APPENDIX Q:

Intersection Spacing Requirements

ACCESS MANAGEMENT GUIDELINE

Dated: January 2015

Halton REGION

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. The following are valid criteria used to consider direct access to a Regional Road:

- Land parcels are otherwise landlocked;
- Environmental and utility considerations/impacts;
- A site possesses unique constraints which negate any other access opportunities, such as the lot depth, the footprint of existing buildings, grades, or minimal frontage onto local streets; and
- Alternate access creates unacceptable traffic operational conditions on, or in close proximity to, the Regional Road.

A Transportation Impact Study is required to support all proposed direct access locations.

3.2 ACCESS SPACING

There are various reports and conclusions in the Traffic Engineering field that discuss the spacing recommendations for different types of access. The general spacing guidelines for right in/out access is 115 metres to 140 metres between accesses. Where spacing is not conducive to the land use, physical or economical reasons, a spacing of 30 metres to 60 metres may be considered

Although typical spacing for partial moves access (left in, right in/out) will vary depending on the volume of each roadway and the necessary left turn storage and taper requirement, every effort should be made to maximize the spacing for these proposed accesses. The Access Management Guideline for Activity Centres – US Department of Transportation indicates a minimum spacing of 235 metres should be obtained and with the provision to provide sufficient storage and taper for left turning vehicles when considering this type of access.

The general spacing guidelines for a full movements access is 300 metres to 400 metres. This range of spacing is based on the speed of the roadway, traffic signal coordination and storage requirements for left turning vehicles. Full movement accesses should be located at a point to allow enough spacing to the nearest signalized intersection to avoid any possible interference with intersection queues.

Beyond accommodating traffic movements, the demands on Regional roads are changing in that they also need to address multiple roles related to other users including transit riders, cyclists, and pedestrians. Regional streets are also an integral element in promoting high quality urban design, serving as entryways to communities and encouraging the development of pedestrian-friendly and transit-oriented neighbourhoods.

Halton Region has created Access Spacing guidelines (see Table 1) that correspond to the Region's Right-of-Way Guidelines which group the functional classification of roadways into three categories, Rural/NHS, Corridor and Node. The three categories reinforce an urban structure model that directs growth away from rural and natural heritage areas and towards identified urban growth areas within the Regional Official Plan.

Rural/Natural Heritage System (R)

Rural lands are designated areas for agriculture and protection of infrastructure that supports farming and Natural Heritage Areas (NHS) are lands designated for natural area conservation. In planning for new urban areas, the Region is seeking to minimize development of prime agricultural lands. Regional Roads in Rural/NHS lands should respect the rural character of the area.

Corridors (C)

Corridors are urban growth areas identified along major roads, arterials or higher order corridors that have the potential to provide a focus for higher density mixed-use development and employment use consistent with planned transit service levels. The design and physical appearance of corridors contribute directly to livability and economic success and therefore should offer a positive community environment and convenient access for residents and businesses to a variety of goods and services.

Corridors will generally vary in use along their length and their design needs to reflect the change in surroundings. Over time, corridors could include a mix of uses such as: sidewalk-fronting shops or businesses, offices, civic uses appropriately scaled and designed public spaces and a broad mix of residential forms and densities. Corridors that travel through employment lands are to provide for development of quality business environment and include a range of offices, industrial-type buildings and services supporting employment such as business related retail and restaurants located in buildings with doors and windows that front the street.

Node (N)

Nodes are defined as compact, transit-oriented, pedestrian/cyclist friendly and mixed use/residential neighbourhood centers that are areas of more intensive urban uses within a community. They provide area residents with a hub to meet a variety of daily needs (goods and services) and serve as a social focus for the community and as concentrations of office employment uses. Nodes are generally located at the intersections of major corridors within the identified intensification areas and extend approximately 200-400 metres from the intersection.

Halton Region's access spacing guidelines are further refined by providing spacing for cross-section type as identified in the Region's Right-of-Way guidelines. Please see Appendix B for the individual cross-sections by Rural/NHS (R), Corridor (C) and Node (N).

Table 1 outlines the minimum spacing requirements for access and road connections to Regional roads. As speed limits increase, greater minimum distance is required between access locations. Access spacing can be reduced to a minimum of 250 metres within the intensification areas (Node) identified within the Regional Official Plan that can substantiated through the submission of a comprehensive corridor analysis and Transportation Impact Study analyzing all possible alternatives and taking into consideration land use and community factors. Access spacing is measured stop bar to stop bar.

Table 1 – Minimum Access Spacing

TYPE*	Full Movement Access (m)	Right in/out Access (m)
R1	400	115
R2	400	115
C1	400	115
C2	300	115
C3	300	115
C4	300	115
C5	300	115
N1	250	115
N2	250	115

3.4 SIGHT DISTANCE REQUIREMENTS

A safe sight distance is the distance needed by a driver on a Major Arterial, or a driver exiting a driveway or street to verify that the road is clear and to avoid conflicts with other vehicles.

Adequate sight distance must be provided for both movements into and out of an access with a minimum of hazard and disruption to traffic. Sight distance requirements must be considered both for vehicles approaching the access and departing from the stopped position at the access.

The sight distances should be designed to enable existing vehicles:

- Upon turning left or right, to accelerate to the operating speed of the street without causing approaching vehicles to reduce speed by more than 15km/h; and
- Upon turning left, to clear the near half of the street without conflicting with vehicles approaching from the left.

The operating characteristics (driver eye elevation, visibility of the vehicle, and vehicle acceleration characteristics) of both trucks and passenger vehicles should be considered if both vehicle types are anticipated to utilize the access.

3.5 DRIVEWAY AND SITE CONFIGURATION

Driveway location and design affects the ability of a driver to safely and easily enter and exit a site. Road classification, right-of-way, design speed, design hour volumes, and land use influence driveway location and design. For driveways to be permitted along major Regional roads, the design of the proposed driveways should be feasible to minimize interference with the mobility of the through traffic by designing the driveway to provide desirable:

- Driveway width – See Section 5.4 -Table 2
- Driveway radii – See Section 5.4 – Table 3
- Clear throat conditions

MILTON

Engineering and Parks Standards Manual

Part 1

2024 - September

Right-of-Ways

Notes for Table 1.1:

i. Minimum and maximum longitudinal grade values refer to individual road segments, and are not intended to stipulate the 'average road grade.'

ii. Where two numbers are shown, the smaller numbers are for 'minor' and the larger numbers are for 'major' roads.

iii. ROW widths of laneways may vary from 8.5 m to 11.0 m, subject to functional design review at the time of development application.

iv. Vertical curves are required for grade changes in excess of 1.5%. Lengths of curves (m) shall not be less than design speed (km/h), however this is not applicable to local roads.

v. Asphalt width to be expanded 1.0 m on 90° bends. (Refer to TMSD 03.03-01.)

vi. Any public road or laneway that will be maintained by the Town must provide a minimum clearance of 4.5 m through any choke point (face of curb to face of curb) to ensure adequate clearance for snow clearing.

Table 1.2 Intersection Characteristics

Intersection	Curb Radius	Daylighting	Intersection Spacing
Local / Laneway	8 m	5.0 m – Radius	Min. 60 m
Local / Local	8 m	5.0 m – Radius	Min. 60 m
Local / Collector	10 m	7.5 m - Triangle	Min. 60 m
Collector / Collector	10 m	10.0 m – Triangle	Min. 60 m
Arterial / Local	15 m	15.0 m – Triangle	Min. 400 m
Arterial / Collector	15 m	15.0 m – Triangle	Min. 400 m
Arterial / Arterial	15 m	15.0 m – Triangle	Min. 400 m

Notes for Table 1.2:

i. Bus routes require a minimum curb radius of 13 m.

ii. Industrial roads require a minimum curb radius of 15 m.

iii. Intersection spacing for arterial roads is the same spacing whether the intersection is signalized or un-signalized.

iv. Three-legged intersections may be spaced at a minimum of 40 m. (Refer to TAC Section 2.3.1.7.)

v. When a Town road intersects a Regional road, Regional standards will apply.

vi. Intersection spacing for Local/Laneway will be reviewed on case-by-case basis, and at the Town's discretion.

vii. Lay-by lanes are not permitted on arterial roads, subject to review.

viii. Roundabouts may require daylighting in excess of what is outlined in Table 1.2, which must be confirmed through detailed design, to the satisfaction of the Town.

ix. The road with the higher classification governs the daylighting requirements at the intersection.

1.1.2 AutoTURN Analysis

1.1.2.1 General

A swept path assessment is to be conducted for each subdivision/development application. AutoTURN analyzes the swept path of vehicle maneuvers to determine the appropriate roadway/driveway design to accommodate turning vehicles. AutoTURN should be used to simulate ingress and egress movements from driveways as well as maneuvers through the site for large vehicles, including but not limited to the following:

- Waste collection vehicles
- Emergency response service vehicles
- Loading vehicles
- Snow clearing and maintenance vehicles

The vehicles requested for inclusion in a swept path analysis may vary depending on the development, and will be subject further to Town approval, determined on a case-by-case basis. The vehicular circulation assessments should illustrate that access to relevant areas of the site (waste collection/loading areas, fire routes, etc.) based on the vehicles requested to be included in the assessment are functional. The swept path analysis is to be completed using the latest version of AutoTURN software package available.

1.1.2.2 Roundabouts

An AutoTURN swept path analysis must be submitted for each roundabout showing the appropriate design vehicle completing each type of manoeuver (left turn, through, and right turn) from all approaches. The design vehicle will be confirmed by the Town's Traffic Division. An AutoTURN swept path analysis must also be submitted for driveways where a splitter islands may interfere with ingress and egress turning manoeuvers.

Refer to Section 1.1.6 (Roundabouts) for more design criteria pertaining to roundabouts.

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CHAPTER 8 – ACCESS

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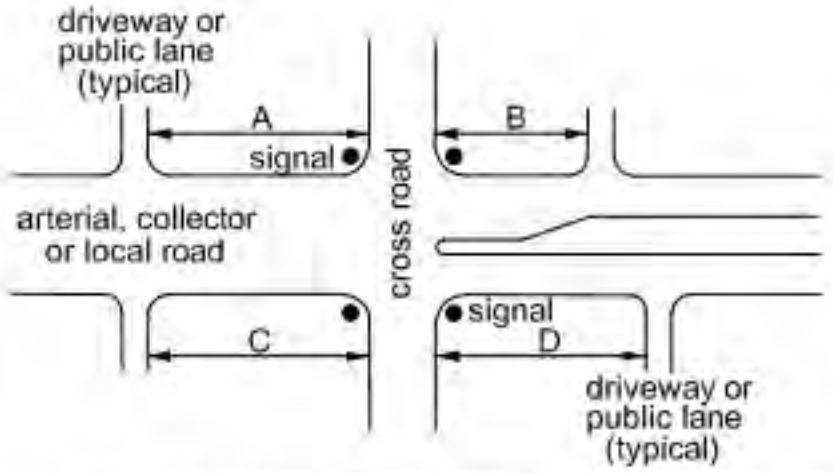
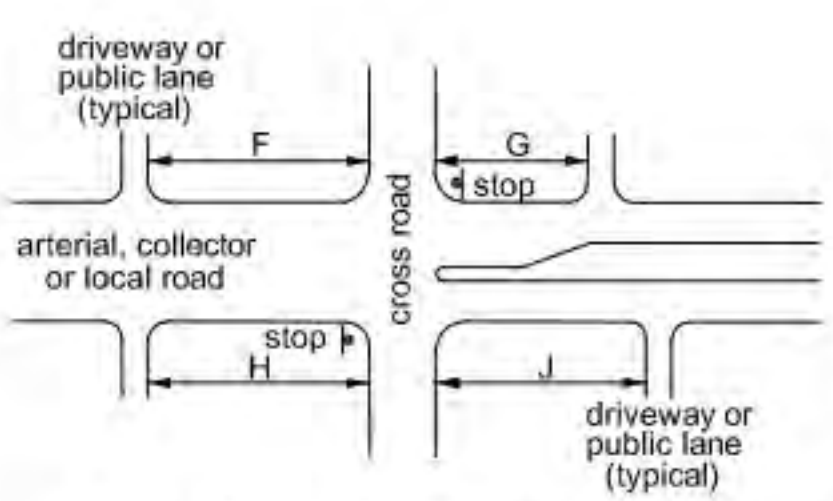


item	min. clearance, m		
	arterial	collector [b]	local [b]
A	70 [c]	55	15
B	# [a]	25	15
C	70	55	15
D	70 [c]	55	15

Notes: a. Distance (#) positions driveway or public lane in advance of the left turn storage length (min.) plus bay taper (des.).
b. Lesser values reflect lower volumes and reduces level of service on collectors and locals.
c. Reduced distances feasible if auxiliary lane implemented, see Section 8.5
d. Values based on operating speed of 50km/h, higher values desirable for higher speeds or may be warranted by traffic conditions.

signals at the cross road



item	min. clearance, m		
	arterial	collector [b]	local [b]
F	35	20	15
G	# [a]	25	15
H	25	25	15
J	35	20	15

Notes: a. Distance (#) positions driveway or public lane in advance of the left turn storage length (min.) plus bay taper (des.).
b. Lesser values reflect lower volumes and reduces level of service on collectors and locals.

stop control at the cross road

Figure 8.8.2: Suggested Minimum Corner Clearances to Accesses or Public Lanes at Major Intersections

Inadequate corner clearance between accesses and signalized intersections along a major road, such as a major arterial, can create serious operational problems including:

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CHAPTER 9 – INTERSECTIONS

June 2017

The development of a final design is facilitated by drawings that become progressively more detailed throughout the process. Some important aspects of the process are described below.

Roads are one form of land use and one element in the transport system. In developing areas and existing urban road networks, the role of roads is influenced by the type of land use and the other modes of transportation available. The development of new roads and road networks therefore requires input from specialists in land use planning, transport modelling, and traffic engineering.

While the current traffic situation is relevant in many cases, designs for new roads and major upgrades of existing roads requires estimations of traffic flows, traffic movements, and traffic composition in a future design year. In some cases, the need for an intersection may be questioned. A decision not to provide a new intersection or to remove an existing intersection should be taken only after an analysis of the likely effects on other roads and intersections in the surrounding road network. These effects could involve traffic congestion, crashes at other intersections, or traffic infiltration into local streets.

For new intersections, possible locations will have to be identified, taking into account topography, natural and man-made features, and many other considerations as outlined in **Section 9.3**. It may also be appropriate to consider a range of layout options and to evaluate them in terms of safety, traffic performance, environmental effect, and cost.

The process also involves an approval process that is preceded by consultation with other stakeholders (e.g., local municipalities and service authorities), the outcome of which may influence the design and final recommendation.

9.4.2 LOCATION AND SPACING OF INTERSECTIONS

Both rural road and urban road network spacing are often based on the location of the original road allowances before urban development. The systems of survey employed in the layout of original road allowances vary from region to region across Canada. As rural areas urbanize, the development of major roads generally occurs along these original road allowances; consequently, road networks vary from region to region. As examples, the land survey system in Ontario has created a basic spacing between major roads of 2.0 km, whereas the land survey system in the Prairie Provinces has resulted in a 1.6 km grid.

As development occurs, this spacing is often reduced. In areas of commercial or mixed use development, the vehicle, cyclist, and pedestrian traffic generated by employment and retail shopping may result in a reduced arterial spacing. In downtown areas, this spacing could be reduced further, as determined by the various road user characteristics and typically higher relative needs of pedestrians and cyclists.

The spacing of intersections along a road in both an urban and rural setting has a great effect on the operation, level of service, and vehicular capacity of the roadway. Ideally, intersection spacing along a road should be selected based on function, traffic volume, and the relative presence of various road user modes (e.g., vehicles, cyclists, pedestrians). However, it is often not always possible to provide ideal intersection spacing for all road users, especially in an urban setting. The designer should consider arterials, collectors, locals, cross roadway intersection spacing adjacent to interchanges, and traffic signal spacing and progression.

9.4.2.1 Arterials

Along signalized arterial roads, vehicular traffic volumes are generally high. It is therefore desirable to provide spacing between signalized intersections that is consistent with the desired vehicular traffic progression speed and signal cycle lengths. By spacing the intersections uniformly, based on known or assumed running speeds and appropriate cycle lengths, signal progression in both directions can be achieved. Progression allows platoons of vehicles to travel through successive intersections without stopping. For a progression speed of about 50 km/h and a cycle length of 60 s, the corresponding desired spacing between signalized intersections is approximately 400 m. As speeds increase, the optimal intersection spacing increases proportionately.

Where an arterial corridor must accommodate a variety of road users (e.g., vehicles, cyclists, and pedestrians), vehicle operations and the consequent intersection designs must balance the various needs while recognizing that the priority of arterial roadways is generally servicing vehicular traffic movement.

A typical minimum intersection spacing along arterial roadways is 200 m, generally only applicable in areas of intense existing development or restrictive physical controls where feasible alternatives do not exist. The 200 m spacing allows for minimum lengths of back to back storage for left turning vehicles at the adjacent intersections.

The close spacing does not permit signal progression; therefore, it is normally preferable not to signalize the intersection that interferes with progression along a major arterial. Intersection spacing at or near the 200 m minimum is normally only acceptable along minor arterials, where optimizing traffic mobility is not as important as along major arterials.

Where intersection spacing along an arterial does not permit an adequate level of traffic service, many alternatives can be considered to improve traffic flow. These include, but are not limited to:

- Converting two-way to one-way operation
- Implementing cul-de-sacs for minor connecting roads
- Introducing channelization to restrict turning movements at selected intersections to right turns only.

The designer's options may be substantially limited by the policies of the local jurisdiction.

On divided arterial roads, a right-in, right-out intersection without a median opening may be permitted at least 100 m from an adjacent all-directional intersection. The distance is measured between the closest edges of pavement of the adjacent intersecting roads.

In retrofit situations, the desired spacing of intersections along an arterial is sometimes compromised in consideration of other design controls, such as the nature of existing adjacent development and the associated access needs.

9.4.2.2 Collectors

The typical minimum spacing between adjacent intersections along a collector road is 60 m.

9.4.2.3 Locals

Along local roads, the minimum spacing between four-legged intersections is normally 60 m. Where the adjacent intersections are three-legged, a minimum spacing of 40 m is acceptable.