guide encourages the use of professional judgment in a Context Sensitive Design process that integrates stakeholder input while considering land use context in planning and design.

The *TAC/ATC Bikeway Traffic Control Guidelines* focus on signs, intersection considerations, rail crossings, and pavement markings for bicycle infrastructure and cycling facilities. Similar to the Manual on Uniform Traffic Control Devices (MUTCD), it is intended to be used in the detail design phase of both new and retrofit roadway projects to ensure the consistent development of safe and user-friendly bicycle traffic infrastructure.

The American Association of State Highway and Transportation Officials (AASHTO):
A Policy on Geometric Design of Highways and Streets (2001)
A Guide for Achieving Flexibility in Highway Design (2004)
Guide for the Development of Bicycle Facilities (1999)

AASHTO advocates for the positive role transportation plays in quality of life and the economic vitality of the United States. It serves as a liaison between the US government and the Departments of Transportation of 50 US states, the District of Columbia, and Puerto Rico.

The voting membership of AASHTO consists of representation from the above mentioned DOTs as well as

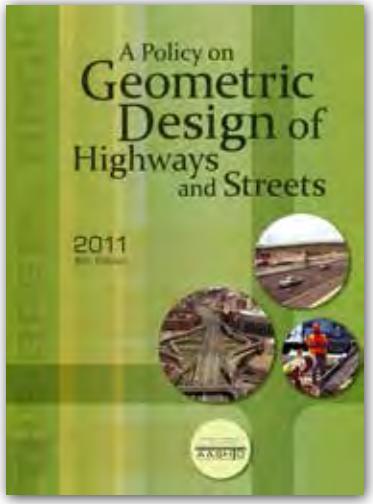
the United States Department of Transportation, some U.S. cities, counties and toll-road operators, most Canadian provinces as well as the Hong Kong Highways Department, the Turkish Ministry of Public Works and Settlement and the Nigerian Association of Public Highway and Transportation Officials have non-voting associate memberships.

Among transportation professionals, AASHTO is recognized as the definitive international leader in setting technical standards for highway design and construction.

AASHTO's *A Policy on Geometric Design of Highways and Streets* (commonly referred to as "the Green Book") recommends safe and efficient practices for the design of roadways. The recommendations are based on extensive engineering research and provide a range of acceptable design criteria based on the type of roadway and expected traffic volume for the facility. The US Federal Highway Administration (FHWA) has adopted the Green Book as the minimum standard for projects on the National Highway System, which includes the Interstate System and other selected principal routes and connectors to intermodal facilities. For all other projects, developed with US federal-aid funds or not, design is directed by the standards adopted by the state or local government. Almost every state and the majority of local governments have adopted the Green Book in whole or in part for use on their own projects.

AASHTO's *A Guide for Achieving Flexibility in Highway Design* describes how to interpret the range of design criteria within the Green Book to achieve context appropriate design solutions. It recommends that the design process should be flexible and that professional judgement should be used while considering context in the design of highway facilities. It encourages the use of a Context Sensitive Design process that considers the needs of all users.

The *Guide for the Development of Bicycle Facilities*, also an AASHTO guiding document, describes a process and provides design criteria for specific issues and opportunities associated with designing bicycle facilities. The guide identifies the need to integrate bikeways into the overall transportation system and demonstrates design choices and methods to integrate bikeways onto streets.



The Institute of Transportation Engineers (ITE) Designing Walkable Urban Thoroughfares: A Context Sensitive Approach (2010)

ITE is an international educational and scientific association of transportation professionals who are responsible for meeting mobility and safety needs. ITE facilitates the application of technology and scientific principles into research, planning, functional design, implementation, operation, policy development and management for any mode of ground transportation.
(Source: http://www.ite.org/aboutite/index.asp)

The ITE design manual *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* describes elements and approaches necessary to create pedestrian friendly, attractive and walkable environments and "illustrates how AASHTO guidance can be applied to roadway improvement projects to make them more compatible with community objectives and context in urban areas".

2.2.4 Governing Documents Summary and Observations

The governing documents illustrate two general themes that overlap with RCS objectives. They focus on land use policy integration with transportation and flexibility in technical requirements that support desirable transportation outcomes. These general themes support the RCS process by providing direction and support for making decisions within the limited space found in Regional Road rights-of-way.

From a policy perspective, land use and transportation regulating documents emphasize:

- The creation of integrated and balanced multi-modal transportation systems with an emphasis on transit, TDM, and active transportation.
- Reducing transportation generated greenhouse gases and other emissions.
- Designing compact and complete communities that limit sprawl.
- Allowing for safe and efficient goods movement.
- Incorporating green infrastructure.
- Innovation in funding transportation infrastructure.

From a technical perspective, the industry leading technical guidelines emphasize:

- Flexibility in the use of standards.
- The need for use of professional judgment.
- Ranges of design options for meeting community objectives.

2.3 Area Tours

Driving tours along Regional Roads were conducted to provide insight and familiarity with current road design and how they currently serve adjacent land use contexts.

2.3.1 Cities of Brampton and Mississauga Tours

On April 18, 2012 a bus tour of the Region was conducted with the consultant and staff from the Region's Transportation, Planning, and Health Divisions to develop an understanding of the existing land use conditions. This tour focused upon established areas of Brampton and Mississauga, and some greenfield areas in northern Peel, as well as potential intensification locations. The route passed through older built-out areas of the communities where reverse frontage and single-family lots bounded by noise walls frame the Regional Roads. At key intersections of arterial roads or major collector roads, automobile oriented commercial strip-mall development is common.

The form of certain areas, such as the Mount Pleasant development area of Brampton, shows that walkable communities are being created in green field locations. This is more effectively being accomplished by turning development away from the Regional Roads, instead of facing the street. In other, older parts of the community, such as the Dixie Road (RR#4) and Cawthra Road (RR#17) corridors near Lakeshore Road, where historic single family development front the streets, access control influences how these sites are being redeveloped.

Dixie Road north of Derry Road East, Brampton

Industrial land use impacts on transportation infrastructure are apparent around Pearson International Airport. Dixie Road, Airport Road (RR#7), and Derry Road (RR#5) transition through many scales of industrial land uses and in certain areas, such as Malton, into residential enclaves. It is evident that consideration of freight movement needs to be balanced with the needs of workers that use transit or cycle to industrial employment locations.

2.3.2 Town of Caledon Tour

On June 12, 2012 a tour of northern Peel was conducted with the consultant and staff from the Transportation Division. The tour of the Regional Road network in the Town of Caledon started along Mayfield Road (RR#14), the border with Brampton, near Airport Road (RR#7). Significant truck traffic was observed within this largely rural setting with some industrial and warehousing use. Low-density housing, highway commercial, and some residential uses occur closer to the Highway 410 extension.

West along King Street (RR# 9) the road passes through the community of Terra Cotta. This area is rural scenic, with rolling hills and tree lined lanes. The road continues into the village where several buildings and homes are built right up to the street with little to no frontage. This is similar to the nature of the western area of the Town along Olde Base Line Road (RR#12) past the Cheltenham Badlands and the winding Forks of the Credit (RR#11) into Belfountain. Winston Churchill Boulevard (RR#19) goes from a paved to gravel road surface for much of its length within Caledon, and provides access for several conservation, camping and recreational sites. Further along at Olde Base Line Road and Dixie Road a round-a-bout is used in place of a signalized intersection.

It was observed that Charleston Sideroad (RR#24) which travels through Caledon Village, transitions from an 80km roadway to a 50km roadway with little change in physical road design to indicate the speed change. The same was observed traveling south along Airport Road into Caledon East. Once in the village, the character was significantly different, with tree-lined streets, wide sidewalks, and on-street parking.

The Village of Palgrave is situated along Highway 50 (RR#50). The village centre comes up quickly with a very short transition zone in and out of its core. As the road enters Bolton it narrows through the historic centre and then quickly transitions back to a more suburban character as it travels south. At this point it is framed by strip-commercial and rear facing residential lots. It becomes more industrial with large warehousing and manufacturing closer to Queen Street (RR#107).

2.3.3 Existing Land Use Summary and Observations

The land use character of different areas within the Region varies dramatically from north to south and east to west. It is apparent that:

- Some of these areas will remain stable due to land use economics and regulatory restrictions while others will change as a result of the intensification policy.
- There may be opportunities to celebrate the Regional Roads that pass through distinct character areas by making them more responsive to adjacent land use.
- A unified future land use vision is an important and necessary element to ensure that the agreed upon road characters accurately reflect the future context and avoid conflicting uses and visions. Without a cohesive land use vision, particularly along boundary roads, the goal of the RCS process will not be achieved.

Dixie Road north of Lakeshore Road, Mississauga

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3.0 Best Practices Review

3.1 Introduction

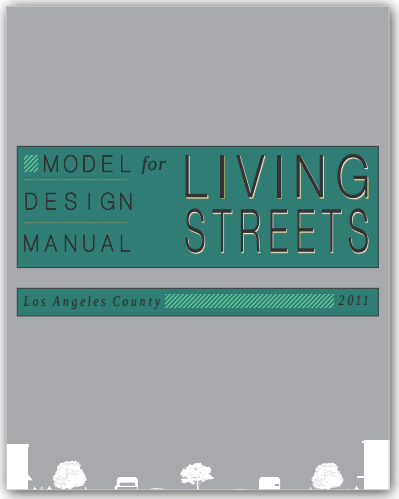
This section summarizes recommendations from a review of best practice road characterization manuals. This is followed by a summary of the five documents from around North America; two of which were produced in an Ontario municipal context. It concludes with a description of common themes found within the documents.

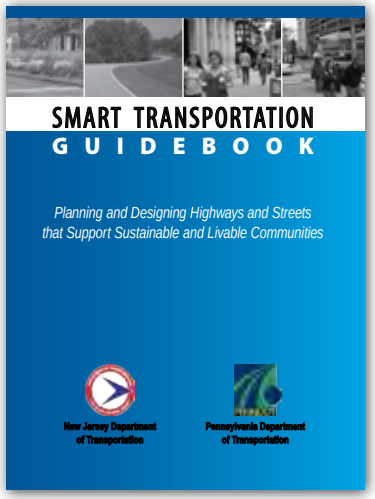
The selected documents highlight precedents and demonstrate the state of practice that can be applied to the redesign of Regional Roads. The review focuses on innovations (as of 2012) in integrating technical requirements with local needs.

It is worth noting that the Area Municipalities have already made significant progress towards employing best practices. The City of Mississauga, in its City Centre redevelopment, is employing Context Sensitive and Complete Street Designs with the introduction of roundabouts and flush curb street designs. Similarly, the City of Brampton is envisioning a grand future and putting the policy and infrastructure framework in place to make Queen Street, west of Highway 410, more livable and vibrant while Caledon's municipal leaders are taking active positions for balancing growth potential with the values and needs expressed by their residents.

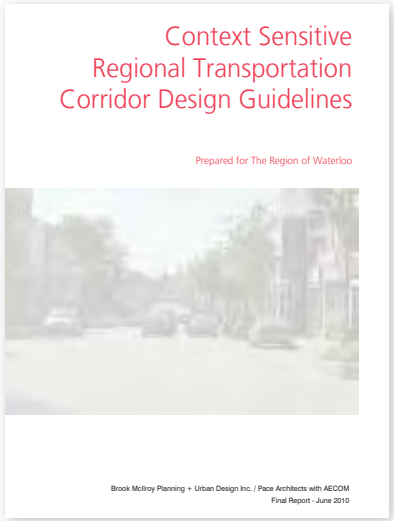
The best practices examples were chosen based on the following criteria:

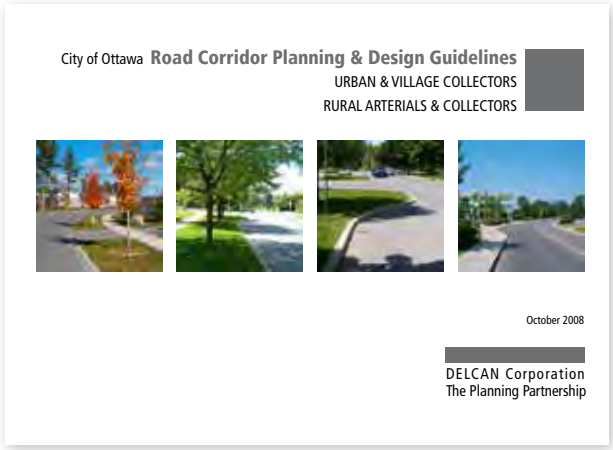
- Must have been completed within the last five years.
- Focused on characterization versus functional classification.
- Must be broad based enough to capture the diversity of road types within the Region.





Best Practices Review





There were a limited number of best practice examples. The outcome of the RCS is a natural evolution of road design across large areas with diverse contexts and builds upon other proactive industry initiatives.

3.1.1 Recommendations

As a result of the best practices review, the following is recommended:

1. The Region should focus on co-creation of transportation solutions with the public and other stakeholders. Future roadway design RFPs should include consideration of tailored communication plans that are specific to the project area and: i. emphasize the leadership role of the Region; ii. be used as a public relations and education tool; and iii. recognize the impacts of budgets and the evolution of land use over time.

3.2 Summary of Documents

Five street characterization and design guideline manuals were reviewed as part of the Road Characterization Study. These documents included:

Complete Streets Planning and Design Guidelines (2012) by the North Carolina Department of Transportation.

Smart Transportation Guidebook (2008) by the New Jersey Department of Transportation and Pennsylvania Department of Transportation.

Model for Living Streets Design Manual (2011) for Los Angeles County.

Context Sensitive Regional Transportation Corridor Design Guidelines (2010) for the Region of Waterloo, Ontario.

Regional Road Corridor Design Guidelines (2000) for the Region of Ottawa-Carleton, and the City of Ottawa's *Road Corridor Planning & Design Guidelines* (2008)

The following is a summary of the best practice documents.

North Carolina's Complete Streets Planning and Design Guidelines (2012)

The North Carolina Department of Transportation (NCDOT) was given the policy direction to consider all modes of transportation within new projects and changes to existing roadway infrastructure in 2009. This policy included a requirement for the NCDOT to work with communities to develop Context Sensitive Solutions throughout the planning and development of projects. This document provides the framework for realizing the intent of that policy change. Key elements of the guide include:

- How to incorporate complete streets in the planning and development process including the role of vision.
- Understanding context and user needs.
- Planning and design elements.
- Intersection design.
- Planning and designing to accommodate transit.
- Accommodating pedestrians and cyclists, as well as bus shelters or other structures (signal control boxes, light poles, etc.).
- Implementing the guidelines.

The guide emphasizes street design based on local land use character. Several street types are illustrated in cross sections to aid roadway designers. The guide is meant to be flexible and responsive to the needs of different communities so ranges of options are provided rather that specific dimensions or treatments.

NJDOT and PennDOT's Smart Transportation Guidebook (2008)

This guidebook was jointly developed by the two states after officials realized they could not solve congestion; they could only mitigate its impacts in the face of financial realities and the endless demand for capacity increases (similar to Peel). Critically, the two states realized that wider and faster streets cannot keep up with the demand created by inefficient land use. This guidebook supports a variety of community endorsed approaches to roadway design that respond to local contexts. The guidebook includes:

- Tools and techniques including sections on defining the transportation issue and needs, communications and defining success, and how to assess alternatives.
- A description of the need for vision and commitment to do better.

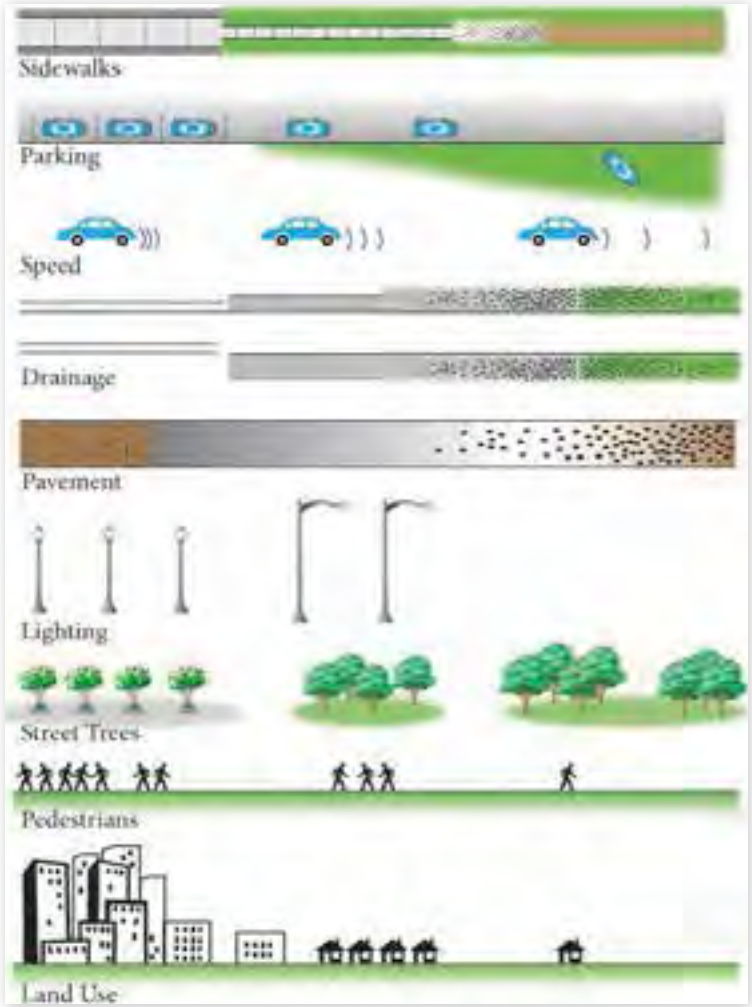


Image: Urban to Rural transition
Source: North Carolina DOT (2012)

- A discussion of the role of land use context (from urban to rural and points in between) and transportation context including typology, network and signal spacing.
- Considerations for roadway design values including: typology, desired speed, and the role of retrofits.
- Detailed design guidelines for roadway elements within the curbs and at the roadside.
- A discussion of access management, traffic calming, emergency vehicles and operations and maintenance.
- Technical support necessary to design and construct roads that fit within the context of the places they serve.

Los Angeles County's Model for Living Streets Design Manual (2011)

This comprehensive document provides background to support communities that want to design their streets for health, safety, livability, and sustainability. It examines and provides support for the entire process of developing streets from vision and policy through to detailed implementation. It explains the need to develop better streets and describes both the technical and legal documents that are necessary to implement a more Context Sensitive approach. This is supported by sections that:

- Develop a vision and policy framework with performance measures.

- Classify the role and community serving function of the street, i.e. commercial main street, regional connecting street, etc.
- Describe the impacts of the design of the travel way including design elements and geometry.
- Specify intersection design considerations including the role of roundabouts.
- Influence accessible design with specific focus on sidewalks based on context.
- Detailed considerations of pedestrian crossings, bikeways, transit accommodation and traffic calming.
- Discuss streetscape elements such as storm water, urban canopy, utilities and furnishings.
- Demonstrate streets as places (placemaking through street design).

The manual is intended to provide support for municipalities and Regions beyond the Los Angeles County area that want to do a better job of creating streets that support quality of life within their communities.

The following two documents were reviewed based on their relevance in Ontario. The have been included as a contrast to local solutions rather than as examples of best practices applicable in Peel.

The Region of Waterloo's Context Sensitive Regional Transportation Corridor Design Guidelines (2010)

This manual attempts to balance the needs of various stakeholders to accommodate all modes of travel while incorporating aesthetics into roadway design. It is a prescriptive document that considers:

- Land use planning context of the upper tier and lower tier municipalities.
- Specific roadway classifications including: i. community connector, ii. neighbourhood connector, iii. residential connector, iv. rural connector, v. and rural village – main street.
- Design guidelines for: boulevards, roadways, turning lanes, passing lanes, medians, fences, and general guidelines.
- Decision making processes for implementing and updating the document.

The manual includes descriptions of each road classification along with a cross section and bird's eye view of the roadway design for two alternative layouts per class. The guidelines covers aesthetic features, intersection treatments, speed, utility treatments, and material usage for the roadway, the roadside boulevard, pedestrian way, and the bikeway. The document includes a workbook for designing and implementing roads.

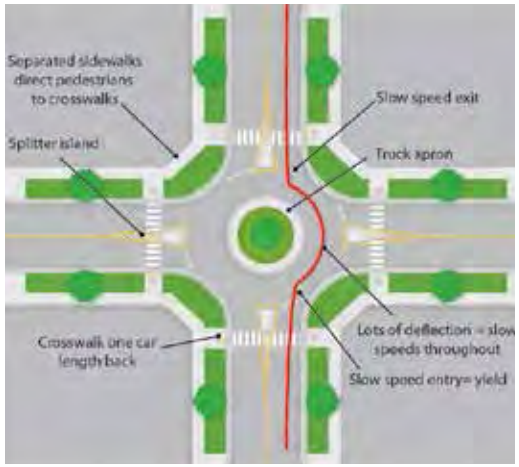


Image: Round-a-bouts
Source: Los Angeles County (2010)

Image: Bus shelter designs
Source: North Carolina DOT (2012)

Region of Ottawa-Carleton's Regional Road Corridor Design Guidelines (2000) and the City of Ottawa's Road Corridor Planning & Design Guidelines (2008)

These document focus on land uses and character of road corridors. They include design considerations for elements within the road rights-of-way and suggested cross section and plan responses that extend beyond. Specific items presented include:

- Need for a corridor vision.
- Design considerations:
  i. adjacent land use,
  ii. road edge,
  iii. roadway,
  iv. intersections, driveways and pedestrian crossings, and
  v. service considerations and operations.
- Cross sections based on context.
- Tools for implementation including engagement and financing.
- Six road typologies and associated cross sections are presented including: urban core, urban residential, urban main street, suburban commercial, suburban residential, suburban business/institutional. It concludes by describing how to implement the design guidelines through visioning, partnerships, and planning.

3.3 Common Themes

Several common themes emerged from the review:

- The need for a land use vision in the near term (5-15 years) and the long term (15-30 years and beyond).
- Land use context changes over time must be anticipated and guided.
- Design guideline details.
- The role of implementation tools.

These themes are described in the following section.

3.3.1 The Need for a Common Vision

The need for land use vision that will provide guiding principles for street design is discussed in each document Generally, these visions are already established by the community or stakeholders in the form of land use plans or long range transportation plans. These visions should be specific. They should anticipate and guide the evolution of land uses and align them with neighbouring jurisdictions. Where visions are lacking in detail it becomes necessary to develop a visioning process as part of the street planning and design effort.

A corridor vision may be aspirational or pragmatic but is always based on the future of the corridor not merely a response to what currently exists. A corridor vision provides a framework for the community and street designers to build upon.

3.3.2 Roadway Characterization Based on Land Use Context

Road characterization is based on surrounding land use contexts that range from urban to rural and occasionally suburban. These categories are further subdivided into main street, neighbourhood, commercial, or industrial depending on the immediate adjacent land use or desired function of the street.

Significantly, road characterization also depends on the vision of evolving corridors as communities change and respond to economic and cultural shifts. This makes the characterization of roads dependent upon identified future corridor land uses and function.

3.3.3 Design Guidelines

The majority of each best practice document focuses on right-of-way guidelines. Specific design elements include:

Pedestrian Ways/Bikeways/Transit Ways and Stops

Accommodating pedestrians, cyclists, and transit users based on the street type and the function of adjacent existing or desired land uses.

Intersections

Balance the needs and expectations of pedestrians, cyclists, transit users, and motorists within the context of the street corridor. The use of roundabouts is also discussed in some documents.

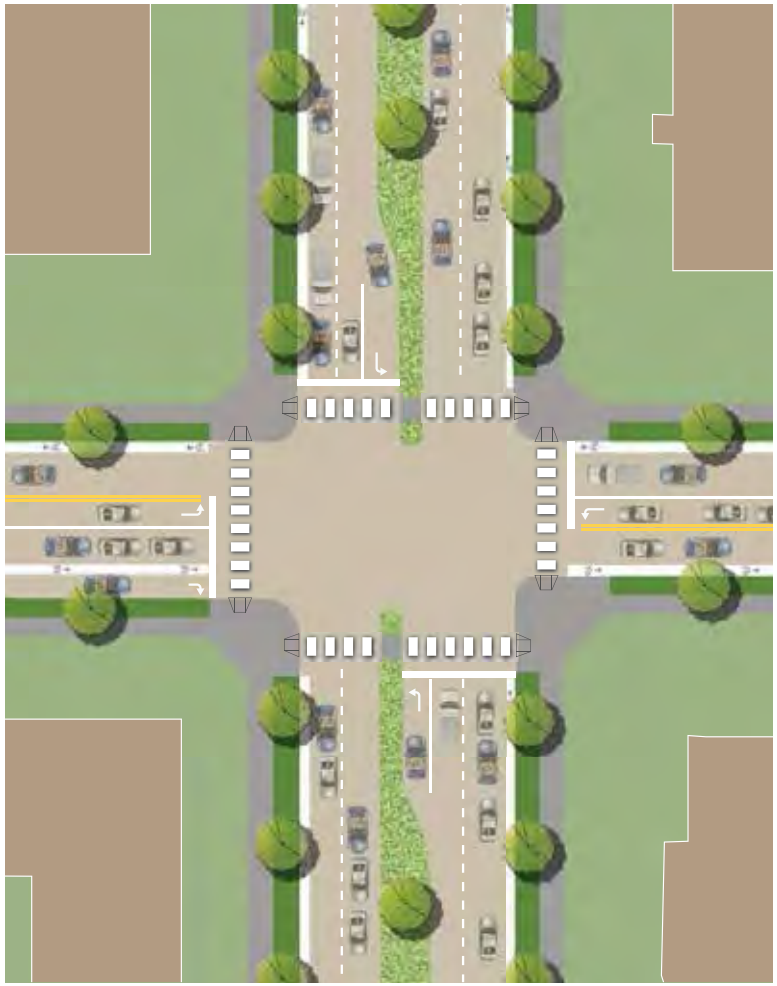


Image: Intersection Design with Boulevard Treatment
Source: North Carolina DOT (2012)

Lanes

Consider lane widths and number of lanes based on the users of the street including the impacts on pedestrian crossings and the role of medians. Consideration was also given to the need and role of parking areas and turning lanes and how they contribute to road character.

Medians

Reduce crossing distances by providing refuge on multilane roads or as an aesthetic feature in special districts or important roads.

Speed

Design streets to operate at a desired speed that matches the context.

Aesthetics/Landscaping/Furnishings

Provide landscaping and street furniture to enhance the pedestrian realm to increase comfort, and provide identity and character.

3.3.4 Implementation Tools

Implementation was a common theme throughout the documents. Some documents focus on engaging the community during design development while others discuss the role of place making, financial tools, and operations and maintenance. The emphasis is on an inclusive process that is transparent and understandable.

All documents emphasized that roadway redesign is a process that should be implemented when other infrastructure changes are made, through road diets, or done with small improvements like adding temporary landscaping features or repainting to alter lane configurations. A community led, simple, cost effective and relatively fast solution is often the best.

Some documents included "how to" sections while others provided templates or a "tool box" for decision making and the next steps for implementing specific recommendations. The next steps varied depending on the document and anticipated use.

3.3.5 Other Considerations

Measuring success, most often through level-of-service, is significant in characterizing roads. Several interesting ideas were introduced in two of the documents. Los Angeles suggests using a Multi-Modal Level of Service (MMLOS) while North Carolina suggests Quality of Service (QOS) that address metrics of success for roadway design to meet the needs of all users such as pedestrians, cyclists, motorists, and transit users.

Los Angeles includes the use of short term or pilot projects to demonstrate initiative and show effective change. The simple use of temporary elements such as paint, planter boxes, and temporary curb stops can be used to test design ideas. This method has been employed successfully in other cities such as New York in their drive to accommodate all modes.

3.4 Summary and Observations

The review describes common themes found in the Best practice review. These themes can be built upon and customized for specific conditions and goals found at the Region of Peel. Many of these themes are relevant to the RCS process and could be implemented early on in order to reduce the time it takes to roll-out the RCS recommendations. They include:

- The need for future land use vision.
- The importance of engaging the public and stakeholders early in the project development process.
- The need to accommodate all users in the appropriate context.
- Developing appropriate measures of success.
- The role of detailed design.
- Discussion about implementation.

Image: Centre Median Treatments
Source: Region of Waterloo (2010)

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4.0 Stakeholder Engagement

4.1 Introduction

This section describes the stakeholder interviews that were conducted as part of the Stakeholder Engagement Plan. This is followed by a description of the common themes that emerged from the stakeholder meetings.

4.2 Recommendations

As a result of the stakeholder interviews, the following is recommended:

1. The Region should employ the flexibility found in roadway standards, through professional judgment, to meet community goals.

2. The Region should define its metric of success for roadway design based on *Quality of Service* instead of *Level of Service* as a balanced and pragmatic approach to realizing its vision.

4.3 Stakeholder Meeting Format

The project team met with individual stakeholders for intensive open-ended interviews. The meetings were pre-arranged by the Region's Project Manager and conducted in groups of no more than six people. The meetings allowed for candid conversations where stakeholders with competing interests (i.e., different municipal organizations) had an opportunity to be heard without fear of being judged by peers.

Stakeholder Kick-Off Meeting

During the meetings, open-ended questions were asked that did not seek specific answers. Rather participants were allowed to discuss their perspectives of issues and opportunities related to the RCS. This process also allowed the project team the opportunity to identify stakeholder issues that could not be resolved as part of the RCS scope in order to set realistic project outcome expectations.

For the interviews, a map of the Region served as a reference and conversation starter. Stakeholders used the map to help them explain their observations, concerns, and questions about the RCS and the Regional Road system. Stakeholders were also given the opportunity to discuss their ideas, draw issues onto the maps, or write them down.

The project team conducted the interviews at 10 Peel Centre Drive (April 19, 2012 and June 19 and 21, 2012), a location across the street from Mississauga's City Hall (April 24, 2012), Brampton Civic Centre (April 25, 2012) and within Caledon Town Hall (April 30, 2012), in order to maximize the opportunities for staff from the area municipalities and the Region to participate.

4.4 Common Themes

Based on the interviews conducted, which included over 60 participants, the following themes (not listed in any particular order) emerged:

Communication

Multiple departments and jurisdictions from all levels of government involved in delivering roadways can improve communications to deliver better roadways. Opportunities to demonstrate staff capabilities to Council should be encouraged.

Goods Movement

Goods Movement is an important economic contributor to the Region, however there are issues as to how this impacts design within the rights-of-way. It was observed that the term "goods movement" is often misinterpreted to mean that "big trucks should be allowed everywhere." The Region should clearly describe how goods movement impact the various street types it designs and maintains as well as educate stakeholders as to the intended meaning.

Multi-Modal Networks

Regional Roads must be part of a multi-modal integrated network that meets the needs of all roadway users, including pedestrians, cyclists, transit users, and motorists as well as accommodating trucks.

Stakeholder Engagement

Land Use Integration

Specific land use issues adjacent to roadways highlight the need to integrate land use context with roadway designs. The need for a common vision within the Region, particularly on boundary roads was emphasized often.

Infrastructure

Infrastructure planning, design, and construction, must include consideration of maintenance, operations, and all other life-cycle considerations based on the vision of the community.

Level of Service

The Region's current Level of Service "D" requirement (v/c = 0.9) may be resulting in over-design of intersections without consideration of the quality impacts on surrounding land uses. Level of service should be balanced with walkability, cycling safety, economic development opportunities, and other community building considerations.

Additional Details

Although the RCS was meant to deal with higher level issues, much of the discussion was very detailed oriented and addressed more specific concerns such as signal timing and pedestrian crossings. This study will not address these detailed issues.

Stakeholder Kick-Off Meeting

4.5 Summary and Observations

There is a willingness to discuss and solve common issues throughout the Region. Collectively the knowledge of staff and partners can be harnessed to deliver better results. The Region should work with Area Municipalities to develop common solutions to common issues rather than strictly serving as a reviewer of projects.

Areas that need specific attention include:

- Developing a method for communicating what goods movement means at various levels and scales within the Region's transportation network.
- Creating a future land use vision in concert with Area Municipalities.
- Determining where active transportation funds can be targeted to have the greatest impact.
- The impact of these items goes beyond the RCS mandate but must be achieved in order to realize the RCS goals.

Stakeholder Kick-Off Meeting

Stakeholder Engagement

Stakeholder Kick-Off Meeting

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5.0 Workshops

5.0.1 Introduction

The RCS focused on balancing the needs of Area Municipalities and Regional priorities through a collaborative and mutually productive conversation. The consultant team worked with the Region's project manager to bring together Regional and Area Municipal staff in a collegial setting where they developed right-of-way design solutions within a fixed amount of time.

Multi-day workshops were held in June, September, and November 2012. Workshop 1 focused on developing a matrix that correlated land use context with design elements within the right-of-way to establish road typologies. Further, these roadway typologies were mapped onto the Regional Road network. Workshop 2 focused on developing cross sections based on the roadway typologies. Workshop 3 established the foundation for the Region's Access Control By-law.

5.0.2 Recommendations

As a result of the Roadway Characterization Workshops, the following is recommended:

1. The Region should encourage public and stakeholder consultation early on in project development (i.e., during Phase 1 "Problem and Opportunity Definition" of Municipal Class Environmental Assessment (MCEA)) rather than during the development of alternatives.
2. The Region, in its review capacity, should continue working with Area Municipalities to employ its Access Control By-law in order to shape land development projects and achieve Regional and local priorities in a holistic manner.
3. The Region should develop a formal dispute resolution mechanism that emphasizes the process that informs land development applicants prior to submitting site plans about access control and right-of-way requirements, as per the Official Plan.

Cross Section Design Workshop - Day 3

Workshops

Road Characterization Workshop - Day 1

5.1 Workshop 1: Roadway Characterization

5.1.1 Introduction

The intent of Workshop 1 was to develop preliminary roadway characterization criteria with stakeholders and then classify and map the Regional Roads based on stakeholder developed criteria. The workshop was conducted as a daylong charrette (an interactive and collaborative design session) so that all stakeholders could have input and co-create solutions and visions for the Region.

5.1.2 Opening and Project Review

The session opened with a greeting by Damian Albanese, Transportation Division Director, and Dr. Mowat, Medical Officer of Health (Peel Health was a workshop sponsor). The introductions stressed the importance of making good transportation decisions that support the economic viability, environmental well-being, social vitality, and the health of people within the Region. It was emphasized that the process would be inclusive and that each stakeholder played an important role in the RCS.

Opening comments were also made by Sabbir Saiyed, Manager of Transportation System Planning, representing the Strategic Goods Movement Network Study and Margie Chung from Sustainable Transportation, of the Active Transportation Study team. They described how their studies, as well as others from the Region's Long Range Transportation Plan, integrate with the RCS to support the community.

Road Characterization Workshop - Day 2

Workshop 1: Roadway Characterization

The workshop began with a review of the project process to date, the project schedule, and expected outcomes. Information from the stakeholder interviews as well as best practices for roadway characterization were also presented. This included how Regional Roads can be classified according to both their function and context and what kind of road classification criteria can be developed for each road type.

5.1.3 Values and Goals Exercise

Following the opening presentation, the project team conducted a 'values and goals' exercise which demonstrated to stakeholders that while they may have different needs and desires about the project outcome (based on their circumstance and mandate) they share common goals and have common issues. The exercise allowed participants an opportunity to see each other's perspectives and how they relate to the larger vision of creating a great Regional Roads.

The following themes emerged:

- All users of the road need to be accommodated based on the context. Users include pedestrians, cyclists, transit users, and motorists of all ages and abilities.
- The RCS should support a safe and environmentally sound system that promotes a strong quality of life.
- The need for a unified vision and strong communication between all levels of government and municipalities.
- The efficient and unrestricted movement of all forms of traffic facilitated by sound infrastructure and good maintenance.
- The inclusion of aesthetically pleasing and innovative design that is consistent with the distinct personality of local areas.
- The ability to move goods efficiently and provide support for economic generators.
- A stronger focus on current and future local land use adjacent to Regional Roads, and how that can support transportation systems.

5.1.4 Issues Exercise

Individual concerns about roadway classification and characterization were then discussed in the group setting. The following key issues were identified and ranked in importance based on an informal exercise where participants placed a green dot next to issues they felt are very important. The following issues received the most attention:

- Need to accommodate all users of the road including pedestrians, cyclists, motorists, and transit users.
- Integration of land use in transportation planning.
- Lack of communication and shared vision (earlier and better).
- Combining of functional aesthetics of streetscape and land uses.
- Need for a better transit system.
- Need to address environmental and safety concerns.
- Recognition that goods movement has limited options but numerous economic benefits.

- Congestion, connectivity, capacity and efficiency – the need for prioritization in decision making processes.

5.1.5 Classification and Characterization Exercise

Participants were asked to explore the role of segments of Regional Roads as the roads passed through distinct land use character areas throughout Region. Road types were identified based on local land use contexts. Participants were then asked how the elements, including pedestrian and cycling facilities, parking, drainage, and utilities within identified road type rights-of-way, should respond to adjacent land uses.

The groups then mapped the various road types onto the Regional Roads on an overlay of a map of the Region. This formed the foundation of the Roadway Character Type Map. Some teams also mapped future roads and development to better visualize the character of roads.

5.1.6 Outcome

Based on the identified road types and corresponding map developed during the workshop, a Roadway Character Matrix was created. It correlated road type with design considerations including desired operating speed, role of transit, pedestrian and cycling facilities, parking, drainage, etc.

The results of Workshop 1 were presented to the project Steering Committee for their consideration. Specifically, the data from the matrix was used to create preliminary cross

Road Characterization Workshop - Day 1

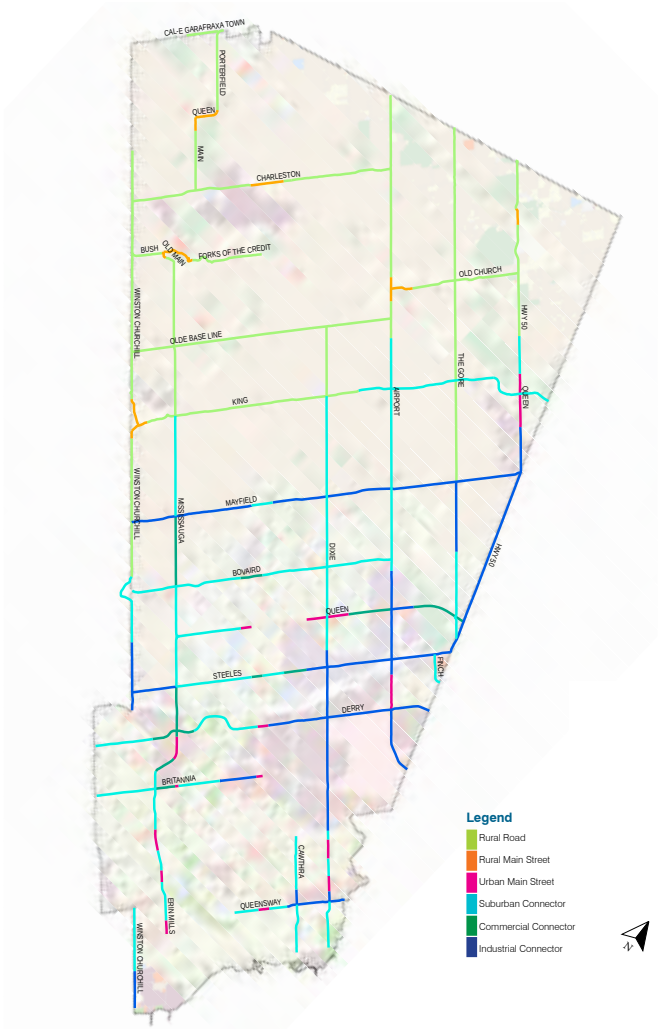
Road Characterization Workshop - Day 1

sections for the different road types based on future right-of-way dimensions from Schedule F of the Regional Official Plan. The Steering Committee provided direction to the Project Team as to which road types to use and whether the map should be modified to better serve the Region's needs. This direction was used to shape further study and as the basis for Workshop 2.

5.1.7 Summary and Observations

The workshop was well attended by approximately 80 people. Participants helped educate each other about common concerns and priorities. The Roadway Character Matrix and Road Character Map that were generated, were used as the basis for developing detailed designs and cross sections for each street type.

Road Characterization Workshop - Day 2



Outcome: RCS Road Character Map

This map, described in more detail in Section 2, will be amended periodically in response to approved secondary plans, block plans, or council endorsed development applications.

Note: Existing land use data for the base map was sourced from Area Municipal Official Plans.

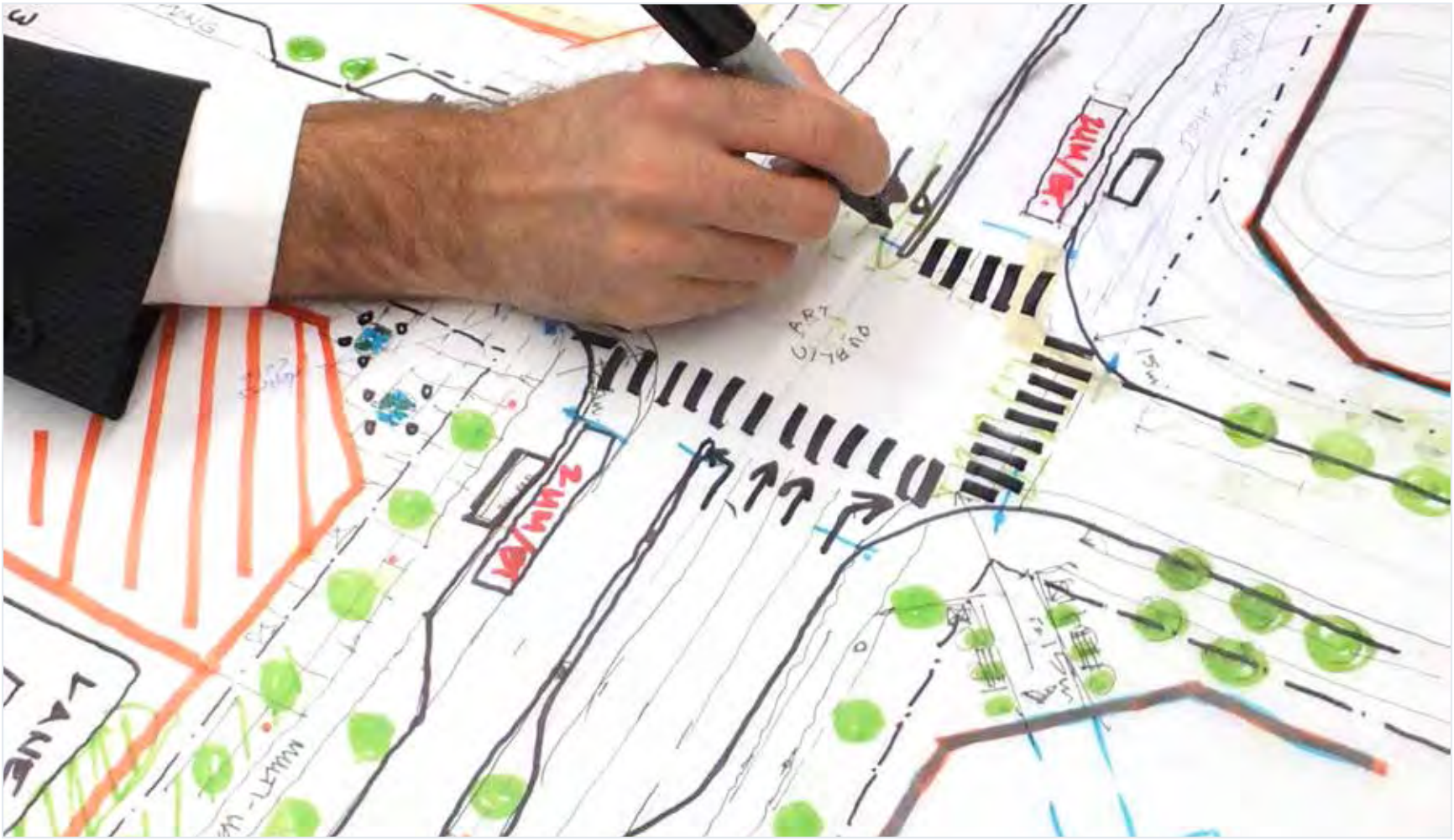
Workshop 1: Roadway Characterization

Street Type	Area Context	Through Lanes	Desired Operating Speed	Transit Role	Area for Pedestrian and Other Facilities	Bicycle Facilities*	Drainage Conditions	Freight Role
Rural Road	Rural Agricultural, Scenic and Greenlands	2 to 4	40* to 80 km/h	Very Limited and Site Specific	Shoulder	Shoulder	Rural Swale	Primarily Local Deliveries, Aggregates and Agricultural Material Transport with Restrictions Through Village Centres
Rural Main Street	Rural Village Centre	2 to 4	40* to 50 km/h Community Safety Zone/School Zone	Limited to Designated Stops or Stations	Village Specific - 1.5 Minimum Sidewalk (Wider where appropriate) + Furnishing/Planting Zone + Splash Strip + Utility Zone	Behind the Curb Where Design Speeds Exceed 50km/h Otherwise Sharing the Road	Curb and Gutter	Local Deliveries
Urban Main Street	Urban Village Centre Mixed Use	4 to 6	40* to 50 km/h	Major	Location Specific - 1.5 Minimum Sidewalk (Wider where appropriate) + Furnishing/Planting Zone + Splash Strip + Utility Zone	Behind the Curb	Curb and Gutter	Local Deliveries
Suburban Connector	Includes some existing Residential Areas with Reverse Frontages and Associated Intersections that have Neighbourhood Service Retail	4 to 6	50 to 70km/h	Moderate to Major	Desired 1.5m Minimum Sidewalk + Furnishing/Planting Zone + Splash Strip + Utility Zone	1) For New Construction or Reconstruction accomodated in a 3m Off-Street Multi-Use Trail 2) In Transitional Situations provide a 1.5m Striped On-Street Bicycle Lane	Curb and Gutter	Yes
Commercial Connector	Commercial Uses Including Employment Lands/Office Campus and Regional Serving Retail	4 to 6	50 to 70 km	Moderate to Major	Desired 1.5m Minimum Sidewalk + Planting Zone + Splash Strip + Utility Zone	On-Street when using ≤ 50km/h Posted Speed or Behind the Curb Where Posted Speeds Exceed 50km/h Otherwise Sharing the Road	Curb and Gutter	Yes
Industrial Connector	Industrial and Warehousing Areas and Routes from those Areas to 400 Series Highways	4 to 6 (Professional Judgement to be Used if Climbing Lanes are Necessary on Steep Grades)	60 to 80 km	Moderate to Major	Location Specific - Desired 1.5m Minimum Sidewalk + Planting Zone + Splash Strip + Utility Zone	Recommend the Use of Professional Judgement in High Truck Volume Traffic Areas Where Access Points to Adjacent Uses or Intersections are < 300m Apart	Curb and Gutter or Rural Swale Depending on Adjacent Uses	Yes

Outcome: Road Character Matrix – to be covered in more detail in Section 2

* The Region is committed to designing for active transportation. All future designs will reference the Region's Active Transportation Plan.

Workshops



Road Characterization Workshop - Day 2

5.2 Workshop 2: Cross Section Design

5.2.1 Introduction

Workshop 2 explored the trade-offs for developing cross sections for the various roadway types. The intent of the workshop was to develop balanced design criteria that took into account the needs of various stakeholders and then develop a series of cross sections based on their input. The workshop was conducted as three distinct working sessions, one for each municipality, so that the unique circumstances of each Area Municipality could be explored.

5.2.2 Session Opening and Project Review

The session was opened up with a greeting by the Region's project manager who related the importance of the re-envisioning the regional roadways to ensure efficient movement of people, transit, and goods in support of economic vitality, and the social and environmental health and welfare of all regional residents.

Gayle Bursey, Director of Chronic Disease and Injury Prevention, Peel Health, also addressed the groups and reiterated the importance of making our streets more pedestrian friendly and integrating active options into our current transportation system.

The working session began with a presentation of the project process to date. It covered the Roadway Character Matrix and Map developed as part of the previous workshops. The matrix and map were presented along with explanations of the established character areas.

Road Characterization Workshop - Day 2

5.2.3 Working Session

Using the matrix and map as a guide, teams developed cross sections for two different roads in the Region. Each team selected their own road segment for consideration. After all teams had completed two cross sections they presented their results to the larger group and answered questions. In the day-long session in Mississauga and Brampton the teams also developed plan-views of intersections to emphasize that cross sections are not easily translated at intersections. The final designs were again presented to the larger group at the end of the day.

The resulting designs shared several common features. Almost all designs, with the exception of Rural Roads, contain space for landscaping and street trees within the ROW. This includes Industrial areas as well as Main Street, Suburban and Commercial Connectors.

Transit was also included in all designs, with the exception of Rural Roads and Rural Main Streets. This was anticipated due to the lack of transit routes in the rural areas. Bicycle facilities were incorporated into all street sections including Rural Roads where bikes were expected to operate on paved shoulders. Significant conversations occurred around the role of cycling facilities on industrial connectors.

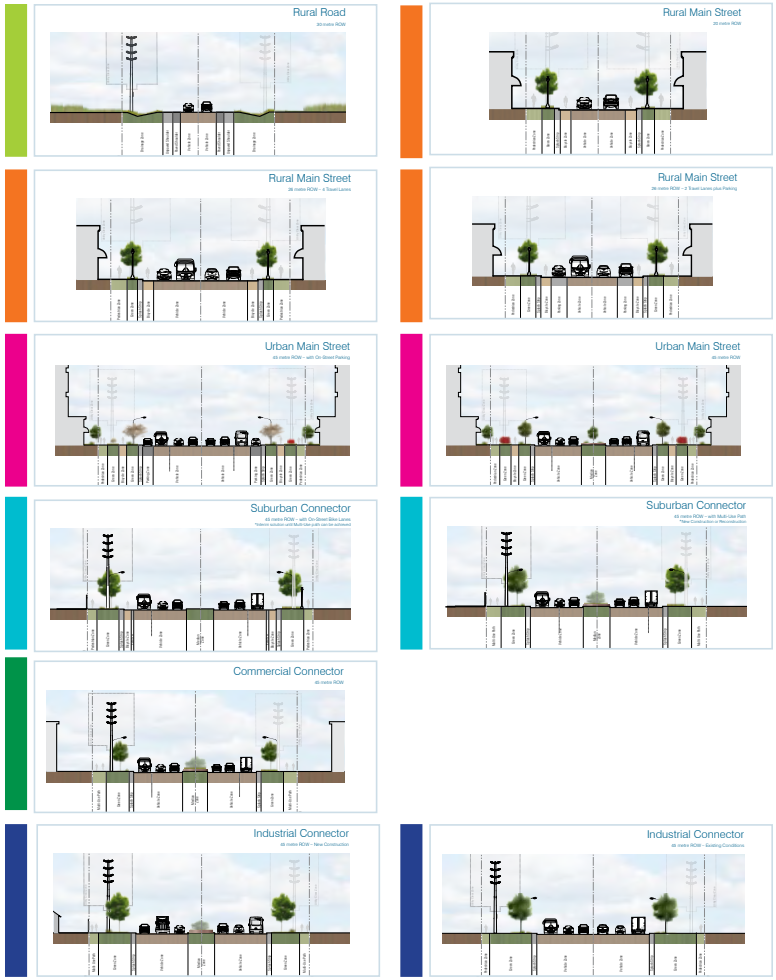
5.2.4 Summary and Observations

The original format of the workshop was reduced from three full days for all participants to one day for each Area Municipality with Peel staff attending all sessions. Although each day was very well attended, it did reduce the amount of information the groups could cover due to time constraints.

Teams actively discussed and debated the alternatives under the guidance of the facilitators. Several of the designs contained large boulevards with street furniture and landscaping, while pavement dimensions employed maximum lane widths of 3.75 metres. A tremendous amount of consideration of goods movement occurred. Ultimately, participants recognized the difficulty in accommodating all desired uses within constrained rights-of-way.

The cross sections developed during this workshop were presented to the Region's steering committee and used to inform the ultimate cross sections that have been developed for the RCS.

Workshop 2: Cross Section Design



*Outcome: Cross Section Illustrations**

* to be covered in more detail in Section 2

Cross Section Design Workshop - Day 1

Cross Section Design Workshop - Day 3

Workshops

Access Control Workshop - Day 1

5.3 Workshop 3: Access Control

5.3.1 Introduction

The Access Control Workshop began the process of creating flexibility for the Region's Access Control By-law. Access control rationale and techniques were discussed. Participants developed an understanding of how access control works and how it complements roadway function and impacts land use. The workshop was conducted over two days to provide an educational overview for participants that were less knowledgeable about access control. During the first day general concepts were presented and participants explored unique issues associated with their municipality. The second day focused on applying concepts to select areas within the Region.

5.3.2 Session Opening

The access control sessions were opened with a discussion of the Region's desire to create a flexible and responsive set of access control measures that will meet the unique needs of the municipalities. Specific mention was made of new intersection spacing requirements for urbanizing areas within Mississauga and Brampton, as well as the economic implications of land development and access control. It was emphasized that the Region wants to work with the area municipalities to provide flexibility while retaining an access control by-law.

Road Characterization Workshop - Day 2

Access Control Workshop - Day 2

Workshop 3: Access Control

5.3.3 Day 1: Education

The session was divided into three-two hour presentations, one each for Caledon, Brampton, and Mississauga. The consultant team gave the same presentation to each group followed by an open discussion. They covered several concepts including:

- Access control is primarily about safety – that is, reducing or limiting access reduces potential conflict points.
- Shared access can reduce the need for multiple driveways.
- A fine grain road network, like that presented by city blocks, satisfies many access control intents.
- There is an economic development component of access control from both a land use and roadway function perspective.

Municipal staff then discussed and documented their issues with the current access control practice and suggested how the current by-law needs to change or be eliminated. Among the identified issues were:

- The need for flexibility in the by-law or the desire to eliminate it.
- The need to address evolving land-uses over time.
- The need for the guidance that addresses the variety of character types across the Region – including goods movement and rural roads.
- The opportunity to add language to the new Official Plan that aids in the creation of road networks.

5.3.4 Day 2: Charrette

The second day built on concepts learned in day one by applying them to segments of roadways within specific areas of the Region. Participants from the Region and Area Municipalities came together to discuss their approaches to access control based on their needs. The final concepts were presented to the larger group at the end of the day.

Participants from Brampton along with Peel Region staff explored the Kings Cross area along Queen Street (RR#107). After discussing the issues and constraints of the roads, the group produced a concept that identified opportunities for increasing connectivity and network along the roadway while presenting opportunities for crossing Queen Street to Chinguacousy Park.

The Mississauga group and Regional staff worked on Erin Mills Parkway (RR#1) near Eglinton Avenue. Again, much of the time was spent discussing the constraints and alternatives available when applying access control principles. The final design identified several locations to expand the local network. They also noted new intersections need to be changed in stages using different access methods as the area matures. Pragmatically, the idea of establishing a main street environment along arterials was discussed in detail. Mississauga would like the Erin Mills Parkway and Eglinton intersection to become more livable in the future as it is identified as a major node and intensification area in the City's Official Plan.

Workshop 3: Access Control

The Caledon participants along with Walter Kulash and Regional staff focused on Caledon East Village with particular attention to the intersection of Airport Road (RR# 7) and Old Church Road (RR#22) and the area's pedestrian issues. Alternative bicycle routes, parking, and potential watercourse crossings were explored.

5.3.5 Summary and Observations

The workshop complemented previous workshops on Road Characterization and Design. The core lesson was how access control depends upon establishing a local roadway network to facilitate turning movements from real intersections in order to open up the potential for development on previously 'sterilized' land.

The reaction of the participants was positive, with most appearing to be bolstered by the interactions with Regional staff and the inter-department collaborations that developed through the two days. Final designs reflected the teamwork and cooperation between the groups in the development of viable and mutually acceptable solutions.

Through the RCS process it was noted that access management needs to be a consideration of the Area Municipality's development review, early in the approvals process. (Figure 1) Early reviews can highlight access considerations to shape development and meet the needs of Area Municipalities and the Region. This alleviates the need for future design modifications and may ultimately save developers from paying to adjust designs later in the process.

Figure 1: Land Development Process
To be most effective, and mutually beneficial, access control issues and opportunities should be discussed early in the process. Determining access at the preapplication milestone will save time and potentially design costs before site plan applications are formally submitted.

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6.0 Glossary of Terms

AASHTO: American Association of State Highway and Transportation Officials.

Access Control: The condition where the privilege to access a roadway by automobile by abutting owners, occupants, or other persons is controlled by public authority. Types of access control include access by permit, fully-controlled access, and partially-controlled access.

Accessibility for Ontarians with Disabilities Act (AODA): This act prohibits discrimination against people with disabilities. Transportation facilities that support accessibility for people with disabilities include curb ramps, detectable warning pads and level landings, among other features.

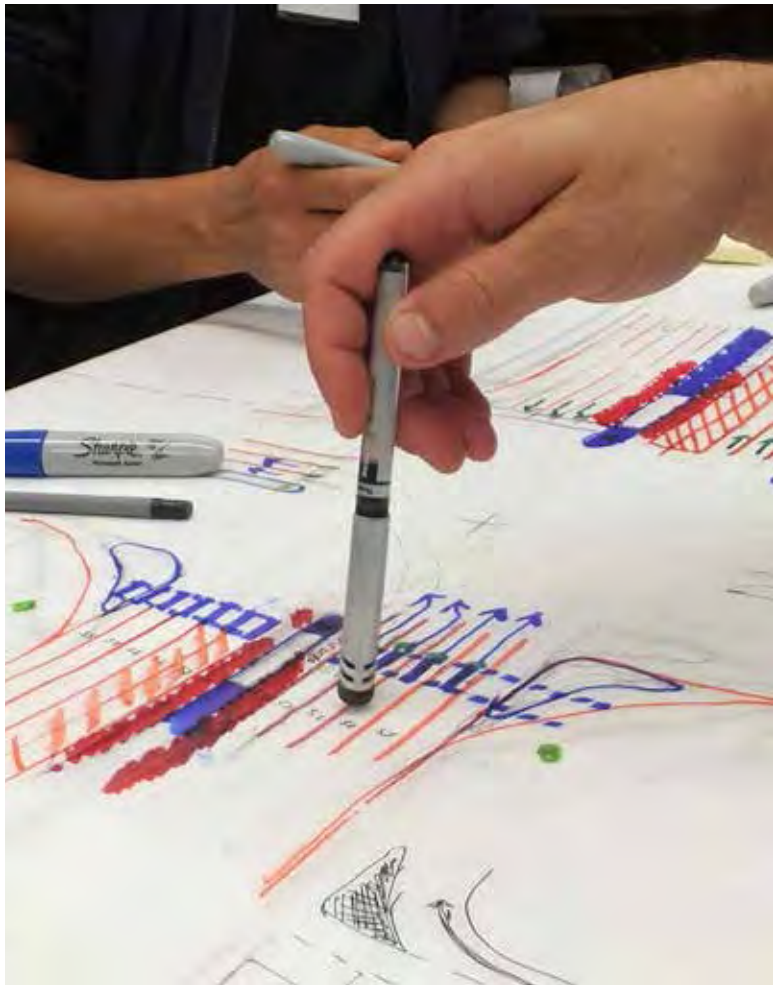
Area Type: Categories used to describe a variety of areas or geographies. The category is based on then context and character that reflect local land uses

Complete Streets: Complete streets are streets designed to be safe and comfortable for all users, including pedestrian, bicyclists, transit riders, motorists and individuals of all ages and capabilities. These streets generally are well-integrated with surrounding land uses and include sidewalks, appropriate bicycle facilities, transit stops, and context-appropriate traffic speeds.

Flush Curb: A street with curbs that are even or 'flush' with the roadway surface. They are often used on slower, shared streets and can offer water filtration benefits.

Cross Section Design Workshop

Glossary of Terms



Cross Section Design Workshop - Day 2

Greenfield Area: A piece of usually semi-rural property that is undeveloped except for agricultural use, especially one considered as a site for expanding urban development.

Growth Area: An area where growth is likely to occur and that is categorized as, or transitioning to, urban and/or suburban. It also may include a town or community and areas around or near parks, lakes and schools.

Intensification Area: Areas identified in municipal growth management strategies for increases in employment and/or population density in order to meet Provincial growth targets and allocate capital infrastructure investments.

Level of Service (LOS): A measure used to describe the effectiveness of transportation infrastructure for motor vehicles; traditionally used to describe traffic flow. The factors normally included are: speed, travel time, delay, traffic interruptions, and convenience.

Long Range Transportation Plan (LRTP): A long-term planning document detailing the transportation improvements and polices to be funded and implemented over the next twenty (20) years.

Professional Judgment: A process used to reach a well-reasoned conclusion that is based on the relevant facts and circumstances available at the time of the conclusion. A fundamental part of the process is the involvement of individuals with sufficient knowledge and experience. Professional judgment involves the identification, without bias, of reasonable alternatives; therefore, careful and

Glossary of Terms

objective consideration of information that may seem contradictory to a conclusion is key to its application. In addition, both professional skepticism and objectivity are essential to the process and to reaching an appropriate conclusion.

Quality of Service (QOS): A qualitative assessment of the level to which a street provides for all modes of travel, with a particular focus on bicyclists, pedestrians and transit users. Quality of Service is based on the physical and operational designs of the street and emphasizes that these affect the functionality of the street for all users, particularly non-motorists.

Roadway: means the part of the highway that is improved, designed or ordinarily used for vehicular traffic, but does not include the shoulder, and, where a highway includes two or more separate roadways, the term "roadway" refers to any one roadway separately and not to all of the roadways collectively.

Street: A public thoroughfare in a city or town, usually with sidewalks, along with the houses or buildings abutting it.

TAC: Transportation Association of Canada

Target Speed: Target speed refers to the preferred travel speed on the street.

Traffic Calming: One or a combination of mainly physical measures installed within the street right of way to control traffic speeds and improve the safety and livability of local streets. Traffic calming measures are intended to reduce the negative effect of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users.

Traffic Volume: Traffic volume refers to the amount of motor vehicles that travel on a street.

Cross Section Design Workshop - Day 1

Region of Peel's Road Characterization Study

Section 2: Illustrative Cross Sections





Region of Peel
Working for you

Table of Contents

Section 2: Illustrative Cross Sections

Illustrative Cross Sections

King Street near McLaughlin Road, Caledon

Illustrative Cross Sections

1.0 Purpose

This document illustrates roadway cross sections to be employed when considering changes to the Regional Municipality of Peel's road rights-of-way. The cross sections have been developed through the 2012 Road Characterization Study process and are to serve as a starting point for designers when Regional Roadway projects are undertaken.

The cross sections reflect road typologies established through workshops with stakeholders and the Region's steering committee. The typologies are based on a context-sensitive solutions approach that responds to current and envisioned future land uses. The new road types include Rural Road, Rural Main Street, Urban Main Street, Suburban Connector, Commercial Connector, and Industrial Connector for the Regional right-of-way dimensions identified in Schedule F of the Region's 2012 Official Plan. For each road type an illustrative cross section identifies ranges of real estate required within the right-of-way to accommodate different users and functions of the road including pedestrians, cyclists, motor vehicles, utilities, landscape, and drainage. These requirements are conceptual in nature and may need to be adjusted to respond to site specific conditions during the Environmental Assessment process. It should be noted that various Regional Roads may not meet the designated right-of-way and as such, the proposed cross sections may need to be tailored to reflect existing conditions.

Dixie Road north of Dundas Street West, Mississauga

Ontario Khalsa Darbar (Sikh Temple) at Dixie Road north of Derry Road East, Brampton

2.0 Background

The Region's Transportation Division commissioned the Road Characterization Study (RCS) as a more responsive method to plan and develop future Regional Roadways that respect multiple transportation modes and ensure that the Regional arterial transportation network considers all users, transportation options, and local contexts while maintaining its primary functionality to move Regional traffic.

The Region specifically identified the following objectives for the RCS in the project request for proposals:

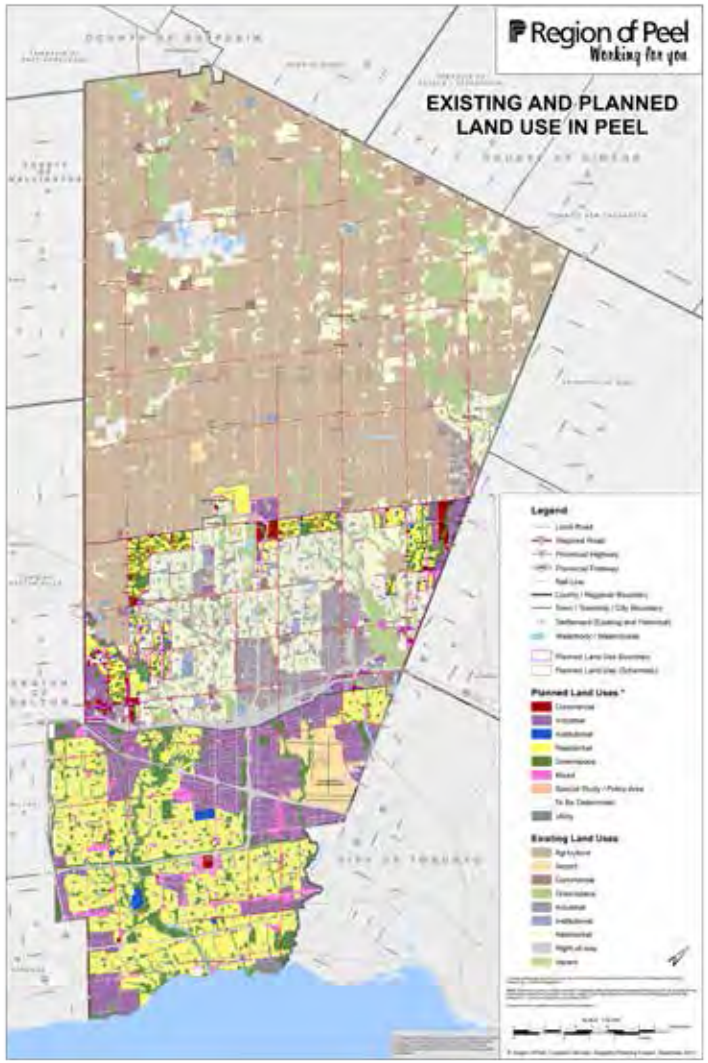
Forks of the Credit in Belfountain, Caledon

1. To improve transportation and land use integration by identifying opportunities that improve connectivity to adjacent current and future land uses through roadway characterization.
2. To support a Regional multi-modal transportation system that minimizes environmental, community, and human health impacts.
3. To protect the current and future functionality and maximize the efficiency of the Regional Road network.
4. To increase continuity between various jurisdictional roads throughout the Region by garnering support and encouraging Area Municipalities to develop and adopt a coordinating set of designs for roadways within their respective jurisdictions.
5. To recommend updates to policy and technical documents that embody a long-term vision of roadway functionality that is more responsive to adjacent land uses and helps shape the character of communities within the Region.
6. To align with Provincial plans, Regional plans, local plans and associated transit plans to provide workable solutions.

For this reason, RCS process did not change the functional classification or capacity of the Regional arterial roads. All roads considered in the study remain under Regional control and remain functionally classified as arterial roads.

3.0 Existing and Planned Land Use in Peel

Staff members from the Region's Transportation Division worked with Area Municipalities to assemble an Existing and Planned Land Use in Peel Map to inform the RCS process. Proposed developments in Caledon, Brampton, and Mississauga were combined with existing land uses in one map, to show more detailed patterns of settlement than is currently shown in Regional Structure Schedule D of the Regional Official Plan. The Existing and Planned Land Use in Peel Map provided the land use context for establishing the road typology segments for the RCS map.



Source: Region of Peel

Mayfield Road near Terra Cotta, Caledon

Dixie Road south of Countryside Drive, Brampton

4.0 Road Character Matrix

The Region of Peel recognizes that Regional Roads exist within varying evolving land use contexts. In Caledon two lane roads connect rural villages to agrarian and natural lands associated with Greenbelt legislation, the Oak Ridges Moraine, and the Niagara Escarpment Influence Area. These areas are heavily influenced by the movement of aggregate resources and farming needs. The Regional Roads in the southern portion of Caledon are being influenced by changes resulting from the GTA West corridor planning. Mississauga and Brampton are mostly built-out and conversely, these municipalities are heavily influenced by intensification resulting from the Province of Ontario's Places to Grow legislation, requiring a more balanced approach to meeting the needs of pedestrians, cyclists and transit users within the Regional Road rights-of-way.

In response to the diverse land use contexts a matrix that correlates land use character with associated right-of-way considerations was developed as part of the RCS process. This is a simple tool for stakeholders to consult as decisions are made about Regional Road design.

The road types identified in the matrix have been applied to all Regional Roads in the Road Character Map on page 9 of this document.

Road Character Matrix

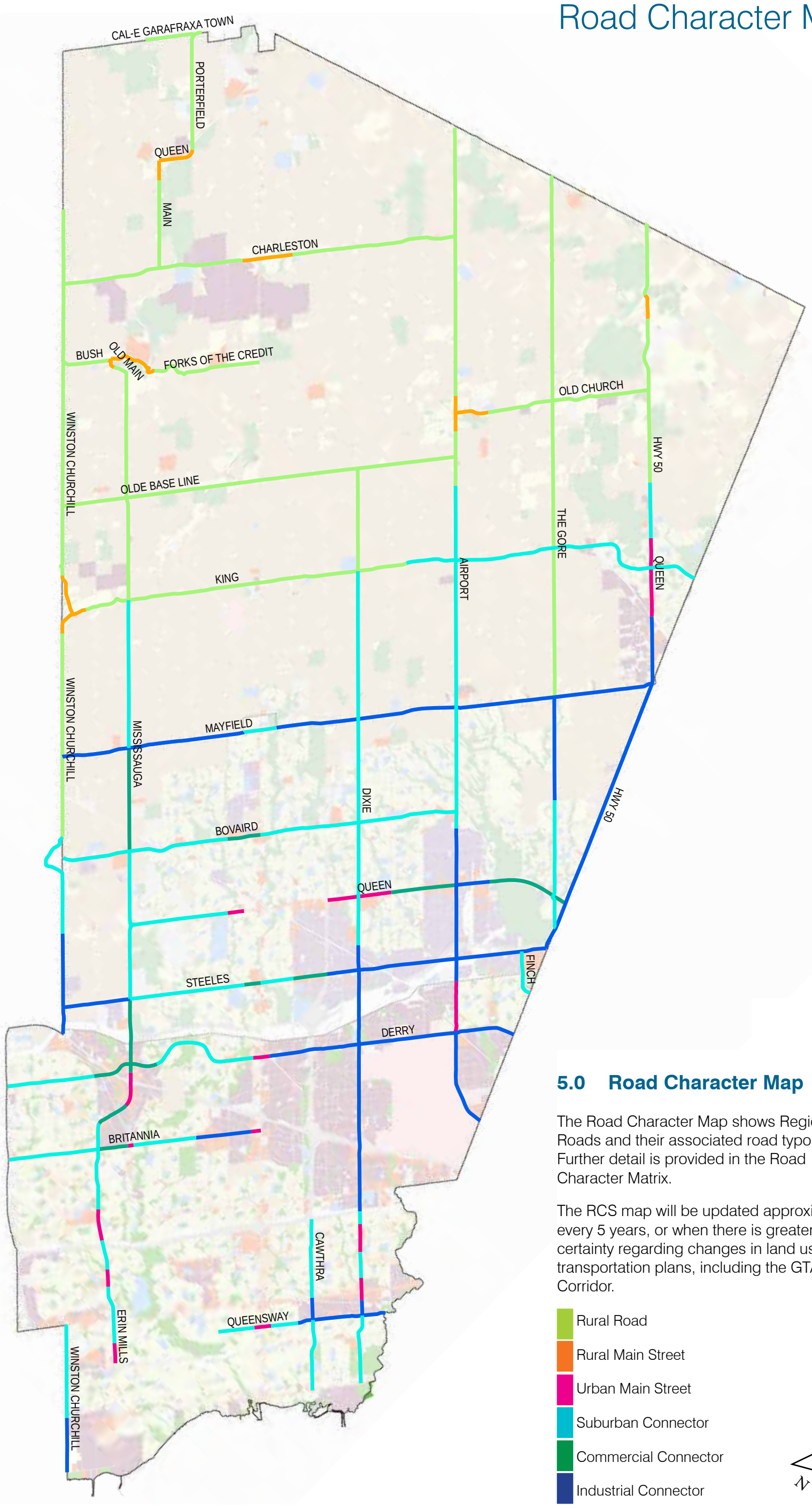
Street Type	Area Context	Through Lanes	Desired Operating Speed	Transit Role	Area for Pedestrian and Other Facilities	Bicycle Facilities*	Drainage Conditions	Freight Role
Rural Road	Rural Agricultural, Scenic and Greenlands	2 to 4	40* to 80 km/h	Very Limited and Site Specific	Shoulder	Shoulder	Rural Swale	Primarily Local Deliveries, Aggregates and Agricultural Material Transport with Restrictions Through Village Centres
Rural Main Street	Rural Village Centre	2 to 4	40* to 50 km/h Community Safety Zone/School Zone	Limited to Designated Stops or Stations	Village Specific - 1.5 Minimum Sidewalk (Wider where appropriate) + Furnishing/Planting Zone + Splash Strip + Utility Zone	Behind the Curb Where Design Speeds Exceed 50km/h Otherwise Sharing the Road	Curb and Gutter	Local Deliveries
Urban Main Street	Urban Village Centre Mixed Use	4 to 6	40* to 50 km/h	Major	Location Specific - 1.5 Minimum Sidewalk (Wider where appropriate) + Furnishing/Planting Zone + Splash Strip + Utility Zone	Behind the Curb	Curb and Gutter	Local Deliveries
Suburban Connector	Includes some existing Residential Areas with Reverse Frontages and Associated Intersections that have Neighbourhood Service Retail	4 to 6	50 to 70km/h	Moderate to Major	Desired 1.5m Minimum Sidewalk + Furnishing/Planting Zone + Splash Strip + Utility Zone	1) For New Construction or Reconstruction accomodated in a 3m Off-Street Multi-Use Trail 2) In Transitional Situations provide a 1.5m Striped On-Street Bicycle Lane	Curb and Gutter	Yes
Commercial Connector	Commercial Uses Including Employment Lands/Office Campus and Regional Serving Retail	4 to 6	50 to 70 km	Moderate to Major	Desired 1.5m Minimum Sidewalk + Planting Zone + Splash Strip + Utility Zone	On-Street when using ≤ 50km/h Posted Speed or Behind the Curb Where Posted Speeds Exceed 50km/h Otherwise Sharing the Road	Curb and Gutter	Yes
Industrial Connector	Industrial and Warehousing Areas and Routes from those Areas to 400 Series Highways	4 to 6 (Professional Judgement to be Used if Climbing Lanes are Necessary on Steep Grades)	60 to 80 km	Moderate to Major	Location Specific - Desired 1.5m Minimum Sidewalk + Planting Zone + Splash Strip + Utility Zone	Recommend the Use of Professional Judgement in High Truck Volume Traffic Areas Where Access Points to Adjacent Uses or Intersections are < 300m Apart	Curb and Gutter or Rural Swale Depending on Adjacent Uses	Yes

* The Region is committed to designing for active transportation. All future designs will reference the Region's Active Transportation Plan.

Illustrative Cross Sections

Forks of the Credit, Belfountain, Caledon

Road Character Map



5.0 Road Character Map

The Road Character Map shows Regional Roads and their associated road typologies. Further detail is provided in the Road Character Matrix.

The RCS map will be updated approximately every 5 years, or when there is greater certainty regarding changes in land use or transportation plans, including the GTA West Corridor.

- Rural Road
- Rural Main Street
- Urban Main Street
- Suburban Connector
- Commercial Connector
- Industrial Connector

Note: Existing land use data for the base map was sourced from Area Municipal Official Plans.
This map will be amended periodically in response to approved secondary plans, block plans, or council endorsed development applications.

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6.0 How to Use This Document

This document is intended to be a starting point for the design, redesign, or alteration through maintenance, of Regional Roads within the Region of Peel. The streetscape condition within the cross sections is shown for illustrative purposes only. Area Municipalities and the Region of Peel will work together to determine appropriate tree and shrub planting opportunities for the Regional corridors.

Elements of the illustrative cross sections shown on the following pages may be realized through re-striping travel lanes during routine maintenance, underground utility changes, construction of multi-use paths (to realize the Region's Active Transportation Master Plan goals), or through changes that result in the need for an Environmental Assessment. Projects that result in large portions of Regional rights-of-way being torn up for other purposes must be required to reconstruct the road to achieve the RCS cross sections. Roadway designers, maintenance staff, and utility providers must consider how to appropriately respond to surrounding context and community values whenever projects are conceived. As an example, a joint utility trench could be considered where additional room is needed for tree planting, but can only be realized through coordination between the Utility, the Region, and Area Municipalities.

It must be recognized that the cross sections presented cannot capture every moment in the evolution of Regional roadways. Some corridors may be in transition between two characters, and the Region will partner with the Area Municipalities to realize the evolving vision as urbanization occurs. The cross sections do not reflect all existing rights-of-way, but rather only those found in Schedule F of the Regional Official Plan, depicting ultimate build-out.

The purpose of this document is to be a reference for land use planners when preparing site plans, block plans and other development plans; for land developers during the process of determining accesses; engineers during traffic assessments and access management, as well as other key players in the planning and implementation process.

In addition to standard roadway design practice, the following additional steps are recommended:

1. Tour the corridor to identify unique physical and cultural attributes to be enhanced, preserved, or celebrated.

2. Identify future land uses based on Regional and Area Municipality Official Plans and an understanding of development trends through the respective development services offices.

3. Meet with stakeholders and share the RCS outcomes as a starting point for discussions influenced by their needs for the roadway combined with those of the Region.

   The following pages contain illustrations of cross sections that represent the road types identified in the RCS Matrix. Professional judgment is to be used when applying cross section designs to unique conditions.

Illustrative Cross Sections

Zone Legend

Within each cross section specific zones are identified for illustrative purposes. These zones are described in detail below.

Vehicle Zone: The primary travel way for motor vehicles including buses, trucks and cars.

Pedestrian Zone: The area reserved for pedestrian traffic that is free of obstructions such as utilities, landscape elements, and lighting.

Multi-Use Path Zone: A shared pathway that can be used by both pedestrians and cyclists.

Bicycle Zone: An area exclusively for bicyclists.

Green Zone: The landscape or green zone located between the travel-way and the pedestrian zone. It may serve as the median between lanes of oncoming traffic.

Median Zone: Centre divider between opposing traffic lanes, which may include landscaping treatments.

Splash Strip: Areas reserved for utility placement, or paved areas adjacent to travel lanes that can tolerate salt spray from the road.

Parking Zone: A dedicated area for parking within the right-of-way.

Note: Overhead Utility Clear Zone
Clear zones for overhead high voltage transmission lines were negotiated between the Region and its utility providers prior to the RCS process. These negotiated clear zones significantly impact the Region's ability to plant trees within the Regional rights-of-way. Given the competing interests for space within rights-of-way and the importance of trees for supporting community identity, influencing walkability, creating habitat and reducing urban heat island effects among others, the Region's designers must work with utility providers to ensure trees can be planted adjacent to sidewalks and multi-use paths while maintaining the use, functionality, and accessibility of overhead utilities. This may require using joint utility trenches under sidewalks

Illustrative Cross Sections

Mayfield Road near Airport Road, Brampton/Caledon Border

Rural Road

Key Elements

The context of a **Rural Road** is typically farm lands, natural land, or scenic landscapes with little to no built structures. Buildings are often set well back from the right-of-way and are spaced infrequently along the roadway. There typically is little to no pedestrian traffic and few bicyclists. In scenic areas of significance there may be a moderate amount of bicycle activity during off-peak travel times as part of group rides. Vehicular traffic consists of local automobiles, goods movement, service trucks, and farm equipment. There is limited to no transit service in the area.

Mayfield Road near Airport Road, Brampton

Dixie Road south of Countryside Drive, Brampton

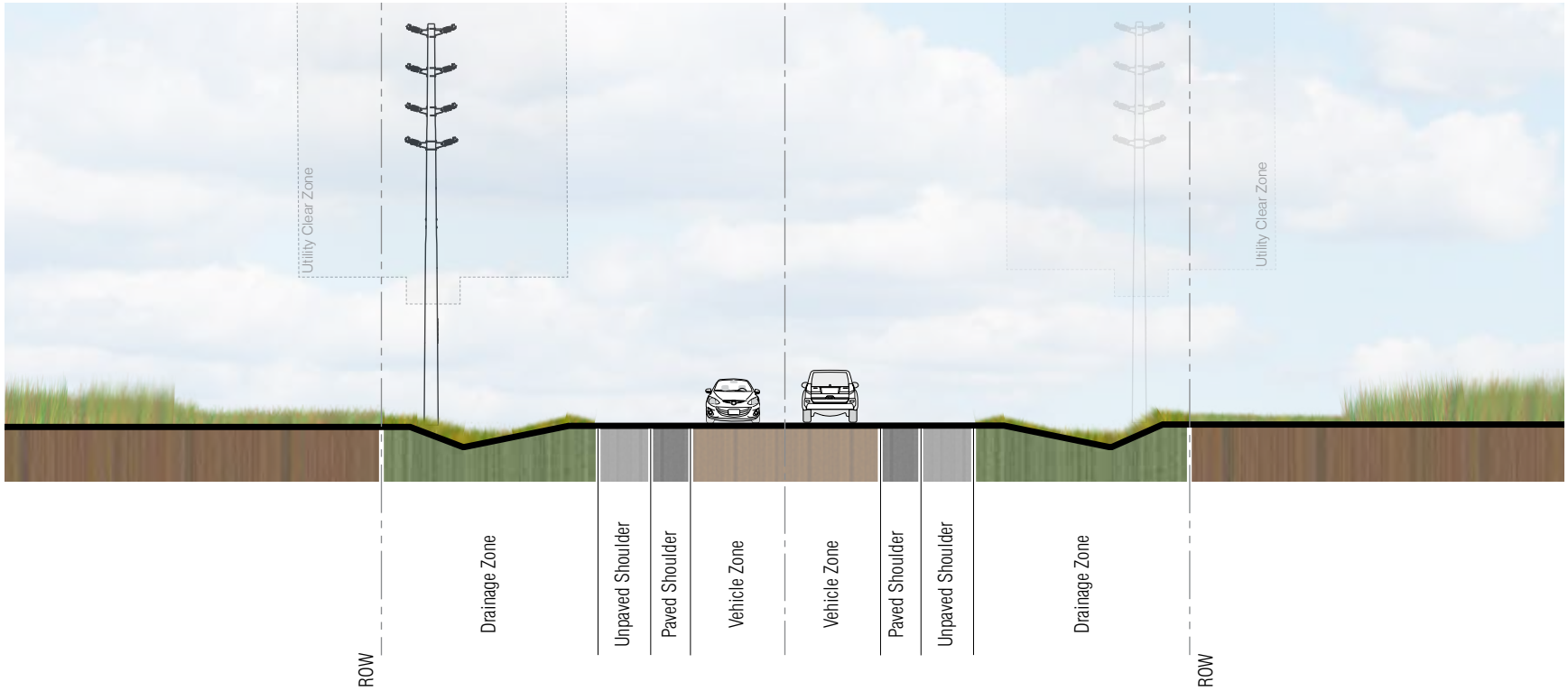
Highway 50, Caledon

Notes

1. The 30 meter Rural Road right-of-way may not be sufficient to accommodate rural drainage requirements where a flat bottom ditch is required by the conservation authority.
2. A combination of travel lanes and paved and unpaved shoulders is intended to accommodate the movement of farm equipment to reduce the need for larger travel lanes.
3. The 1.5 meter paved shoulders can be converted to bicycle lanes in the future with the unpaved shoulder serving as a bicycle recovery area.

Rural Road

30 metre ROW



Zone Dimensions

Vehicle Zone (Lane Width)	Paved Shoulder	Unpaved Shoulder	Drainage Zone
3.5-3.65 metres	1.5 metre min	2.0 metres	8.0 metres

Rural Main Street

Key Elements

A **Rural Main Street** is the heart of a village centre. It is typically a short area of concentrated development in the centre of town that is frequently a retail hub. Often the main street includes local civic structures and services such as banks, pharmacies, grocery stores and post offices. Buildings are typically located close to the right-of-way and on-street parking is often available to service the businesses. Pedestrian traffic is moderate to high and bicycling activity variable in most rural main street communities. Transit, if available, is typically inter-city or Regional in nature.

Mayfield Road, Village of Belfountain, Caledon

Village of Inglewood, Caledon

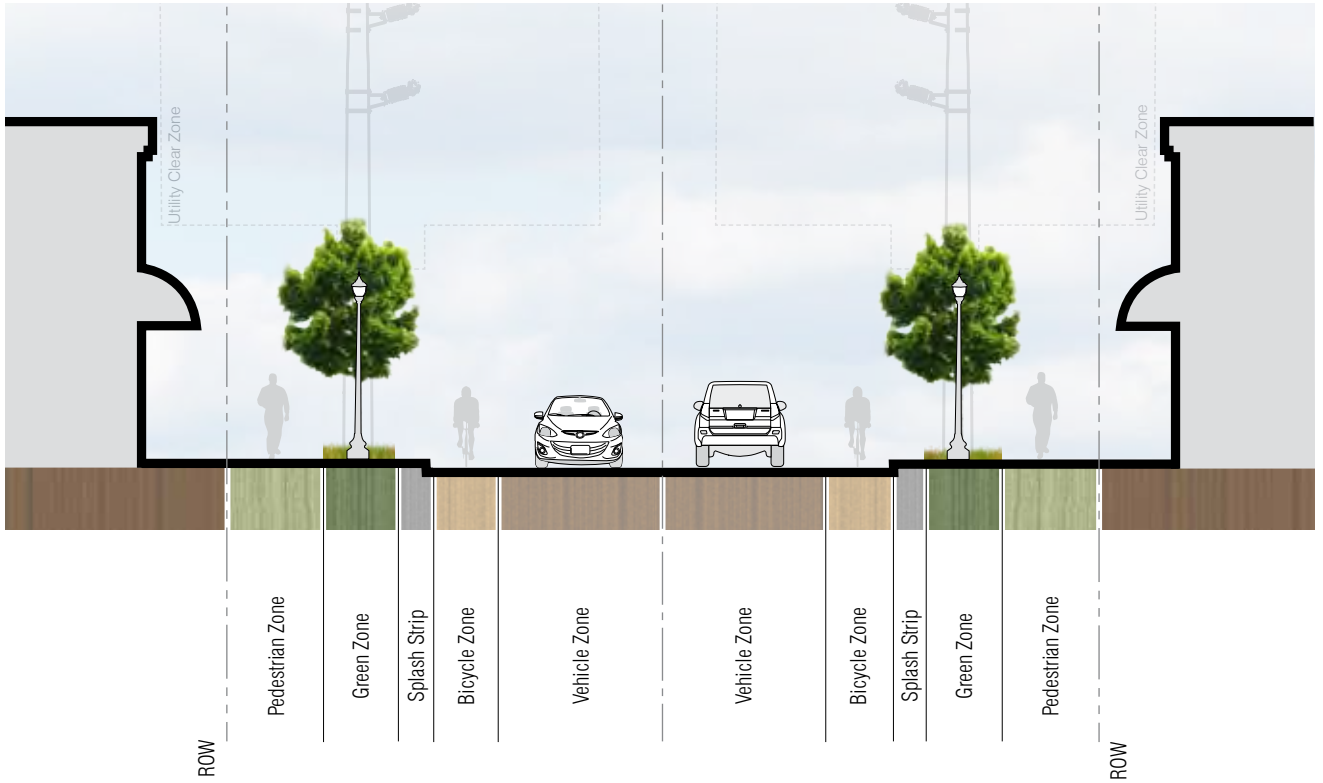
Charleston Sideroad, Village of Caledon East, Caledon

Notes

1. To reduce visual clutter and balance the competition for limited space within the Regional Road right-of-way it is recommended that the Region work with providers to place utilities underground through short lengths of up to 300 meters to support Main Street character.
2. Where it is not possible to place utilities underground, trees and pedestrian scaled lighting must be accommodated in Main Street areas to support the character of the area.

Rural Main Street

20 metre ROW

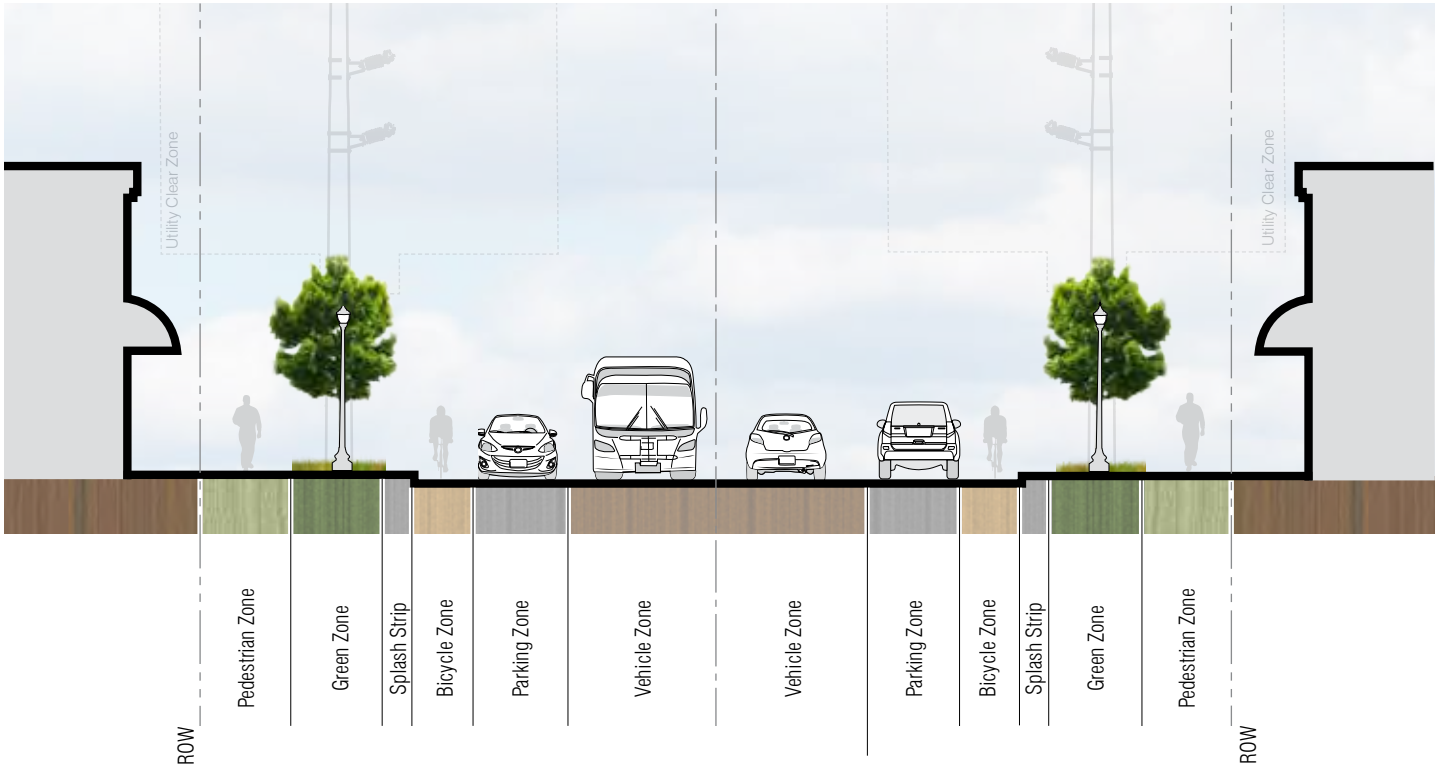


Zone Dimensions

Vehicle Zone (Lane Width)	Pedestrian Zone	Bicycle Zone	Green Zone	Splash Strip
3.4-3.65 metres	1.5 metre min	1.5 metre min	2.0 metre min	1.0 metre

Rural Main Street

26 metre ROW – 2 Travel Lanes plus Parking

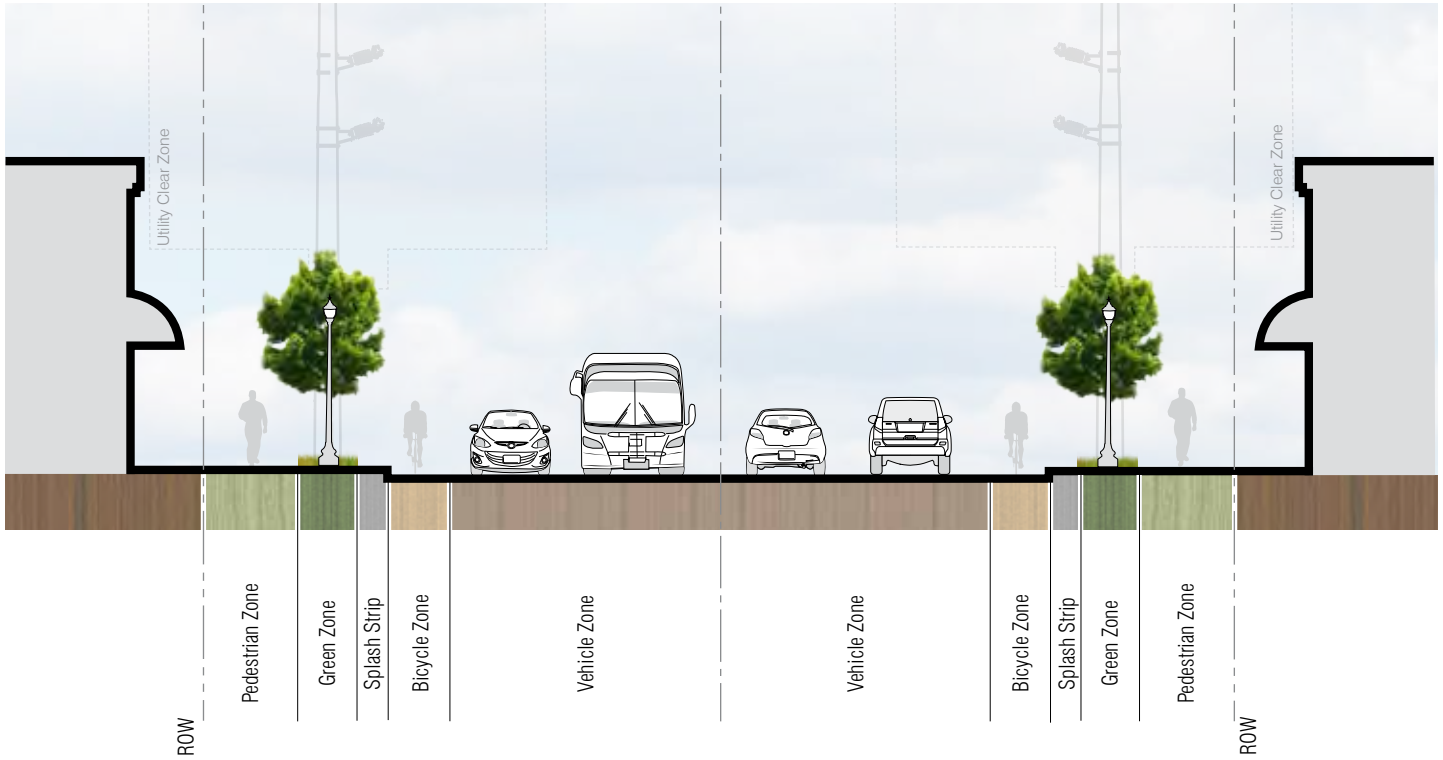


Zone Dimensions

Vehicle Zone (Lane Width)	Pedestrian Zone	Bicycle Zone	Green Zone	Splash Strip	Parking Zone
3.4-3.65 metres	1.5 metre min	1.5 metre min	2.0 metre min	1.0 metre	2.4 metres

Rural Main Street

26 metre ROW – 4 Travel Lanes



Zone Dimensions

Vehicle Zone (Lane Width)	Pedestrian Zone	Bicycle Zone	Green Zone	Splash Strip
3.4-3.65 metres	1.5 metre min	1.5 metre min	2.0 metre min	1.0 metre

Urban Main Street

Key Elements

The typical **Urban Main Street** is characterized by a dense walkable urban form commonly found in the downtowns of large to mid-sized municipalities. It is an area of heavy pedestrian traffic and public meeting place. Land use is typically a mix of commercial, office, institutional and residential uses. Services such as boutiques, pharmacies, restaurants and department stores, as well as schools, post offices or libraries are located nearby. Buildings are placed closer to the street and the local built form is frequently known to include mid to high-rise structures. The typical length of an urban main street is approximately between 275-350 metres.

Yonge Street north of Eglinton Ave., Toronto

Hurontario Street south of Burnhamthorpe Road, Mississauga
(Source: Google Street View)

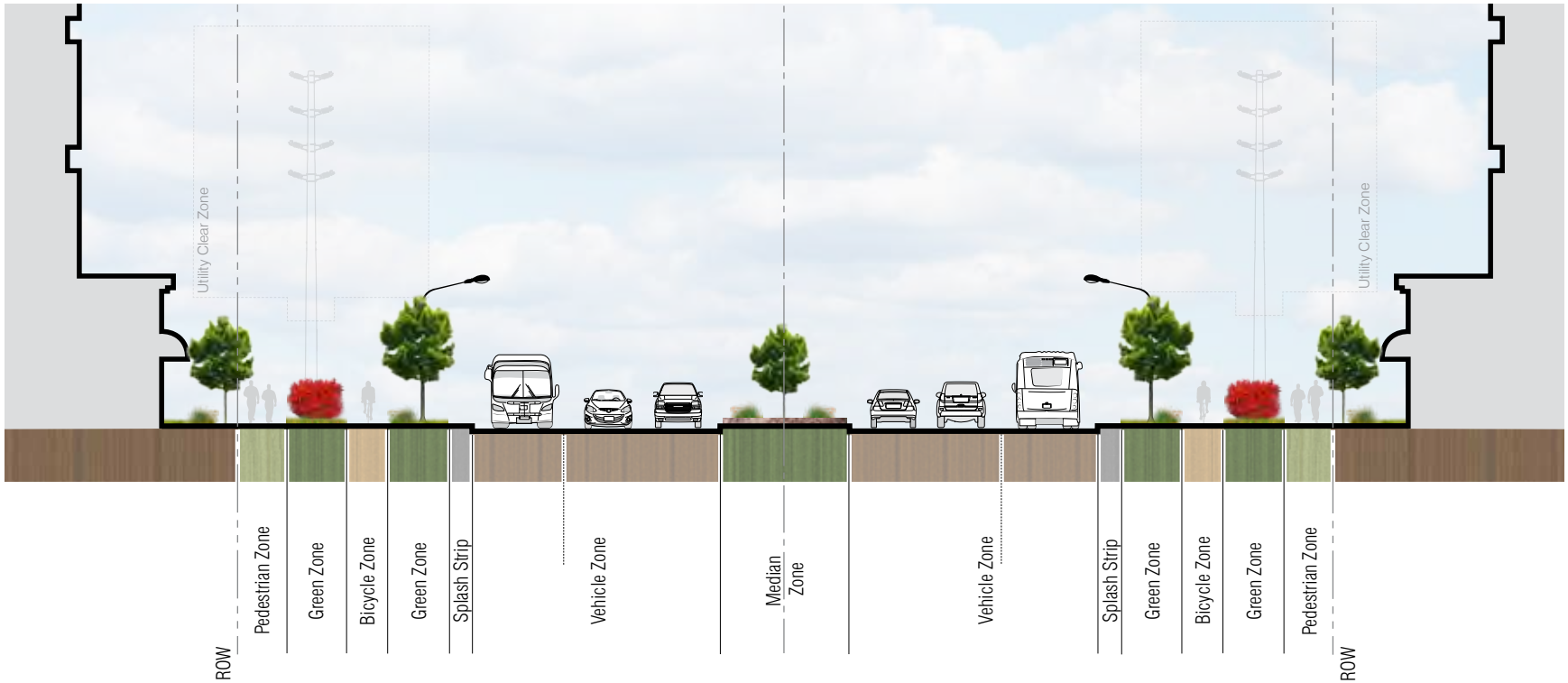
Goreway Roadnorth of Morning Star Drive, Malton, Mississauga
(Source: Google Street View)

Notes

1. To reduce visual clutter and balance the competition for limited space within the Regional Road right-of-way it is recommended that the Region work with providers to place utilities underground through short lengths of up to 300 meters to support Main Street character.
2. Sidewalks should be wider than average and allow for shop front displays, restaurant patios and street furniture while also maintaining a clear zone for heavy pedestrian traffic

Urban Main Street

45 metre ROW

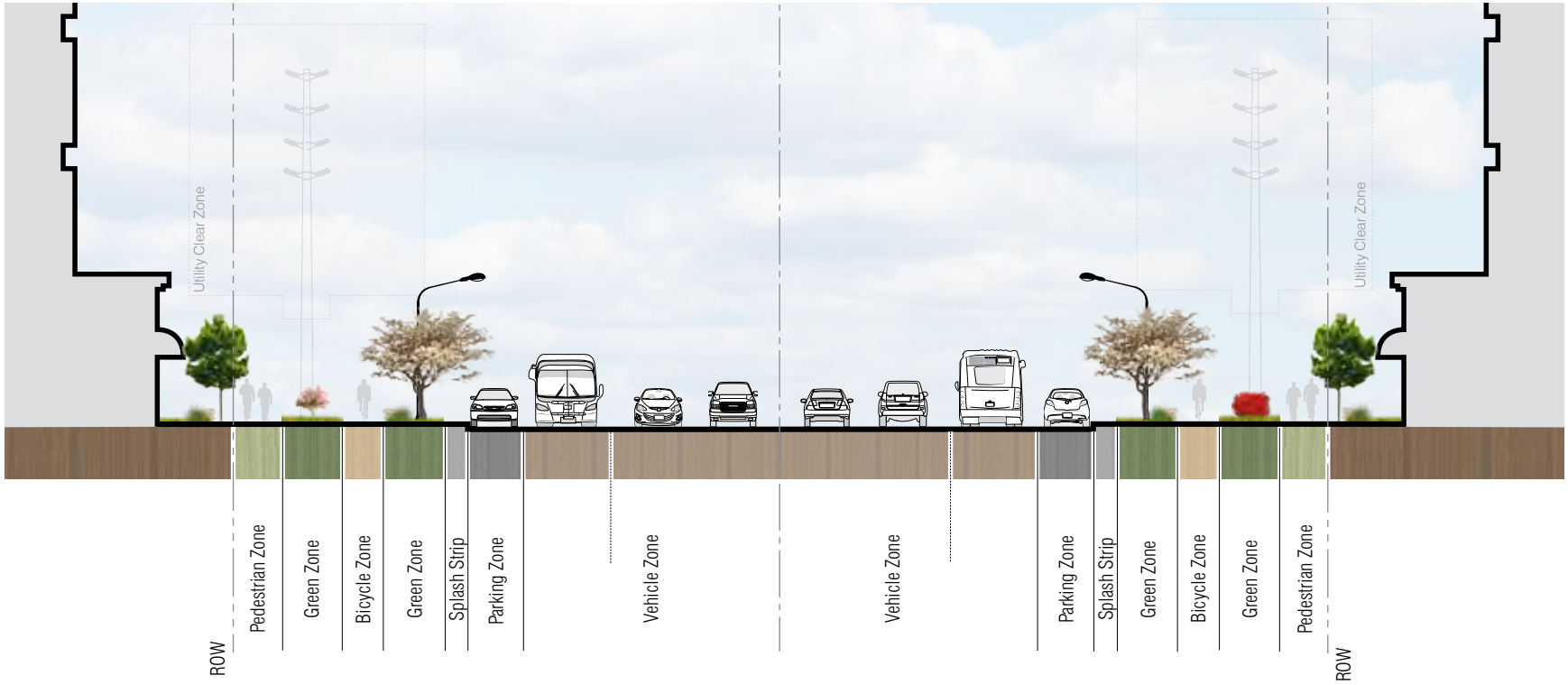


Zone Dimensions

Vehicle Zone (Lane Width)	Pedestrian Zone	Bicycle Zone	Green Zone	Splash Strip	Median Zone
3.4-3.5 metres Curb Lane 3.5-3.7 metres	2.0 metre min	1.75 metre min	2.0 metre min	1.0 metre	5.5 metres

Urban Main Street

45 metre ROW – with On-Street Parking



Zone Dimensions

Vehicle Zone (Lane Width)	Pedestrian Zone	Bicycle Zone	Green Zone	Splash Strip	Parking Zone
3.4-3.5 metres Curb Lane 3.5-3.7 metres	2.0 metre min	1.75 metre min	2.0 metre min	1.0 metre	2.4 metres

Illustrative Cross Sections

Dixie Road near Rathburn Road, Mississauga

Suburban /Commercial Connector

Key Elements

Suburban Connectors are often the link between strip commercial retail development hubs and suburban housing. It has auto-oriented development, with street fronting retail malls located behind surface parking areas, reverse frontage residential development, and some mid-density residential units often in the form of row housing or stacked units. Pedestrian traffic is generally moderate, with isolated examples of high pedestrian activity. Bicycle traffic is low with limited integrated facilities. Transit services the area. Automobile traffic is intended to be free-flowing with limited access between major intersections.

Commercial Connectors are very similar to Suburban Connectors in their look and feel. The biggest difference is the higher density of commercial activity along the roadway versus residential development. Pedestrian and bicycle traffic is low to moderate in character. Automobile traffic is intended to be free-flowing with limited access between major intersections.

Mayfield Road near Snelgrove, Caledon

Dixie Road south of the Queensway, Mississauga

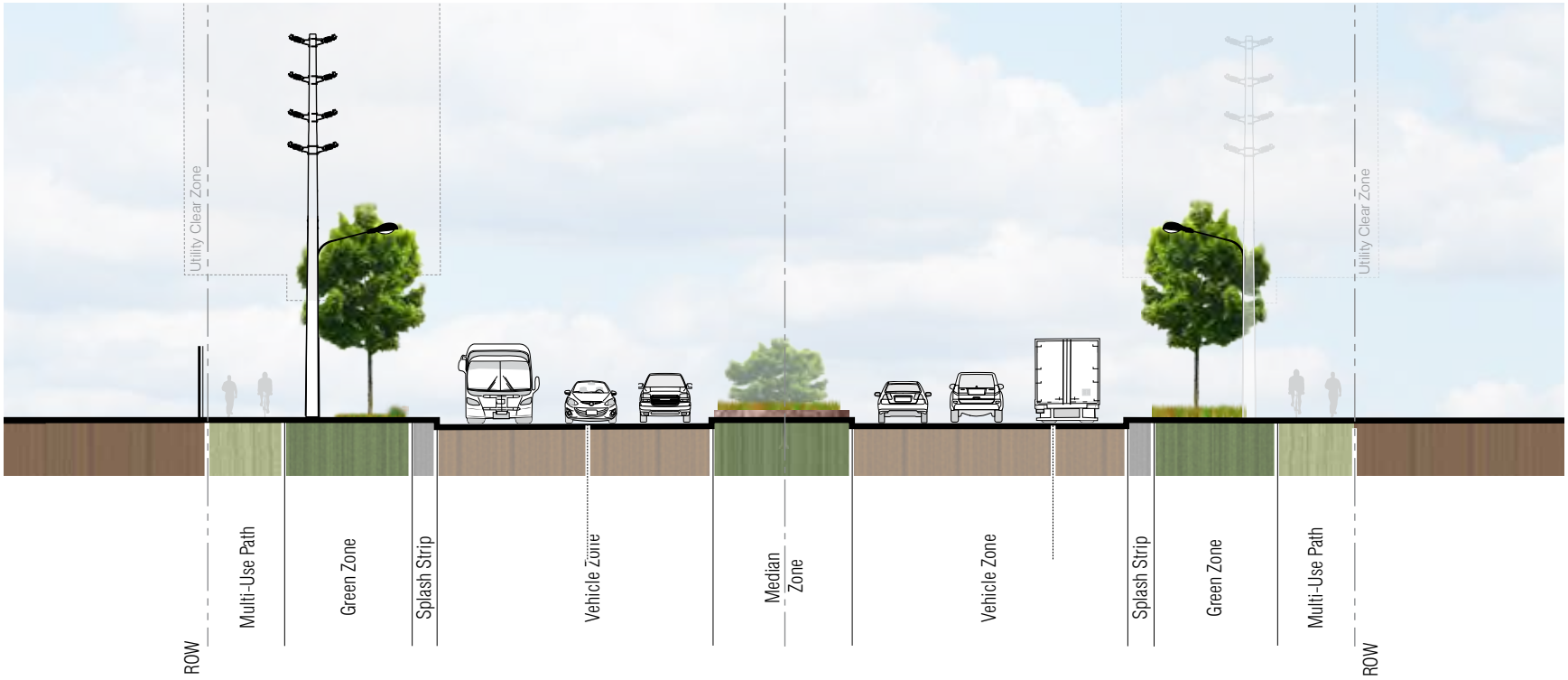
Queen Street East near Torbram Road, Brampton
(Source: Google Street View 2013)

Notes

1. Two Suburban Connector cross sections are shown. The first cross section shows the ultimate build out scenario for a newly constructed or reconstructed facility. The second cross section shows an interim solution that may result from re-striping travel lanes in the short-term.
2. Careful consideration should be given to areas currently shown as Suburban or Commercial Connectors as segments of these roads may be evolving to Urban Main Streets through intensification. For example, growth, development and intensification is anticipated in the character areas in Mississauga.

Suburban Connector

45 metre ROW – with Multi-Use Path
*New Construction or Reconstruction

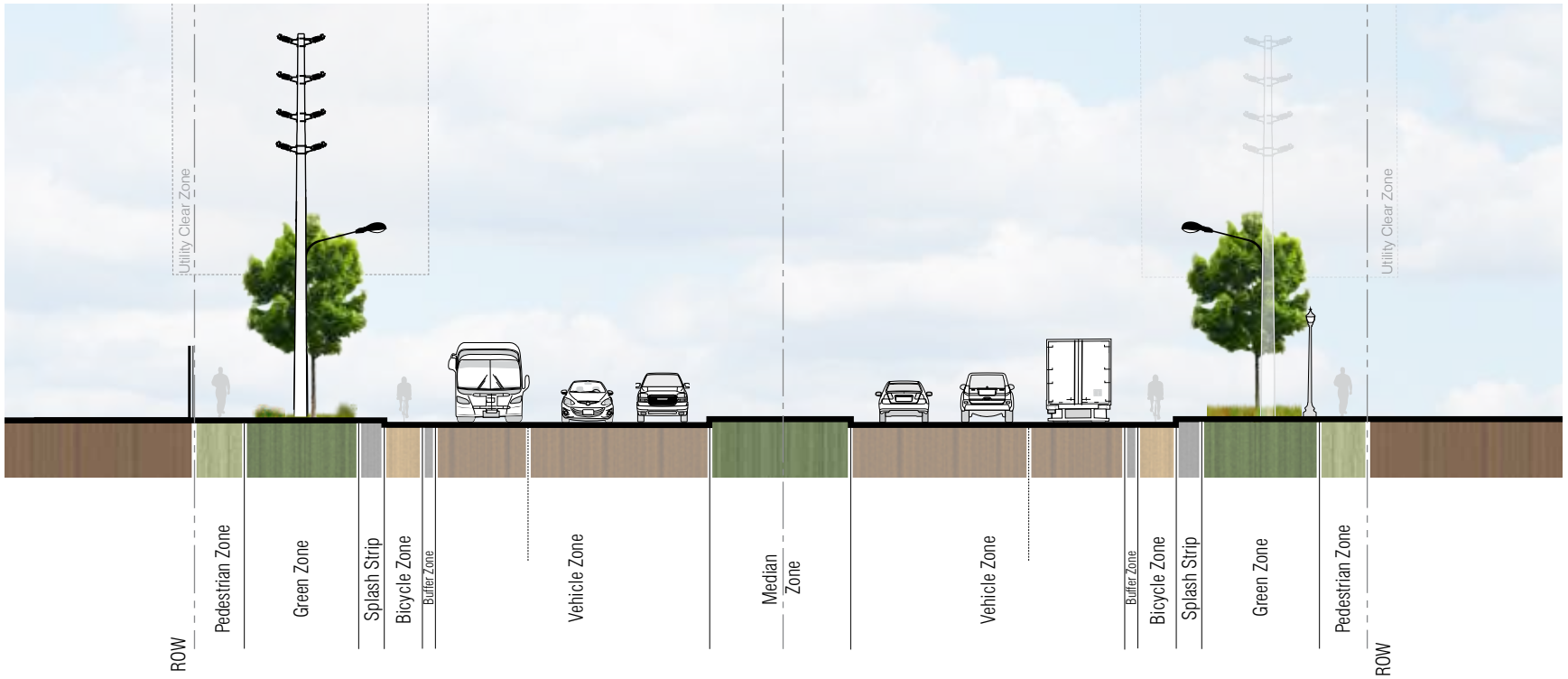


Zone Dimensions

Vehicle Zone (Lane Width)	Multi-Use Path	Green Zone	Splash Strip	Median Zone
3.4-3.5 metres Curb Lane 3.5-3.7 metres	3.0 metre min	4.0 metre min	1.0 metre	5.5 metres

Suburban Connector

45 metre ROW – with On-Street Bike Lanes
*Interim solution until Multi-Use path can be achieved

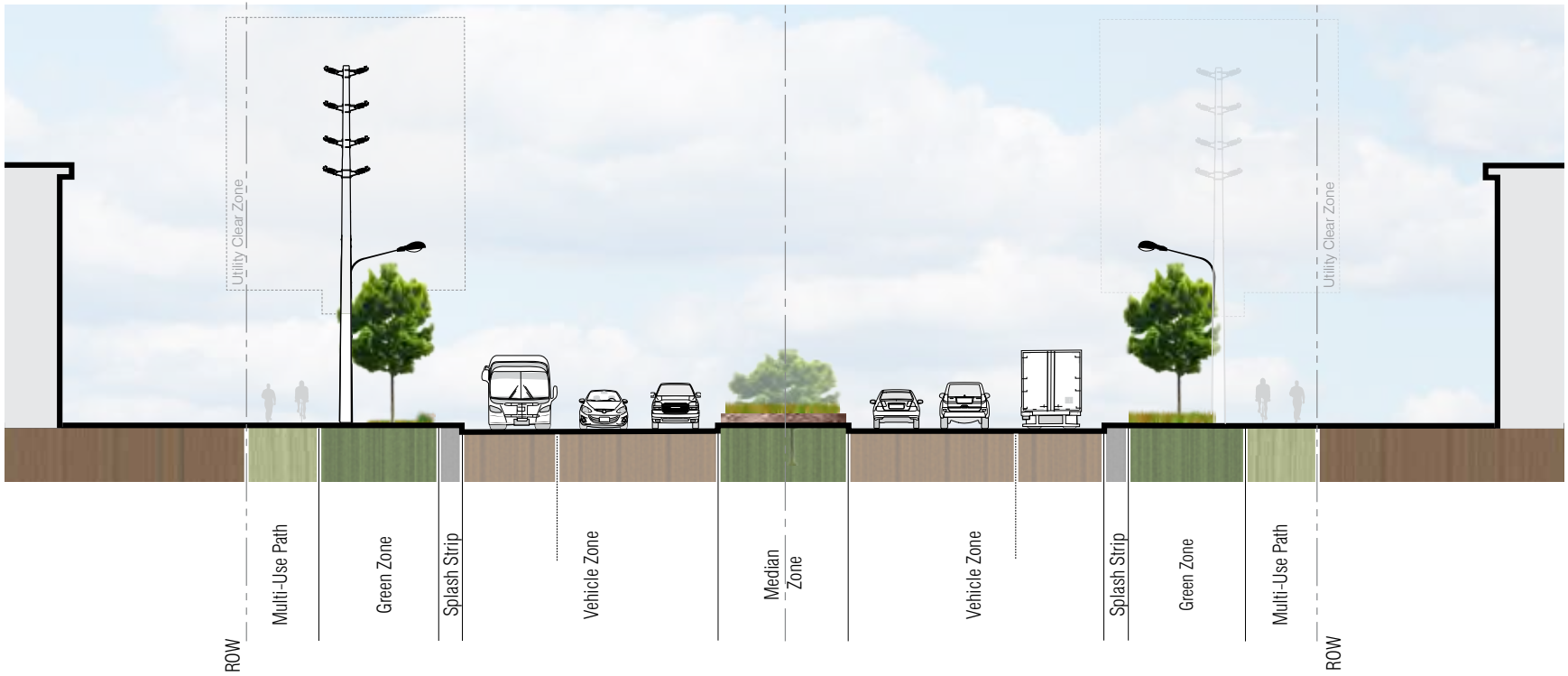


Zone Dimensions

Vehicle Zone (Lane Width)	Pedestrian Zone	Bicycle Zone	Green Zone	Splash Strip	Median Zone
3.4-3.5 metres Curb Lane 3.5-3.7 metres	1.5 metre min	1.5 metre min plus 0.5m buffer zone	4.0 metre min	1.0 metre	5.5 metres

Commercial Connector

45 metre ROW



Zone Dimensions

Vehicle Zone (Lane Width)	Multi-Use Path	Green Zone	Splash Strip	Median Zone
3.4-3.5 metres Curb Lane 3.5-3.7 metres	3.0 metre min	4.0 metre min	1.0 metre	5.5 metres

Industrial Connector

Key Elements

The typical **Industrial Connector** is characterized by a high amount of warehousing and industrial development in the area. It is characterized by high levels of truck traffic and often serves as a primary route between other industrial hubs such as rail or air distribution centres. Traffic is intended to be free-flowing but may have some driveway access for truck traffic. Due to the character of the area, pedestrian traffic is low and is primarily from transit stops to employment sites. Bicycle traffic is limited and may be unsafe in areas where there are multiple driveways with constant truck traffic.

Queen Street near Airport Road, Brampton
(Source: Google Street View 2013)

Dixie Road near the Queensway, Mississauga

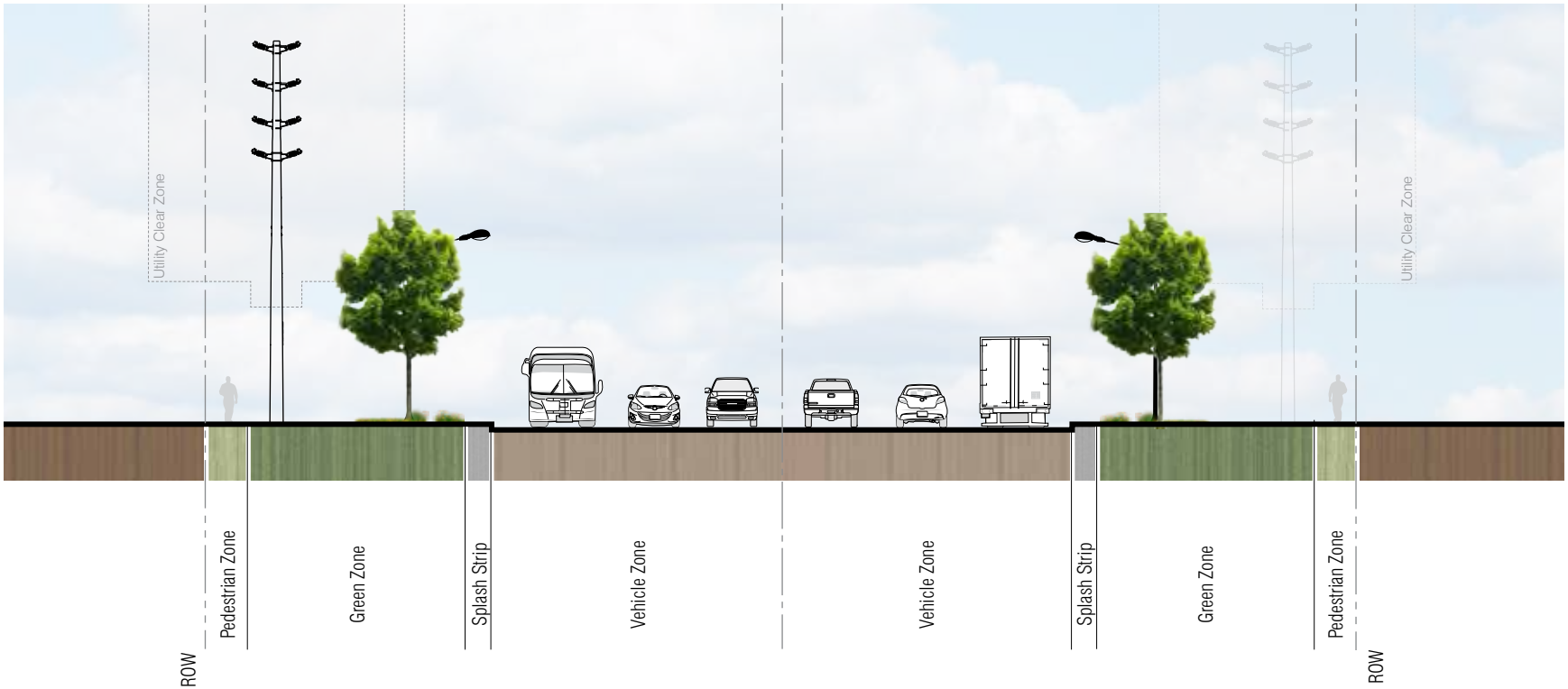
Derry Road east of Dixie Road, Mississauga
(Source: Google Street View 2013)

Notes

1. Two Industrial Connector cross sections are shown. The first cross section shows the limited potential for the existing facility. Significantly, it does not include bicycle lanes as a result of the many conflict points created by multiple, closely spaced driveways. The second cross section shows an ultimate build out scenario where the arterial road is accessed from intersections with local or collector road intersections only.
2. Where driveway accesses have been consolidated use professional judgment.

Industrial Connector

45 metre ROW – Existing Conditions

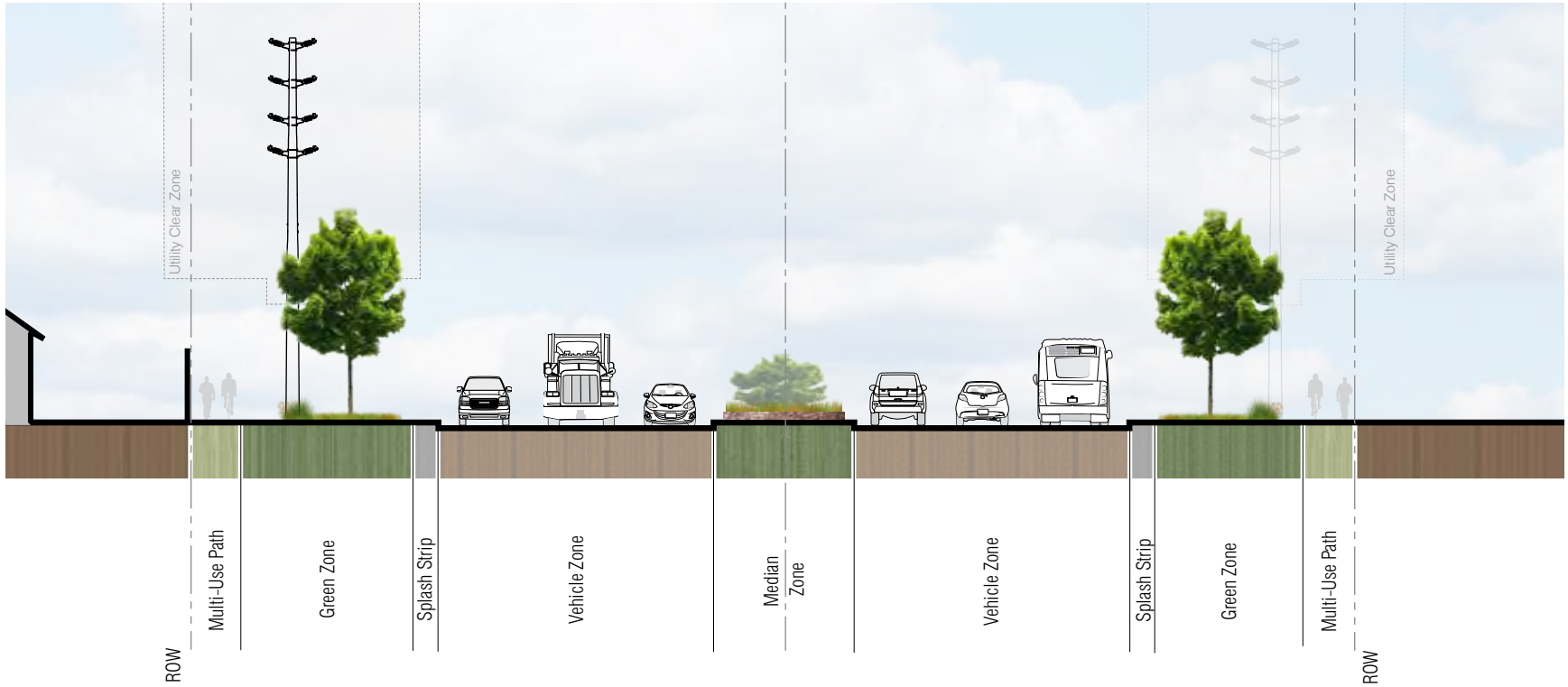


Zone Dimensions

Vehicle Zone (Lane Width)	Pedestrian Zone	Green Zone	Splash Strip
3.7 metres	1.5 metre min	8.0 metre min	1.0 metre

Industrial Connector

45 metre ROW – New Construction



Zone Dimensions

Vehicle Zone (Lane Width)	Multi-Use Path	Green Zone	Splash Strip	Median Zone
3.5-3.7 metres	2.0 metres*	5.0 metre min	1.0 metre	5.5 metres

** 3.0 metre minimum for shared-use path as per TAC 3.4.6.1*

Technical References

The dimensions identified in the cross sections are derived from the following sources.

Consideration	Dimension/Measurement	Reference
Lane width	3.0-3.7 metres- rural roads 3.0-3.7 metres - urban roads	Transportation Association of Canada. (2011). Geometric Design Guide for Canadian Roads. Ottawa, Canada: TAC-ATC. (Sections 2.2.2.1-2.2.2.3)
	Average 2.7 to 3.6 metres 3.0 to 4.8 metres optimum	American Association of State Highway and Transportation Officials. (2011). A Policy on Geometric Design of Highways and Street. Washington, DC: AASHTO. (Section 4.3 - pg.4-7)
Clear Zones Automobiles	2.0-14m based on design speed, design ADT and fill or cut slope ratios, or addition of a non-mountable curb.	Transportation Association of Canada. (2011). Geometric Design Guide for Canadian Roads. Ottawa, Canada: TAC-ATC. (Table 3.1.3.1)
	varies based on design speed, design ADT and fill or cut slope ratios	American Association of State Highway and Transportation Officials. (1999). Guide to the Development of Bicycle Facilities. Washington, DC: AASHTO. (Section 4.6.1 - pg 4-15)
Parking Lanes	2.4 metres - local streets 2.8 m - other streets 3.5 m - off peak parking only	Transportation Association of Canada. (2011). Geometric Design Guide for Canadian Roads. Ottawa, Canada: TAC-ATC. (Section 2.2.3.2)
	2.4m -on urban collectors 3.0-3.6m off-peak parking	American Association of State Highway and Transportation Officials. (2011). A Policy on Geometric Design of Highways and Street. Washington, DC: AASHTO. (Section 4.20 - pg 4-73)
Bike Path Lane Widths	1.5 - 2.0m one-way, exclusive 2.5 - 3.5m two-way, exclusive 3.0 - 4.0m two-way, shared with pedestrians 2.0 - 3.0m one-way, shared with pedestrians	Transportation Association of Canada. (2011). Geometric Design Guide for Canadian Roads. Ottawa, Canada: TAC-ATC. (Section 3.4.6.1)
	3.0-4.2m two-way, shared use path 1.8 m one-way shared path	American Association of State Highway and Transportation Officials. (1999). Guide to the Development of Bicycle Facilities. Washington, DC: AASHTO. (pg.35)
On-street Bike Lane	1.5-2.0m one-way exclusive 4.0-4.8 shared with vehicles (sharrow)	Transportation Association of Canada. (2011). Geometric Design Guide for Canadian Roads. Ottawa, Canada: TAC-ATC. (Section 3.4.6.2)
	1.2m on roadways with no curb and gutter 1.5m min on all other roadways	American Association of State Highway and Transportation Officials. (1999). Guide to the Development of Bicycle Facilities. Washington, DC: AASHTO. (pg. 22)
	3.3m min in a shared parking lane	American Association of State Highway and Transportation Officials. (1999). Guide to the Development of Bicycle Facilities. Washington, DC: AASHTO. (pg. 23)
Clear Zones Bicycles	0.6-1.0m horizontal distance from Edge of Pavement (EoP) to lateral obstruction	Transportation Association of Canada. (2011). Geometric Design Guide for Canadian Roads. Ottawa, Canada: TAC-ATC. (Table 3.4.6.3)
	0.9m from EoP to lateral obstruction	American Association of State Highway and Transportation Officials. (1999). Guide to the Development of Bicycle Facilities. Washington, DC: AASHTO. (pg. 36)
	1.5m from EoP to canals, ditches or down slopes	American Association of State Highway and Transportation Officials. (1999). Guide to the Development of Bicycle Facilities. Washington, DC: AASHTO. (pg. 36)
Sidewalks	1.5m min- 1.8m preferred	Transportation Association of Canada. (2011). Geometric Design Guide for Canadian Roads. Ottawa, Canada: TAC-ATC. (Section 3.3.2.2)
	1.8m min-for exterior accessible routes and walkways 1.5m min for recreational trails	Ministry of Community and Social Services. (2009). Initial Proposed Accessible Built Environment Standard. Ottawa, Ontario: Government of Canada. (Section 5.1.2 a - pg54) & (Section 11.1.3.1 - pg170)
	1.2-2.4m wide with sidewalks less than 1.5m requiring a passing area	American Association of State Highway and Transportation Officials. (2011). A Policy on Geometric Design of Highways and Street. Washington, DC: AASHTO. (Section 4.17.1 - pg4-57)

Region of Peel's Road Characterization Study

Section 3: Access Control





Region of Peel
Working for you

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Section 3: Access Control

CHAPTERS

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1.0 Purpose and Need

Access management measures maintain the quality of the traffic service on controlled roads while providing efficient access to the surrounding properties. Access management actions, typically initiatives of agencies with responsibility for the arterial road (Region of Peel in this case) and municipalities with land use control, fall into two categories:

1. Access control (typically, limit) the number of accesses to the arterial, and the design of these connections,and;

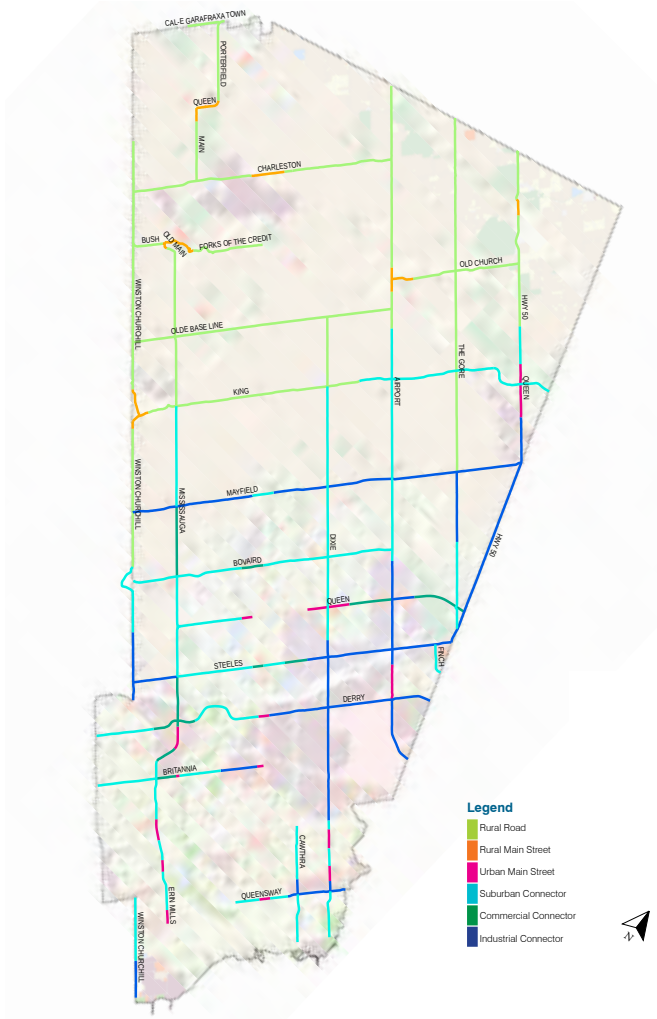
2. Creating a network of local streets and internal (private) accesses from adjacent land uses to the surrounding arterials.

This section summarizes the rationale for access management, and then defines individual access management measures. It identifies how to they apply each of the six Regional Road types as defined in the Region of Peel's (hereinafter the Region) Road Characterization Study (RCS).

1.1 How to Use this Document

This document is to be a reference for land use planners when preparing site plans, block plans and other development plans; for land developers during the process of determining accesses; engineers during traffic assessments and access management, as well as other key players in the planning and implementation process.

All spacings and access points are to be verified by a Transportation Impact Assessment and/or sightline analysis. This document is to be used in conjunction with the RCS map and matrix located in Section 2 of the RCS books.



RCS Road Character Map

This map, described in more detail in Section 2, will be amended periodically in response to approved secondary plans, block plans, or council endorsed development applications.

Note: Existing land use data for the base map was sourced from Area Municipal Official Plans.

1.2 Access Management Purpose and Need

The scope of access management measures depends on a road's functional class, reflecting the blend of mobility and property access intended for the road. The roads addressed in the RCS are all classified as arterial and all of them are important for movement of through traffic, but also to provide land access as origins and destinations increase on Regional Roads through intensification.

Historically, access management actions have responded only to the road's functional classification with greater emphasis on maintaining mobility along arterials. Previously, less attention was given to roads which function as collector and local streets.

In the past access management practice, no distinctions were made as to the character of the roads. These access management measures for Peel Region are in the forefront of current access management practices in recognizing that, not only functional class, but also the character is determinant of the access management approach for the road.

Despite their shared function in carrying freight, transit and through traffic, the Region's arterials are bordered by areas of greatly varying character. These differences are reflected in the RCS definition of different road character types (see Road Character Matrix and Map, Section 2). Consequently, there is no single set of one-size-fits-all access management measures applicable to all six road types. Rather, access management measures, while recognizing the primary importance of maintaining through traffic service with the preservation of mobility and level of service, are individually fitted to the character of each of the six road types.

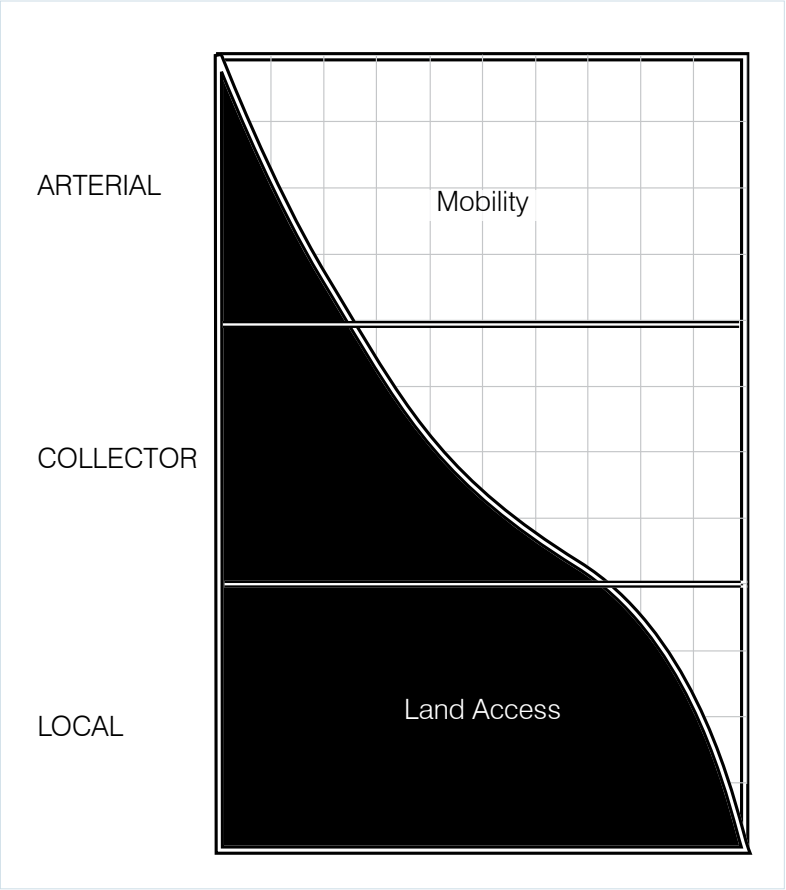


Figure 1: Functional Class Vs Access
Source: FHWA Access Management Principles presentation.

1.2.1 Efficient Access to Adjacent Properties

Maintaining efficient access to properties along a road is a major purpose of access management, even where Regional mobility for through trips is the major function of the road. Access management measures promote efficient property access by linking accesses along the arterial to well-organized networks of local streets and cross-access easements within adjacent land uses that abut the arterial road.

1.2.2 Pedestrian and Bicycle Travel

Accommodating non-motorized (pedestrian and bicycle) travel is important along and across segments of the Region's arterials. Non-motorized travel is likely to increase in importance, as more segments of the Region's arterial roads intensify with urban patterns of development. Access management can recognize the importance of this non-motorized travel through the spacing and design of vehicular access points. As the land use adjacent to an arterial road becomes urban in character, measures to improve non-motorized travel focus on providing new municipal streets intersecting the arterial, connected to a supporting network of local streets and cross-access easements. The resulting pattern of small blocks and numerous possible walking routes is scaled to the pedestrian travel needs of compactness and variety of walking route opportunities. A dense network of streets, while increasing the number of possible conflict points between motor vehicles and non-motorized travel, has the offsetting safety advantages of reduced vehicle speeds, less likelihood of pedestrian 'jaywalking' given the small block size, and smaller intersecting street sizes with a correspondingly reduced pedestrian crosswalk distance.

1.2.3 Character and Appearance

Access management measures, while not originally intended to enhance the aesthetics of the arterial roads and the surrounding areas, are in actual practice likely to do so. Preserving the continuity of the raised, landscaped median and limiting the number of accesses along a road generally improves the appearance of the road and its environment. As the land use adjacent to an arterial transitions from sparse suburban density to higher intensity of urban development, the network of accesses inherent in that urban pattern becomes the signature of the highly valued human-scaled walkable urban environment.

1.3 Categories of Access Management Actions

Access management can be grouped into four broad categories:

1. Spacing of accesses – These access management actions are intended to control the number and location of the points of vehicular access along an arterial road. Control of number and spacing of accesses, in turn, minimizes the number of signalized accesses, critical to preserving the travel time on the signal coordinated arterial road. Minimizing the number of accesses reduces interruptions to traffic flow on the arterial, improves safety through eliminating points of vehicular conflict and allows for better managed and achievable progression. Reduction in fuel consumption and pollution is also

Access Control Workshop - Day 2

possible since greater efficiencies are realized when progression is improved, reducing the starting and stopping of vehicles that causes braking and idling. Many new fuel saving technologies and softwares also focus on the same principle of reducing inefficiencies caused due to stop and go movements, either by adjusting speed, turning off the engine when it is idle, or alternatively, trying to regain lost energy through regenerative brakes.

2. Access Design – These design measures control the number of turning movements (and consequently the number of vehicular conflicts) at an access. Categorized as to their physical design, access connections can be: (a) a full median opening (the standard design for municipal intersections and an option for private driveways) permitting all turning movements between the arterial and access, (b) a partial (left-in, right-in/out) median opening (optional for driveways, rarely used for municipal intersections) permitting left turns into an access connection but not left turns from out of an access, and (c) restricted right-in/right-out (most often for driveways and occasionally for municipal intersections) permitting right turns into and out of an access, but prohibiting all left turns.
3. Provision of auxiliary lanes—Auxiliary lanes provide space for vehicle deceleration and storage for right or left turns from arterial roads at their points of access as well as a refuge for turning vehicles. These lanes improve capacity and safety on the arterial by removing slowing or stopped vehicles from through lanes with higher-speed traffic.

4. Forming a network of local connections – These networks consist of a grid of local streets, private service roads and cross-access easements to support access connections to the arterial road. A network of local connections can improve vehicular capacity, travel speed, pedestrian convenience and safety for all modes of travel on the arterial road, while simultaneously furthering local plans for intensified areas such as main streets and village centres by distributing turning movements to multiple accesses, thus reducing pressure at major intersections.
5. Mid-block U-turns and roundabouts can be important elements in support of local street connectivity. Mid-block U-turns can remove some vehicular traffic from signalized intersections and deliver it directly (i.e., without passing through a signalized intersection) to desirable access points such as shared driveways. Roundabouts provide an efficient method of allowing U-turns, thereby reducing the need for median openings. Further, the visibility of roundabouts and their typically high level of traffic service for minor street approaches can make them useful in dispersing cross-street traffic volumes to multiple accesses along an arterial.

Access Control Workshop Outcome - Day 2

1.4 Responsibilities for Access Management Actions

Responsibility for access management actions resides with both:

- The Region, based on its jurisdiction over the arterial roads and their local and private access connections, and;
- Area Municipalities based on (i) their control of local streets intersecting the Region's Roads (ii) their control of the development approval process for properties with access connections to arterials and (iii) their sponsorship of land use plans for adjacent or abutting Regional Roads.

The Region controls the design and operation of all arterial roads, pursuant to (1) the *Municipal Act, 2001, S.O.2001, c.25* as amended, and (2) the Region's *Official Plan Objective* #5.9.4.1.1 and Policy #5.9.4.2.12 (subject to change). As part of this authority, and as further amplified in the Region's *Controlled Access By-Law 59-77* as amended or replaced from time to time, (hereinafter the Access By-Law), the Region can control the access connections to the arterial.

The Region's most effective administrative tool for access management is control over the spacing and design of median openings. The Region also grants access for private property, but the Region's control of their number and spacing is constrained by the need of property owners adjoining an arterial road to have an access interconnection between properties.

Municipalities work with land owners to plan local streets, which includes establishing the location, locating and acquiring right-of-way, and their design and construction. Zones of high connectivity featuring new municipal intersections with an arterial road are a powerful tool for access management on the arterial, reducing the need for driveways and diffusing arterial traffic volumes away from problem intersections.

The Area Municipalities' process for land development approval, while not mandating access management measures as such, affords the opportunity to include such features (importantly, cross-access easements and redirecting private driveways to local streets) in the approval process of site plan control and land division.

The Area Municipalities' ability to develop detailed land use and traffic circulation plans for areas of special interest is a powerful tool for gaining, over time, the highly connected network that is a critical element of access management in intensifying areas. Seizing opportunities to create network, particularly in greenfield areas dufing the planning stage, provides many benefits to accomplishing this goal throughout the urbanization process.

The involvement of both the Region and Area Municipalities is essential in developing the grid network of connections critical to managing access as an area urbanizes. The spacing of median openings and accesses, a prerogative of the Region, establishes the armature of the block and street pattern characteristic of a street grid. The implementation of complementing network of local streets, private service roads and encouragement of cross-easement connections are local municipal initiatives and good planning.

In partnership with the Area Municipality, the Region of Peel will evaluate every spacing request using the principles established in this document to determine the appropriate access management option.

1.5 Economic Benefits and Costs of Access Control

The discussion of economic benefits and costs of access management follows from the nature of the actions pursued:

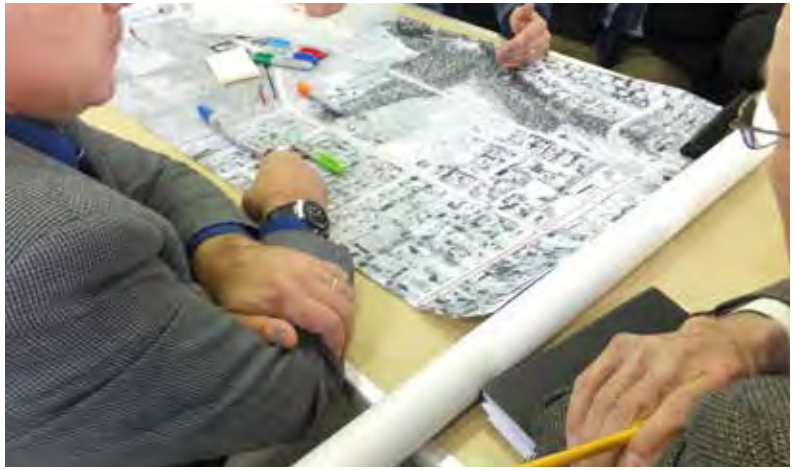
- Controlling the number and spacing of accesses on the arterial.
- Providing auxiliary lanes at access connection points.
- Building local networks in surrounding the arterial.

1.5.1 Controlling Spacing of Median Openings

The direct beneficiaries of access management influencing the number and spacing of accesses are (1) pedestrians, cyclists, and motorists on the arterial road making through trips (i.e., with neither origin nor destination nearby) on the arterial road; and (2) property owners at median openings.

Benefits to drivers on the arterial include travel speeds higher than if access were not controlled, reduced likelihood of stopping at intersections and reduced probability of vehicular collisions (due to limitation of unsignalized median openings). Under rural conditions and at the earliest stage of suburban development, these benefits to motorists can be substantial. However, even modest amount of suburban growth erodes the benefits to drivers of access management measures consisting solely of limitation of accesses.

Access Control Workshop - Day 2



Access Control Workshop - Day 2

Purpose and Need

Access Control Workshop Outcome - Day 2

Access management measures limiting the number of median openings confer large value on the properties served by such openings. In the absence of a plan for local connectivity, this large value is captured solely by the property owners directly connected to the arterial, and is unlikely to be voluntarily shared (with cross-access easements, new local streets, etc.) with adjacent property owners. With a plan for local connectivity in place preceding the opening of the median, the value added by its opening can drive the negotiation for connectivity well beyond the properties immediately benefited.

The major indirect economic impact of limiting spacing of accesses along arterials is that some trip destinations (i.e., commercial land uses) that, in the absence of access management, would have located on arterials instead of locate elsewhere. When this elsewhere is intended by local plans or policies (for example, a main street), the impact of access management on location can be beneficial to both traffic flow on the arterial as well as to success of community plans. More likely, however, limiting commercial access on arterial roads simply drives many of the commercial destinations that are denied access to the arterial to seek locations on intersecting roads in the near vicinity of an arterial. In the absence of any new local street network this clustering of trip generators on existing intersecting streets rapidly increases cross-street traffic volumes, and even more rapidly increases the volumes of turning movements at their intersections with the arterial. The resulting demand on the arterial's traffic signal green time adds stops and delay to arterial travel, with a corresponding decrease in travel speeds. Paradoxically, this deterioration in arterial

traffic service, which worsens exponentially with increases in cross street traffic volume, erodes the very purpose (i.e., preservation of arterial traffic service) intended by the limitation of access to the arterial.

1.5.2 Controlling Spacing of Access

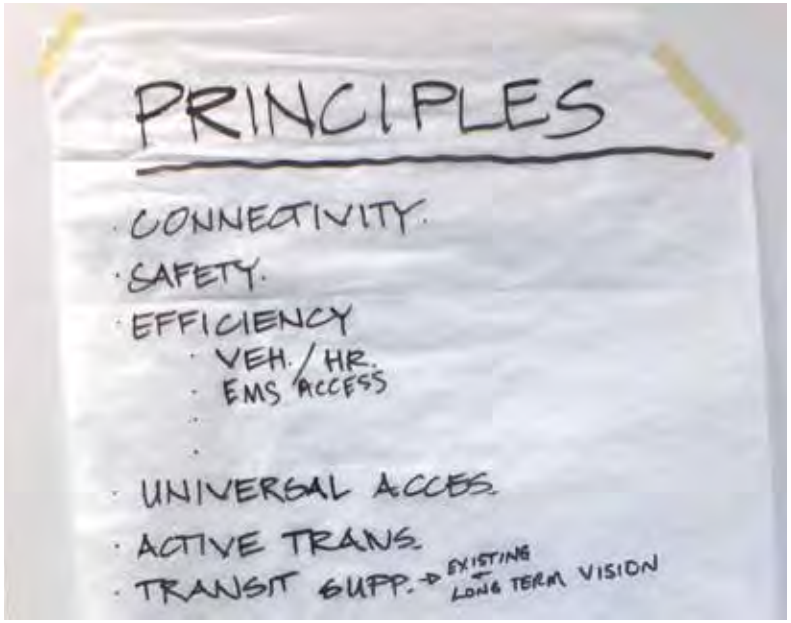
The benefits of access spacing accrue to drivers, in the form of travel speeds, reliability of travel speed and reduced probability of vehicular collisions.

Unlike median openings, designed and controlled by the Region, a driveway (Right-In/Right-Out) onto an arterial is assured, by right, for any property dependent on it as its sole means of access to a public road. Driveway access, therefore, does not typically confer the large value as does a median opening and is consequently not as powerful an incentive for gaining agreement for connectivity between adjacent properties. However, given a strong plan for local access improvement, the approval of the number and location of accesses per property can still be a significant bargaining factor in developing local connectivity.

1.5.3 Providing Auxiliary Lanes at Access Connections

Benefits of auxiliary lanes accrue to drivers on the arterial, in the form of continuous travel speeds and safety due to the separation of the slowing and turning vehicles from the through travel lanes. This is a refuge for turning traffic that reduces rear-end collisions.

At crosswalks present at intersections or otherwise, auxiliary lanes are detrimental to pedestrian access, increasing the walking time and distance across the arterial road, and generally increasing the speed of vehicles entering accesses that must be crossed by pedestrians. Right turn channels reduce controlled crossing distance for pedestrians although they also force crossings between the channel and the curb. Right turn channels will be evaluated on a case-by-case basis, based on the contextual needs of traffic, pedestrians and transit.



Access Control Workshop Outcome - Day 2

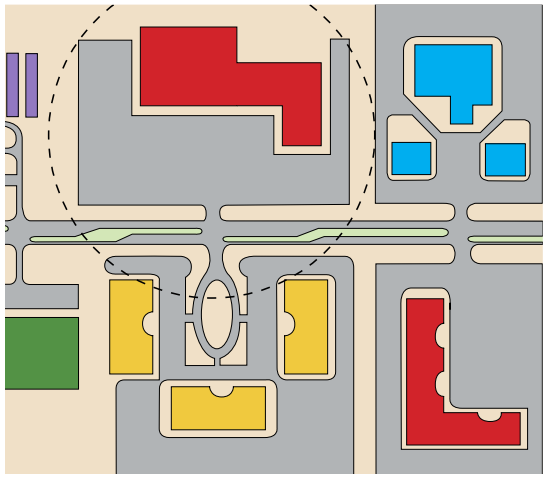


Figure 2: Origins/Destinations within Walking Distance – No Network

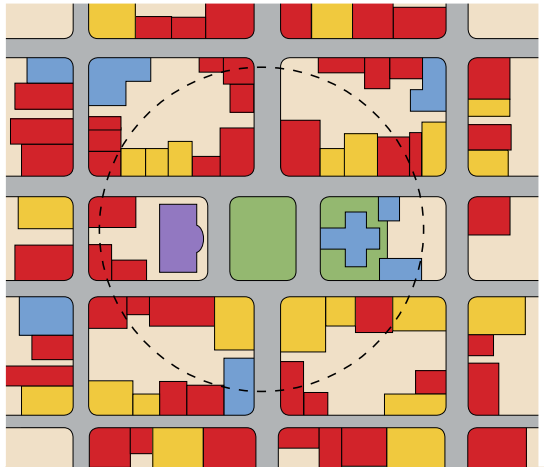


Figure 3: Origins/Destinations within Walking Distance – Local Network

Sources: Walter Kulash for Glatting Jackson

1.5.4 Benefits of Local Connectivity

Benefits of more local connectivity accrue to drivers, non-motorized (pedestrian and bicycle) travelers, and property owners. Benefits include reduced Vehicle Kilometers Traveled (VKT), which decreases Green House Gas (GHG) emissions, and improved health by encouraging balanced options for cyclists and pedestrians.

Benefits to Drivers

Zones of high connectivity benefit motorists both on the arterial road and on the network of local streets and complementary network of private service roads governed by cross-access easements. The network can reduce intersection delay on the arterial and therefore increase overall travel speed for through traffic. For local trips (i.e., to/from destinations/origins within the local network), the network reduces the time spent waiting to make turning movements from and onto the arterial roads. The network reduces the travel distance and time between the arterial and final destination, and places access turning movements to/from final destinations onto a safe, low-speed environment on local streets, rather than in the high-speed multi-lane environment of the arterial roads. Goods movement, transit, and emergency service vehicles all benefit from this increased safety, mobility, and connectivity. Additionally, access for Fire and Emergency Medical Services (EMS) to service roads entrances governed by cross-access easements provides the opportunity for emergency vehicles to take alternative routes.

Roundabouts and mid-block U-turns benefit drivers, both by reducing the inconvenience that might be otherwise caused by restriction of median openings, as well as facilitating access to the arterial at locations other than signalized intersections.

Benefits to Non-Motorized Travel

A highly connected network of local streets and private service roads is a critical element of a successful walking and cycling environment. The density of uses supported by such networks contributes to a large number of origins and destinations that may be within reasonable walking and cycling distance of each other *(Figures 2 & 3: Origins/ Destinations within Walking Distance).* The character of the network (low-speed local streets, small intersections and attractive private walkways) assures an appealing setting for walking and bicycling trips as well as improves health by encouraging increased physical activity. The greater number of routes for walking and cycling in a well-connected network is a further advantage for non-motorized travel. (See the Region's Active Transportation Plan for more details about non-motorized travel)

Benefits to Property Owners

Highly connected networks benefit property owners by creating an enormous amount of commercially valuable street frontage within a short distance of an arterial and further by creating a number of possible routes between the arterial and these street frontages. Local street networks can significantly reduce the amount of parking required from property owners by (1) providing on-street parking and (2) fostering a park-once environment, in which drivers no longer demand parking on the immediate premises of their destinations, but rather choose a suitably located joint-use parking facility (publicly or privately owned). From this location they can walk to multiple destinations while remaining parked in the same location. A successful park-once environment can reduce a district's parking requirement by around half (compared

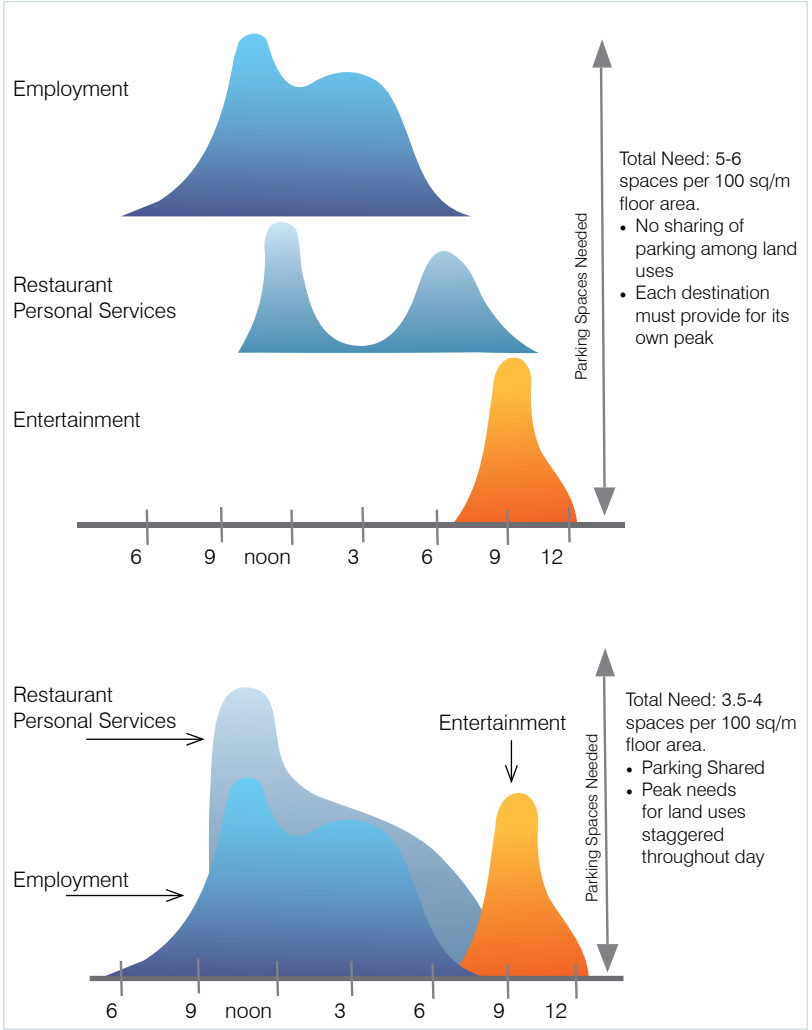


Figure 4: Joint-Use vs. Conventional Parking

Source: Walter Kulash for Glatting Jackson

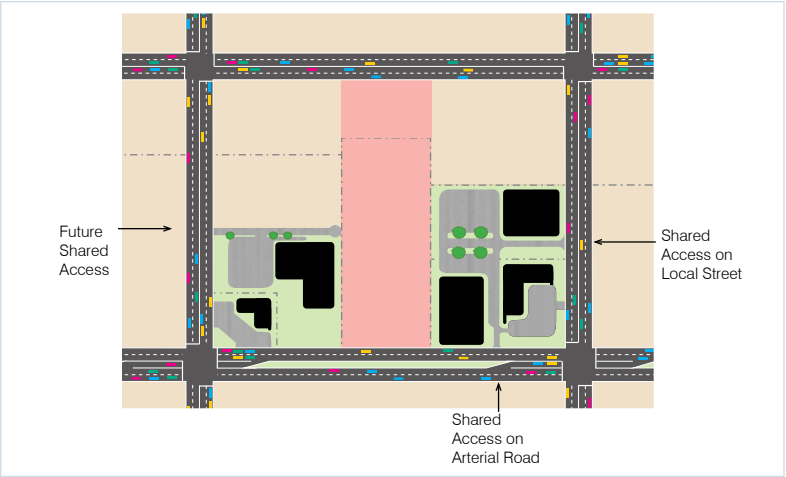


Figure 5: Shared Access

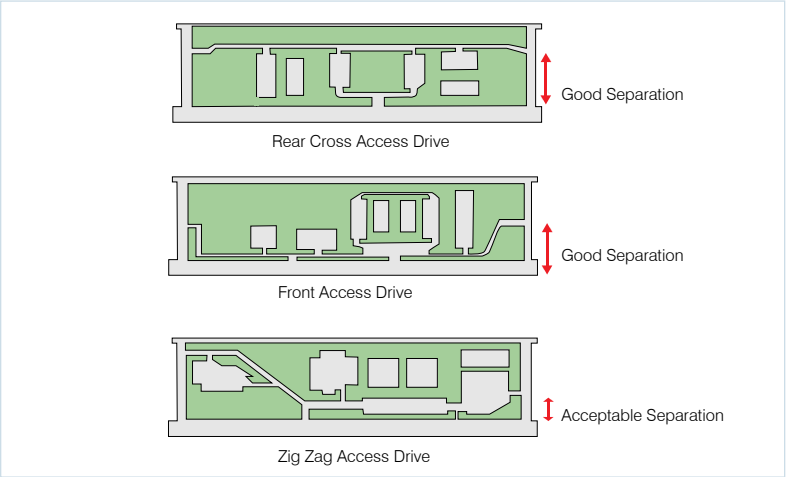


Figure 6: Cross Access Corridors

Sources: Walter Kulash for Glatting Jackson

to conventional on-premises parking) with the benefits (reduced cost of parking spaces and their maintenance) accruing directly to property owners. *(Figure 4: Joint-Use vs. Conventional Parking)*

The successful park-once district is thought of, by most visitors, as a single destination, such as a downtown, village center, Main Street, SOHO (New York), LODO (Denver) and so on. This identity as a single destination, often strongly promoted by property owner consortiums such as business improvement areas (BIAs), benefits the district by increasing the average duration of visitors' stay in the district. By increasing the number of destinations visited on a single trip to the district, it is populated with pedestrians and by minimizing the vehicular travel required during visits.

Beyond improving access to public streets, cross-access easements yield advantages for internal circulation within the connected private properties. Usually, cross-access easements reduce the number and size of internal drive lanes needed on the connected properties, and eliminate the need for some vehicle turnaround areas. Cross-access easements can greatly reduce the total area required, among the connected properties, for truck maneuvering.

1.6 Local Connectivity and Street Network

Local connectivity and street network actions provide vehicle routes that reduce vehicular travel and turning movements on the arterial road and shift arterial traffic and turning movements from arterial road locations with

capacity or safety problems to less problematical locations. Local connectivity and street network actions achieve these reductions and shifts in arterial street traffic through:

- Cross-access easements, that combine the arterial road access for multiple properties into a single driveway
- Developing a network of local streets, and combined with cross-access easements, directing property access onto these streets rather than the arterial.

1.6.1 Consolidating Driveways

As part of the site plan approval process, Area Municipalities and the Region should consider the benefits by requiring cross-access easements for adjacent properties which share a single driveway. The adjacent properties sharing a driveway need not develop simultaneously for the measure to be effective; it is only necessary that the joint location be established, be understood by both property owners and be in use by at least one of the properties.

1.6.2 Connecting Properties through Cross-Access Easements

Cross-access easements, the most frequently used means of gaining vehicular access between adjacent properties, permit access to a public street for multiple properties to be combined into a single driveway on an arterial, or even better, to be directed to a local street intersecting the arterial.

Cross-access corridors (continuous series of cross-access easements connecting to a public street) can take a number of physical forms. At a minimum, the cross-access corridor can consist of nothing more than a series of drive lanes in surface parking lots with driveway-like connections between them. More desirably, the corridors can resemble a local street, continuous in design across multiple properties, with street-like design features such as curbs and gutters, sidewalks, crosswalks, lighting intersections and landscaping.

Figure 7: Redirecting Access to Local Streets
Source: Walter Kulash for Glatting Jackson

1.6.3 Redirecting Access from Regional Roads to a Local Street Network

A combination of new local streets and cross-access easements can permit property access to be redirected from arterial roads to local streets that connect, at appropriate spacing, to the arterial roads. For traffic flow on the arterial road, advantages of this redirection are reduction in number of driveways on the arterial, reduction in driveway traffic volumes at those driveways remaining, and reduction in intersecting traffic volume at existing intersections (from which traffic is rerouted to new intersections) and driveways.

Dixie Road north of the Queensway, Mississauga

1.6.4 Urban Block Size

It is axiomatic that grids of closely-spaced streets forming blocks are critical to good urban places. However, there is no definitive size of block and the related question of spacing of streets. Rather, the question of block size and street spacing can be approached from at least three directions:

1. Successful urban places. *(Figures 9-14)*
2. Current urbanism principles: block size dimensions as developed by a collaboration of urban designers and summarized in the *Smart Code* reflect a large amount of research into the subject, and offer a well thought out numerical basis for discussing the spacing of new intersection along arterial roads in Peel Region.
3. These dimensions *(Table 1)* are keyed to an array (known as the *Transect* in the *Smart Code*) of land use types, each of which can be correlated to one or the other of the land uses identified as bordering arterial roads in the RCS. These numbers are not intended for adoption, by public agencies, as binding criteria, but rather as one of the several considerations in establishing block size.
4. Detailed urban design plans. The signature element of these plans, typically focusing on small areas such as town centres or Main Streets, is likely to be the street and block patterns emerging from the intended character of the area, its existing features, and input from involved stakeholders.
5. Traffic Microsimulation. These techniques can provide valuable insight into the question of appropriate block size, particularly in countering the widely-held perception that traffic ‘won’t work’ with small block sizes.

Figure 8: Land Use Transect
Source: Duany Plater-Zyberk & Company

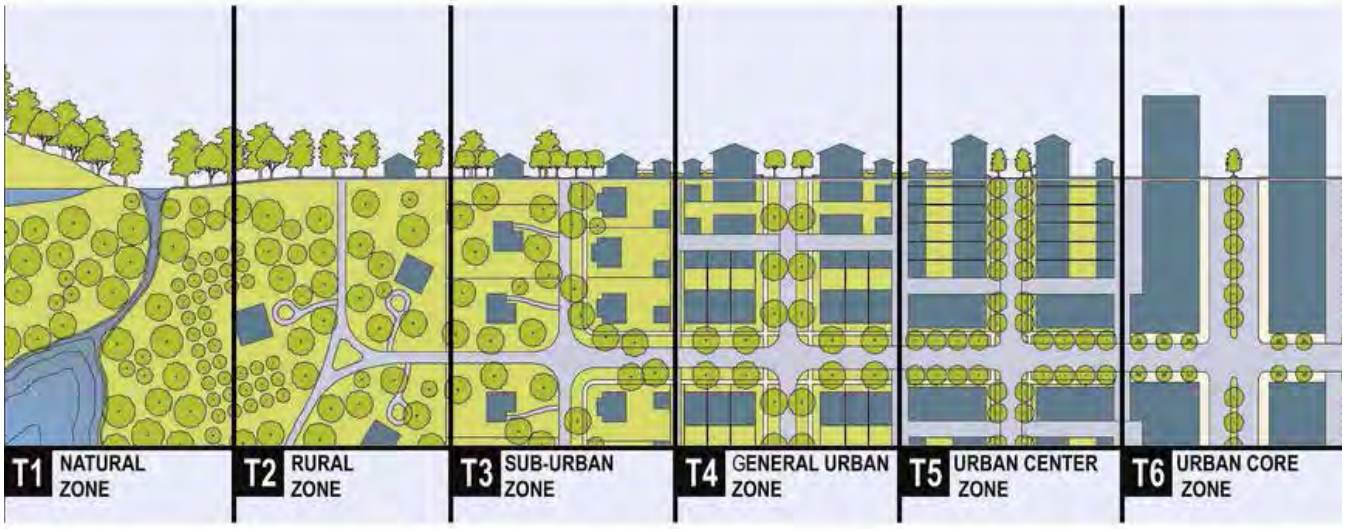


Table 1: Block Sizes

	Land Use Zone (From Transect)					
Block Dimensions (metres)	**Natural**	**Rural**	**Suburban**	**General Urban**	**Urban Centre**	**Urban Core**
Perimeter, Minimum	N/A	N/A	1,000	800	600	500
Perimeter, Maximum	N/A	N/A	1,200	1,000	800	800
Block Face, Minumum	N/A	N/A	200	160	100	100
Block Face, Maximum	N/A	N/A	250	200	150	125

Block Dimension

Traditional intersection spacings, associated with access control of suburban arterial roads, are inadequate to support urban intensification. These spacings create large development blocks with limited access and egress options serving increasing number of trips generated by intensification. This results in a reduction of capacity at intersections as more signal time must be dedicated to accommodate longer left turn cues entering or exiting sites. Alternatively, more accesses, and associated auxiliary lanes can be added between intersections in response to increasing densities but this creates friction between through traffic and traffic entering sites as well as circuitous routing in response to median controls. Conversely, smaller development blocks with stop controlled intersections that follow accepted traffic engineering practice allow for more intense development with fewer access conflict points.

Urban scale development blocks do not fit within the common 300m spacing criteria. As areas in the Region intensify and alternative routing options are developed through new functional roadway network connections, a more historic urban form of smaller blocks must be realized. Several cities were examined to demonstrate that smaller intersection

Figure 9 :Toronto, ON
Approximate Block Size: 130m x 200m
Source for all Aerial Images: Google Earth © 2013

Figure 10 : Vancouver, BC
Approximate Block Size: 90m x 170m

Figure 11: Montreal, QC
Approximate Block Size: 75m x 150m

spacing, resulting from smaller block sizes, is possible and does work using accepted traffic engineering practice.

A cross section of block sizes, and corresponding intersection spacing, from historic areas of Commonwealth cities including Toronto, Vancouver, Montreal and Melbourne were examined, with local examples of Port Credit in Mississauga and the downtown core of Brampton. Caledon has developed as traditional farm-to-market villages at intersecting roads and as such does not yet have the density to support clear block patterns. While the dimensions vary among the cities, the intersection spacing is generally between 75m and 130m on the narrow end of the block face and between 150m and 200m along the wide block face. These city blocks are surrounded by streets that follow accepted traffic engineering practice, they support intense urban development, and they are highly walkable. As such, in intensifying areas of the Region, it may be appropriate to allow for the development of intersections that are spaced around development blocks as small as 75m x 150m as long as they are within a connected grid of streets that allow for multiple routing and turning options. Without the supporting street network small blocks will not be feasible.

Figure 12: Melbourne, Australia
Approximate Block Size: 100m x 200m

Figure 13: Port Credit, Mississauga, ON
Approximate Block Size: 90m x 150m

Figure 14: Four Corners, Brampton, ON
Approximate Block Size: 80m x 175m

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2.0 Balancing Traffic Service

2.1 Traffic Service and Safety

A primary purpose of access management is to maximize mobility and safety on the arterial road:

- Mobility, by limiting interruptions (stopping or slowing) to traffic flow and;
- Safety, by limiting points of conflict between vehicles.

Access management measures limit interruptions to traffic flow by controlling the number of accesses (intersections, median openings and driveways), their spacing, design, and the traffic control devices (stop signs, signals, etc.) employed at them.

Access management measures also limit the number of points of conflict between vehicles by limiting the number of accesses and by accommodating slowing or stopped vehicles in auxiliary (turning) lanes, thereby removing them from the through traffic lanes.

As the land use adjacent to an arterial road becomes urban in character, measures to preserve the traffic service on the arterial road transition from minimizing the points of access to providing more access points. This forms a highly-connected network comprised of the streets intersecting the arterial, local streets parallel to the arterial and cross-access easements providing connections through private properties within the network. The resulting dense network of accesses diffuses the traffic conflicts from turning movements to multiple locations along the arterial, rather than concentrating them at a few points. Most of the actions (for example, new local streets,

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joint use of driveways, cross-access easements between private land, etc.) required to form this highly connected network are municipal prerogatives, typically exercised during the process for approval of land development and land division along the arterial.

A highly connected network, while dispersing (rather than consolidating) traffic conflicts along the arterial, does not preclude other access management measures. In particular, applying access management measures for spacing and design of median openings and accesses is as important where street spacing is frequent as in the opposite instance of large street spacing.

Traffic safety, also an important reason for access management, is addressed through minimizing the number of accesses along an arterial road, and further controlling turning movements at such access points. As the number of accesses increases due to more intense levels of development and new public streets, access management measures improve safety by redistributing trips from arterial roads and balancing these trips within the complementing network of local streets. Safety is further improved through the provision of auxiliary right turn and left turn lanes. By removing slowing or stopped vehicles from through traffic lanes, auxiliary lanes reduce or eliminate the likelihood of rear-end collisions between vehicles moving at differing speeds. Further, at unsignalized median openings, the left turn lane lets left-turning motorists wait for a safe gap in traffic to complete their turn, without the need to hurry into an unsafe turn for fear of delaying through (i.e., non-turning) traffic behind them.

2.2 The Relationship of Traffic Service to Access Connection Spacing

The assumption that traffic service (speed, capacity, safety) on an arterial road is maximized by strictly limiting the potential interruptions to traffic flow (traffic control signals, driveways, median openings) is widely accepted by traffic engineering professionals as well as motorists. While such restriction of access maintains good traffic flow in rural or near-rural conditions in undeveloped areas, it becomes less effective in suburban areas and even counterproductive in urban settings.

2.2.1 Under Ideal Conditions, Low Density Development

For rural conditions and during early stages of urban development, traffic service is likely to benefit from wide spacing between access connections. Under such low-volume traffic conditions, traffic control signal timing can be arranged (in a progression) *(Figure 15: Perfect Progression)* so that vehicles pass through sequences of signals in groups (platoons) encountering only green traffic control signal indications (green band) with no waiting vehicles (queue) hindering their progress *(Figure 16: Ideal Flow: Perfect Progression)*. Cross-street traffic volumes, reflecting the still-rural land use, make little demand on the available capacity (green time) of the traffic signal on the arterial. Typically, vehicles on the arterial have neither origin nor destination along the arterial, but rather are passing through the area, therefore not making turning movements into or from the arterial road. Further reflecting the rural character of the area, daily traffic is distributed more evenly than in the pronounced twice-daily commuter trip peaks, typically congested, of suburban and urban areas.

Under these rural conditions, traffic speeds are noticeably affected by the spacing of signalized intersections *(Figure 17: Speed vs. Signal Spacing)*. Theoretically, under these ideal (at least for moving traffic) conditions, increasing the spacing of traffic control signals from one per kilometre to a spacing of around eight per kilometre (typical of urban areas) would reduce travel speeds over the affected arterial from 70 kilometres per hour to 35 kilometres per hour.

Signal spacings are based on protypical analysis of suburban conditions that can transition into a future urban condition where speeds are slower and the need for auxiliary lanes, including tapers and storage are less desired (i.e. to reduce crossing distances for pedestrians), and where turning movements can occur at multiple locations thus reducing or eliminating the need for storage and tapers.

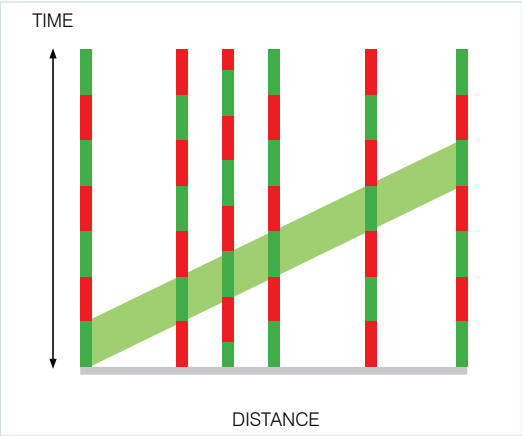

Figure 15: Perfect Progression

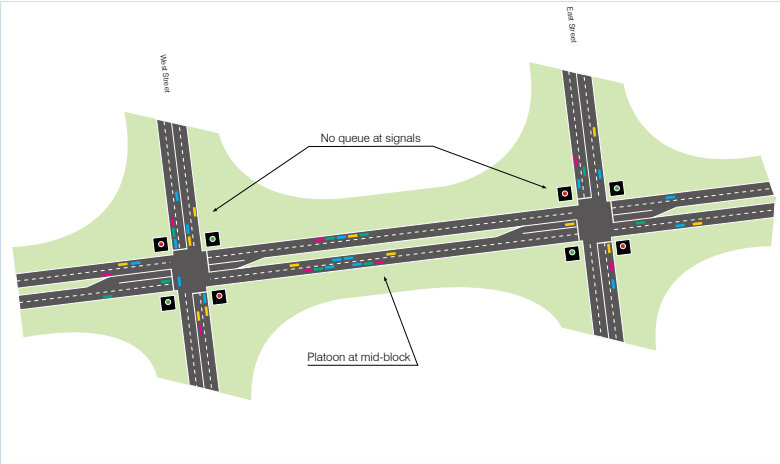

Figure 16: Ideal Flow – Perfect Progression

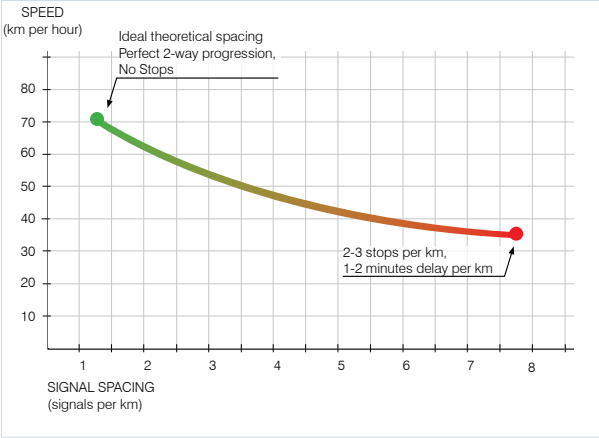

Figure 17: Speed vs. Signal Spacing

NOTE: Based on prototypical analysis of suburban conditions
Sources: Walter Kulash

2.2.2 The Suburban Reality – Advantage of Wide Spacing Begins to Erode

As an area transitions from rural to low densities typical of suburban development, the ideal relationship between vehicle speed and traffic control signal spacing begins to erode. As an intersection's traffic volumes grow moderately (to around 50 percent or so of capacity) the likelihood of perfect progression through even widely spaced traffic control signals diminishes, as platoons of drivers no longer pass through signals uninterrupted, but instead encounter queues ahead of them. *(Figure 18: Suburban Flow - Eroding Progression)* Traffic volumes entering from the side street, negligible under rural conditions, grow and demand more green time, thereby reducing the green time available to the arterial and, in turn, impairing the traffic control signal progression on the arterial road. The changing pattern of trip origins and destination erodes the traffic capacity of the arterial, as accesses (with their associated turning movements)

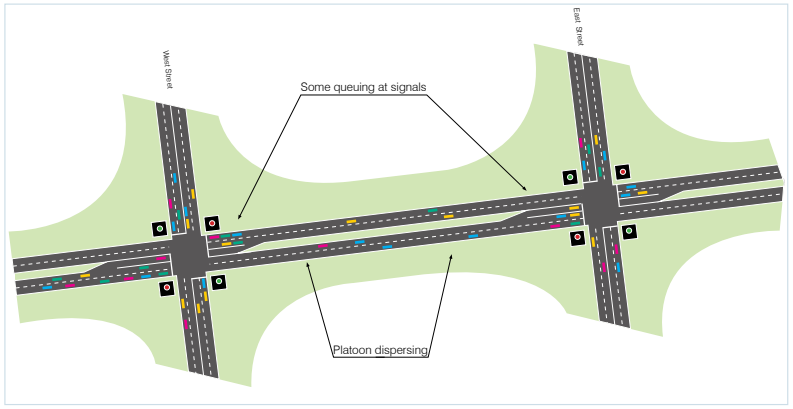

Figure 18: Suburban Flow – Eroding Progression
Source: Walter Kulash

appear along the arterial. Growth in nearby trip origins and destinations, even when not resulting in traffic accesses, diminish the fragile capacity of the few available intersections. Daily travel peaks becomes more concentrated into the twice-daily commuter travel peaks, causing traffic control signals to operate at saturated levels for longer periods daily.

This changing pattern of traffic at even the earliest stages of suburban development narrows the impact of additional intersections on traffic service. *(Figure 19: Speed vs. Signal Spacing: Suburban Reality)* Rather than the 35 kilometre per hour difference likely as traffic control signal spacing increases from one to around eight per kilometre, under ideal assumptions, even modest levels of growth are likely to erode the difference to no more than a 15 kilometre per hour difference.

2.2.3 Urban Conditions – Wide Intersection Spacing Becomes Counterproductive

In urban traffic conditions where traffic volumes at signalized intersections approach saturation (around 80 percent or more of capacity), and large traffic volumes approach the arterials from intersecting streets, and many trip origins and destination are on or near the arterial roads, daily traffic on the arterial is concentrated into the pronounced twice-daily commuter work trip peak plus large sustained mid-day volumes.

As these urban traffic conditions are approached, a wide spacing between traffic control signals no longer yields benefits to traffic flow and, in many situations, actually becomes counterproductive to traffic flow. *(Figure 20: Speed vs. Signal Spacing - Urban Reality)* Under these conditions, traffic volumes and the turning movements between the arterial and cross-street consume large amounts of the available green time. As the demand for green time becomes critical (near saturation

volumes) the traffic control signal delay for all drivers – arterial as well as cross-street – increases exponentially. Approaching saturation, even small increases in traffic volume (either arterial or side street) inflict disproportionately large increases in delay to all vehicles entering the intersection, whether approaching from the arterial or the side street.

2.2.4 Improving Arterial Traffic Flow by Increasing (Not Limiting) Intersections

Under urban traffic conditions described above, increasing the number of intersecting streets on an arterial is likely to improve arterial traffic in two ways: (1) by spreading the traffic load from one (or a few) to a greater number of signalized intersections, thus more green time can be given to through movement; and (2) by shifting some traffic and turning movement volumes completely away from the arterial.

Additional intersections combined with supporting local street connectivity disperse the traffic loading from the single intersection approaching saturation to multiple other intersections. *(Figure 21: Critical Intersection Volumes)* With additional intersections in place, no single intersection is approaching saturation and the aggregate delay for all vehicles (on arterial as well as side street) is likely to be less than at the single saturated signalized intersection, a consequence explained by the exponential increase in delay as saturation is reached.

In addition to dispersing traffic away from problem locations, closely spaced intersections along an arterial, supported by local street and cross-access easements, shift some traffic and turning movement volumes away from the arterial and onto less congested streets. *(Figure 22: How Network Reduces Arterial Traffic)* With a well-connected network, a number of trips from origins (typically

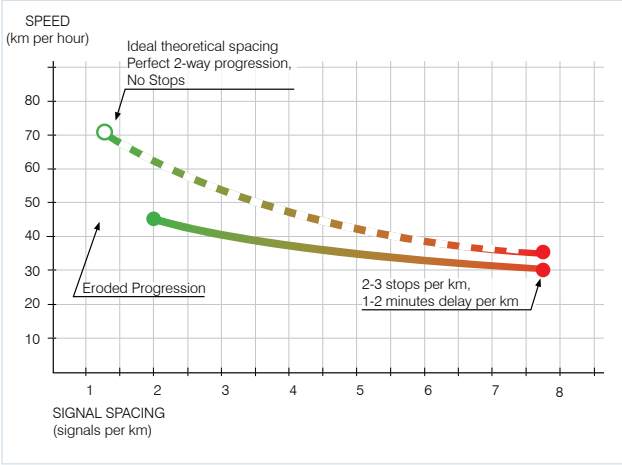

Figure 19: Speed vs. Signal Spacing – Suburban Reality

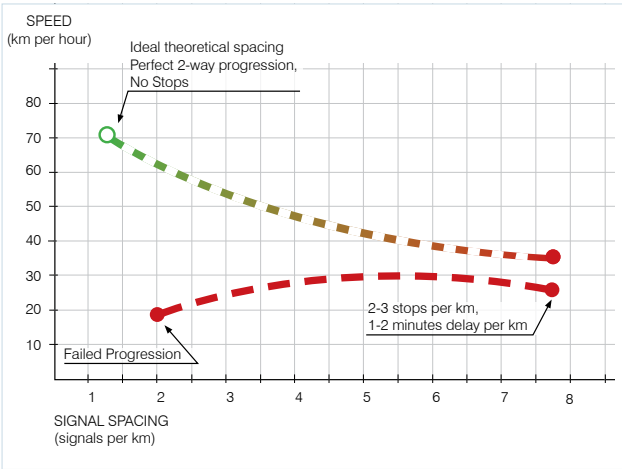

Figure 20: Speed vs. Signal Spacing – Urban Reality

NOTE: Based on prototypical analysis of suburban conditions
Sources: Walter Kulash

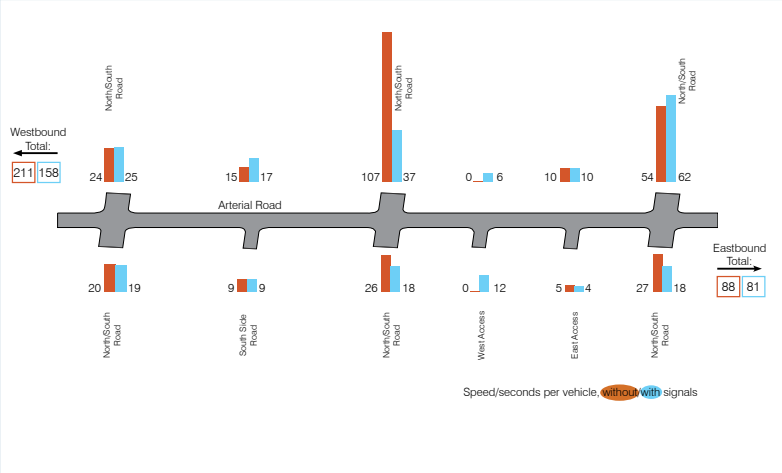

Figure 21: Critical Intersection Volumes
Source: Walter Kulash based on microsimulation analysis provided by Region of Peel

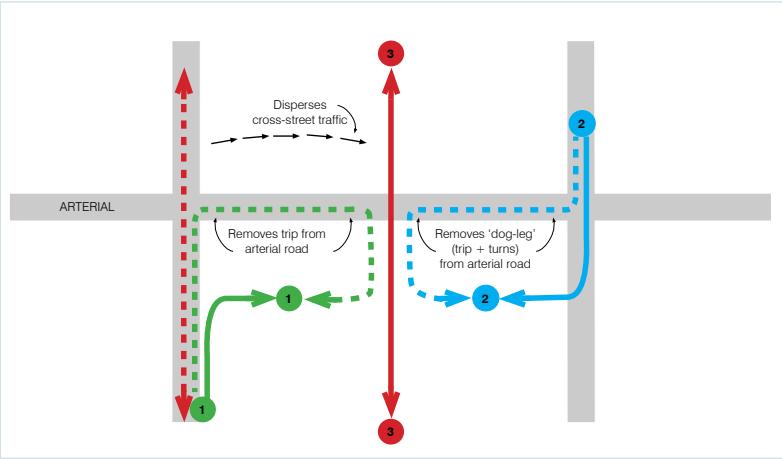

Figure 22: How Network Reduces Arterial Traffic
Source: Walter Kulash

homes) near the arterial road to destinations (typically commercial land uses) along the arterial can be made without any travel at all on the arterial. Some other trips, required to make multiple turning movements onto/off the arterial in the absence of a local street network, can avoid these turning movements where local street network is available by distributing turning movements to the local street network instead of the arterial road.

The benefit to traffic flow of adding intersections along an arterial depends heavily on the particulars of the arterial segment being considered. Most importantly, its traffic volumes, traffic volumes on intersecting streets, number of arterial and intersecting street lanes, origin-destination patterns of travel and extent of local street connectivity in support of the new intersections along the arterial. Detailed analysis on selected Canadian and U.S. arterials carrying 20,000 – 30,000 daily vehicles* shows that, as saturation of at least some of the existing traffic control signals along an arterial segment is approached, the addition of a signalized intersection (and in some cases more than one), supported by effective local street connectivity among the existing and new intersections, will yield 10 - 25 percent reduction in delay for the peak hour peak direction vehicle.

2.2.5 Considerations for Reduced Intersection Spacing

Identifying segments of arterial roads that would benefit from reduced intersection spacing can be approached in two ways: (1) recognizing indicators for emerging problems on arterials with existing widely spaced intersections and (2) simulating the performance of different intersection spacings using traffic modelling software and traffic capacity analysis methods.

*Based on results of microsimulation analysis for reconfigured arterial street networks in Cincinnati, OH, Virgina Beach VA , Birmingham AL and Winter Spring, FL.

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Indicators that a road segment may benefit from a reduced spacing of signalized intersection can be found in intersection conditions, travel patterns and land use plans for specific areas along the arterial. All of these indicators, in concert with data provided as part of a Transportation Impact Assessment and/or traffic simulation, will factor into the evaluation of reduced intersection spacing.

Intersection condition indicators:

- Volumes approaching saturation (80 percent of capacity) during daily peak hours.
- Dual turn lanes required or in place.
- U-turn volumes of around 50 vehicles hourly or greater.
- U-turn restrictions required to maintain signal capacity.
- Traffic queues regularly overflow auxiliary lanes in daily peak hours.

Trip pattern indicators:

- Numerous trip origins and destinations (employment, commercial, institutional) on or near arterial.
- Twice-daily commuter traffic peak on weekdays.
- Sustained high levels of traffic (60 percent or so of peak during off-peak hours).

Land use planning:

- Secondary plans identifying new local street connections.
- Tertiary or precinct plans for nodes of intense activity (downtowns, village centres, Main Streets, etc.).
- Increased desire to support a walkable environment.

It is imperative that land use plans with connected street networks be in place prior to requesting reduced intersection spacing. To adequately consider the need for reduced intersection spacing the Region must consider the benefits that a connected street grid contributes to traffic operations in concert with the land use planning objectives for a community.

The Region recognizes that in Rural and Industrial environments the priority is on mobility. That priority shifts to land access as land uses evolve to urban environments. Traffic service will be evaluated specifically to maximize the best possible outcome during access evaluations, with a renewed focus on network.

Comparison of configurations of arterials with varying number of intersecting streets can be efficiently accomplished through microsimulation analysis (SimTraffic, VISSIM or similar modelling program), which simulates the flow of traffic through multiple intersections along an arterial and compiles statistics describing that flow. Among the most useful of these outputs, succinctly describing the impacts of varying the number of intersections along an arterial corridor, are:

- Aggregate peak hour delay for all vehicles on all intersection approaches – The best overall measure of economic benefit to traffic flow. It shows whether all users of the system, arterial as well as cross-street, experience more or less delay with the street configuration tested.
- Delay per vehicle on arterial, by intersection and by direction – Focuses on vehicles on the arterial itself. This permits comparison of delay for precise locations (by intersection and approach) and identifies travel time “winners and losers”.
- Travel speed along arterial roads relative to intersection spacing.
- Number of stops – while delay at stops is accounted for in all of the above measures, the number of stops has additional interest as a measure of motorist convenience, travel time reliability, fuel consumption and air quality.

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3.0 Current Practices Review

This section summarizes the access management practices from several municipalities, as well as Ministry of Transportation Ontario (MTO) and Transportation Association of Canada (TAC) references. While efforts were made to find documents that offer a comprehensive approach to access management, few exist that use land use character or discuss the creation of network.

3.1 Technical Resources

3.1.1 Transportation Association of Canada (TAC)

The *TAC Geometric Design Guide for Canadian Roads* (referred to as the TAC Manual) offers suggestions for access management applications including ranges for intersection spacing (for arterials, 200m for unsignalized and 400m for signalized) and the use of functional road classifications to identify the degree of access control used. The TAC Manual discourages private access on new developments abutting arterials and recommends a minimum spacing of 400m for rural road accesses. It is the primary document of reference in most municipal access management practice.

3.1.2 Ministry of Transportation Ontario (MTO)

One of the earliest documents still referenced in current municipal access management practice is the *Manual of Uniform Traffic Control Devices (MUTCD)*, the official predecessor to the *Ontario Traffic Manual (OTM)*. The MUTCD was last updated in 1995, however its guideline on traffic control signal spacing dates back to 1982. With particular interest in maintaining good corridor progression,

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it discourages traffic control signal spacing less than 300m. This 300m metric has since been used in numerous municipal access management practices, including at the Region of Peel where it was introduced in the 1993 amendment of the Access By-law.

OTM Book 12 – Traffic Signals (2007) went on to discourage traffic control signal spacing of less than 415m on roads with a posted speed of 50km/h in order to prevent inefficiencies in corridor progression. A spacing of 215m was only recommended where corridor progression was not considered, as this spacing allows sufficient perception and reaction to the downstream traffic control signals. This spacing is consistent with more recently published municipal access management measures.

The MTO also published the Highway Access Management Guidelines (2008) for provincial class highways. While it does not govern local municipal or regional roads, it offers some guidance for desirable intersection spacings (namely 800m minimum desirable) and controls. In rural conditions on provincial highways, the 800m spacing guidance per MTO is often applied.

3.1.3 National Cooperative Highway Research Program (NCHRP)

NCHRP's Guidebook for Including Access Management in Transportation Planning (2005) offers ways to enable the inclusion of access management principles in the transportation planning process, rather than provide specific access management measures and spacings. It stresses the need to look at local area land uses and to approach access management through an integrated planning process that includes looking at long-range, corridor, operational and project planning together (NCHRP p.13).

The State of the Practice in Highway Access Management (Synthesis 404, 2010) is a comprehensive study of current access management practices in the U.S. derived from literature reviews and questionnaire responses from 50 state departments of transportation (DOTs) and local governments. It provides the rationale for the Transportation Research Board's (TRB) Access Management Manual (2003).

These documents are important references because they demonstrate the importance of being flexible when approaching access management. They note that specific

consideration should be given to adjacent land uses and that the larger corridor function needs to be considered. While there are core access management principles to consider, multiple jurisdictions employ different approaches to meet their unique circumstances.

3.2 Summary of Municipal Access Management Practice in Ontario

The following access management measures and by-laws were examined to survey the state of practice in Ontario:

- Region of Waterloo Policy and Procedures for Access onto Regional Roads, September 1984 (Appendix to Controlled Access By-law 58-87, last amended 2012);
- District of Muskoka Policy and Procedures for Access onto District Roads, 1987 (By-Law 87-50, last amended 1996);
- County of Simcoe Controlled Access By-law 4396 (for County Road 90 only), May 1998;
- Region of Halton Access Management Plan for Regional Road 5, November 1999;
- York Region Access Guideline for Regional Roads, September 2007;
- County of Simcoe Entrance By-law 5544, September 2007;
- Town of Lakeshore Corridor Management and Access Control Policy, March 2008; and
- City of London Access Management Guidelines, April 2012.

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Several municipalities in Ontario manage access by means of a controlled access by-law, but do not provide specific criteria for controlling individual accesses but rather assess the merit of an individual application for access on a case-by-case basis. These include:

- Region of Durham (By-law 211-79);
- Region of Niagara (By-law 4291-86);
- City of Ottawa (Traffic By-law 2003-530, Part V); and
- Town of South Bruce Peninsula (By-law 58-2009).

3.2.1 Use of Road Character or Land Use

Of the lower-tier municipalities, functional class is most commonly used to distinguish access management measures on different road types. However, York Region defines its six road types as classifications, with character included as a component for consideration when determining access. York Region considers the following components when determining access: number of lanes, driveway density, operating speed, surrounding land use, pedestrian activity, traffic patterns, and detailed design elements.

Any reference to land use by the other municipalities is primarily used to distinguish an access type. The Region of Waterloo, District of Muskoka, and County of Simcoe apply different access criteria per their by-law to different land uses, typically based on residential, commercial/industrial and farm uses.

3.2.2 Development of Network

York Region, Town of Lakeshore and City of London, as well as the County of Simcoe in its controlled access by-law for County Road 90 promote the development of a highly connected street network for enhanced mobility, but the first three jurisdictions do not offer specific guidance or incentives.

The County of Simcoe's corridor-specific by-law uses network development as an incentive for obtaining or retrofitting access to County Road 90 by considering such access at a location "acceptable for a future public road access and where the municipality is willing to accept ownership of a future road allowance" (Schedule 1, Part I). In this way, the County is attempting the support the development of a finer grain network.

3.2.3 Intersection and Access Spacing (on Arterial Roads)

Since the Region of Peel is only responsible for arterial roads, access management measures for other functional classes are not documented in this section.

For the most part, municipalities recommend a desired spacing as per the TAC Manual and latter MTO principles of 400m-800m spacing (with the higher of the two being primarily for rural roads), but offer "flexibility" by requiring a minimum spacing in accordance with the older MTO principle of 300m in urban areas to protect for traffic control signal coordination, and 400m in accordance with the TAC Manual in rural areas. The Region of Peel has previously enforced

full movement access spacing requirements in the form of a range (300m-400m) and have, in the majority of cases, approved new intersections and accesses at the lowest end of the spectrum. A more effective approach may be to provide a fixed spacing criteria associated with a range of road character types.

The MTO principle of 215m for signalized intersection spacing with little or no regard to corridor progression has been applied in select jurisdictions on more “urban” arterials where pedestrian activity is higher and operating speeds are lower. Any spacing requirement for a full movement intersection/access falling within the 150m-200m range is generally only approved as unsignalized. While such lower spacing does not defy current recommended practice with respect to traffic control signal spacing, it does not take into account the likelihood of future signalization requirements of intersections/accesses approved within this range if they are ever warranted by traffic volumes or delays under an OTM or TAC traffic control signals warrant. One of the objectives of the Region of Peel’s access spacing measures is to consider and plan for the signalization of roads as the adjacent land uses develop and intensify over time. Our *Table 2: Median Opening Spacing* attempts to address signalization over time for different land use types.

Of the municipal access management practices that were reviewed, none acknowledge any requirements for partial-movement median openings (left-in, right-in/right-out access). With respect to restricted right-in/right-out accesses, the majority of municipalities enforce a range of 75m-100m, with the few exceptions based on road type. Some municipalities require lower spacing, however the lot frontage does not allow the reduced spacing, and upon further review larger spacing is often required due to traffic contraints such as queuing. Partial access criteria are combined with full movement intersection spacing criteria to allow for greater flexibility with evolution for permitted movements as well as the possibility for future signalization.

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4.0 Policy Framework

The administrative basis for Regional access management elements (location and type of median openings, spacing between accesses and placement of auxiliary lanes) affecting the arterial itself is contained in the Access By-Law. Its amendments also provide design criteria for these access management measures.

Cross-access easements, the most effective measure of consolidating property access or redirecting it away from the arterials, may be negotiated as a condition of land division or land development.

Secondary plans that specify networks of local streets and cross-access easements in support of access management on arterials are within the planning actions permitted in the *Planning Act (RSO 1990)*.

Form-based controls over development that support the small area plans in furthering access management on arterials are administratively possible under the Planning Act, namely through site plan control and zoning.

4.1 Policy Basis for Regional Access Management

The Access By-Law enacted by the Council of the Region in 1977 and amended thereafter, designates all Regional Roads as controlled access roads and confers broad authority to the Region over the control of access to these roads.

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4.1.1 Access Management Measures Addressed in the Access By-Law

The Access By-Law provides the regulatory basis for the following access management elements:

- Mechanism, in the form of a reserve strip of land, prohibiting access from a private property onto the Regional Road until an applicant for such access has complied with requirements of the Region.
- Provision for dedication, or lifting, as part of the adjacent Regional Road, of those segments of the reserve strip of land approved for use as an access to the Regional Road.
- Criteria for the spacing of median openings from intersections.
- Criteria for the spacing of accesses.
- Criteria for the length of vehicle storage space on auxiliary lanes with reference to the TAC Manual for taper lengths.
- Referral to criteria in the OTM Book 12 for traffic control signal installation.

4.1.2 Access Management Actions Not Referenced in the Access By-Law

While providing a clear statement of intent to manage access on the Region's arterials, as well as setting forth some detail on accomplishing that intent, the Access By-Law does not specifically address two issues emerging from the RCS:

1. Flexibility for differing road characterizations – The Access By-Law does not categorize Regional Roads based on their character (other than being arterials) or reflecting the character of the areas through which they pass. Consequently, the "one size fits all" criteria in the Access By-Law, while appropriate for many segments of Regional Roads, are on the other hand not well suited to other segments, particularly those designated in the RCS as Rural Main Street or Urban Main Street.
2. Actions beyond access restriction – The Access By-Law is focused on measures to restrict access to Regional Roads. While this is unarguably a useful focus, its effectiveness erodes as the density of development in the areas surrounding Regional Roads approaches urban levels. Preserving the utility of Regional Roads through measures such as developing highly connected networks of local streets and cross-access easements, appropriate responses to urbanization, are beyond the scope of the Access By-Law.

4.2 Cross-Access Easements

Cross-access easements, in which the agreeing property owners jointly agree to permit access into and through their respective properties, is a highly effective approach to both reducing the number of accesses on arterials and redirecting vehicular access to streets other than the arterials.

Cross-access easement agreements may, in some instances, be entered into at the initiative of the involved property owners. More likely, cross-access easements are established in response to requirements, by a municipality, as part of the land division or land development approval process. It is one of the tools that can be utilized at the discretion of the area municipalities.

4.2.1 Regulatory Basis for Cross-Access Easements

Cross-access easements may be gained through either (a) mutual/reciprocal access easements, where owners of adjacent parcels mutually agree to the easement or (b) access easements in favour of abutting lands, where one parcel owner is agreeable to cross access but the adjacent owner is not yet motivated to agree.

Mutual/Reciprocal Access Easements

In mutual/reciprocal access easement, owners of adjacent properties agree to mutually provide cross-access. These easements are typically established during a land division in the form of a severance, regulated through consent applications with the Committee of Adjustment under Section 53 of the Planning Act. Through this process, an Area Municipality can require that only one access be permitted to service both lots (severed and retained), that mutual/reciprocal access easements be established through a separate consent application with the Committee of Adjustment, and that an access agreement be entered into with the municipality and registered on the titles of the two parcels.

Mutual/reciprocal access easement can also be achieved through site plan control, but this is typically successful only when the two abutting parcels are under the same ownership. Since one cannot dedicate an easement to themselves, they would be required, as a condition of approval under Section 41(8.a.ii & 8.6) of the Planning Act, to enter into a Section 118 agreement under the Land Titles and Registry Act that restricts the sale of one or both (or more) parcels until such easements are established. The access requirements are either registered on the titles of the two parcels in the site plan agreement associated with the application or a separate agreement is entered into and registered on the titles of the two parcels in the absence of a requirement by the area municipality for a site plan agreement.

Access Easement in Favour of Abutting Lands

Where a site plan control application is made to an Area Municipality, and the abutting owner is not in favour of reciprocal access easements, the applicant can still be required, as a condition of approval under Section 41(8.a.ii & 8.6) of the Planning Act, to dedicate an access easement in favour of the adjacent land owner through a separate consent application with the Committee of Adjustment. While such a requirement would appear to be irrelevant at the time it sets the framework in place for future mutual/reciprocal access easements once the abutting property undergoes a site plan control application. At such time, the Area Municipality would require the applicant site plan approval of the abutting property to dedicate an access easement in favour of the initial property owner, thus completing the mutual/reciprocal easements for access between and into the abutting properties. In the case of both site plan control applications, access requirements would be registered on the title.

4.2.2 Possible Configurations of Cross-Access Easements

The legal basis of cross-access agreements, while requiring access intended to consolidate property access to a limited number of points, allows wide latitude as to how this is accomplished. With respect to routing, cross-access easements are typically, but not necessarily, oriented toward the conventional access management goal of minimizing the number of accesses on arterial roads, and arranging the spacing of the permitted accesses in a way most beneficial to traffic flow on the arterial.

Beyond the conventional view, cross-access easements can also be configured to direct access to surrounding streets (collector or local in function) that are less stressed than the arterials with the movement of large amounts of regional traffic. This use of cross-access easements becomes important as land use intensifies and the conventional approach to access management gives way to the goal of developing a highly connected network of urban streets and blocks enveloping the arterial, such that local trips may choose not to use arterial roads.

4.3 Small Area Plans and Codes

Detailed plans focused on limited areas within the Region are one of the most effective mechanisms for establishing the highly connected grid network that is a sophisticated form of access management, and one that becomes increasingly appropriate as areas transition from low-density suburban development patterns to more dense urban forms.

4.3.1 Benefits of Small Area Plans for Access Management

An important product of most small-area plans is a concept for a grid network of highly connected local and collector streets. This grid is important for access management on the arterials in and near the planned district, by virtue of diffusing the traffic load away from the otherwise concentrated loadings at existing intersections on the arterial. Also, the grid is important for providing internal circulation within the planned area, so that these local trips are not compelled to use arterials for short, local trips.

Small area plans can advance access on arterials by designating corridors that connect multiple properties to new and existing local streets, thereby reducing vehicular volumes and turning movements on the arterials in the district. This would reduce the need for cross-access easements.

The appealing walking environment that is a key goal of most special plans reduces dependency on a single access and parking area for vehicle trips and instead encourages vehicle access through a number of possible points to parking areas not limited to the traveler's final destination but rather accessible to them by walking. This pattern of access to the district supports access management on the arterial by diffusing travel generated by the district to multiple intersections along the arterial, rather than having the traffic confined to a single access point on the arterial. The walking environment in a district, by concentrating trip origins or destination in a compact area, encourages the use of public transit for trips to/from the district. While transit use is not,

strictly speaking, an access management action it certainly accomplishes a complementary goal of reducing vehicle volumes on the arterial.

4.3.2 Statutory Basis for Small Area Plans

The Planning Act gives municipalities broad authority to designate and plan for areas of special concern. Such plans yield substantial public benefit for their districts: compact development, with attendant efficiency of infrastructure; reduction in travel per capita density sufficient for public transit and ability to accommodate projected growth.

4.3.3 Form-Based Codes

Form-based codes are primarily applied in the U.S. but are becoming increasingly appealing in Canada. They control the form (but not the use) of development sites and their structures through measures such as placement of buildings on the site, location of parking and building massing. Elements of form-based codes are well within the scope of site plan control and zoning actions allowed or even required of municipalities in the Planning Act. Currently, there is no holistic Canadian equivalent of form-based codes.

4.3.4 Impact of Form-Based Codes on Access Management

Form-based codes are primarily applied in the U.S., but are becoming increasingly appealing in Canada. Unlike conventional zoning, form-based codes focus on urban form rather than on land use. They can also apply to elements in the public realm and include requirements such as cross sections for street types. They control the form (but not the use) of development sites and their structures through measures such as place of buildings on the site, location of parking and building massing. Elements of form-based codes are well within the scope of site plan control and zoning actions allowed or even required of municipalities in the Planning Act.

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5.0 Access Management Elements

5.1 Access Management Approach

In developing the spacing for access connections, the traffic operation objectives of continuous movement of all types of modes (traffic service), reduction of conflict points when possible between pedestrians, cyclists, and motorists (traffic safety), and efficient access to adjacent properties must be our primary purpose. However, successful urban places are not created through good traffic operations alone but are dependent upon the principles and objectives of land use planning. For this reason, both traffic operations objectives and current practices together with land use planning principles and the expectation of development were used to formulate an access management approach for the Region of Peel.

A large consideration of land use planning in the Region of Peel is the understanding that population growth will dramatically impact our communities through urbanization, intensification and development. Of course some of our rural places, particularly within the greenbelt will remain largely unchanged; however we can reasonably predict and should plan for the influx of development throughout Peel. To align more effectively with the Growth Secretariat's direction through Places to Grow and to support urbanization in specific locations, all spacing connection guidance should also consider the evolution of transitioning land uses over time. For this reason *Table 2: Median Opening Spacing*, was developed with this premise and the underlying assumption of development over time. The table reads left to right following the established transect model of land uses with the Rural type evolving to the Urban or Rural Main Street road types.

Access Control Workshop - Day 2

Access Management Elements

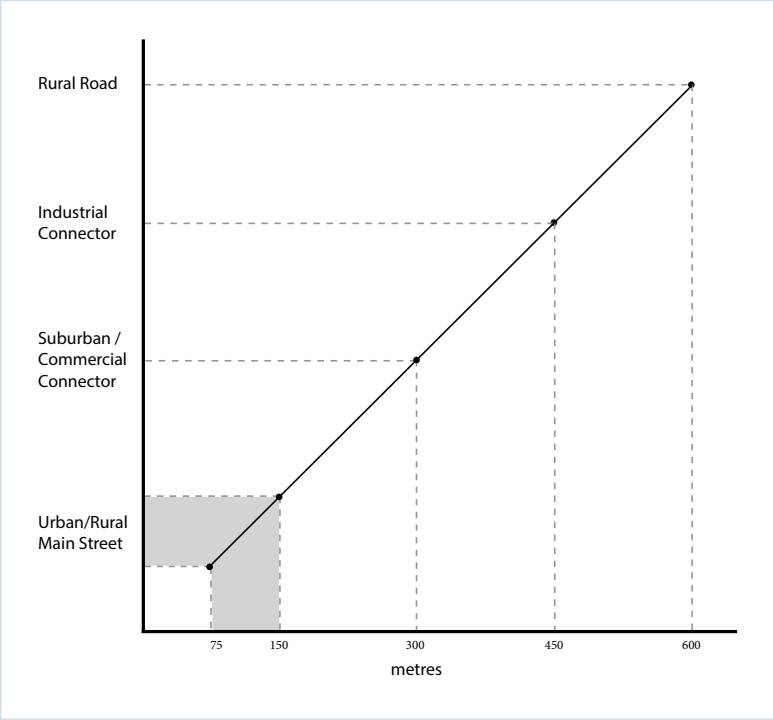


Figure 23: Access Spacings – Rural to Urban Transition
Source: Region of Peel

As highlighted in the Current Practices Review (Chapter 3), there is limited detailed guidance that considers development over time when regulating intersection spacing. In the absence of a complete and established set of detailed specifications, our approach was to consider the elements of successful urban places throughout the world and in Peel as identified earlier through the discussion on block dimensions (Chapter 1). Communities that offer walkable, compact, dense design begin with block dimensions in the range of 75m to 130m on the narrow end of the block face and between 150m and 200m along the wide end of the block face as established. The Urban Main Street criteria establish 150m for intersection spacing in an urban environment. The table continues by either halving this for partial access (Full to Left-In and Full to Right-In/Right-Out) or doubling it to 300m as in the case of the Suburban Connector. The graph below illustrates the decreasing spacing between intersections as land uses evolve over time and require reduced intersection spacing.

Inherent in this approach is the assumption that Commercial Connectors, such as Mississauga Road are the most likely of the road types to develop into Urban Main Streets and that Suburban Connectors with residential uses between commercial nodes will evolve more slowly over time.

5.1.1 Intersection Spacing

The need for new public streets intersecting the Region's arterials is predictable, given the growth of trip origins (homes) and destinations (commercial and employment space) along the arterial corridors, and the need to provide armatures of local streets for this growth. The creation of new

local streets is a municipal prerogative, while the location and design of their connection to arterials is a joint initiative of both the Region and Area Municipalities.

Where most new public streets require a full median opening for a full movement intersection with an arterial, the appropriate spacing between existing intersections is given as the *Full to Full* entry in *Table 1*. The *Full to Full* criteria vary significantly according to arterial characterization type. For three arterial types (Rural, Commercial Connector and Industrial Connector, their large spacing reflects an emphasis on minimizing vehicle delay within these corridors. This is consistent with both the historical and current practice of traffic control signal spacing of 300m–450m to allow for effective progression on the arterial road (see Access Management Practices Matrix). By contrast, for three other arterial characterization types (Rural Main Street, Urban Main Street and Suburban Connector) their small intersection spacing reflects the street and block pattern of urban activity centres and rural village centres. Lower spacings of 200m–215m are not only used in current municipal access management practice, but are also prescribed in traffic control spacings where traffic control signal coordination is not being considered. Further lower spacings of 150m for full movement accesses are generally accepted at unsignalized intersections/accesses only, and are only recommended where queues do not extend past 150m from the nearest signalized intersection.

For the Rural Road type, typically located in undeveloped areas (refer to Road Typologies Matrix), increased intersection spacing minimizes the number of public street intersections. For the connector road types, typically serving areas with industrial and commercial destinations, these spacings anticipate a limited increase in the number of public street connections. For the Main Street road types (both Rural and Urban) the spacings for public street intersections shift emphasis away from limiting the number of access connections and focus instead on forming a more dense pattern of local street connections where possible.

5.2 Access Management Rationale

The Region considers specific intersection spacing requirements based on land use character and transportation function for different contexts along Regional Roads. The rationale for the spacing shown in *Tables 2* and *3* by road type are as follows:

Rural Road – 600 metres

- Preservation of arterial function.
- Fewer stops desired in rural environmental.
- Larger/agricultural land parcels necessitating less frequent access.
- Minimal conflict points.
- Lowest pedestrian activity requiring fewer crossings.
- May evolve into other road types but may remain the unchanged (if in greenbelt, etc).
- Horizontal and vertical curves may limit intersection opportunities.
- Limited (inter-regional) transit requiring fewer stops.
- Preserves constant operating speed with fewer conflict points reduces acceleration and deceleration thus less noise, pollution and delay especially for large transport vehicles

Access Management Elements

Industrial Connector – 450 metres

- Preservation of arterial function.
- Fewer stops desired to reduce stopping and starting delays of large vehicles.
- Allows for effective signal optimization for trucks.
- Higher percentage of long vehicles requiring longer storage for larger vehicles and longer taper distances.
- Large lot sizes for warehouse and other industrial uses.
- Pedestrian activity higher (employees/transit riders) and thus crossing needs at intersections are more frequent than for Rural Roads.
- Existing conditions may present challenges for cyclists as vulnerable road users.
- Minimal conflict points.
- Primarily inter-regional travel with emphasis on connectivity to 400 series highways.
- Greater transit needs than on a Rural Road.
- Both inter and intra-regional travel.
- Balancing demand at intersections results in reduced emissions.
- Controls platooning making it easier to achieve good progression on higher saturated roads with mixed types of traffic.
- Preserves constant operating speed and helps to gain controlled progression, results in less deceleration and acceleration, less noise and pollution.

Suburban Connector – 300 metres

- Preservation of arterial function.
- More frequent stops than the Rural Road and Industrial Connector categories.
- Both inter and intra regional travel.
- Supports Goods Movement with cross section dimensions (specifically lane widths and turning radii).
- Fewer truck turning movements than the Industrial Connector.
- More pedestrians and cyclists than the Industrial Connector.
- More distribution points requiring more intersections and fewer turning movements from arterial to arterial (less protected phasing required).
- Transit supportive requiring more frequent stops than Rural and Industrial Connector road types.
- Consistent with both the historical and current practice of traffic control signal spacing to allow for effective progression on the arterial (See Access Management Practices Matrix).
- Controls platooning making it easier to achieve good progression on higher saturated roads with mixed types of traffic.
- Preserves constant operating speed and helps to gain controlled progression, results in less deceleration and acceleration, less noise and pollution.

Commercial Connector – 300 metres

- Preservation of arterial function.
- More frequent stops than the Rural Road and Industrial Connector categories.
- Both inter and intra-regional travel.
- Supports Goods Movement with cross section dimensions (specifically lane widths and turning radii).

- Fewer truck turning movements than the Industrial Connector.
- More pedestrians and cyclists than the Industrial Connector and possibly the Suburban Connector as a result of employment lands.
- More distribution points requiring more intersections and fewer turning movements from arterial to arterial (less protected phasing required).
- Transit supportive requiring more frequent stops than Rural and Industrial Connector road types.
- Consistent with both the historical and current practice of traffic control signal spacing to allow for effective progression on the arterial
- More frequent stops/turning movements than Rural, Industrial and Suburban due to commercial nodes of activity requiring reduced partial access points.
- More conflict points as a result of the greater land use intensities and decreased partial intersection spacing.
- Slower operating speed.
- Controls platooning making it easier to achieve good progression on higher saturated roads with mixed types of traffic.
- Preserves constant operating speed and helps to gain controlled progression, results in less deceleration and acceleration, less noise and pollution.

Rural Main Street – 150 metres

- Preservation of arterial function in a Main Street environment (urban center).
- Inter regional Transit.
- Increased demand for turning movements.
- Increased pedestrian and cycling activities.
- Lower volumes, less queuing.
- Lower speeds.
- Smaller lot size requiring increased access points.
- Shorter signal cycles.
- Can accommodate more stops as a result of the shorter signal cycles.
- Fewer turning movements resulting in reduced need for auxiliary lanes.

Urban Main Street – 150 metres

- Preservation of arterial function in a main street environment.
- Inter-regional Transit.
- Increased demand for turning movements resulting in more distributed turning points to alleviate pressure on main intersections.
- Decreased queuing.
- Connected street network.
- When a connected network exists, more access is realized by properties other than those fronting an arterial resulting in increased economic opportunity for land owners. Businesses no longer require access off the arterial to be successful.
- Shorter signal cycles.
- Can accommodate more stops as a result of the shorter signal cycles.
- Increased pedestrian and cycling activities.
- High transit activity requiring more frequent stops.

5.3 Access Connection Spacing

5.3.1 Median Opening Spacing

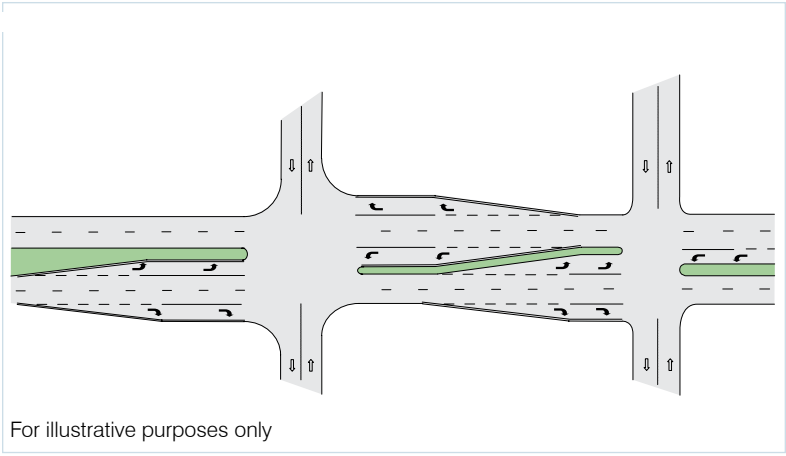
Controlling access along a divided roadway through openings in the median is among the most effective and readily available of access management actions available for Regional Roads. Median access does not have to be provided for individual properties but rather can be configured, at the direction of the Region, to focus turning movements at appropriate locations, to limit locations for conflicting (i.e. left-turn) movements and to establish points at which important access such as future public streets or major private driveways should be located. The Region's Active Transportation Plan can be referred to for pavement markings and other treatments recommended for the safe crossing of pedestrians and cyclists at access connections.

Three types of median openings are identified *(Table 2)*:

- Full-movement median opening at public street intersections and/or private driveways. (Full to Full)
- Partial-movement opening (Left-In/Right-In/Right-Out to Left-In/Right-In/Right-Out) allowing left turns to be made from the arterial road into a property, but preventing the counterpart left turn from the access onto the managed arterial road. (Full to Left-In/Right-In/Right)

The spacing of these types of median openings on each of the six Regional Road types identified in the RCS are given in *Table 2: Median Opening Spacing*.

For the Rural Road type, typically located in undeveloped areas, median opening spacings minimize the number of median openings (Note: Rural Roads do not typically have medians). For the Connector road types, typically serving areas with industrial and commercial destinations, median opening spacing criteria limit them to important destinations or combinations of such connections. For the Main Street road types (both rural and urban) mid-block median openings are undesirable, being either redundant or even incompatible with the closely-spaced public street intersections and small blocks that exist or are planned for such areas.



For illustrative purposes only

Figure 24: Median Opening Spacing – Full to Full
Source: Walter Kulash based on Access Control Diagrams provided by Region of Peel

Access Management Elements

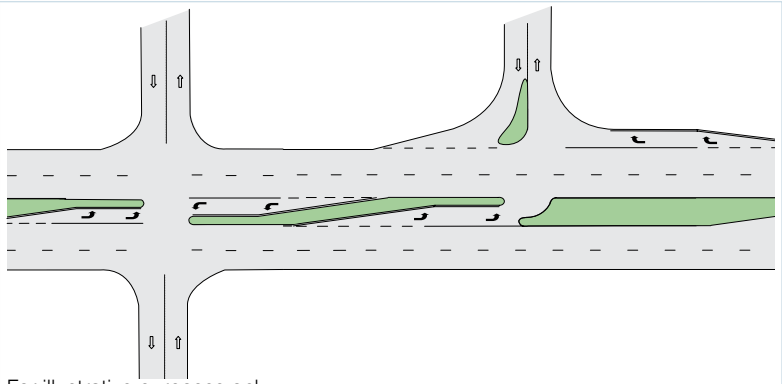


Figure 25: Median Opening Spacing – Full to Left-In/Right-In/Right-Out

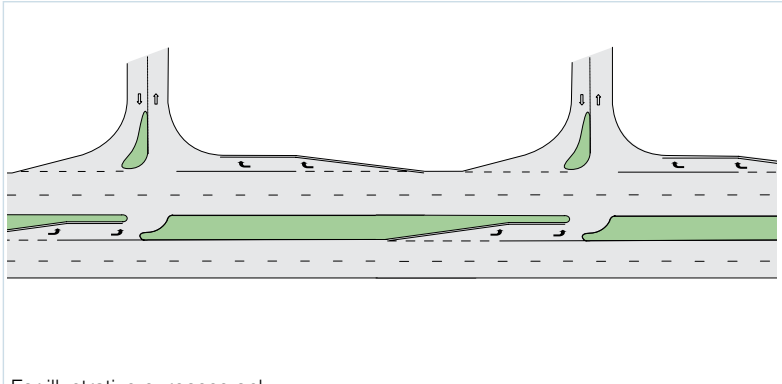


Figure 26: Median Opening Spacing – Left-In/Right-In/Right-Out to Left-In/Right-In/Right-Out

Sources: Walter Kulash based on Access Control Diagrams provided by Region of Peel

Minimum Spacing Between (metres)	Rural Road	Industrial Connector	Suburban Connector	Commercial Connector	Rural Main Street	Urban Main Street
Full to Full	600	450	300	300	150	150
Full to Left-In/Right-In/Right-Out	ISR	225	150	150	75	75
Left-In/Right-In/Right-Out to Left-In/Right-In/Right-Out	ISR	225	150	150	75	75

Table 2: Median Opening Spacing

NOTE: Spacing measured between curb extension to curb extension. (See Figures 24-26)
All spacings and access points to be verified by a Transportation Impact Assessment and/or sightline analysis.

LEGEND: ISR: Individual Site Review

Source: All Tables were developed in consultation with the Region of Peel and are based on governing documents and professional judgment.

5.3.2 Right-In/Right-Out Spacing

The number of accesses and their possible locations are largely dictated by (1) the need to provide reasonable access to public roads for all properties and (2) the size and shape of these properties. Within these dictates, access spacing criteria can minimize the number of access and influence their location.

For the Rural Road type, typically located in undeveloped areas, access spacing criteria can limit accesses to existing (large) spacing. For the Connector road types, typically serving areas with industrial and commercial destinations, access spacing criteria can foster joint access by adjacent properties and lay the foundation for future public streets or service roads. For Main Street road types, (both rural and urban) accesses are undesirable, being at odds with the village, urban street fronts that exist, or are planned for such areas.

Along with access spacing criteria, the whole range of roadway network building actions can greatly reduce the number of accesses needed, and also influence their location.

Access spacing is categorized according to four distances from Right-In/Right-Out access to:

- Full median openings (Full to Right-In/Right-Out).
- Partial median openings (Full to Left-In/Right-In/Right-Out)
- Right-In/Right-Out to Right-In/Right-Out.
- Right-In Only to Right-Out Only.

The spacing of accesses on each of the six road types identified in the RCS are given in *Table 3: Right-In/Right-Out Spacing*. Restricted access spacing of 75m is a generally accepted municipal access management practice on more urban or Main Street roadways, while the 100m spacing is consistent with current municipal practice for divided arterials and commuter roads.

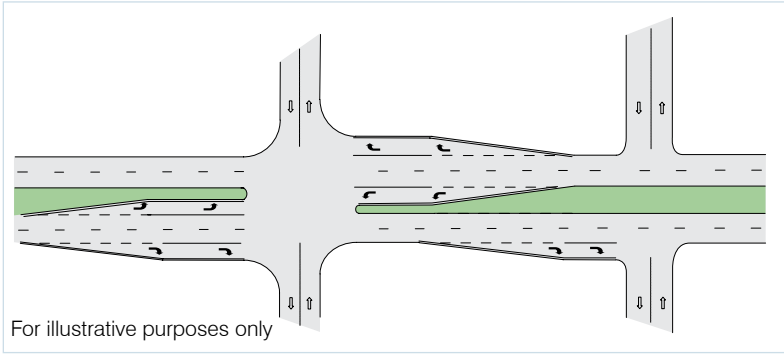


Figure 27: Full to Right-In/Right-Out with Median

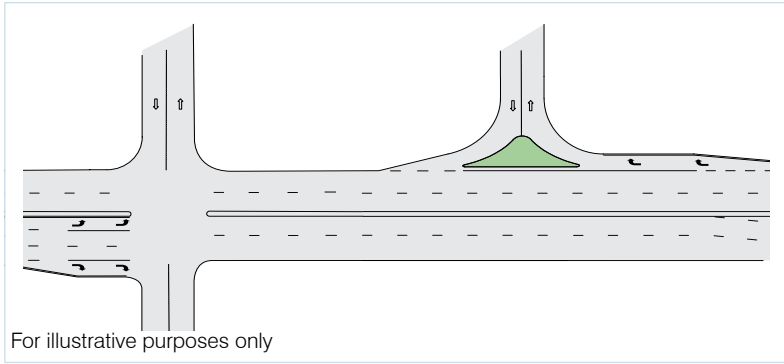
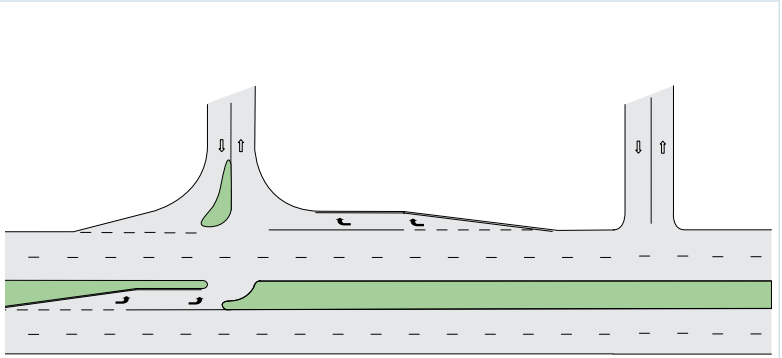


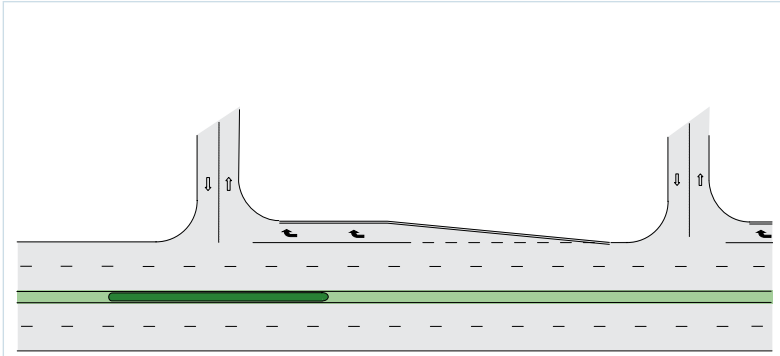
Figure 28: Full to Right-In/Right-Out with Divisional Island
Sources: Walter Kulash based on Access Control Diagrams provided by Region of Peel

Access Management Elements



For illustrative purposes only

Figure 29: Left-In/Right-In/Right-Out to Right-In/Right-Out



For illustrative purposes only

Figure 30: Right-In/Right-Out to Right-In/Right-Out

Sources: Walter Kulash based on Access Control Diagrams provided by Region of Peel

Minimum Spacing Between (metres)	Rural Road	Industrial Connector	Suburban Connector	Commercial Connector	Rural Main Street	Urban Main Street
Full to Right-In/Right-Out	75 or max lot frontage	100	75	100	75	75
Left-in/Right-In/Right-Out to Right-In/Right-Out	ISR	100	75	100	ISR	ISR
Right-In/Right-Out to Right-In/Right-Out	ISR	100	75	100	ISR	ISR

Table 3: Right-In/Right-Out Spacing

NOTES: Spacing measured between curb extension to curb extension. (See Figures 27-30)

LEGEND: ISR: Individual Site Review

All spacings and access points to be verified by a Transportation Impact Assessment and/or sightline analysis.

Source: All Tables were developed in consultation with the Region of Peel and are based on governing documents and professional judgment.

5.4 Auxiliary Lane Placement

Guidance for providing auxiliary turn lanes (left turn and right turn) at access connection points are summarized in *Table 4: Auxiliary Lane Placement*. A screening process for an access that, per this document, qualifies as a right-in/right-out access only is provided in *Table 5*, and detailed requirements for restriction and auxiliary lanes based on traffic volume impacts.

5.5 Traffic Volumes for Accesses, Median Openings, and Auxiliary Lanes

In addition to the spacing criteria for median openings *(Table 2)* and accesses *(Table 3)* which apply to the arterial, the Region has proposed a traffic volume-based response addressing the need for access, auxiliary lanes and the encumbrance of land title with requirements for access limitation and provision of auxiliary lanes. This guidance, along with the Transportation Impact Assessments, provide opportunities for advancing a number of access management planning activities:

- Identifying the need for auxiliary lanes.
- Identifying the need for, and type of median opening or physical restriction (e.g. divisional island).
- Analyzing impact of U-turns on nearby intersections.
- Suggesting ways to shift some of the traffic to other streets.
- Suggesting a path toward a highly connected network
- Establishing if a traffic control device is warranted.

Access Connection	Turn Lane Type	Rural Road	Industrial Connector	Suburban Connector	Commercial Connector	Rural Main Street	Urban Main Street
Full Movement Intersection	R	Cond	Yes	Cond	Cond	Cond	Cond
	L	Cond	Yes	Yes	Yes	Cond	Cond
Left-in Median Opening and Right-In/Right-Out	R	Cond	Yes	Cond	Cond	Cond	Cond
	L	Cond	Yes	Yes	Yes	Cond	Cond
Driveway	*See Volume Thresholds for Access Control – Table 5*						

Table 4: Auxiliary Lane Placement

NOTE: These spacings may not be achievable due to limited frontage of land parcels or proximity to intersections.

LEGEND: Cond: Conditional, based on results of a Transportation Impact Assessment.
L: Left Turn Lane R: Right Turn Lane

Access Management Elements

New Development			
	Low Impact	Medium Impact	High Impact
	less than 60 veh/hr peak hour	60-100 veh/hr peak hour	over 100 veh/hr peak hour
Physical Access Restriction	N/A	N/A	Yes
Auxillary Lane(s) Requirement	N/A	Yes, if supported by Regional staff and TIA	Yes
Access Restriction on Title	N/A*	Yes	Yes
Auxillary Lane(s) Requirements on Title	N/A	Yes	Yes

Re-Development/Intensification			
	Low Impact	Medium Impact	High Impact
	less than 60 veh/hr peak hour	60-100 veh/hr peak hour	over 100 veh/hr peak hour
Physical Access Restriction	N/A	N/A	Yes
Auxillary Lane(s) Requirement	N/A	N/A	Yes
Access Restriction on Title	N/A*	Yes	Yes
Auxillary Lane(s) Requirements on Title	N/A	Yes	Yes

Table 5: Volume Thresholds for Access Control

* Not Applicable in Rural Road conditions.

Source: All Tables were developed in consultation with the Region of Peel and are based on governing documents and professional judgment.

5.6 Design Criteria for Access

Design criteria for access are summarized in the following table and the four supporting diagrams:

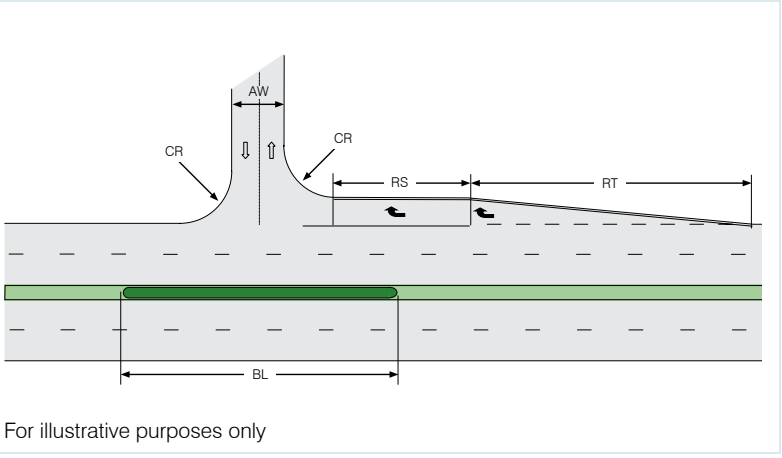
- Table 6: Design Criteria for Access.
- Figure 31: Typical Layout for Right-In/ Right-Out Access (with Median Island).
- Figure 32: Typical Layout for Right-In/ Right-Out Access (without Median Island).
- Figure 33: Typical Layout for Full Moves Median Opening.
- Figure 34: Typical Layout for Left-In, Right-In/Right-Out Access.

Design Criteria (metres)		Rural Road	Industrial Connector	Suburban Connector	Commercial Connector	Rural Main Street	Urban Main Street
Access Width (AW)		ISR	9.0 min	9.0 min	9.0 min	ISR	ISR
Access Throat Length (TL)		ISR	i	i	i	ISR	ISR
Corner Radius, Min (CR)		5.0***	9.0***	9.0***	9.0***	5.0***	5.0***
Median Barrier Length, Min (BL)		30.0*	30.0*	30.0*	30.0*	N/A	N/A
Left Turn Lane Transition (LT)		TAC	TAC	TAC	TAC	TAC	TAC
Left Turn Lane Storage, Min (LS)		30.0	30.0/vol	30.0/vol	30.0/vol	30.0	30.0
Right Turn Lane Transition (RT)		TAC	TAC	TAC	TAC	N/A	N/A
Right Turn Lane Storage, Min (RS)		30.0/vol	30.0/vol	30.0/vol	30.0/vol	N/A	N/A
Auxiliary Lane Width, Min (AW)	L	3.5 **	3.5**	3.5**	3.5**	3.5**	3.5**
	R	3.25***	3.25***	3.25***	3.25***	3.25***	3.25***
Pedestrians		Design of all accesses must consider pedestrians and the continuity of existing or planned Active Transportation facilities.					

Table 6: Design Criteria for Access

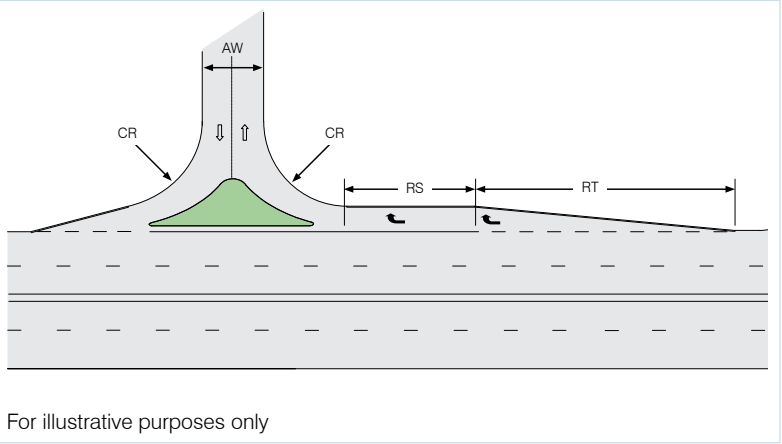
NOTES: * 30m on either side of access control as per current by-law.
** Match through-lane if less or determined based on design vehicle needs.
*** Pending Design Vehicle Needs.
i) Conditional based on needs as identified in Transportation Impact Assessment or at the discretion of the Region. Minimum 30m from curb, except for single residential lots.

LEGEND: TAC: Transition length based on design speed of roadway utilizing the TAC Manual and geometric design standards.
Vol: Determined based on projected turning volumes ISR: Individual Sight Review
N/A: Not Applicable L: Left Turn R: Right Turn



For illustrative purposes only

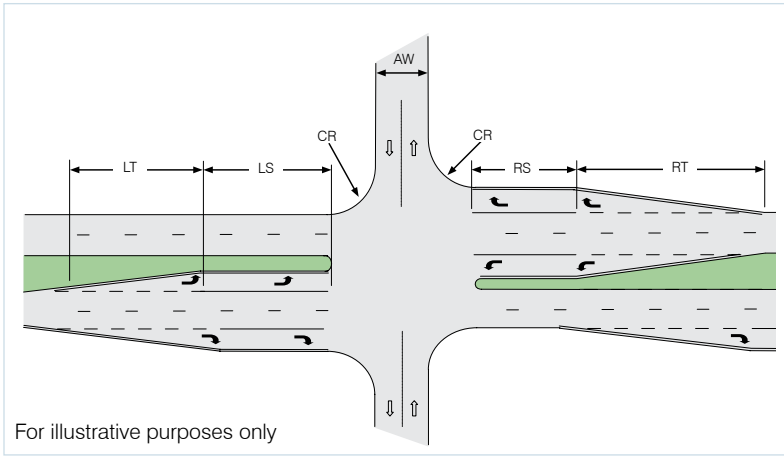
Figure 31: Typical Layout for Right-In/Right-Out Access with Median Island



For illustrative purposes only

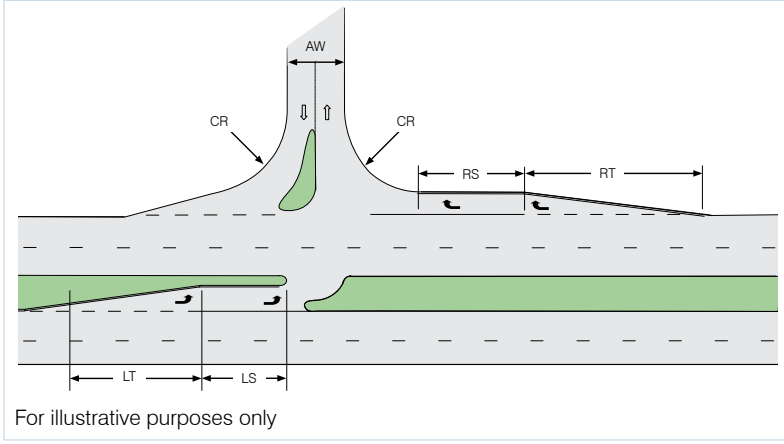
Figure 32: Typical Layout for Right-In/Right-Out Access without Median Island

NOTE: Please see Table 6 for definition of acronyms.
Sources: Walter Kulash based on Access Control Diagrams provided by Region of Peel.



For illustrative purposes only

Figure 33: Typical Layout for Full Moves Median Opening



For illustrative purposes only

Figure 34: Typical Layout for Left-In plus Right-In/Right-Out Access

5.7 Additional Spacing Considerations

5.7.1 Traffic Control Device Spacing

The need for traffic control devices (stop control, signalization or roundabouts) is largely determined by thresholds of traffic volumes approaching the controlled intersection, evaluated for automobiles and pedestrians, as specified in the Transportation Impact Assessment. Consequently, it is not realistic to simply apply minimum-distance criteria to directly control the spacing of traffic control devices. Rather, their spacing is indirectly controlled through: (1) the spacing of median openings and (2) traffic volumes on the arterial and access at such median opening.

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As discussed in Chapter 3, traditional access management measures associated with spacing were developed around traffic control signal coordination. Depending on design speed, any spacing lower than 300m–415m was considered to disrupt corridor progression, thereby resulting in poorer service levels for traffic.

Most Regional Roads stand to benefit from spacing between traffic control devices that is as large as possible, thereby minimizing their negative impacts (delay resulting from vehicle acceleration/deceleration) on traffic flow. Where traffic control devices are needed at new accesses their negative impacts can be greatly offset by maximizing the connectivity of the new access, so that the it absorbs and disperses some of the traffic elsewhere otherwise rather than simply adding a new source of delay along the arterial. Where applicable, roundabouts will be considered as a complimentary measure to minimize conflict movements at accesses, as those entering or exiting a partial moves access can circulate through the roundabout at the nearby intersection as a means of performing the required left turn.

5.7.2 U-Turn Locations

Mid-Block U-Turns

Provision for U-turns at mid-block locations (i.e., other than at intersections) are a valuable access management measure in support of restriction of property access to right-in/right-out driveways. Mid-block U-turns, in both their spacing and design elements, are similar to partial median openings (left-in, right-in/right-out). Mid-block U-turn locations can reasonably be expected to evolve into future partial access or even full intersections.

U-Turns at Intersections

U-turns at signalized intersections, while frequently associated with access management practice, are not themselves an access management action. Rather, U-turns are a consequence of restrictions on left turns causing drivers to overshoot their intended destination access, then to make the U-turn and return to the destination, followed by a right turn at the right in/right out access.

In general, it is compatible with good access management practice to simply allow U-turns at the first signalized intersection downstream of the driver's intended destination access. Accommodating U-turns in this manner minimizes the increment of the travel added to the arterial by the turn restriction, and avoids the aggravation, to motorists, of having to negotiate more than one signalized intersection in order to make their U-turn.

U-turns nearly always require a protected left turn traffic control signal indication, as likely as not adding to the critical approach volume at a signalized intersection, and thereby consuming some of the traffic control signal's capacity. As signalized intersections approach their capacity, the increment of total delay caused by even small volumes of U-turns (say 50 – 60 hourly) becomes significant.

The most effective approach to excessive volumes of U-turns at traffic control signals is the accommodation of property access through a well-connected network of local streets properly spaced along the arterial. Further, these cross streets should be connected to cross-access easements permitting much of the needed property access to be supplied by local streets intersecting the arterial, rather than on a limited number of accesses directly connecting to the arterial. While the Region recognizes that relying on u-turns as an access management measure is not desirable, they will be considered in unique cases where appropriate and can be safely accommodated to minimize conflict movements.

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6.0 Glossary of Terms

Access Connection: Location along an arterial providing connection for vehicular travel between the arterial and a connecting driveway or street.

Access Management: Measures intended to maintain the quality of traffic service on the controlled road (typically an arterial) while also providing efficient access to the surrounding properties.

Arterial or Regional Roads: As defined in the Region's Access By-Law, as controlled access roads.

Auxiliary lane: Traffic lane accommodating deceleration and storage of vehicles making right-turn or left-turn movements at intersections or median openings.

Connectivity: The measure of how many alternate routes are possible for travel between a given origin and destination.

Cross-Access: A private vehicle way connecting two or more private properties

Cross-Access Easement: An agreement, between property owners, to allow vehicular traffic generated by the agreeing owners' sites to have vehicular access across the other owners' sites.

Cross-Access Corridor: An area adjacent to and generally parallel with a minor arterial that provides shared access to multiple properties

Driveway: A privately owned vehicular way intersecting with a public street. The intersection is an access connection (above).

Glossary of Terms

Easement: The right given to another person or entity to trespass upon land that the person or entity does not own. Typically used for roads or given to utility companies for the right to bury cables or access utility lines.

Full Median Opening: Discontinuity (opening) in a median permitting all movements to be made at an access connection at the median opening.

Functional Classification (Class): The grouping of roads into arterial, collector, and local types based the service it is intended to provide.

Green Time: The time, typically usually measured in seconds per signal cycle or hourly total, for which a traffic signal displays a green signal to a given approach direction.

Grid: (see Street Grid)

Joint Access Driveway: Driveway connecting two or more private properties to a public street at a single Access Connection.

Left In, Right In/Right Out: Discontinuity in a median allowing left turns from an arterial into, preventing left turn into the arterial and allowing right turns from and into the arterial.

Local Road Network: System of connected roads composed of a variety of roadway types, including local public and private streets, collector roads, public and private service roads, and internal (private) accesses.

Local Trip: Journey, typically but not always vehicular, that has either its origin or destination or both, within a designated local area.

Median: The area of a road constructed in a manner physically separating the two directions of travel lanes and preventing turning movements from one direction of travel across the opposing direction.

Median Opening: A discontinuity in a median, either Full Median Opening (allowing all movements into and out the median-controlled street) or Partial Median Opening (allowing some but not all movements).

Microsimulation: see Traffic Microsimulation

Mutual/Reciprocal Access Easement: see Joint Access Driveway

Owner: The owner of record of property directly adjacent to an arterial.

Partial Median Opening: Discontinuity (opening) in a median permitting some turning movements to be made at the access connection at the median opening.

Platoon: Series of vehicles traveling in a closely spaced grouping, typically as a result of traffic signal phasing.

Raised Median: A median (area separating different directions of travel lanes) that is raised or otherwise obstructed to prevent vehicular crossing.

Right-In/Right-Out: An access connection permitting right turns from-and-into the arterial but, through raised median or other barrier, preventing all left turns.

Smart Code: A form or transect-based planning and zoning document based on environmental analysis which addresses the scales of planning, from the region to the community to the block and building.

Glossary of Terms

Street Grid: A network of streets, sometimes complemented by cross-access corridors, providing a large degree of connectivity to travelers.

Through Trip: Journey, typically but not always vehicular, that has neither its origin nor destination within a designated local area.

Traffic Impact Assessment: see "Transportation Impact Assessment"

Traffic Microsimulation: Computerized algorithm that models the flow of vehicles, one by one, through a designated network of streets. Typically, results of Microsimulation results are shown as animated diagrams of vehicle-by-vehicle flows and stoppages.

Traffic Study: see "Transportation Impact Assessment"

Transportation Impact Assessment: (also referred to as "Traffic Impact Study," "Traffic Impact Assessment "or "Traffic Study") A study submitted by an applicant for access from a proposed development site onto an arterial, projecting the volume of traffic from the proposed land development, and assessing the impact of that traffic on the surrounding transportation network.

Universal Access: Concept that all public roads are equally accessible by all modes of transportation including pedestrians and bicyclists, as well as automobiles. Overall goals for Universal Access roadway design includes: integrated, not segregated, uses; uniformity and simplicity of design; minimal hazards or obstructions for all users; easily crossable intersections, and; adequate operating space on sidewalks and road surfaces for all users.