

PUBLIC WORKS DEPARTMENT POLICY MANUAL

PW5.RO1.3

SECTION	NAME OF POLICY
Transportation	Road Cross Section

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DEVELOPED BY: TRANSPORTATION ENGINEERING

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POLICY STATEMENT:

The Regional Road system forms the critical transportation link between the twelve municipalities of the Niagara Region. This arterial roadway network provides consistency in planning and design for motorists commuting across the Region.

This policy provides guidance regarding cross-section elements. These elements consist of the travelled way, shoulders, curb and gutter, drainage features, roadway structure, side and back slopes, and utility locations. They include provisions for pedestrians, cyclists, and parking. These elements are designed with consideration of design speed and traffic volumes and the rural or urban character of the roadway to create a safe, efficient, and economical transportation system.

The Region of Niagara policy will supplement current roadway standards used in Ontario which are referenced in Section 6.

DEFINITIONS

- AADT = Average Annual Daily Traffic volume
- B = Base Thickness
- Design Speed = is the highest continuous speed vehicles can travel with safety on a road when conditions are favourable and traffic density is so low that the safe speed is determined by the geometric features of the road.
- Design Year = period in years to the first necessary rehabilitation by means of overlay or resurfacing when performance has become inadequate (anticipated life span of proposed improvement)
- DHV = Design Hourly Vehicles
- Highway = Synonymous with through-road
- HM = Hot Mix Asphalt
- OPSD = Ontario Provincial Standard Drawings
- OPSS = Ontario Provincial Standards and Specifications

- ROW = Right of Way

POLICY

Section 1.0 Roadway Cross-Section

The roadway cross-section Policy is based on Ontario Provincial guidelines for municipal roads and highways.

Section 1.1 Pavement Width

The pavement width is the sum of the widths of travelled lanes and median within the roadway and is always measured from edge of pavement to the edge of pavement. This width may also include parking facilities, bike way facilities, and vehicle breakdown amenities.

The Region of Niagara recognizes that truck and bus widths (including mirrors) can easily extend up to 3.2m and has therefore adopted a minimum through lane width of 3.5m. Additional lane width is relative to the design speed and volume of traffic for a given roadway and is outlined in the Geometric Design Standards for Ontario Highways.

The minimum urban pavement width for a Regional Road is 10m. The MTO Geometric Design Standards for Ontario Highways notes that "urban arterial streets normally experience average daily traffic volumes (AADT) of 5,000 to 50,000." The previous Ministry B-36 Directive dictated that the minimum pavement width for a two lane urban roadway with these traffic volumes was 10m which the Region has adopted as the minimum standard.

The minimum rural road pavement width in the Region of Niagara consists of two 3.5m lanes plus 0.5m partially paved shoulders for a total of 8.0m. The Region also recognizes that a minimum shoulder width of 2.0m is necessary for disabled vehicles.

The Regional road network as noted above is an arterial link through our region. This road system is recognized in the Road Closure Action Plan in the case of highway closures and would constitute main routes in the case of evacuations. Furthermore, unless otherwise posted, the road system is also recognized as the designated truck route. As such, the regional road system must reflect the ability to carry traffic efficiently and not be limited by vehicle breakdowns. Therefore, the minimum pavement and shoulder width standards must be maintained.

Section 1.2 Medians

Medians separate opposing traffic and reduce the risk of head-on collisions. Raised centre medians can control ingress/egress access at entranceways and side streets.

The MTO Standards dictate that the raised centre median should be 2.0m minimum. However, if the MTO minimum is cost prohibitive or creates problems with lane alignments, then the Transportation Association of Canada (TAC) minimum standard of 1.5m would also be acceptable.

Flush medians should be used on five lane cross sections where raised medians are not included. Flush medians must also be used on the approach to raised medians to reduce accidents.

Section 1.3 Shoulders

Shoulders provide a recovery area for errant vehicles and a storage area for stopped emergency/disabled vehicles. As outlined in the MTO Geometric Design Standards, the minimum desirable shoulder width should be 2.0m.

Paved shoulders supply support to the travelled lane pavement improving surface drainage and reducing maintenance. Paved shoulders shall be either full or partial (minimum 0.5m) depending on design requirement and available cross section.

Section 1.4 Curb and Gutter

Curb and gutter is placed adjacent to a lane or paved shoulder and is intended to control and conduct storm water as well as inhibit or at least hinder vehicles from leaving the roadway. Curb and gutter design is outlined in section D.8.1 of the Geometric Design Standards for Ontario Highways and construction should be consistent with OPSS and OPSD standards.

Section 1.5 Boulevards

The boulevard area extends from the back of curb to the sidewalk. This area provides a buffer from traffic for pedestrians and can accommodate street accessories such as signs, streetscape appurtenances as well as being a snow storage area. Boulevard widths should be 3.0m or greater with a minimum desirable width of 1.5m. Boulevards less than 1.5m wide should be considered for a hard surface treatment and "kill strips" of 600mm should be considered in problem areas.

Sidewalks in the Niagara Region are the responsibility of the local municipality. The MTO Guidelines point out that a minimum sidewalk width should be 1.5m. Sidewalk ramps at intersections should be a minimum of 1.8m wide. At the discretion of the local municipality, sidewalks in urban commercial areas may be wider as required.

Section 1.6 Ditches and Side Slopes

Ditches carry storm water runoff from the roadway as well as adjacent lands. These ditches must have adequate hydraulic capacity with relief systems that will not limit the operation of the arterial roadway.

Side slopes should follow the standards found in section D.9 Grading and Drainage Channels of the Geometric Design Standards for Ontario Highways. Side slopes shall be a maximum 3:1 front slope for vehicle recovery and ease of maintenance.

Section 1.7 Roadway Structure

For purposes of this section, it is assumed Niagara's arterial urban/rural road network carries 10% commercial trucks and that the foundation is a competent non-saturated subgrade of silty-clays having moderate to high susceptibility to frost heaving.

A geotechnical consultant shall be retained to determine the general soil type(s) from which it will recommend the most appropriate and cost-effective structure best suited to the specific project conditions (i.e. subgrade soil characteristics, drainage, traffic volume and loading, and the use of recycled materials).

1.7.1 Pavement Types

a) Flexible Pavements

All flexible pavement structures are to be designed having a minimum thickness that will produce a service life of 10-12 years. Design year for reconstruction projects shall be 20 years. Pavement structures shall be conventional comprised of an asphaltic wearing surface and binder course and granular "A" base course (crushed limestone or approved equivalent recycled material).

i) Minimum Rural Structure

HM	130mm (min. 50mm top course)
B	400mm
GBE	660mm

ii) Minimum Urban Structure

HM	130mm (min. 50mm top course)
B	500mm
GBE	760mm

b) Rigid Pavements

All rigid pavement structures are to be designed having a minimum thickness that will produce a service life of 20-25 years. Design year for reconstruction projects shall be 40 years. Pavement structures shall be composite plain concrete (Portland Cement Concrete) with short random contraction joint spacing with transverse load transfer devices and ties bars at all longitude joints. The pavement structure shall be either plain (exposed) or composite. Exposed pavements shall be comprised of a minimum 260mm of 30 MPa (at 28 days), concrete having a base of 120mm of granular "O" and sub-base of 80mm of granular "A" (crushed limestone), composite pavements shall be comprised of a minimum of 80mm of asphaltic wearing course over 225mm of 30 MPa (at 28 days) concrete, have a base of 120mm of granular "O", and sub-base of 80mm of granular "A" (crushed limestone).

Section 1.8 Utilities and Servicing

Utility placement should not inhibit the future expansion of the roadway. Underground utilities should be installed in a uniform alignment parallel to the right-of-way lines. Sewer manhole covers and watermain valves should not be located in the wheel track path. Above ground plant must conform to the MTO Roadside Safety Manual.

Section 2.0 Right-of-Way

Right-of-way refers to the public lands designated for the roadway. For more information on right-of-way, refer to the Region of Niagara Right-of-Way Policy and MTO Geometric Design Guidelines for Ontario Highways section D.10.

Section 3.0 Retrofit Construction of Roadways

The Region recognizes that existing conditions such as right-of-way, roadway geometrics, structure locations, ditches, utilities, and other variables may limit possible retrofit work. The costs to retrofit a pre-developed roadway may greatly exceed those of new construction because of existing deficiencies. In such cases, the design should reflect reasonable costs without compromising current safe conditions.

Section 4.0 New Construction

Construction of roadways in areas previously undeveloped should follow the design standards. These standards should not be compromised except in the case of extraordinary conditions.

Section 5.0 Extraordinary Conditions

Design judgements are made with safety as the predominant factor. Conditions such as extreme costs may limit the design and MTO specifications may not be practical. If for reasons beyond the designers control the MTO standards can not be achieved, the designer will utilize Transportation Association of Canada (TAC).

Section 6 REFERENCES

- Ref. 1 Geometric Design Standards for Ontario Highways first published in 1985 and updated by the MTO (2002)
- Ref. 2 MTO Roadside Safety Manual (1993)
- Ref. 3 Ontario Provincial Standards and Specifications and Ontario Provincial Standard Drawings
- Ref. 4 MTO Pavement Design and Rehabilitation Manual (1990)
- Ref. 5 Niagara Peninsula Standard Contract Documents

REFERENCES:

<u>Report</u>	<u>Committee Date</u>	<u>Council Date</u>
PWA 208-2005	December 6, 2005	December 15, 2005