

Thorold Transportation Master Plan Background Report G: Road Classification

**Final Report
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1 Introduction

1.1 Road Classification Requirements for the Transportation Master Plan

The 2018 Terms of Reference for the Thorold Transportation Master Plan (TMP) requires that the following information be provided dealing with road classification and right-of-way within the City:

1. Conduct a comprehensive review of the classification of existing roads and provide rationale for minimum and maximum road widths.
2. Determine ultimate ROW widths, including consideration for neighbourhood character and design, objectives and complete streets.
3. Review and recommend updates to City standard policy of when to use urban and semi-urban standard cross sections on arterial, collector and residential roads.
4. Outline road classes as they relate to the City's Official Plan specifications in relation to how roads operate in reality.
5. Determine the Road Classification for all existing and future roads within the City, including public laneways.

1.2 Purpose of Road Classification

The existing classification of streets in Thorold is currently provided in Section D2 and Schedule D of the Thorold Official Plan (April 2016). For the new TMP, an updated classification system will be used to re-classify City streets where warranted. In developing the street classification system, the following factors have been considered:

- **Basic Roadway Geometry** – Standard right-of-way and pavement widths to accommodate pedestrians, cyclists and other vulnerable road users, and incorporating design features that help limit the need for reactive traffic calming measures (i.e. vertical or horizontal deflections) by aligning the design speed with posted speed, while supporting TMP goals and objectives.
- **Traffic Management** – Including vehicle types, speed and volume.
- **Roadway Services** – Including transit, on-street parking, property access, Active Transportation, traffic calming, truck access, neighbourhood character, streetscaping and connections.

Road classification also provides an opportunity and guidance for the City and residents to consider other factors relating to road operations such as:

- **Development Impacts** – Consider changes to street classification over time such as the conversion of a Local street to a Collector because of future street connections or development.
- **Private Roads and Public Lanes** – Continue to include Private Roads in the classification system to identify those roadways that are not owned or the responsibility of the City to maintain. Introduce Public Lanes in the classification system that are owned by the City.
- **Future Roadway Linkages** – Recommend specific locations where future street linkages should be developed as a specific street classification based largely on the City’s Official Plan and Secondary Plans.
- **Complete Streets** – Incorporate complete streets principles into the roadway classification system, where applicable, to ensure that of all roadway users are considered in the design of new streets and roadway retrofit projects and prepare an accompanying complete streets policy or guideline document.

1.3 Importance of Road Classification

A road classification system establishes a hierarchical structure of roadway groupings according to their physical and functional characteristics and the type of service they are intended to provide to the public. Currently the Thorold Official Plan includes seven (7) classifications of roads in the City:

1. Provincial Road (Controlled Access Highway)
2. Regional Road (Highway)
3. Arterial Road
4. Collector Road
5. Local Road
6. Private Road
7. Other Types of Roads (i.e. unopened, assumed)

Benefits of implementing any expansions of this existing system, for example into Urban and Rural classifications, include:

- Establish geometric design standards for consistent application on all City short- and long-term operational needs of all City streets, be they in an urban or rural setting;
- Established standards for functional characteristics such as land access, traffic volume thresholds, level of service (LOS), speed limits, accommodation of cyclists and pedestrians, and parking provisions;
- Improved coordination and planning of land use and transportation developments;

- Prioritized levels of street maintenance based on the role of streets in the City network;
- Set appropriate speed limits based on street geometry, function and abutting land use; and
- Preserve the intended service function of planned roadways and promote a safer environment with operational integrity.

2 Best Practices Review – Niagara Region

The research component of this report involved a review of road classification systems adopted by other Niagara Region municipalities as well as the Transportation Association of Canada. There are some differences, and many similarities in how each of the Region’s municipalities classify their roads. Some focus on road strategies, while others reflect road role and function. However, most use a designated set of classifications to create a hierarchy of roads, determined by a set of design and operational criteria such as right-of-way widths, land use and intended purpose of the road.

2.1 Transportation Association of Canada (TAC)

The most common approach taken from municipal comparisons is to classify roads as the basic Highway, Arterial, Collector and Local as per the Transportation Association of Canada (TAC) guidelines. Some municipalities also differentiate between existing and future or planned roads using these basic TAC classifications.

The TAC produced the *Geometric Design Guide for Canadian Roads: Chapter 2 Design Control, Classification and Consistency* Dated June 2017. Chapter 2.6 of the TAC Design Manual, named *Design Classification*, provides a general structure for roadway classification with recommended standards. The information and tables introduced in that chapter are the most commonly referred to sources for road classification across the country.

Under the TAC Design Manual guidelines, roadways are divided into primary divisions under the classifications of “Rural” and “Urban”. The terms Rural and Urban refer to the primary characteristics of adjacent land use and not necessarily jurisdictional boundaries. The primary divisions that are most commonly referenced are shown in Exhibit 2.1. The divisions are organized from “low-level” to “high-level”, where the lowest level primarily provides land access to low traffic volumes without consideration to mobility, and the highest-level primarily provides mobility to high traffic volumes with less consideration to access. Each division type typically connects to divisions of one level higher or one level lower. These divisions can be further subdivided to reflect the individual needs of residential, industrial, and commercial land uses.

Exhibit 2.1: TAC Design Manual Road Classification Divisions

Rural	Urban	
	Public Lanes	
Locals	Locals	
Collectors	Collectors	
Arterials	Arterials	
	Expressways	
Freeways	Freeways	

To identify the appropriate classification for any roadway, the service function and operational characteristics need to be considered. The TAC Design Manual recognizes the following factors as the most important characteristics to consider when assigning a roadway classification:

- Land Use** – Land use is an important factor when classifying roadways because of its relationship with access demands, geometric requirements, prevalent vehicular traffic, and site-specific objectives. For example, an industrial land use may serve heavier vehicles and may have different geometric requirements than a residential land use. Also, residential roads may have specific objectives such as traffic calming and the promotion of cycling and walking.
- Service Function** – All roads serve traffic and land access by varying degrees of priority. For example, freeways and arterials mainly service traffic mobility, whereas local roads and public lanes almost exclusively service land access. Collectors typically provide service to both traffic mobility and land access.
- Traffic Volume** – Road classes that mainly service traffic movement (i.e. freeways, highways and arterials) are typically associated with high traffic volumes, whereas road classes that do not prioritize the movement of traffic are typically associated with low volumes (i.e. locals and public lanes). The volume range for each classification is wide and overlaps that of other classifications. It is important to note that traffic volume should not be used as the main criteria for classifying roadways because it reflects how a road is serving demand in a particular part of the network, rather than a road's role in the network. For example, a collector connected to more than one arterial may experience high volumes, but this alone does not justify it being classified as an arterial. Improvements to the arterial grid capacity often alleviate escalating volumes on collectors or local roads.
- Flow Characteristics** – The desired characteristics of traffic flow greatly impact the performance of a roadway and therefore play a major role in road classification. Uninterrupted traffic flow is expected for roadways serving traffic movement such as freeways, highways and arterials

(except at controlled intersections and crosswalks). Interrupted flow is expected for collectors and local roads where traffic movement is restricted by traffic entering, leaving and crossing the roadway, or by features such as on-street parking and traffic calming.

- **Design Speed/Running Speed** – Typically, design and running speeds increase from locals to collectors, arterials, highways and freeways. However, to ensure a safe running speed, care must be taken to select the design speed that appropriately corresponds to the adjacent land use, service function, and speed zoning policy for the roadway. An inappropriately selected design speed (i.e. a residential collector with a design speed of 80 km/h) can encourage high running speeds and high variations in speeds between vehicles, compromising the safety of road users.
- **Vehicle Types** – The proportion of passenger cars and heavy vehicles (trucks) served by a roadway is dependent of the purpose of that roadway. Therefore, vehicle type is related to road design and classification. Freeways, highways and arterials are generally designed to carry a higher proportion of commercial vehicles than local and collectors which typically service passenger cars and small trucks. However, allowances can be made within the classification subgroups for the operational needs of vehicle types accessing industrial and/or commercial areas.
- **Connections** – Ideally, public lanes, private roads and local streets connect with collectors, collectors connect with arterials, and arterials connect with highways and freeways. Maintaining such connectivity increases consistency within a road network and facilitates short and long term planning.

In addition to these key factors, the TAC Design Manual also includes provisions for the following:

- Transit Service;
- Accommodation of Cyclists;
- Accommodation of Pedestrians;
- Parking;
- Minimum Intersection spacing; and
- Right-of-way width.

The TAC Design Manual guidelines provide a good starting point for road design classifications, including a high level of detail among the many functional characteristics. Jurisdictions across Canada commonly adopt the TAC system but may modify the guidelines to meet their specific needs. But some municipalities chose to abandon the traditional classification structure for a more unrestricted and flexible convention. Despite the more open nature of this practice, roadway class definitions became fuzzy, which lead to confusion and

uncertainty during the planning of new developments and the operations of existing road networks. Too much room for interpretation can lead to disputes between stakeholders while attempting to protect their best interests (i.e. residential neighbourhoods).

The City of Thorold needs to consider these classification examples in terms of how they serve the specific needs of this city in managing their road network, for example involving road design, traffic control, speed control, adjacent land use control and Active Transportation.

2.2 Niagara Region Comparisons

Some of the Niagara Region comparisons summarized below in Exhibit 2.2 further sub-categorize below the basic TAC classification for example to Major / Minor or Residential / Non-Residential classifications (see Port Colborne). Some municipalities also specifically classify specific roads “Scenic Roads”.

Exhibit 2.2: Niagara Region Road Classification Comparisons

Municipality	Source	Road Classifications
Fort Erie	October 2018 Official Plan Schedule E	Provincial Highway, Regional Road, Niagara River Parkway, Municipal Road, Private Road
Grimsby	August 2018 Official Plan Schedule	Provincial Highway, Regional Road, Town Arterial Road, Collector, Local Road, Future Road Connections
Lincoln	April 2015 Official Plan, Part 6 and Schedule D-1	Provincial Highway, Regional Road, Arterial, Local Road-Collector, Local, Wine Route, Victoria Avenue Market Greenway
Niagara-On-the-Lake	July 2017 Official Plan Schedule G	Provincial Highway, Regional Road/Arterial Road, Niagara Parkway, Collector Roads, Local Roads
Pelham	March 2014 Official Plan Schedule C	Regional Road-Variable Width, Arterial Road-Variable Width, Collector Road-Variable Width, Local Road, Closed Winter Road
Port Colborne	November 2013 Official Plan Section 9 and Schedule D	Laneway, Local Road, Local Commercial or Industrial, Arterial, Collector, Collector Commercial or Industrial, Regional, Provincial
St. Catharines	July 2012 Official Plan Section 6.9 and Schedule C (Garden City Plan)	Regional Arterials, Arterials, Collectors, Local Roads
Wainfleet	January 2016 Official Plan Section 5.3 and Schedule D	Provincial Highway, Regional Arterial Roads, Collector Roads (not shown on Schedule D), Local Roads, Private Road

Municipality	Source	Road Classifications
Welland	June 2017 Official Plan Section 6.4 and Schedule E	Expressway, Arterial Road, Collector Road, Local Road, Private Road
West Lincoln	November 2018 Official Plan Section 14.5 and Schedule F	Highway 20 Bypass, Regional Arterial, Township Arterial, Collector, Local Road
Thorold	April 2016 Official Plan Section D2 and Schedule D	Provincial Roads (Controlled Access Highway), Regional Roads (Highway), Arterial Roads, Collector Roads, Local Roads, Private Roads, Other Types of Roads

3 Recommended City of Thorold Road Classification System

3.1 Urban vs Rural Roads

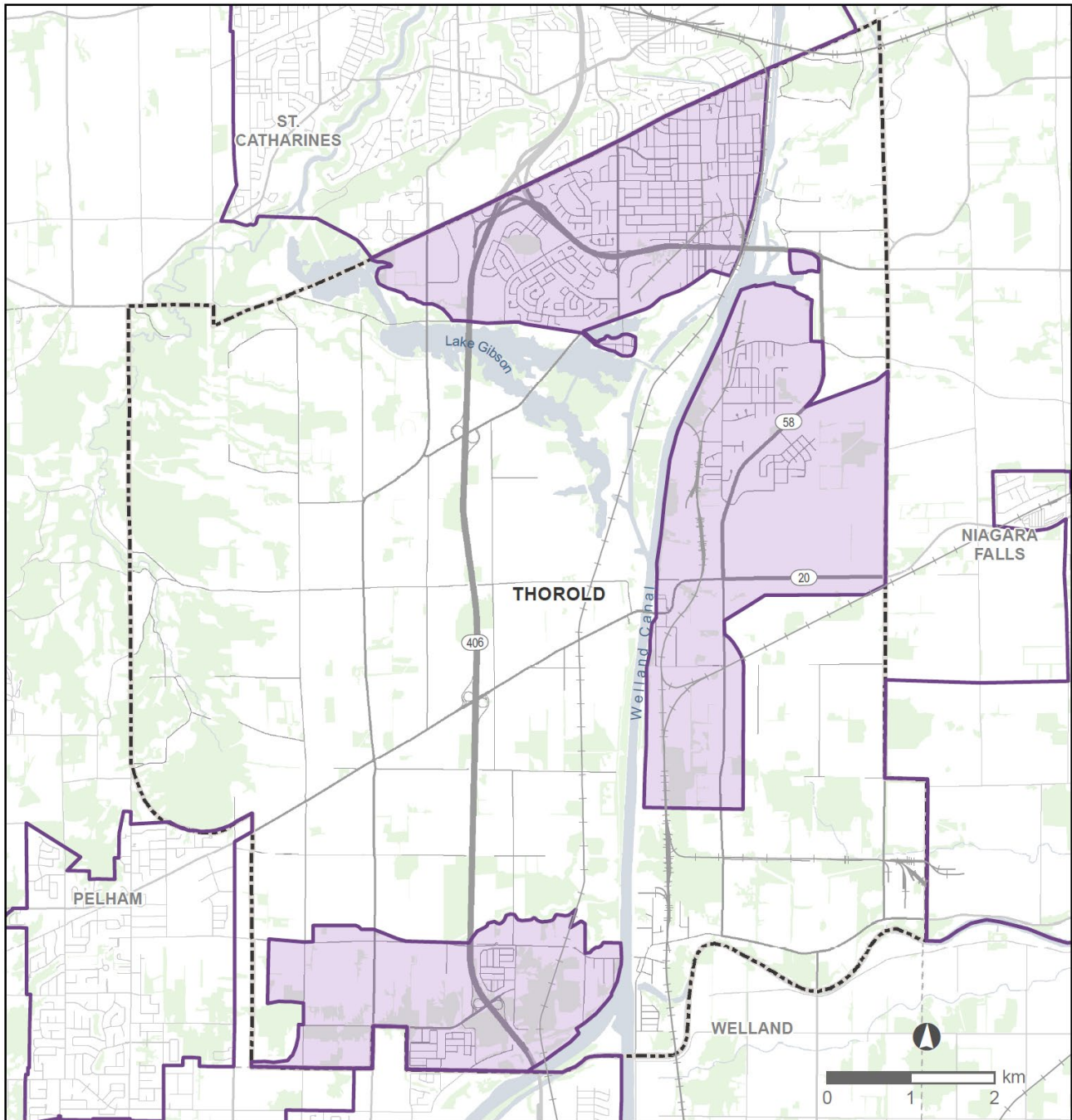
The first differentiation of Thorold streets is whether they operate in an urban or a rural setting. This dictates the basic roadway geometry, traffic management measures and services offered by the road. The Thorold Official Plan has the vast majority of the City designated as rural, being beyond the Urban Area Boundary shown on Exhibit 3.1.






These designated Urban Areas in the Official Plan include roads in:

- Thorold Proper
- South Thorold (including Rolling Meadows)
- Port Robinson West

For the road classification system, all other areas of the City are considered to be Rural.

Exhibit 3.1: Designated Urban Areas



-  Thorold Boundary
-  Surrounding Municipality
-  Wooded Area
-  Urban Area
-  Existing

3.2 Existing Road Classes

The City's Official Plan includes the following established definitions for the following road classifications that apply to both Urban and Rural locations¹:

Provincial Roads

The City of Thorold is served by Highway 58 and Provincial Highway 406 together with four interchanges. These highways have controlled access and new development abutting these highways is required to obtain a Ministry of Transportation (MTO) Land Use Permit and may entail the review and approval of a transportation impact study as a condition for the issuance of MTO permit(s).

Regional Roads (Arterial Road / Highway)

Roads serving a regional role by carrying traffic through and to/from the City. All abutting development is subject to the jurisdiction of the Region of Niagara.

Arterial Roads (Urban and Rural)

These are intermediate roads which carry significant volumes of traffic from local roads to Regional Roads. Direct access to arterial roads will generally not be permitted unless traffic impacts have been assessed and, if necessary, mitigated. All arterial roads as Official Plan of the City of Thorold 213 Adopted By By-law 60-2015 on April 21, 2015 identified in this Plan may be subject to the conveyance of land for a road widening or road improvement at the time of or as a condition to the approval of any Planning Act application.

Collector Roads (Urban and Rural)

Collector roads are City roads that provide efficient access between Regional and Arterial Roads from Local Roads. All collector roads as identified in this Plan may be subject to the conveyance of land for a road widening or road improvement at the time of or as a condition to the approval of any Planning Act application.

Local Roads (Urban and Rural)

Local roads carry traffic from the Regional Road system and from the arterial roads to individual properties. Access to these roads is subject to the jurisdiction of the City. All local roads as identified in this Plan may be subject to the conveyance of land for a road widening or road improvement at the time of or as a condition to the approval of any Planning Act application.

Private Roads

The construction or development of new private roads or extensions to existing private roads shall not be permitted unless the private road is in a Plan of Condominium. New rights-of-way, in the form of private driveways, may be granted by the Committee of Adjustment for access only to parcels that are presently land locked and which are the site of an otherwise legal residential use

¹ Official Plan of the City of Thorold 213 Adopted by By-law 60-2015 on April 21, 2015

on the date the implementing by-law is passed. All proposed rights-of-way for existing land locked parcels must be developed from an existing public road maintained year round and is of a standard acceptable to the City.

Other Types of Roads

The other types of roads in the City include:

- a) Private roads which cross private property to access a lot;
- b) Unopened municipal road allowances;
- c) Unassumed roads; and,
- d) Roads owned and maintained by a public authority for only a part of the year.

3.3 New Road Classes

In addition to delineating roads in the City into Urban and Rural roads as shown on the Exhibit 3.2 road classification matrix, the matrix includes three new classifications:

Urban Major Local Road

Roads that are an integral part of an urban neighbourhood, providing access to individual properties from Urban Collectors and Arterial Roads carrying only local traffic.

Urban Minor Local Road / Mews

A small scale, generally short internal Local Street serving a specific part of an urban neighbourhood. It typically provides a single point of access and egress to individual sites or dwellings rather than all surrounding dwellings and does not serve through traffic. Minor Local Roads can be short dead-end streets and cul-de-sacs (i.e. Ontario Street, Davis Street and Mackan Street east of the Welland Canal. They may also be short dead-end streets created in the late 1940's under the Veterans Land Act.



Another type of Minor Local is a Mews or Woonerf Street (Shared Street) which is a space designed for all modes of transportation: pedestrians, cyclists and vehicles. Features often include no sidewalks, varied shared road/Active Transportation treatments and street furniture.

Public Laneway

Although there are few public lanes in the City, they can be located in older residential or industrial/commercial settlement areas, simply to provide land access to abutting properties and should only connect with Urban Major Local Roads. Through traffic is generally prohibited, as traffic movement is not a consideration. Public lanes are intended for low volumes (< 250 veh/day) and low speeds, with no provision for pedestrian, cyclist or transit facilities.

3.4 Recommended Road Re-classification

Based on the update road classification system, a number of corridors have been recommended for classification changes to better reflect the role and function of the road. Exhibit 3.2 shows the current and proposed road classes where changes are recommended.

Exhibit 3.2: Recommended Changes to Existing Road Classifications

Corridor and Limits	Current Classification	Proposed Classification
Decew Road (Merrittville Highway to Beaverdams Road)	Collector	Urban Arterial
Keefer Road (entirety)	Local	Urban Collector
Winterbury Boulevard (entirety)	Local	Urban Collector
Port Robinson Road (Merrittville Highway to Kottmeier Road)	Collector	Urban Arterial
Cataract Road (Port Robinson Road to south city limits)	Local	Urban Collector
Kottmeier Road (Port Robinson Road to Merritt Road)	Collector	Urban Arterial
Kottmeier Road (south of Merritt Road)	Local	Urban Collector
Merritt Road (east of Highway 406)	Collector	Urban Arterial
Merritt Road (west of Merrittville Highway)	Collector	Regional Arterial
Various Streets*	Local	Urban Major Local
Various Streets*	Local	Urban Minor Local

*Note: See Map G for urban major local and urban minor local roads.

Exhibit 3.3: Proposed Road Classification Matrix

Road Characteristics	Non-City		City Urban					City Rural			Private
	Provincial Controlled Access Highway	Regional Arterial Road / Highway	Arterial Road	Collector Road	Major Local Road	Minor Local Road / Mews	Public Laneway	Arterial Road	Collector Road	Local Road	Private Road
Niagara Region Complete Streets Typology Equivalent ²	N/A ³	Main Street Urban General (Wide) Urban General (Narrow) Transitioning Rural	Main Street Urban General (Narrow) Urban General (Wide)	N/A	N/A	N/A	N/A	Rural Transitioning	N/A	N/A	N/A
Basic Width Geometry:											
Right-of-Way Width	As per MTO ⁴	30m – 36m Varies based on context.	26 m – 36m	20 m – 26 m	20 m	18 m – 20 m	6 m – 10 m	30 m – 36 m	20 m – 26 m	20 m	Varies Minimum 16 m
Pavement Width (curbface to curbface – no bike lanes)	As per MTO	Varies based on lanes and context.	10.5 m – 17.5 m	8.5 m	7.5 m	7.5 m	5.0 m – 6.0 m	7.0m - 8.0 m	7.0m – 8.0 m	7.0 m	7.0 m
Traffic Management:											
Motorized Vehicle Types Served	All Vehicles. (no bicycles or pedestrians)	All Vehicles. Truck Routes	All Vehicles. Truck Routes	All Vehicles. Optional Truck Routes	Passenger & Service Vehicles	Passenger & Service Vehicles	Passenger & Service Vehicles	All Vehicles.	Passenger & Service Vehicles	Passenger & Service Vehicles	Passenger & Service Vehicles
Motorized Vehicular Traffic Volume (Typical AADT) ⁵	20,000 – 30,000	5,000 – 20,000	8,000 – 20,000	5,000 – 10,000	< 5,000	< 2,000	< 250	5,000 – 20,000	2,500 – 10,000	< 2,000	< 1,000
Roadway Design Speed km/h	90 – 120 km/h	80 – 90 km/h	50 – 70 km/h	50 – 70 km/h	40 – 60 km/h	30 – 60 km/h	30 – 40 km/h	70 – 90 km/h	60 – 80 km/h	50 – 60 km/h	50 km/h
Roadway Posted Speed km/h	80 – 110 km/h	70 – 80 km/h	40 – 60 km/h	40 – 60 km/h	30 – 50 km/h	30 – 50 km/h	20 km/h	60 – 80 km/h	50 – 60 km/h	40 – 50 km/h	N/A

² Niagara Region Complete Streets Design Guidelines, Transportation Master Plan, June 2017

³ Not Applicable

⁴ Ministry of Transportation

⁵ Average Annual Daily Traffic

Exhibit 3.3: Proposed Road Classification Matrix (continued)

Road Characteristics	Non-City		City Urban					City Rural			Private
	Provincial Controlled Access Highway	Regional Arterial Road / Highway	Arterial Road	Collector Road	Major Local Road	Minor Local Road / Mews	Public Laneway	Arterial Road	Collector Road	Local Road	Private Road
Proposed Classes for City of Thorold											
Roadway Services:											
Transit Service	Yes	Yes	Yes	Yes	Generally No	No	No	Yes	Yes	Generally No	No
On-Street Parking Provision	No Parking	No Parking	No Depending on Context	One or Both Sides	One or Both Sides	One Side	No Parking	No Parking	No Parking	Permitted	No Parking
Property Access	Restricted	Restricted	Access Control	Permitted Where Required ⁶	Permitted	Permitted	Permitted	Access Control	Permitted	Permitted	Permitted
Minimum Cycling Facilities (bike lanes, routes) ⁷	None	Permitted only as per Niagara Region TMP	Potential Segregated Bike Lanes	Marked Bike Lanes	Shared Lanes	Shared Lanes	Shared Route	Shoulder or Segregated Bike Lanes	Shoulder or Marked Bike Lanes	Shared Bike Lanes	Shared Bike Lanes
Pedestrian Facilities (sidewalks, multi-use trails (MUT))	None	Sidewalks Both Sides	Sidewalks Both Sides	Sidewalks Both Sides	Sidewalk One or Both Sides	Sidewalks One Side	Shared Route	Shoulder lanes or MUT	Shoulder lanes or MUT	Not Required	Not Required
Traffic Calming Applications	Not Required	Not Required	Not Required	Where Warranted	Where Warranted	Where Warranted	Not Required	Not Required	Where Warranted	Where Warranted	Not Required
Commercial Vehicle Access	Allowed	Allowed	Allowed	Allowed. May Be Subject to Time Restrictions	Not Permitted Except as Required by Adjacent Land Use	Not Permitted Except as Required by Adjacent Land Use	Not Permitted Except as Required by Adjacent Land Use	Allowed	Allowed. May Be Subject to Time Restriction	Not Permitted Except as Required by Adjacent Land Use	Not Permitted Except as Required by Adjacent Land Use

⁶ For example, access off a collector would not be required for reverse frontage lots.

⁷ Cycling facilities required if corridor is identified on TMP Cycling Network Plan.

Exhibit 3.3: Proposed Road Classification Matrix (continued)

Road Characteristics	Non-City		City Urban					City Rural			Private
	Provincial Controlled Access Highway	Regional Arterial Road / Highway	Arterial Road	Collector Road	Major Local Road	Minor Local Road / Mews	Public Laneway	Arterial Road	Collector Road	Local Road	Private Road
Proposed Classes for City of Thorold											
Roadway Services:											
Streetscape Amenities	Limited Opportunity	Limited Opportunity	Main Street-Type Features (i.e. lighting, sidewalks, vegetation, filter swales)	Main Street-Type Features (i.e. lighting, sidewalks, vegetation, filter swales)	Basic Features (i.e. lighting, landscaping, sidewalks, swales)	Basic Features (i.e. lighting, landscaping, sidewalks) with urban or semi-urban cross-section ⁸	None	Limited Opportunity	Limited Opportunity	Limited Opportunity	None
Desirable Connections	Highways, Regional Arterials, Arterials.	Highways, Regional Arterials, Arterials, Collectors.	Highways, Regional Arterials, Arterials, Collectors.	Arterials, Collectors, Locals	Locals, Collectors	Locals	Locals Collectors	Highways, Regional Arterials, Arterials, Collectors.	Arterials, Collectors, Locals	Locals, Collectors	Collectors, Locals

⁸ Including “green infrastructure” such as filter swales.