Niagara Region

ACCESS MANAGEMENT GUIDELINES

Tuesday, July 25, 2023

CIMA+

Engineering for people

NIAGARA REGION

ACCESS MANAGEMENT GUIDELINES

These guidelines are intended to provide an understanding of access management and cover a broad range of traffic situations encountered in practice. They are based on various factors such as safety, convenience, adjoining land use, traffic/transit operation, adjoining roadway classification and roadway typologies. However, no manual can cover all contingencies or all potential cases to be encountered in the field. Therefore, field experience and knowledge of application are essential in applying the direction stated in these Guidelines.

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1 Introduction

Niagara Region aims to maintain safe and effective traffic flow on its roadways. A key element of this is providing safe access, consistent with the function of road and the needs of adjacent land uses. Access Management Guidelines are intended to manage the provision of access to the public road system for new development or redevelopment, and proactively through corridor reconstruction.

Regional roads function as the main arterial roads throughout Niagara Region, and in general direct access to/from these roads should be limited. Limiting access to regional roads improves the overall capacity of the roadway, ensures the continued movement of people and goods across Niagara, and reduces potential conflict points which improve road safety for all users. Where possible, existing entrance(s) should be considered before new entrance(s) are introduced, and where possible consideration should be given to consolidating entrance(s). Entrance to a property should be obtained from the local road system where possible.

1.1 Authority for Access Management

The Niagara Region has the authority to regulate entrance to regional roads through a number of legislative processes.

The Municipal Act allows municipalities to control the construction of entrances onto a public roadway by issuance of permits. An entranceway permit is a site-by-site permission for access and a tool to regulate the location of the entranceway prior to construction.

By reviewing and approving plans before any work is done, the Niagara Region can ensure that the owner of an entranceway complies with:

- The Official Plans and Zoning By-laws which control the function and land uses of entranceways.
- The Guidelines and Standards which set requirements for design and materials.
- Local Municipal Development Agreements for site plans or subdivision/condominium plans.

In Niagara, the Local Area Municipalities (LAM) are the approval authorities for development applications under the Planning Act. The Niagara Region Planning & Development Department provides transportation related comments and conditions for developments including entranceways to be incorporated into these LAM Development Agreements.

The Entranceway Policy from the Public Works Policy Manual indicates that the Transportation Services Division, is responsible for issuing permits for entranceway(s) on

regional roads and the associated procedures for permitting such entranceway(s). The policy states that no work shall be commenced on the construction of an entranceway(s) which opens upon or is within the limits of the right of way of a regional road or highway without an entranceway permit being obtained from the Niagara Region.

Through the Municipal Act and the Public Works Policy Manual, the Niagara Region has the authority to permit and regulate entranceway including its location, configuration, type, and related construction details including shared/joint entranceway(s).

1.1.1 Right to Reasonable Access

Direct entranceway(s) for a new development or redevelopment location to a regional road will be considered for the following site conditions:

- The subject site has unique land constraints that preclude access via a local street, such as environmental, historical, or archaeological features, insufficient lot depth, conflicting footprint of existing buildings, gradient or minimal frontage onto a local road.
- Alternative entranceway(s) creates unacceptable traffic operations (as defined by the Niagara Region or LAM) on or in close proximity to a regional road or provincial highway.
- Alternative entranceway(s), such as a joint entranceway and common internal driveways, cannot be established or planned.

Where determined that direct access to a regional roadway can, or should be permitted, the number of entranceways to a subject site will be determined based on the recommendation of a Transportation Impact Assessment and/or entranceway spacing as per the Access Management Guidelines.

- Any property fronting onto a regional road is entitled to an entranceway if an entranceway to a suitable municipal road is not available. The Developer must remove all, if any, abandoned driveway entrances and restore the boulevard at their expense.
- Driveway entrance(s) should not be proposed at vertical/horizontal curvature that compromise the sightlines upon entering/exiting the driveway entrance(s), unless a sight line study has been completed, reviewed, and accepted by regional staff.
- Proposed driveway entrance(s) must meet the regional road at (approximately) a perpendicular angle so that drivers entering the roadway can look in both directions and see other road users.

The Developer is to be aware that driveway entrance(s) along residential development fronting roads under municipal and regional jurisdiction will be required to request access

first into municipal roadways before requesting access to regional roads. If existing driveway entrance(s) may not meet current regional standards and may require modification, those shall be fully completed at their expense. Details will be provided when an application is reviewed by the Region.

1.2 Access Management Best Practices

It is the responsibility of the Developer or the Developer's consultant(s) to exercise engineering judgement and experience to advise on technical matters in the best interests of the public. Where necessary, they are expected to consult and follow relevant technical and planning documents, including but not limited to:

- Transportation Association of Canada's (TAC) Geometric Design Guide for Canadian Roads (latest version).
- Transportation Research Board's (TRB) Access Management Manual and Application Guidelines.
- Niagara Region's Complete Streets Design Manual and Transportation Impact Assessment Guidelines.
- Niagara Region's Transportation Impact Assessment Guidelines.
- Ontario Provincial Standards (OPSD).

In most designs, applications, or operational functions, the traffic practitioner's judgement should meet or exceed the requirements stated in relevant guidelines. In selected cases, a guideline might not be met for sound reasons, such as space availability, yet the practitioner is still expected to produce a design or operation which may be considered safe. Every effort should be made to stay as close to the guidelines as possible in situations like these, and the Developer or the Developer's consultant(s) shall be responsible for documenting any reasons for deviating from them, and the corresponding approval by regional staff.

1.3 Road Classification

The Niagara Regional Official Plan (ROP) defines all regional roads as arterials. To assist in addressing the Region's various mobility needs, land use contexts, and natural heritage and built form conditions, the Region's Complete Streets Design Manual further categorizes regional roads into the following road typologies:

- Main Street.
- Urban General.
- Thoroughfare (Urban).
- Thoroughfare (Rural).

- Rural Scenic.
- Hamlet.

To align with the approach followed by the Complete Streets Design Manual, these Guidelines present a context-based process to ensure entranceway permission and design is compatible with surrounding land use and consistent with the technical design criteria established by the Niagara Region standards and policy documents.

This approach to access management balances safety, mobility, community interest, and environmental goals while providing flexibility through the application of design standards and guidelines that considers all modes of travel.

This guideline is applicable for all regional road typologies.

2 Access Control Considerations

The number of direct access points to the regional road network must be effectively managed to reduce delay, minimize turning conflicts, and maintain an acceptable level of safety for motorists, pedestrians, and cyclists. Therefore, before direct access to a regional road will be permitted, alternate access opportunities must be explored and the need for access to the regional system must be demonstrated.

2.1 Entranceway Type

The following sections describe the types of entranceways which may be acceptable, with conditions, on regional roads.

2.1.1 Signalized and Unsignalized Intersection

An intersection is defined by the Highway Traffic Act as “the area embraced by the prolongation of lateral curb lines or, if none, of the rights-of-way of two or more highways that join one another at an angle, whether or not one highway crosses the other”. In a signalized intersection all movements are controlled by a traffic signal. Stop controlled and uncontrolled intersections are considered to be unsignalized.

For the purpose of this Guideline when determining access spacing requirements, a roundabout is considered as an unsignalized intersection.

2.1.2 Full Movements Entranceway

An entranceway which allows left-in and left-out movements and right-in and right-out movements. A full movement entranceway will only be considered when the safety and capacity of the roadway will not be adversely affected, and minimum spacing requirements can be achieved, if feasible.

2.1.3 Partial Movements Entranceway

Any entranceway where the full movement is not provided. Where possible, the Developer will be responsible to construct a centre median of 30 metres (starting from the end of the curve) on either side of the entranceway curb extension, or to the end of a left-lane taper. At locations where a centre median can not be constructed due to limited roadway width or adjacent entrance constraints, the Developer may be required to build a directional island to physically restrict the movements at the entrance point.

Five type of access restrictions are considered as part of this Guideline[1]:

- Right-in/Right-Out entranceway.
- Inbound left-turn restriction.
- Left-turn egress restriction.
- Right-in only entranceway.
- Exit only entranceway.

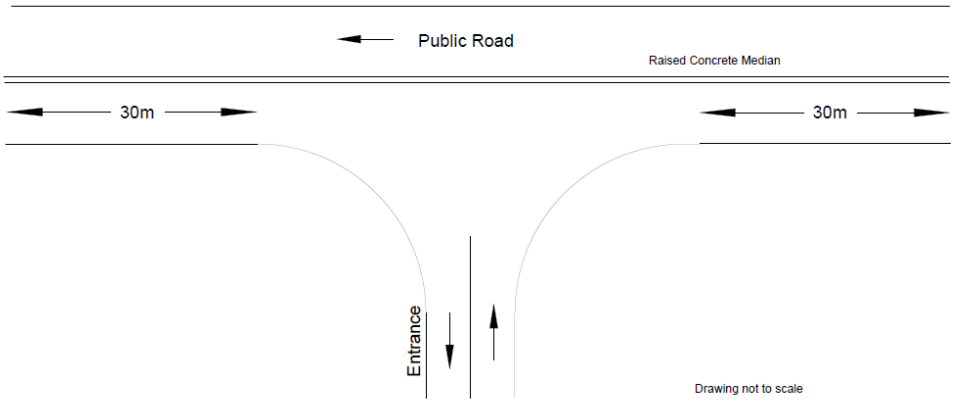


Figure 1 Example of Right-In/Right-Out Entranceway

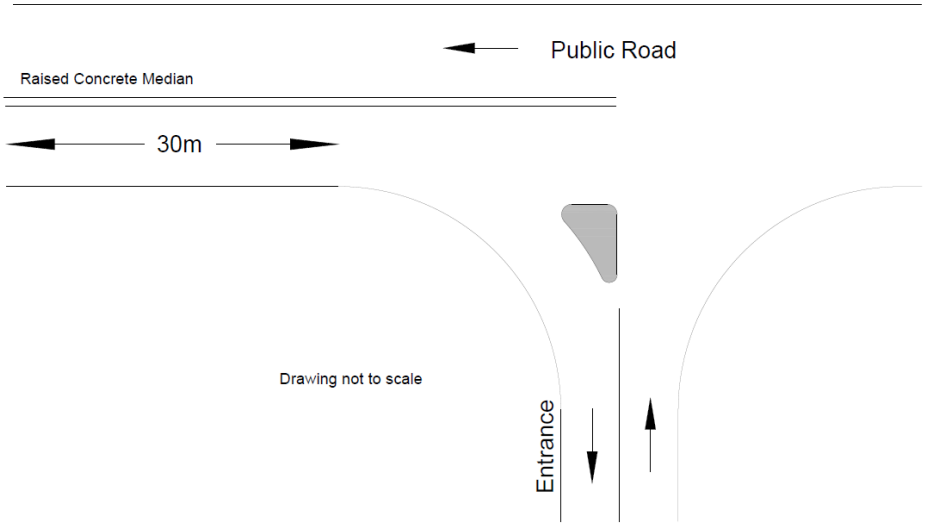


Figure 2 Example of Inbound Left-Turn Restriction

[1] Figures based on schematic representations of access turning restrictions as presented in the City of London's Access Management Guidelines – Chapter 2.

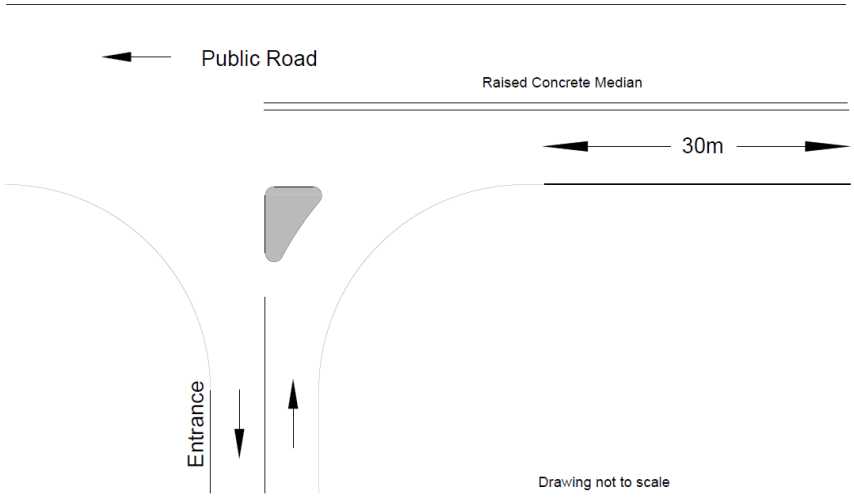


Figure 3 Example of Left-Turn Egress Restriction

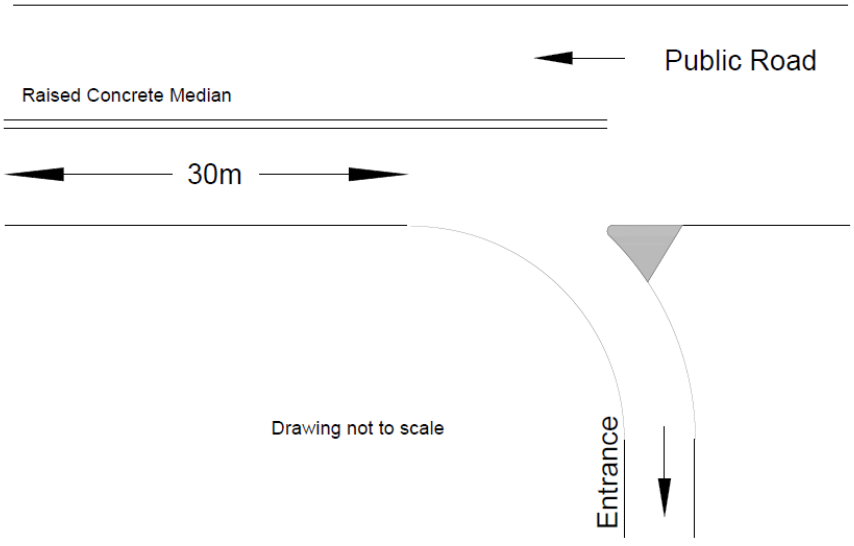


Figure 4 Example of Right-In Only Entranceway

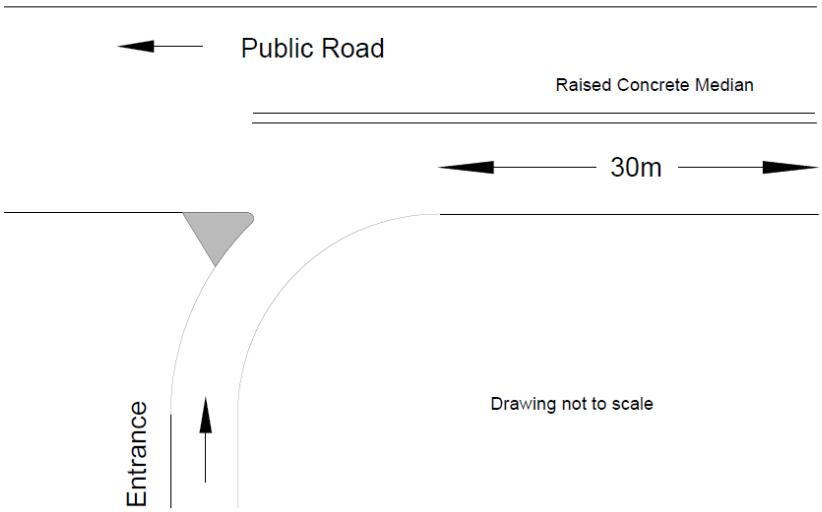


Figure 5 Example of Exit Right-out Only Entranceway

2.1.4 Emergency Entranceways

Any development in which Section 9 of the Ontario Building Code applies, may be required to be provided with emergency access routes. Although these emergency entranceways may provide access to regional roads, such determination shall be made by the Fire Department of the corresponding LAM prior to Site Plan Approval in principle for the proposed development. Emergency entranceways are intended to be provided into areas that would be otherwise cut off, such as cul-de-sacs. These emergency entranceways are not intended for normal driving and are typically only accessible to emergency services by the opening gates or bollards.

2.2 Entranceway Spacing

Dense placement of entranceways can increase conflicts between turning and through vehicles and will introduce delay to the traffic stream due to this potential disruption of traffic. In addition, the placement of entranceways close to the functional area of an existing intersection can further complicate traffic operations and safety.

From an access management perspective, it is critical to locate new entranceways in areas where they will not interfere with other elements. Some examples of areas where new entranceways should be limited or restricted are near signalized intersections, limited access interchange ramps, other entranceways and median openings, and roundabouts. Placing a new entranceway close to these elements may create an unsafe roadway environment.

2.2.1 Offset Entranceways

Entranceways located on opposite sides of an undivided street may have the potential to generate conflicting left turns and associated safety problems (**Figure 6**). As such, aligning a proposed entranceway with an existing opposite entranceway is always preferred (**Figure 7**)[2].

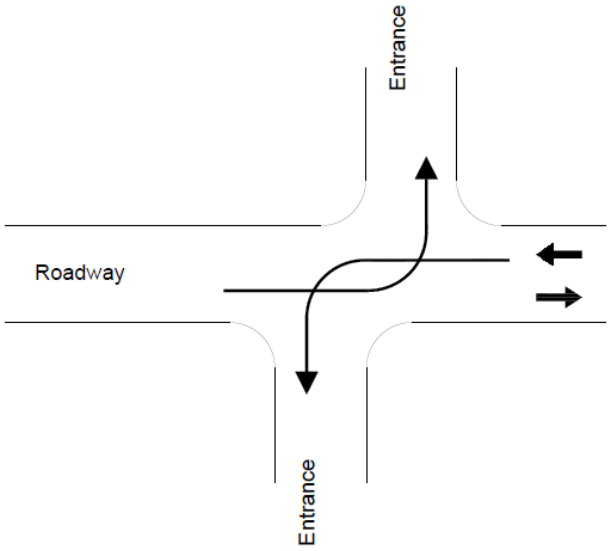


Figure 6 Example of Negative Offset Entranceway

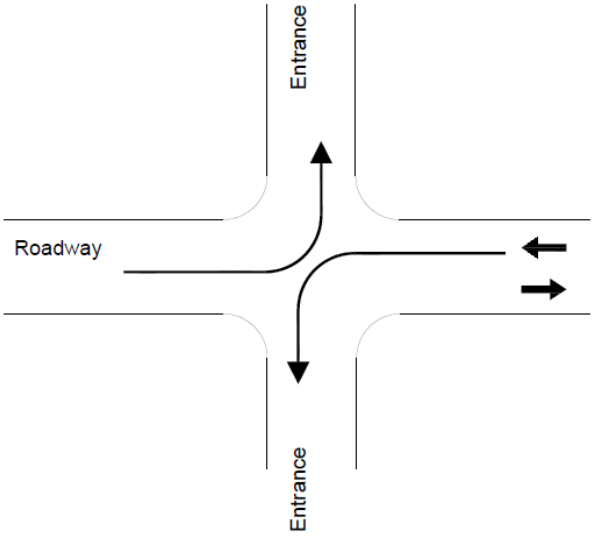


Figure 7 Example of Aligned Entranceway

[2] Figures based on schematic representations of connections on opposite sides of a roadway as presented in the Transportation Research Board's Access Management Manual, Second Edition.

If not feasible, placement of those entranceways will require and adequate separation to create two separately functioning T-intersections (**Figure 8**). The minimum offset distance to avoid overlapping left-turns is 50 metres.

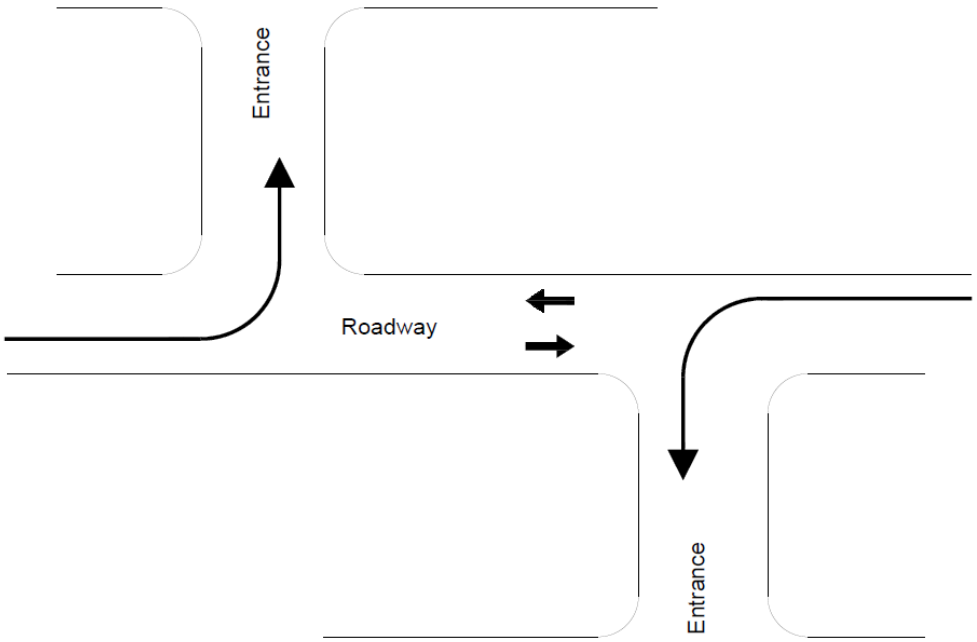


Figure 8 Example of Positive Offset Entranceway

2.2.2 Joint Entranceways and Internal Connections

Joint entranceway and common internal driveways are used to reduce the number of entrance points along a corridor while maintaining reasonable access to adjacent land uses.

A joint entranceway may be constructed if both property owners abutting a common property line agree, or if a row of neighbouring property owners agree. This encourages neighbouring property owners to construct a shared entranceway in lieu of separate ones. Strategies for implementing this access control measure include closing existing entranceways or authorizing joint-use ones. The feasibility of this measure should be viewed as part of the development approval process and may require easements as well as conformance will all other policies (i.e., separation, setbacks).

The physical means by which multiple entranceways can be consolidated between two adjacent properties involves the construction of a joint entranceway between two or more properties. If between two properties, it is recommended that both property owners own

the joint entrance drive in part. That is, the entranceway should straddle the property line dividing the two establishments.

If between more than two properties, the resulting joint-use parking area should be accompanied by an efficient internal circulation plan as shown in **Figure 9**[3].

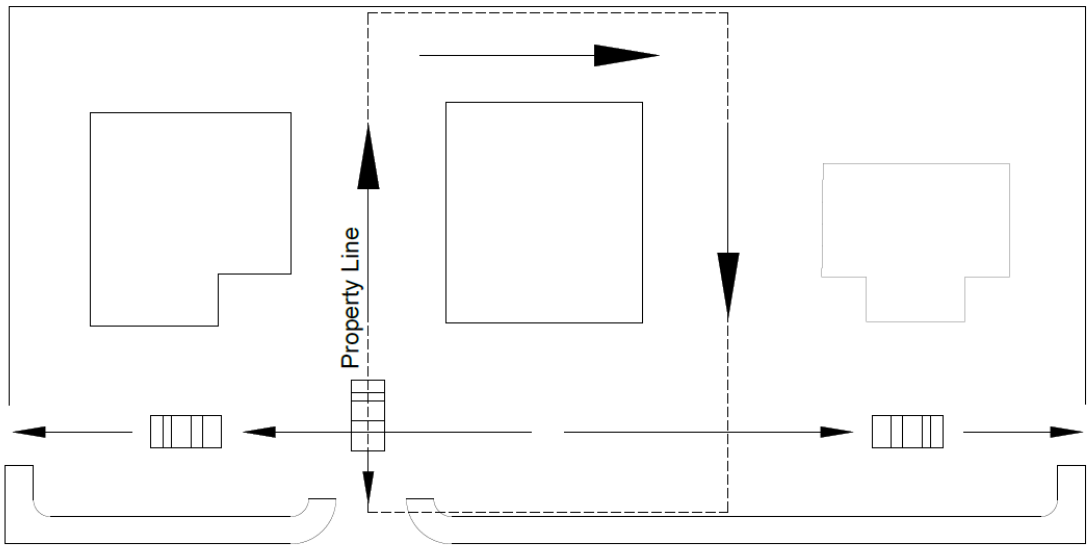


Figure 9 Example of Joint Entranceway and Internal Site Connection

2.2.3 Intersection Functional Area

The functional area includes any area upstream or downstream of an intersection where intersection operation and conflicts severely influence driver behaviour and in consequence vehicles interactions and traffic conditions and it is composed by the elements schematically presented in **Figure 10**[4].

[3] Figure based on schematic representation of joint-used driveways as presented in the Transportation Research Board's Access Management Manual, Second Edition.
[4] Figure based on schematic representation of intersection functional area as presented in the Transportation Research Board's Access Management Manual, Second Edition.

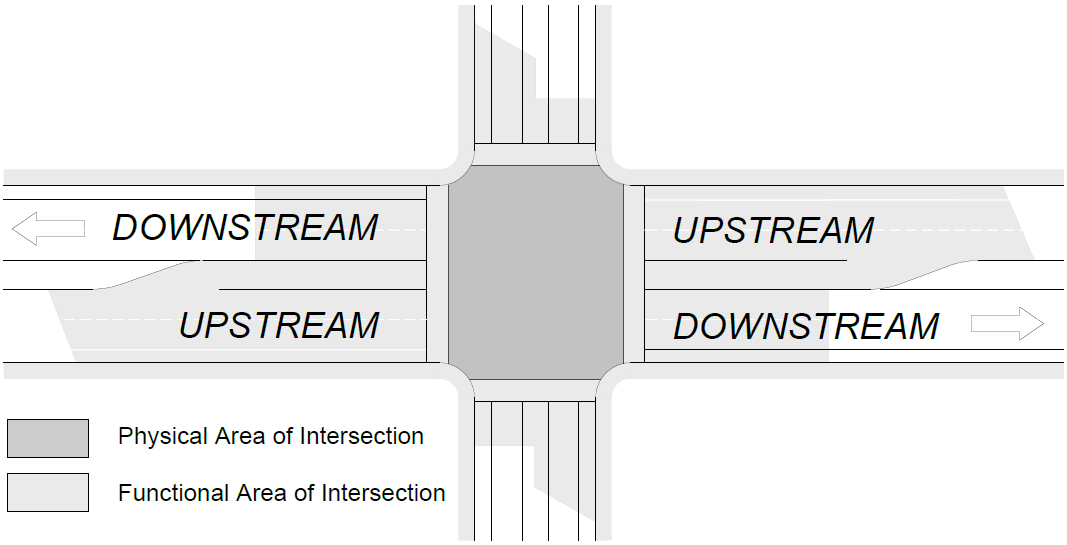


Figure 10 Intersection Functional Area

2.2.3.1 Upstream Functional Area

The upstream functional area of an intersection is based on the stopping sight distance and the queuing requirements.

The upstream functional area includes the following three components.

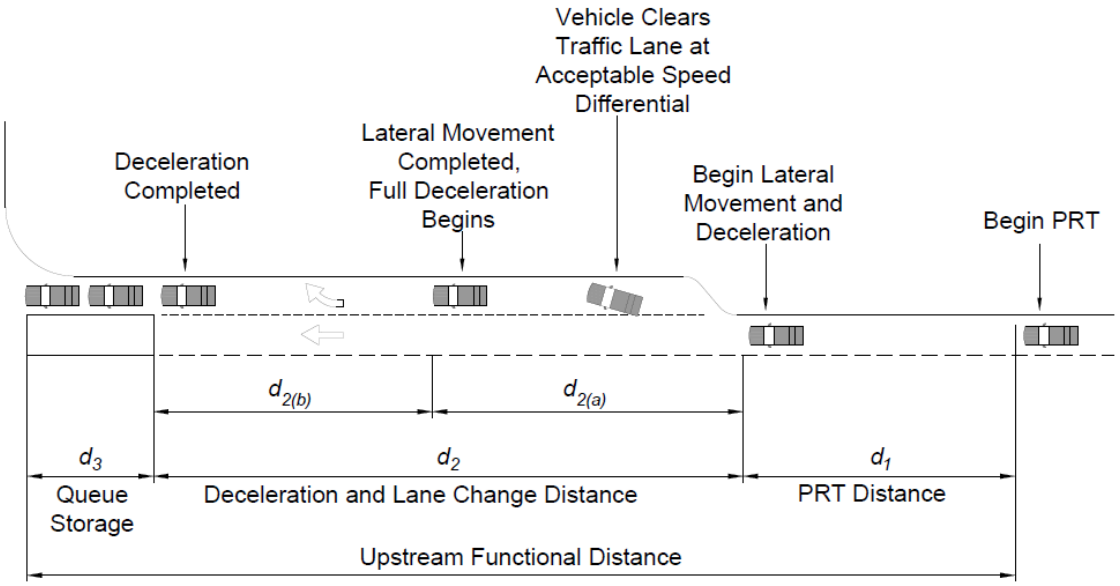
- **Perception – Reaction Distance (PRT)**. The PRT distance required by drivers varies depending on certain factors. For motorists who frequently use the corridor, this may be as little as one second or less. However, unfamiliar drivers may not be in the proper lane to execute the desired maneuver and may require three or more seconds.
- **Deceleration Distance**. The deceleration distance may consist of two components: lane change (taper) and deceleration. Taper is the portion of the roadway that begins the transition to the turn lane, while deceleration is the distant needed to properly slow a vehicle to the storage portion of the intersection.
- **Stopping Queue or Storage Length**. Considered as the adequate length for the storage of traffic waiting to perform a turn[5].

As such the minimum length of the upstream functional area can be estimated as follow:

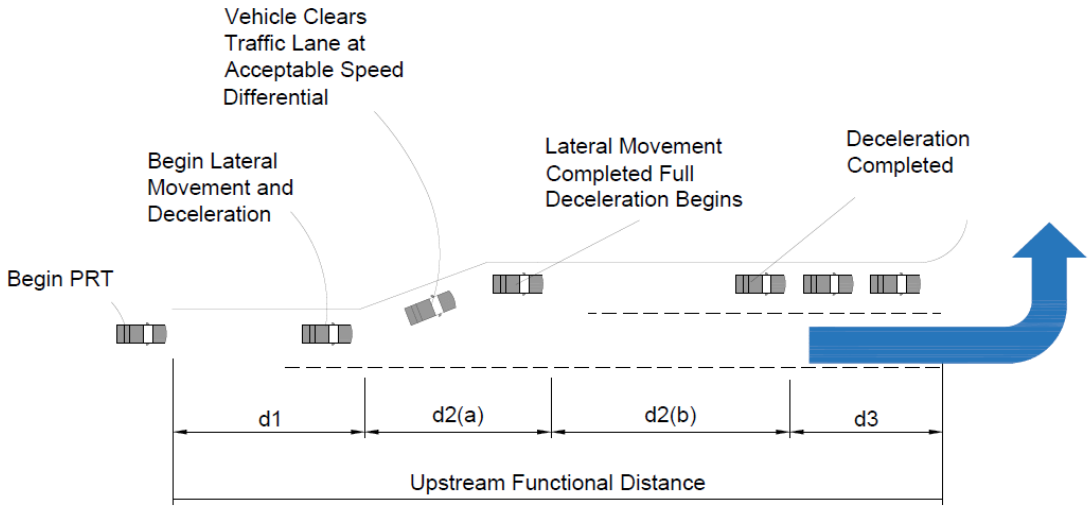
Upstream Functional Distance = *Perception Reaction Distance + Deceleration Distance + Storage Length*

[5] The minimum required storage is based on 95th percentile length.

Thus, the functional intersection area is defined by the largest functional intersection distance of the lanes on an approach as illustrated in **Figure 11**[6] for a roadway with a right or left turning auxiliary lane (A and B respectively).



(A) Right Turning Lane



(B) Left Turning Lane

Figure 11 Upstream Functional Distance at Intersection

[6] Figure based on schematic representations of upstream functional area as presented in the Transportation Research Board's Access Management Manual, Second Edition.

Proposed entranceways within this functional distance will be restricted so to not impact the operation and safety of the intersection. If the aforementioned information is not available and after receiving a formal approval from regional staff, the upstream functional distance shall be understood as beginning at the start of taper of turning lanes.

2.2.3.2 Downstream Functional Area

As shown in **Figure 12**[7], the downstream functional area occurs after exiting the intersection, where the driver accelerates and requires adequate distance to safely negotiate any potential conflict.

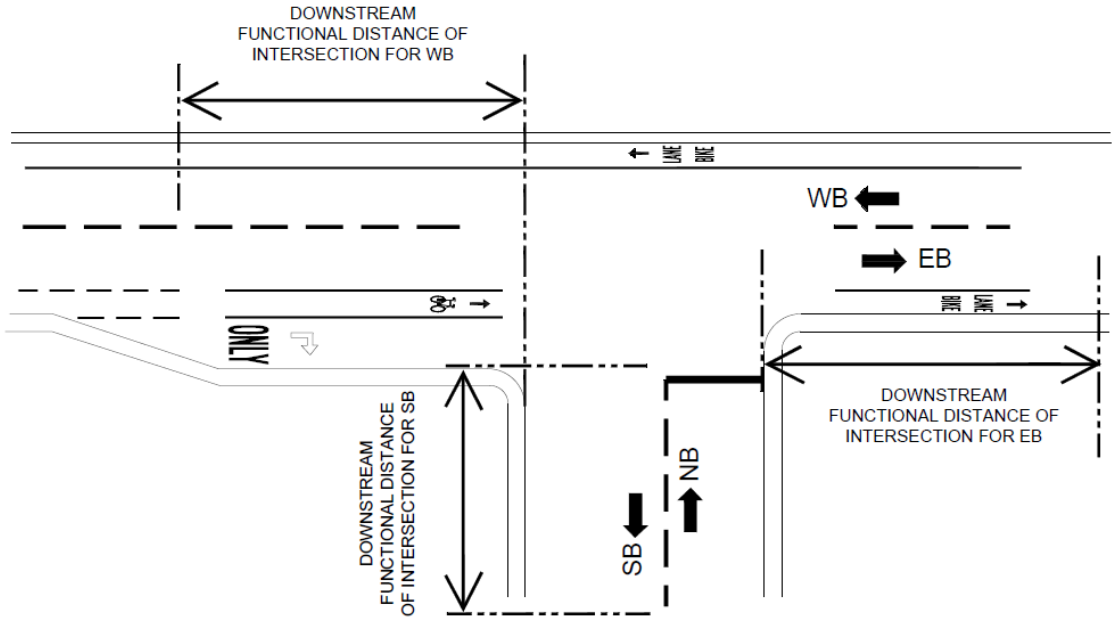


Figure 12 Downstream Functional Length of Intersection

Although the length of the downstream functional area depends on several criteria such as stopping sight distance, influence distance, perception-reaction time, and the right-turn conflict overlap, for the purpose of this Guidelines, the decision sight distance should be used to determine the downstream functional distance, as listed in **Table 1**.

Proposed entranceways within this functional distance will be restricted so to not impact the operation and safety of the intersection.

[7] Figure based on schematic representation of downstream functional length of intersections as presented in a Green Bay Plan Commissions' Technical Memorandum.

Table 1 Minimum Downstream Functional Distance

Road Typology	Characteristics	Posted Speed (km/h)	Minimum Downstream Functional Distance
Main Street	High activity corridors with street-facing built form, mixed-use development, and a vibrant pedestrian realm.	40 – 50	75 metres
Urban General	Streets within existing and future built-up areas that reflect both mobility and place-making priorities with a narrow right-of-way.	40 – 50	75 metres
Thoroughfare (Urban)	Streets within existing and future built-up areas where mobility is a major priority and there is occasional interaction between the street and adjacent land-uses.	50 – 80	125 metres
Thoroughfare (Rural)	Roads in rural areas where mobility is a major priority and that have a wide right-of-way.	60 – 80	100 metres
Rural Scenic	Roads that reflect both mobility and other priorities such as tourism and scenic landscapes.	50 - 60	75 metres
Hamlet	Streets within Hamlet areas that reflect both mobility and place-making priorities.	40 - 50	75 metres

2.2.3.3 Corner Clearance

Corner clearance is measured from the extension of the curb line at an intersection to the centreline of the nearest entranceway and should be governed by the functional area of

an intersection. Corner clearance for entranceways shall meet or exceed the minimum requirements for regional roads unless:

- No other reasonable access to the property is available.
- Effective joint entranceway and common internal driveways between adjacent properties cannot be achieved; and
- The Niagara Region determines that the entranceway does not create a safety or operational problem.

If the regional minimum requirements for corner clearance can not be met, the clearance will be decided based on other standards, engineering judgments to justify the access location.

For a roundabout intersection, no entranceway will be permitted within 50 metres minimum[8] measured from the outer edge of the inscribed circle of the roundabout, without prior approval from the Niagara Region. If an entranceway is approved within the 50 metres of the outer edge of the inscribed circle it shall be “Right-in/Right Out” only.

2.2.4 Interchange Access Offset Spacing

The Ministry of Transportation has established standards for the spacing of various access connection types, depending on whether the access connection is on a highway or a public road within the MTO’s permit control area. The Ministry’s access spacing standards are outlined in Section 4.6.2. of the Ministry’s Highway Corridor Management Manual (September 2018) as amended in 2022.

2.2.5 Signalized Intersections Spacing

Niagara Region’s Transportation Impact Assessment (TIA) Guidelines specify that all proposed traffic and pedestrian signals should be evaluated for conformance to Region Standards, proximity to other adjacent traffic signals, traffic signal progression and any impacts on the corridor. As such, any proposed signalized intersection by the Developer or requested by the Region on a regional road will require the Developer to assess the need of traffic control signals, either within a TIA or through a separate traffic signal warrant analysis by using the technical warrants established by the Ministry of Transportation Ontario (MTO), as well as engineering judgment.

Where warrants are met, traffic signals will be required to be installed at the cost of the Developer. The optimal spacing of signalized intersection depends on the cycle length, the posted speed limits, and the typology of the corridor. Long cycle lengths and high

[8] Stopping sight distance estimated for a design speed of 40 kilometres per hour. TAC “Geometric Design Guide for Canadian Roads – Chapter 2, Design Controls, Classification and Consistency”.

speeds usually require longer distances between signals. Shorter cycle lengths and lower speeds enable closer spacing between signals.

Based on Regional standards, the minimum intersection spacing along regional roadways is 150 m, and only applicable in areas of intense existing development or restrictive physical controls such as Main Streets and streets within Hamlet areas where the design prioritizes the pedestrian realm.

Region staff will require and apply the desirable signal spacing if the subject signal maintains the capacity and safety of the transportation corridor, or if the signal does not impact signal progression excessively. The signal spacing may only be reduced to the minimum spacing if substantiated through the submission of a comprehensive corridor analysis and transportation impact assessment, analysing all possible alternatives, and taking into consideration land use and community factors.

Table 2 outlines the desirable and minimum spacing requirements between signalized intersections along regional roads.

Table 2 Spacing between Signalized Intersections

Road Typology	Desirable Intersection Spacing from Nearest Existing or Planned Traffic Signal	Minimum Intersection Spacing from Nearest Existing or Planned Traffic Signal
Main Street	200 metres	150 metres
Urban General	350 metres	250 metres
Thoroughfare (Urban)	350 metres	250 metres
Thoroughfare (Rural)	600 metres	600 metres
Rural Scenic	600 metres	600 metres
Hamlet	200 metres	150 metres

2.2.6 Unsignalized Intersection Spacing

The optimal unsignalized intersection spacing depends on the following criteria:

- **Access Density**. It is the number of unsignalized intersections per kilometre. The relative collision rates increase as the number of unsignalized access per kilometre increases.
- **Stopping Sight Distance (SSD)**. It is the distance needed by the driver to react to a conflict and come to a complete stop. The stopping sight distance depends on the vehicle speed as described in TAC "Geometric Design Guide for Canadian Roads – Chapter 2, Design Controls, Classification and Consistency".
- **Intersection Sight Distance (ISD)**. It is the sight distance to left and right available to a driver intending to execute a maneuver onto a through roadway from an intersecting roadway as described in TAC "Geometric Design Guide for Canadian Roads – Chapter 9, Intersections".
- **Intersection Functional Area**. The intersection functional area defines the conflict area upstream and downstream of the intersection (See Section 2.2.3).
- **Right-Turn Conflict Overlap**. It is the definition of a situation in which a driver has to keep attention to more traffic entering from more than one intersection/access at a time when traveling through a road.
- **Influence Distance**. Defines the right-turn exit influence on through traffic, and it is the sum of the impact length, the length of a cart and the perception-reaction distance.
- **Egress Capacity**. The term refers to the ability of a vehicle to enter a roadway when exiting a property.

Since the minimum acceptable spacing can be affected by surrounding land uses, spacing of unsignalized intersections should be addressed on a case-by-case basis. When the unsignalized intersection is expected to be signalized in the future, signal access spacing should be followed.

When determining the distance between a roundabout and another access, the measurement is not taken from the centerline. Instead, the point of reference is the Yield Line of the nearest approach (see **Figure 13**)[9].

[9] Figure based on schematic representation of roundabout spacing as presented in the State of Virginia's Road Design Manual – Appendix F, Access Management Design Standards for Entrances and Intersections.

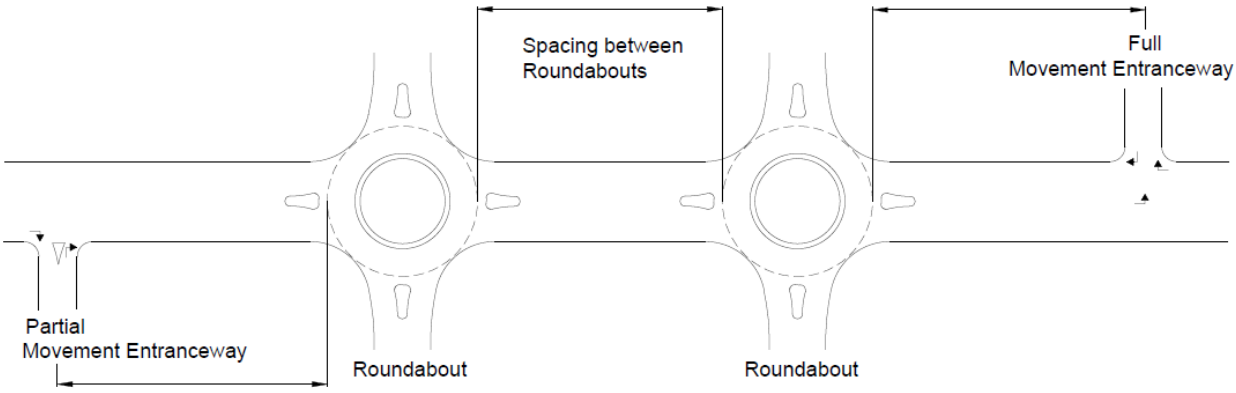


Figure 13 Spacing from Roundabouts

2.2.7 Full Movement Entranceway Spacing

This refers to spacing from full movement entranceways to other signalized intersections, unsignalized intersections, and full movement entranceways as shown in **Figure 14**[10].

The spacing should be based on intersection sight distance to ensure that drivers approaching the entranceway or turning out of the entranceway have sufficient time to react to through and access traffic and to merge safely when making right and left turns[11].

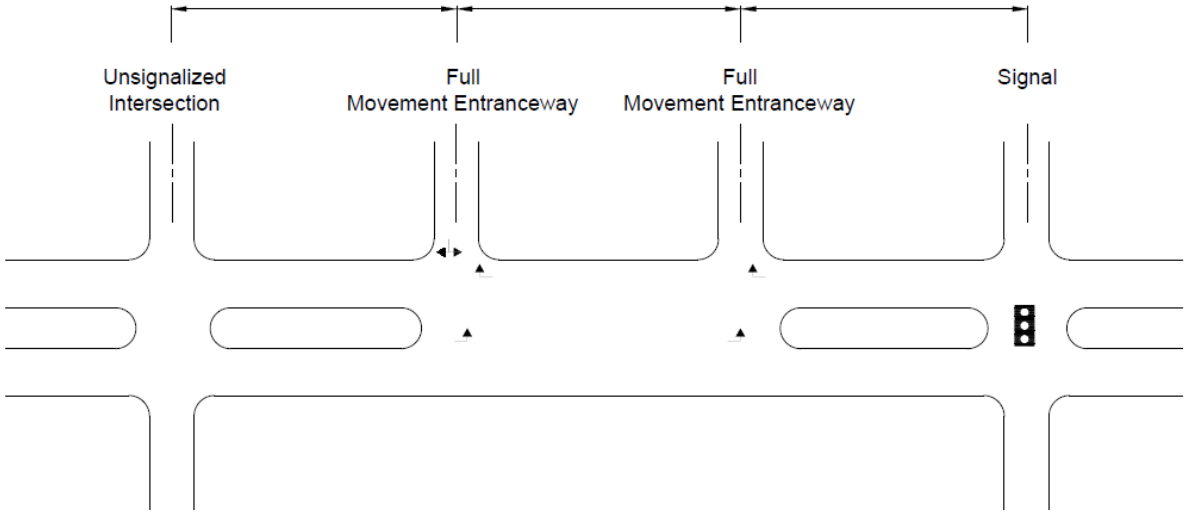


Figure 14 Spacing from Full Movement Entranceway

[10] Figure based on schematic representation of full movement accesses spacing as presented in the State of Virginia's Road Design Manual – Appendix F, Access Management Design Standards for Entrances and Intersections

[11] TAC "Geometric Design Guide for Canadian Roads – Chapter 9, Intersections".

Table 3 outlines the minimum spacing requirements for full movement entranceways along regional roads. If the minimum spacing can not be met, the spacing will be decided based on other standards, engineering judgments to justify the access location[12].

Table 3 Spacing between Full Movement Entranceways

Road Typology	Posted Speed (km/h)	Number of Lanes (Both Directions)	Minimum Spacing
Main Street	40 – 50	2	85 metres
Urban General	40 – 50	5	85 metres
Thoroughfare (Urban)	50 – 80	4	150 metres
Thoroughfare (Rural)	60 – 80	2 - 4	125 metres
Rural Scenic	50 - 60	2	100 metres
Hamlet	40 - 50	2	85 metres

2.2.8 Partial Movement Entranceway Spacing

This type of spacing applies to spacing from partial movement entranceways to other signalized and unsignalized intersections, full movement entranceways and other partial movement entranceways (See **Figure 15**)[13].

The priority for this type of entranceway is (1) to provide drivers with adequate time to observe and react to another vehicle slowing down in front of them to turn into an entranceway or to a vehicle exiting the entranceway and (2) to stop in time to avoid a collision. Stopping sight distance should be used for this purpose[14].

[12] Access spacing shall be measured from centre line to centre line.
[13] Figure based on schematic representations of partial movement accesses spacing as presented in the State of Virginia's Road Design Manual – Appendix F, Access Management Design Standards for Entrances and Intersections
[14] TAC "Geometric Design Guide for Canadian Roads – Chapter 2, Design Controls, Classification and Consistency".

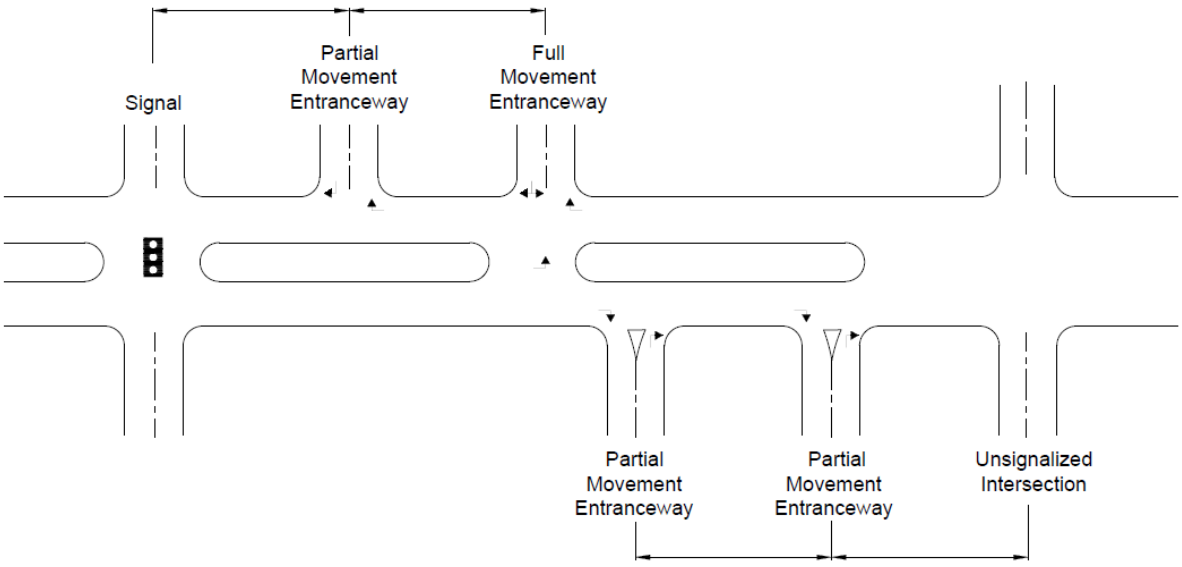


Figure 15 Spacing from Partial Movement Entranceways

Table 4 outlines the minimum spacing requirements for partial movement entranceways along regional roads. If the minimum spacing can not be met, the spacing will be decided based on other standards and engineering judgments to justify the access location.

Table 4 Spacing between Partial Movement Entranceways

Road Typology	Posted Speed (km/h)	Minimum Spacing
Main Street	40 – 50	75 metres
Urban General	40 – 50	75 metres
Thoroughfare (Urban)	50 – 80	100 metres
Thoroughfare (Rural)	60 – 80	75 metres
Rural Scenic	50 - 60	75 metres
Hamlet	40 - 50	75 metres

2.2.9 Spacing Considerations for Entranceways on Opposite Sides of the Road

In the case that two entranceways are not directly across from each other creating a 4-way intersection, the examination of the relative location of opposite entranceway constitutes good design practice to ensure that left turn movements do not conflict. To this purpose, a minimum offset of 55 metres between entranceway centrelines is desirable. **Table 5** presents the minimum offset for entranceways on opposite sides of a roadway, as shown on Exhibit 14-23 of TRB's Access Management Manual and based on applicable road typology. These restrictions do not apply to restricted entranceways.

Table 5 Minimum Offset for Unrestricted Entranceways on Opposite Sides of a Roadway

Posted Speed (Km/hr)	Applicable Road Typology	Offset (metres)
less than 50	Main Street Urban General Hamlet	55
55	Urban General Rural Scenic	100
65	Thoroughfare (Urban and Rural)	200
80		300

2.2.10 Median Opening Spacing

The Niagara Region Complete Streets Design Manual identifies two types of continuous medians suitable for "Urban General" and "Urban Thoroughfare" road typologies as follows:

- Centre two-way left turn-lane (CTWLT) that can be defined as a continuous lane located between opposing traffic flows that provides a refuge area from which vehicles may complete a left turn from a roadway; and
- Raised curb median that can be defined as a physical barrier in the roadway that separates traffic traveling in opposite directions. Openings in medians can perform the following functions:

- Accommodate cross traffic and left-turn movements to adjacent developments, and
- Permit U-turns on divided roadways

The minimum spacing between two adjacent median openings should be determined by the distance required to accommodate exclusive left turn lanes between them or the corresponding spacing guidelines as shown in **Table 3** whichever is greater.

An illustration in the form that the distance between median openings is measured is presented in **Figure 16**[15].

The Developer or the Developer's consultant shall be responsible that the spacing meet minimum traffic engineering standards for storage, deceleration, sight distance and maneuverability.

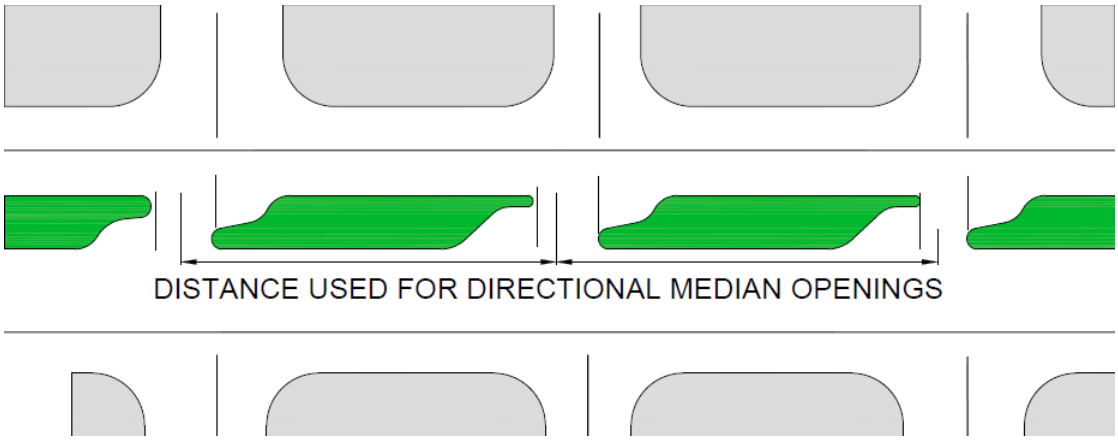


Figure 16 Median Opening Spacing

2.2.11 Spacing Considerations for Entranceways near at-grade Railway Crossing

The Grade Crossings Standards issued by Transport Canada (TC) in January 2019 indicates that a public grade crossing where the railway design speed is more than 25 km/h must be constructed so that no part of the travelled way of an intersection road or

[15] Figure based on schematic representation of median opening spacing as presented in the Missouri Department of Transportation's Engineering Policy Guide – Section 940.7.

entranceway (other than a railway service road), is closer than 30 metres to the nearest rail of the grade crossing (such as D in **Figure 17**)[16].

As such the minimum separation between an existing railway crossing and a proposed entranceway shall comply with the current Transport Canada guidelines.

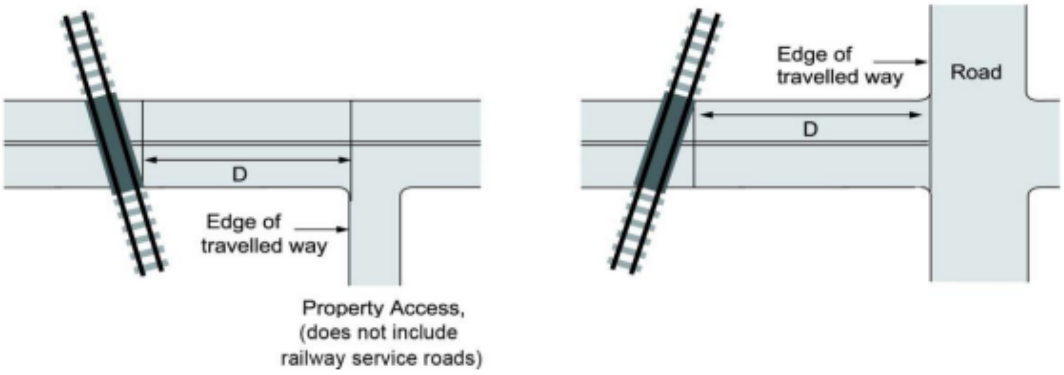


Figure 17 Separation between at-grade railway crossing and entranceways.

[16] Figure based on schematic representation of property access near railway crossings as presented in the Region of Halton Traffic Operations and Safety Study Policy Papers.

3 Entranceway Design

Entranceway design guidelines identify the design thresholds from which desirable operations can be maintained. Entranceway design guidelines are an important part of the entranceway design process. These guidelines help the slower turning traffic move off the arterial road more quickly and help the traffic leaving the entranceway turn and enter the stream of traffic more efficiently. For the purpose of this Guideline, an entranceway is defined as a driveway entrance that is constructed within the public right-of-way to connect a regional road with an adjacent property.

The traffic activities that occur on a site in the vicinity of the proposed entranceway can also affect the traffic operations of the regional road.

Key objectives for the effective management of traffic operations are:

- To reduce delay.
- Remove the need for undesirable movements such as backing out onto the regional road.
- Minimize turning conflicts, and
- Maintain an acceptable level of safety for pedestrians, cyclists, and motorists.

Adequate implementation of driveway geometrics can improve safety of all road users, improve the ingress and egress of vehicles to/from the development, and minimize the impact on through traffic on the regional road.

3.1 Entranceway Width

Due to the relationship between the right turn radius and the entranceway width, the design of the one-way and two-way entranceways should follow the design domain approach established by OPSD standards, (TAC) Geometric Design Guide for Canadian Roads or municipal zoning requirements.

3.2 Entranceway Throat Length

The entranceway throat length is defined as the storage distance from the outer edge of the traveled way of the intersecting roadway to the first on-site intersecting drive aisle or parking stall (see **Figure 18**)[17].

This length depends on the development size, land use and road classification and minimum values for the different road typologies are presented in **Table 6**.

[17] Figure based on schematic representation of a Driveway Throat Length as presented in the City of McAllen's Traffic Operations – Access Management Policy.

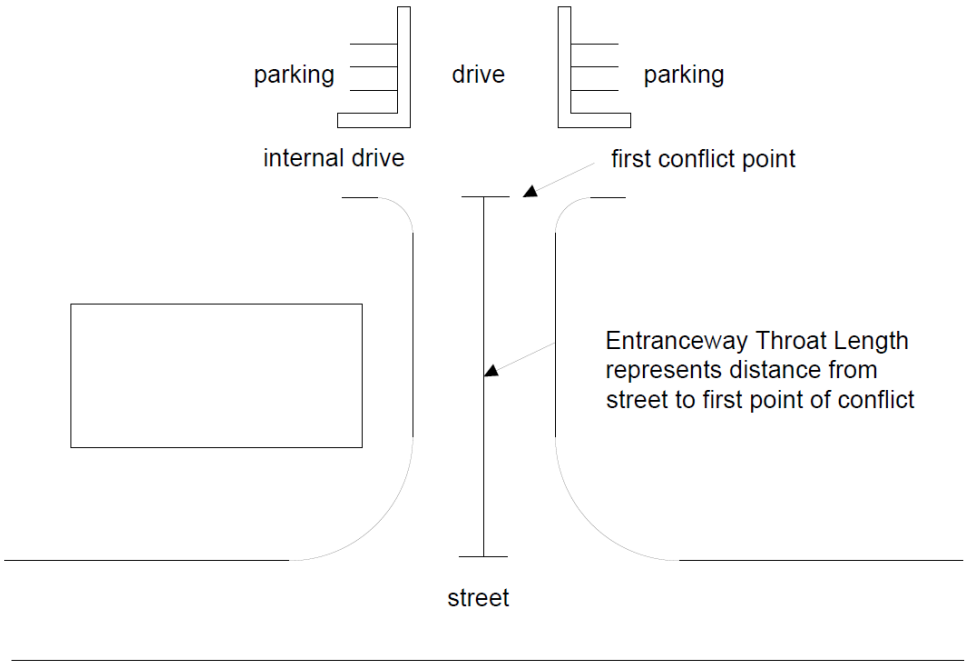


Figure 18 Depiction of Entranceway Throat Length

However, since an inadequate provision of throat length may result in frequent blocking of on-site circulation roads which the consequent queues of entering vehicles, a detailed queueing analysis should be conducted for major developments as part of a Transportation Impact Assessment that considers the following[18]:

- The traffic control provided at the intersecting roadway, the anticipated volumes, and types of traffic,
- The distance required to store the projected number of vehicles leaving the entranceway,
- The distance required to react to potential conflicts ahead after turning into the entranceway, and
- The distance to complete any weaving manoeuvre for the projected traffic volume, where more than one lane per direction is present and weaving take place.

[18] A detailed queueing analysis may be requested for potential traffic operation impacts.

Table 6 Minimum Throat Length

Land Use	Site Area (m2)	Minimum Throat Length (m)	
		Main Street Urban General	Thoroughfare Rural Scenic Hamlet
Light Industrial	Less than 10,000 More than 10,00	15 30	40 70
Shopping Centre	Less than 45,000 More than 45,000	30 45	60 130
Office	Less than 10,000 More than 10,000	25 50	60 130
Mixed-use	All sizes	30	70
Multi-family	All sizes	20	50

3.2.1 Drive-Through Facilities

For the purpose of this Guideline a “Drive-Through Facility” can be defined as the use of land, building or structures, or parts thereof, to provide or dispense products or services, either wholly or in part, through an attendant or a window or automated machine, to persons remaining in motorized vehicles that are in a designated stacking lane. A stacking lane means an on-site queuing lane for motorized vehicles which is separated from other vehicular traffic and pedestrian circulation by barriers, markings, or signs.[19]

For the purpose of this Guideline a drive-through facility does not include a car washing establishment, automobile service station or a gas bar.

Although public convenience and accessibility can increase with the use of drive-through facilities, their operations often result in[20]:

- Traffic generation and congestion.

[19] City of Toronto, Urban Development Services “Urban Design Guidelines for Sites with Drive-Through Facilities”, May 2005.
[20] City of Oshawa, “Background Study of Drive-through Facilities in the City of Oshawa”, May 2016

- Conflicts with facility operations such as parking areas.
- Poor urban design.
- Safety issues related with interference between on-street vehicular traffic. movements and site access.
- Reduced pedestrian safety, and
- Increase noise, air, and light pollution.

3.2.1.1 Stacking Lane

- **Restaurants**. A minimum of 12 stacking spaces shall be provided.
- **Coffee Shop**. A minimum of 15 stacking spaces shall be provided.
- **Financial Institutions**. A minimum of 8 stacking spaces for a facility associates with a bank, trust company or finance company.
- **Pharmacies**. A minimum of 3 stacking spaces for a facility associated with any other land use, including pharmacies, shall be provided.

The length of the stacking lane shall consider the space at the point of service. The point of service shall be considered the first point in the forward vehicle flow at which a product consumer places a request for the service provided on-site (see **Figure 19)**[21]**.**

No portion of the stacking lane shall block any parking space or entranceway regardless of the length of the stacking lane.

Storage for two vehicles must be provided past the forwardmost drive-up window and before the nearest pedestrian or vehicle crossing point.

It is the responsibility of the Developer or the Developer's consultant that such sites are well designed, safe, function efficiently, and do not impact on adjacent roads and land uses, and shall refer to the zoning by-laws for staking requirements for development's LAM.

[21] Figure based on schematic representation of Drive-thru Lane standards as presented in the EDH Area Planning Advisory Committee Guidelines – Citation 7.

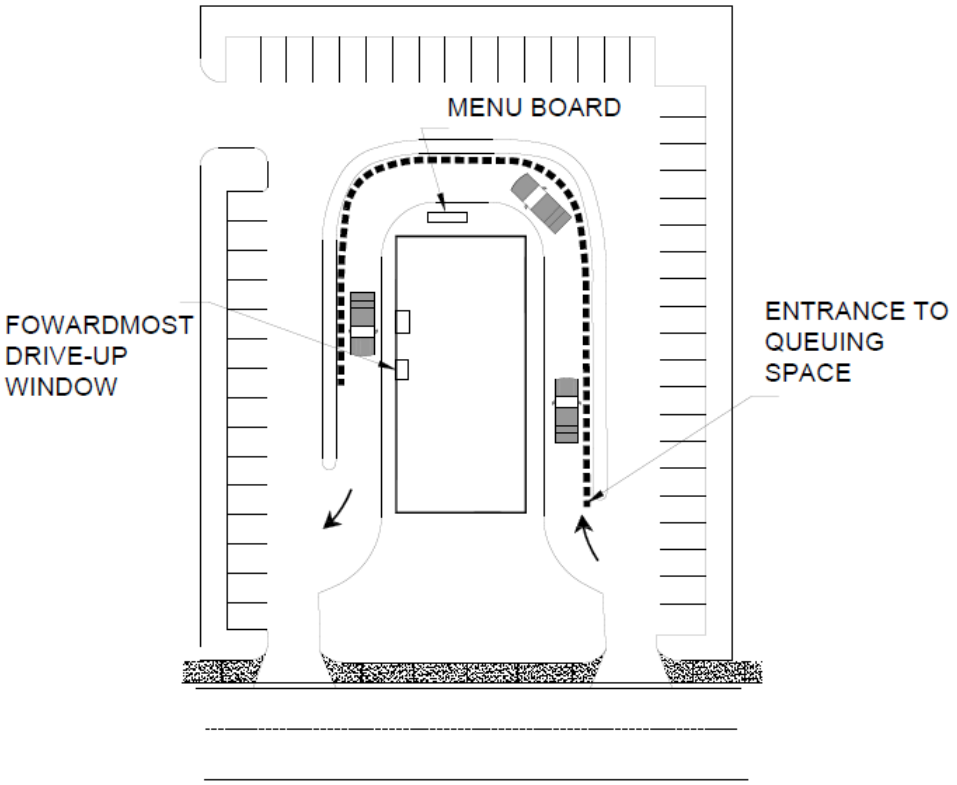


Figure 19 Schematic Representation of a Drive-Through Stacking Lane

3.3 Sight Distance

The design of entranceways servicing commercial, industrial, and large residential developments should consider the provision of adequate sight distance based on the design speed of the intersected roadway and the sight triangle requirements as stated in TAC's Geometric Design Guide for Canadian Roads – Chapter 9, Intersections.

For the purpose of this Guidelines, two types of sight triangles are considered: approach sight triangle and departure sight triangle.

3.3.1 Approach Sight Triangle

Approach sight triangles provide the driver of a vehicle approaching at an entranceway an area that is free of any obstructions that might block their view of potentially conflicting vehicles on the intersecting entranceway. The legs of this sight triangle should be long

enough so that drivers can see potentially conflicting vehicles and have sufficient time to slow or stop to avoid a collision. (See **Figure 20**)[22]

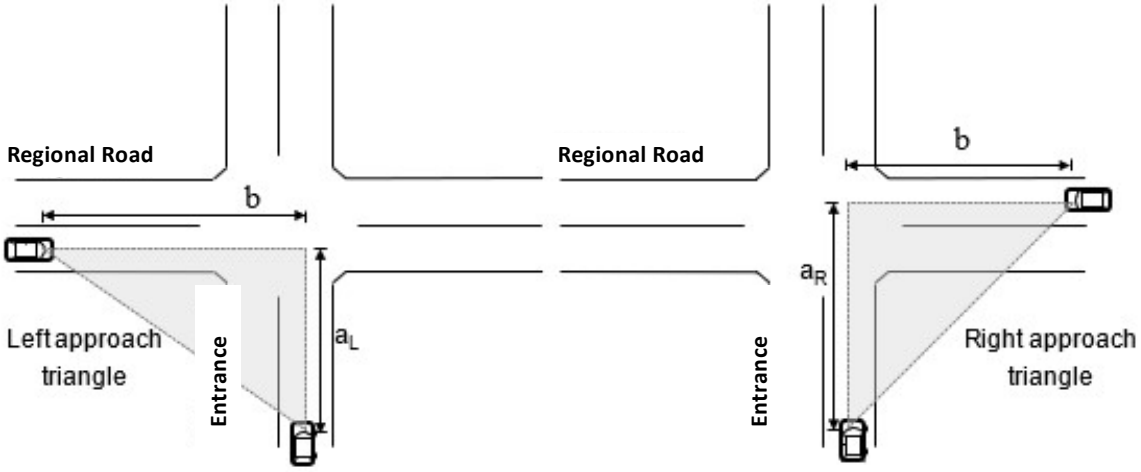


Figure 20 Approach Sight Triangle

3.3.2 Departure Sight Triangles

Departure sight triangles are needed to provide sufficient sight distance for a stopped driver on an entranceway approach to depart, enter, or cross, the intersecting roadway. (See **Figure 21**)[23]. The requirement of departure sight triangles at the entranceway will depend on the type of traffic control used.

The intersection sight distance along the regional road (distance b) is determined by:

$$ISO = 0.278V_{major}\ (tg)$$

Where: ISO = intersection sight distance (length of the leg of sight triangle along the regional road) (m)

V_{major}= design speed of the regional road (km/h)

tg = time gap for departing vehicle to enter the regional road

[22] Figure based on schematic representation of approach sigh triangle as presented in TAC Geometric Design Guidelines Figure 9.9.1.
[23] Figure based on schematic representation of departure sigh triangle as presented in TAC Geometric Design Guidelines Figure 9.9.2.

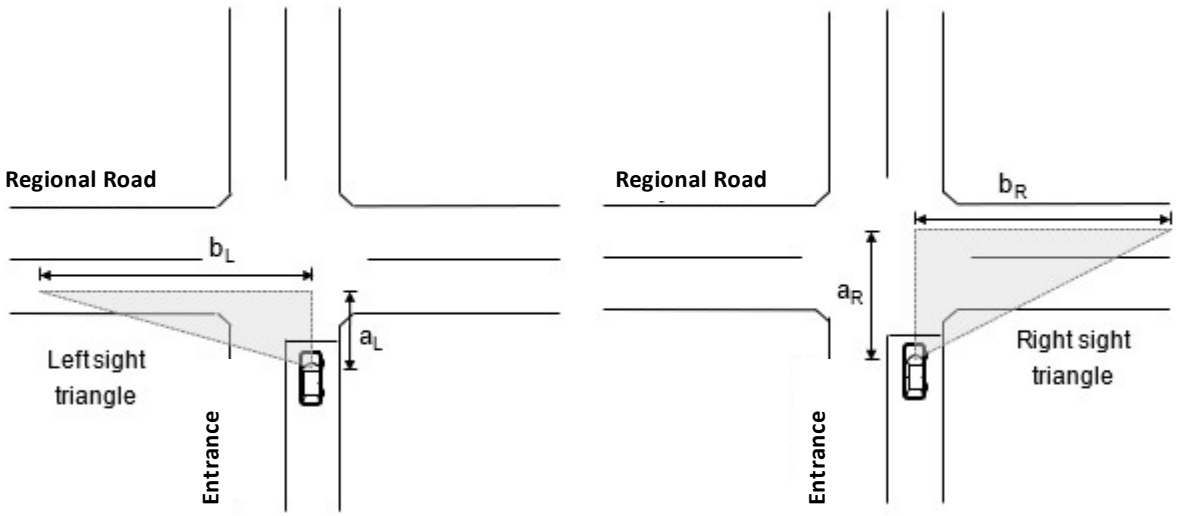


Figure 21 Departure Sight Triangle

3.3.3 Sight Distance Requirements

For the purpose of this Guidelines, the following are the minimum sight distance requirements for specific traffic control devices within regional roads. All necessary calculations should be based on the content of TAC's Geometric Design Guide for Canadian Roads.

- **Yield Control on the Minor Road**: Approach and departure sight distances.
- **Stop Control on the Minor Road (Two-way Stop Control)**: Departure sight distance on the minor road, as well as approach sight distance and visibility triangle.
- **Signalized Intersections**: Departure triangles for Right Turn on Red (RTOR) and left-turning movements, as well as visibility triangle.
- **All-Way Stop Control**: At the intersection, the first vehicle stopped on one approach should be visible to the driver of the first vehicle stopped on each of the other approaches. In addition, the visibility triangle should be met as noted in TAC.
- **Left Turns from the Major Road**: All locations should have sufficient sight distance to accommodate the left turn manoeuvre based on the TAC guidelines. This sight distance design should be based on the left turn by a stopped vehicle.

3.4 Auxiliary Lanes

For the purpose of this Guidelines, all auxiliary lane designs must be in accordance with the latest TAC's Geometric Design Guide for Canadian Roads.

3.4.1 Right-Turn Lanes

Right turn lanes are required on regional roads at all entranceways that:

- Have right turn volume at signalized intersections of 10% of total approach volume; or
- Have constrained sight distance approaching the access.

The storage length required can be calculated by the following formula:

$$S = NL/30$$

Where: S = storage length

N = design volume (vph)

L = length of an average vehicle

The right turn lane taper should be estimated based on the information contained in TAC's Geometric Design Guide for Canadian Roads – Chapter 9, Tables 9.14.1 and 9.14.2.

Right turn tapers are recommended when the proposed entrance is located on a 2-lane regional road with more than 60 kph posted speed if right turn volume does not require right turn lanes.

3.4.2 Left-Turn Lanes

The need for a left turn lane should be identified based on:

- Volume warrants.
- Roadway environment conditions such as sight distance constraints (there should be sufficient decision sight distance approaching a turning point).
- Safety considerations; or
- When the proposed entranceway is located on a 2-lane regional road with more than 50 kph posted speed.

The calculation for the required left-turn lane should be as per MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads – June 2017. The minimum design length (parallel) of left turn lanes is 15 metres, however the storage plus the taper should at least equal the deceleration length. The left-turn lane taper should be estimated based on the information contained in TAC's Geometric Design Guide for Canadian Roads – Chapter 9, Table 9.17.1. If a Transportation Impact Assessment study is conducted, the storage length for the left turn lane should be based on the 95th percentile queue if higher than the TAC estimate.

3.5 Pedestrian and Cycling Infrastructure

Niagara Region Complete Streets Design Manual identifies the recommended cycling facility type for each road typology. Pedestrians and cyclists should be provided the right of way at sidewalk/driveway crossings by way of designing pedestrian and cycling facilities in accordance with the standards set out in Ontario Traffic Manual Book 18. Since the interaction between cyclists and vehicular traffic entering and existing the entranceway may pose safety issues, the entranceway design should consider clear zones that provide an adequate, unobstructed, sight distance for prevalent bicycle speeds.

To estimate the required sight distances for the clear zone, the same principles, and formulas applicable to approach triangles are applicable, with the speed of the vehicle substituted with the prevalent speed of cyclists in that specific location.

Table 7 below provides the required sight distance for a range of cycling speeds using the approach triangle formula. It should be noted that there could be large variations in cycling speeds depending on the riders' ability, terrain/topography (up/ downhill), environment (urban/rural), bicycle specifications and other factors[24].

Table 7 Cycling Facilities per Road Typology

Road Typology	Cycling Facilities	Typical Cycling Speed (km/h)	Sight Distance (m)
Main Street	Wide Separated Facility	10	8.5
Urban General	Wide Separated Facility	15 – 20	12.5 – 17
Thoroughfare (Urban)	Wide Separated Facility	15 – 20	12.5 – 17
Thoroughfare (Rural)	Wide Designated Space or separated MUP	20 – 40 km/h	17 - 33
Rural Scenic	Wide Designated Space or separated MUP	20 – 40 km/h	17 - 33
Hamlet	Separated Facility	10	8.5

[24] Approach triangles estimated using the distance travelled in 3 seconds.

In addition, pedestrian operations at driveway accesses should be explicitly considered when pedestrian activity is expected, and all requirements established by the Region of Niagara's Accessibility Plan as well as legislated Accessibility for Ontarians with Disabilities Standards shall be met.

3.6 Transit

Along Regional roads in which transit service is provided, it is recommended that - whenever possible, bus stops should be located beyond driveways to minimize conflicts. As such:

- The bus operator must be able to see the vehicles entering and exiting the driveway.
- The bus operator and those entering and exiting the driveway should be able to see transit patrons; and
- The people using the driveway should have sufficient sight distance to see oncoming buses and traffic.

Transit stops should be located a minimum of 60 metres away from any existing driveway when possible.

It is also recommended that the location of bus shelters should be outside of the intersection sight triangles and ensure that it does not constitute sightline obstruction.

3.7 Field and Farm Driveways

At a driveway servicing a farm or a field forming a part of a farm in which the routine presence of large vehicles, pickups pulling trailers, or farm tractors pulling agricultural equipment is expected, the design of the driveway should consider the following elements as well as any other Ontario Provincial Standards:

- Adequate sight distance.
- Sufficient width to accommodate large agricultural equipment.
- Drainage design; and
- Enough distance between the shoulder edge and the end of the driveway.

Typical elements to be identified as part of the driveway design are depicted in **Figure 22**[25].

[25] Figure based on schematic representation of the design of driveways in rural roads as presented in the Transportation Research Board's Access Management Manual, Second Edition

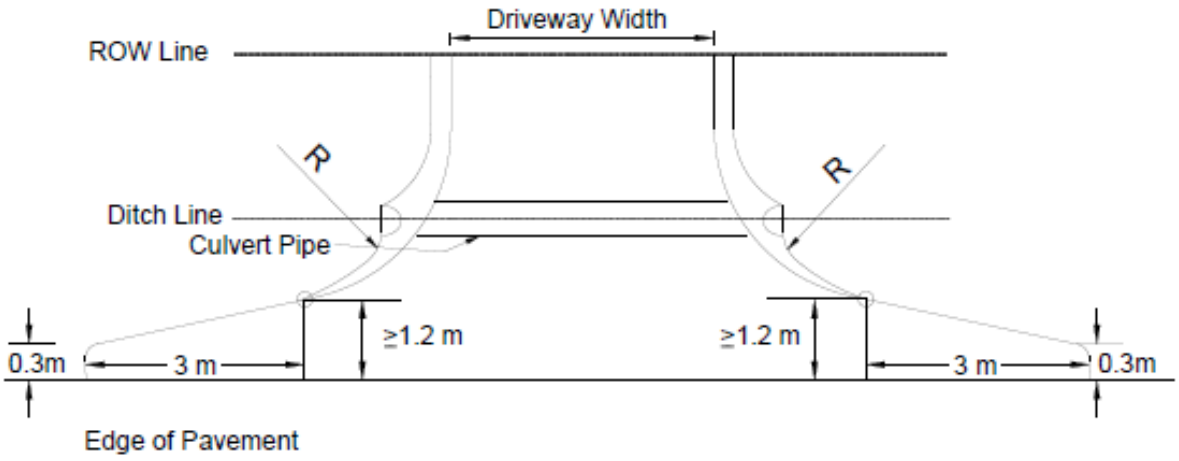


Figure 22 Typical Design Elements of a Field and/or Farm Driveway

4 Transportation Impact Assessment

A Transportation Impact Assessment (TIA) can support the assessment of the effects of a proposed development on the surrounding transportation network, the ability to get traffic on and off the site, and the need for off-site mitigation.

Preparation of a TIA can help the Developer and the Region to:

- Determine the improvements needed to accommodate the proposed entranceway(s).
- Evaluate the number, location, and design of entranceway(s).
- Identify needed roadway improvements included those for non-auto modes.
- Provide a basis for determining the Developer's responsibility for specific off-site improvements.
- Evaluate collision history and ways to improve road safety.
- Address the Region's Complete Streets methodology to accommodate mobility and people of all ages and abilities.

The analysis of transportation impacts will uncover deficiencies and identify potential improvement options. Access improvements and mitigation deemed necessary by the Region will be identified as a condition of an access permit and/or development application and will be financed and implemented by the Developer through legal agreement with the Region where necessary.

If the preparation of a TIA is considered required for the approval of a new entranceway, the assessment should follow the requirements identified in the Niagara Region's Traffic Impact Assessment Guidelines.

A

GLOSSARY

Access Density

Number of unsignalized intersections per kilometre.

Approach Sight Triangle

The area free of any obstructions that might block the view of a driver of a vehicle approaching at an entranceway of potentially conflicting vehicles on the intersecting entranceway.

Corner Clearance

The distance measured from the extension of the curb line at an intersection to the centreline of the nearest entranceway and should be governed by the functional area of an intersection.

Centre two-way left turn Lane (CTWLT)

A continuous lane located between opposing traffic flows that provides a refuge area from which vehicles may complete a left turn from a roadway.

Drive-Through Facility

The use of land, building or structures, or parts thereof, to provide or dispense products or services, either wholly or in part, through an attendant or a window or automated machine, to persons remaining in motorized vehicles that are in a designated stacking lane.

Departure Sight Triangles

An area required to provide sufficient sight distance for a stopped driver on an entranceway approach to depart, enter, or cross, the intersecting roadway.

Egress Capacity

The term refers to the ability of a vehicle to enter a roadway when exiting a property.

Entranceway Throat Length

The storage distance from the outer edge of the traveled way of the intersecting roadway to the first on-site intersecting drive aisle or parking stall.

Full Movement Entranceway

An entranceway which allows left-in and left-out movements and right-in and right-out movements.

Influence Distance

Defines the right-turn exit influence on through traffic, and it is the sum of the impact length, the length of a cart and the perception-reaction distance.

Intersection

The area embraced by the prolongation of lateral curb lines or, if none, of the rights-of-way of two or more highways that join one another at an angle, whether or not one highway crosses the other.

Intersection Functional Area

Any area upstream or downstream of an intersection where intersection operation and conflicts severely influence driver behaviour and in consequence vehicles interactions and traffic conditions.

Intersection Sight Distance

The sight distance to left and right available to a driver intending to execute a maneuver onto a through roadway from an intersecting roadway.

Partial Movement Entranceway

Any entranceway where the full movement is not provided.

Raised Curb Median

A physical barrier in the roadway that separates traffic traveling in opposite directions.

Right-Turn Conflict Overlap

It is the definition of a situation in which a driver has to keep attention to more traffic entering from more than one intersection/access at a time when traveling through a road.

Stacking Lane

An on-site queuing lane for motorized vehicles which is separated from other vehicular traffic and pedestrian circulation by barriers, markings, or sign.

Stopping Sight Distance

The distance needed by the driver to react to a conflict and come to a complete stop.

Engineering
for **people**