YORK REGION
ROAD DESIGN GUIDELINES

Public Works - January 2023

York Region

ACKNOWLEDGEMENTS

The Regional Municipality of York

- Capital Planning and Delivery
- Community Planning and Development Services
- Road and Traffic Operations
- Natural Heritage and Forestry
- Transportation and Infrastructure Planning
- York Region Transit

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1 INTRODUCTION

The Road Design Guidelines were developed to assist with the design of York Region Road Projects. These guidelines are to be read in conjunction with the following design guides:

1.1 Design Standards

- Transportation Association of Canada Geometric Design Guide for Canadian Roads (2017)
- Geometric Design Supplement for TAC Design Guide – MTO – 2017
- Transportation Association of Canada Canadian Roundabout Design Guide (2017)
- Ontario Ministry of Transportation Roadside Design Manual (2017)
- Ontario Traffic Manuals
- Standard RP-8, ANSI / IES American National Standard Practice for Roadway Lighting
- MTO Drainage Management Manual (1997)
- MTO Highway Drainage Design Standards (2008)

1.2 York Region Design Guidelines

Available at www.york.ca/standards

- Designing Great Streets Guidelines (2019)
- Pedestrian and Cycling Planning and Design Guidelines (2018)
- York Region Access Guidelines (2020)
- Street Tree and Horticultural Design Guidelines (January 2022)
- Street Tree and Forest Preservation Guidelines (January 2022)
- Streetscape Design Review Manual – available at Streetscape Program

1.3 York Region Standard Drawings

Available at www.york.ca/standards

- DS 100 Series - Intersection Design Standard Drawings
- DS 200 Series - Commercial and Residential Entrance Design Standard Drawings

- DS 300 Series - Illumination Design Standard Drawings
- DS 400 Series - Pavement Marking Design Standard Drawings
- Electrical Standard Drawings
- Regulated Planting Standard Drawings
- Standard Utility Locations Drawings
- Streetscape Standard Drawings (Series SS-100, SS-200, SS-300)
- YRT Concrete Bus Pad Standard Drawings

1.4 York Region Specifications and Bid Form Templates

Available at www.york.ca/standards

1.5 Transportation CAD Standards

Available at www.york.ca/standards

- Transportation CAD Standards Manual
- Drawing templates and supporting files

2 ABBREVIATIONS

When the following abbreviations are used in the Road Design Guidelines, they shall mean the following:

AC	Asphalt Cement
ANSI	American National Standards Institute
AODA	Accessibility for Ontarians with Disabilities Act, 2005
DFO	Department of Fisheries and Oceans
HDBC	Heavy Duty Binder Course
HDPE	High Density Polyethylene
HL	Hot Laid
HMA	Hot Mix Asphalt
IES	Illuminating Engineering Society
LSRCA	Lake Simcoe Region Conservation Authority
MECP	Ministry of Environment, Conservation and Parks (Ontario)
MNRF	Ministry of Natural Resources and Forestry (Ontario)
MTO	Ministry of Transportation (Ontario)
OPSD	Ontario Provincial Standard Drawing
OPSS	Ontario Provincial Standard Specification
PGAC	Performance Graded Asphalt Cement
PE	Polyethylene
SP	Superpave
TRCA	Toronto and Region Conservation Authority

3 ROADWAY GEOMETRIC DESIGN

3.1 Design References

- Transportation Association of Canada Geometric Design Guide for Canadian Roads (2017)
- Geometric Design Supplement for TAC Design Guide – MTO – 2017
- Transportation Association of Canada Canadian Roundabout Design Guide (2017)
- Ontario Ministry of Transportation Roadside Design Manual (2017)
- Ontario Traffic Manuals (OTM)
- Ontario Provincial Standards Drawings (OPSD)
- Ontario Standards and Specifications (OPSS)
- York Region Standard Drawings
- York Region Specifications

3.2 Design Vehicle

Design vehicles shall be (TAC manual) WB-20 Tractor Semi-Trailer.

When working in a rural environment, the designer shall consider large farm vehicles. It is recommended that the designer contact the local York Region Federation of Agriculture (YRFA) representative for appropriate vehicle size.

3.3 Design Speed

Design speed recommendations are listed in Table 3-1.

For corridors with posted speeds of 60km/h or less, it is recommended that the design speed equal the posted speed.

For corridors with a posted speed of 70km/h or greater, it is recommended that the design speed be 10km/h greater than the posted speed.

Table 3-1 - Posted Speed and Recommended Design Speeds[1]

Posted Speed (km/h)	Design Speed (km/h)
40	40
50	50
60	60
70	80
80	90
90	100
100	110

[1] *York Region Designing Great Streets Guidelines (2019)*

3.4 Lane Widths

Outside travel lanes / curb lanes are measured to the edge of pavement.

Lane width requirements are listed in Table 3-2, Table 3-3 and Table 3-4.

Table 3-2 - Standard Lane Widths - Regional Roads

Width varies with Road Typology	Urban Cross-Section		Rural Cross-Section	
	Min	Max	Min	Max
Inside Travel Lane(s)	3.3m	3.3m	3.5m	3.5m
Outside Travel Lane*	3.5m	3.5m	3.5m	3.5m
Continuous Centre Lane	3.5m	5.0m	-	-
Painted Centre Median	-	-	1.2m	2.0m
Landscaped Median	4.0m	5.0m	-	-
Shoulder, Buffer and Rounding**	-	-	2.5m	2.5m

** A two-lane urban road requires 4.25m travel lanes in both directions to allow for maintenance operations.*

*** Increase rounding to 1.0m where there is guiderail.*

Table 3-3 - Auxiliary Lane Widths - Regional Roads

Turn Lanes	Urban Cross-Section		Rural Cross-Section	
	Min	Max	Min	Max
Right Turn Lane	3.5m	3.5m	3.5m	3.5m
Left Turn Lane	3.0m	3.3m	3.0m	3.3m*
Slip Around Lane	N/A		Drawing DS-100	

**Increase left lane width to 4.0m when there is no median.*

Table 3-4 - 2-Lane Side Road Lane Widths

Lane Width	Inbound	Outbound	Left Turn	Right Turn
Side Road	5.0m	3.5m	3.0m min	3.5m

Note: Designers shall refer to Local Municipal Road Standards for all locally owned roads.

3.5 Turn Lane Design

- TAC Geometric Design Guide for Canadian Roads (2017)
- York Region DS 100 Series Drawing – Intersection Design Standards
- In rural locations, storage, deceleration, and taper lengths shall be increased by 25%.

3.6 Horizontal Control

- Centrelines shall be placed at the crown of the roadway, not in the centre of the right-of-way.
- Sideroads and entrances shall intersect with the Region roads as close to 90 degrees as possible.
- Realign intersections in accordance with TAC Design Guide.
- New intersections shall be spaced at least 400m from the next nearest intersection as measured from the centreline of intersecting roads.

3.7 Vertical Control

- Road grades shall not exceed 8% unless it is an existing condition.
- All grade changes in excess of 2.5% shall be designed with vertical curves.

- Sideroad and entrance profiles shall be considered when changing the road profile.
- A storage platform shall be provided on all intersection approaches.

Table 3-5 - Crossfall

Item	Grades
Minimum Roadway Crossfall	2%
Road Resurfacing Crossfall	1.5% to 2.5%
Intersection Crossfall	0.5% to 2%
Maximum Superelevation – Urban*	4%
Maximum Superelevation at Signalized Intersection	3%
Maximum Superelevation – Rural*	6%
Shoulder Crossfall	2%

Superelevation shall not be used on bridges.

3.8 Gutter Grades

- Minimum gutter grade is 0.5%.
- Gutter grades between 0.35% and 0.50% will be accepted in retrofit projects, provided they only occur in short sections and additional catch basins are placed at the direction of the Region.

3.9 Curb Radii

- Minimum radii shall be 7.5m.
- Increase radius for industrial areas or roads with high volumes of right turning trucks.
- Use vehicle turning templates to confirm (WB-20 Tractor Semi-Trailer template).

3.10 Curb and Gutter

- OPSD 600.040 – concrete barrier curb with standard gutter.
- 0.3 metre gutter pan can be reduced to 0.1 metre subject to Region approval.
- Mountable curbs may be warranted at rural intersections, to accommodate agricultural equipment.

3.11 Boulevards

Table 3-6 - Typical Boulevard Elements Widths

Element – varies with Road Typology	Urban Cross-Section		Rural Cross-Section	
	Min	Max	Min	Max
Frontage Zone	0.6m	3.0m	-	-
Sidewalk / Pedestrian Clearway incl. Clearances	2.1m	3.5m	-	-
Cycle Track incl. Clearances/Buffer	1.75m	2.35m		
Multi-Use Path incl. Clearances	3.0m	4.0m	3.0m	4.0m
Planting and Furnishing Zone*	2.0m	6.0m	-	-
Maintenance Strip	0.8m	1.2m	-	-

** York Region Street Tree and Horticultural Design Guidelines (January 2022)*

- Minimum urban boulevard width is 3.5 metres, measured from edge of pavement.
- Minimum rural boulevard width is 2.0 metres, measured from the edge of pavement.
- Minimum boulevard width to accommodate street tree planting is 3.4 metres, measured from back of curb to inside edge of active transportation facility, inclusive of maintenance/ splash strip.
- Boulevards shall include an additional 0.5 metre platform from the edge of pedestrian or cycling facilities.
- At least one intersection corner shall have a minimum 5.0 metre boulevard, when two Regional roads intersect at a high fill embankment.
- Maintain consistent boulevard width throughout the project where possible.
- Boulevards shall be sloped at 2% towards the roadway.
- Unless it is an existing condition, drainage shall be maintained within the ROW.
- Superelevated roadways shall have a swale a minimum of 0.15m on the high side boulevard.
- 1.3m Edge Zone includes a 0.8m maintenance strip and 0.5m curb and gutter.

- Maintenance strip shall be sodded. Paved splash strip is permitted in Urban Centre Corridors subject to Region approval.

- Sod shall be used on any non-hardscaped elements and placed on 100mm topsoil. Back slopes may be seeded and mulched when directed by the Region.

- Typical cut / fill slope grading should be 2:1. Regardless, all grading slopes including benching requirement shall be supported by a geotechnical report.

- Construct a minimum of 0.3m deep scratch ditch at the bottom of fill slopes, complete with a positive drainage outlet.

- All grading shall be constructed within the Region's right-of-way or within a permanent grading easement.

- Property line grades for new development shall be designed to accommodate an ultimate urbanized cross-section. Typically, a grade of 0.3 metres above the road centreline will achieve this, unless otherwise directed by the Region.

4 PAVEMENT DESIGN

4.1 Design References

- Ontario Standards and Specifications (OPSS)
- OPSS.MUNI 310
- OPSS.MUNI 314
- OPSS.MUNI 1010
- OPSS.MUNI 1151
- York Region Specifications

4.2 Design Requirements

York Region road pavements typically consist of superpave asphalt mixes conforming to OPSS.MUNI 1151 and granular materials conforming to OPSS.MUNI 1010 to meet the requirements of MTO Traffic Category D.

A geotechnical investigation shall be conducted by a licensed Geotechnical firm. A Pavement Life Cycle Analysis shall assess new pavement structure proposals, including reuse / recycling / removal options, based on a 20-year service life over a 40-year to 50-year lifecycle.

Pavement design shall address high water table.

4.3 Asphalt Cement

All asphalt courses shall be designed to PGAC 64-28. The designer may increase (or bump-up) the high temperature grade for heavy and slow-moving traffic when recommended by Geotechnical Consultant and as approved by the Region.

4.4 Minimum Pavement Thickness

Table 4-7 - Minimum Pavement Thickness – Regional Roads

Surface Course Asphalt	Base Course Asphalt	Granular Base	Granular Sub-Base
50mm SP12.5	100mm (2 lifts) SP19.0 or SP25.0	150mm Granular ‘A’	450mm – 525mm Granular ‘B’, Type 1

- Rural shoulders shall be constructed with full depth pavement.
- Regional Road limit extends to the back of daylighting triangle.

- Refer to Local Municipality standards for local road pavement requirements.
- Stepped joints are required between the new asphalt pavement and the existing pavement as per OPSS.MUNI 310.

4.5 Tack Coat

Tack coat to be applied to all existing or milled asphalt surfaces and between all new pavement lifts. Tack coat should conform to the requirements of Ontario Provincial Standard Specifications OPSS.PROV 308.

5 ROADSIDE SAFETY

5.1 Design References

- Ontario Ministry of Transportation (MTO) Roadside Design Manual (2020)
- Ontario Provincial Standard Drawings - 900 Series
- Steel Beam Guide Rail System Type M20 and M30 (Preferred)
- Soft Stop Terminal System (Preferred)

5.2 Clear Zone Requirements

York Region is currently not adopting the clear zone requirements in the MTO Roadside Design Manual (2020) due to property and corridor constraints.

The clear zone requirements in the MTO Roadside Safety Manual (1993) shall be followed.

5.3 Warrants

The warrants are based on these criteria:

- Clear zone
- Embankment (height and slope)
- Roadside hazards
- Accident history

6 RESIDENTIAL AND COMMERCIAL ENTRANCES

6.1 Design References

- York Region Access Guidelines (2020)
- DS-215 Residential Entrance (Urban)
- DS-214 Residential Entrance (Rural)
- DS-203 Commercial Entrance (Urban)
- DS-200 Commercial Entrance (Rural)
- DS-216 Commercial Entrance Curb Return
- York Region DS 200 Series Drawing – Commercial and Residential Entrance Design Standards

6.2 Design Requirements

Table 6-8 - Entrance Standards

Item	Residential – Single Unit	Commercial – Multiple Residential Unit, Condominium, Commercial, Industrial Item
Surface Course Asphalt - Minimum Thickness	50mm SP12.5 or HL-3	50mm SP12.5 or HL-3 (HS)
Base Course Asphalt - Minimum Thickness	-	100mm SP19.0 or HL-8
Granular Base - Minimum Thickness	300mm Granular 'A'	450mm Granular 'A'
Minimum Width*	3.0m	9.0m
Minimum Radius*	3.0m	5.0m

**Increase entrance width and radii to allow for a smooth transition and accommodate turning movements of oversized vehicles.*

- Entrance slopes shall range from 2.0% and 10.0%.
- Grade changes in excess of 4.0% shall be designed with minimum 2.5 metre tangent lengths or vertical curves.

- Entrances within the right-of-way shall drain towards the roadway.
- Commercial entrances shall be graded to ensure that the site drainage is self-contained.

7 PEDESTRIAN AND CYCLING FACILITIES

7.1 Design References

- Pedestrian and Cycling Planning and Design Guidelines (2018)
- Designing Great Streets Guidelines (2019)
- Refer to Local Municipality Standards for sidewalk requirements.
- York Region Standard Drawing E-6.07 - Tactical Warning Plate
- York Region Standard Drawing DS-122 – Concrete Sidewalk Ramps at Intersections with Crossrides
- York Region DS-400 Series - Pavement Marking Design Standards

7.2 Sidewalks / Pedestrian Clearway Widths*

Table 7-9 - Minimum and Preferred Sidewalk / Pedestrian Clearway Widths

Typology**	Minimum	Preferred
Connector	1.8m	2.6m
Main Street City Centre Street – ROW < 43m Avenue - ROW < 43m	2.1m	3.4m
City Centre Street Avenue	2.4m	3.5m

** Widths do not include clearances and buffers*

*** For typologies refer to Designing Great Streets Guidelines (2019)*

7.3 Cycling Facility Widths* – Cycle Tracks (In-Boulevard/Raised)

Table 7-10 - Minimum and Preferred Cycle Track Widths

Typology**	Minimum	Preferred
City Centre Street Avenue Connector Main Street Rural Road	1.5m	1.8m

** Widths do not include clearances and buffers*

*** For typologies refer to Designing Great Streets Guidelines (2019)*

7.4 Cycling Facility Widths* – Paved Shoulder

Table 7-11 - Minimum and Preferred Paved Shoulder Cycling Facility Widths

Typology**	Minimum	Preferred
Rural Road	1.8m	1.5m + 0.5m marked buffer

** Widths do not include clearances and buffers*

*** For typologies refer to Designing Great Streets Guidelines (2019)*

7.5 Multi-Use Path Widths*

Table 7-12 - Minimum and Preferred Multi-Use Path Widths

Typology**	Minimum	Preferred
All Road Typologies	3.0m	4.0m

** Widths do not include clearances and buffers*

*** For typologies refer to Designing Great Streets Guidelines (2019)*

7.6 Design Requirements

- Ramps and curb drops shall meet AODA requirements and be approved by the Region.
- A pedestrian handrail is required when there is an elevation change greater than 1.0 metre adjacent to the pedestrian facility. For cycling facilities refer to Pedestrian and Cycling Planning and Design Guidelines.

- Placement of pedestrian and cycling facilities shall include clearances and buffers. It shall consider impacts to both existing and proposed utilities, street trees, structures, etc.

- Determine illumination, intersection treatments, signal operations, pavement marking requirements, handrail, etc.

8 TRANSIT STOPS

8.1 Design References

- YRT-1.01 Walkway and Passenger Standing Area for Local Roadways
- YRT-1.02 Passenger Standing Area in Front of Sidewalk
- YRT-1.02(B) Passenger Standing Area in Front of Sidewalk (60-foot bus)
- YRT-1.03 Passenger Standing Area with Shelter and Waste Pad Behind Sidewalk
- YRT-1.03(B) Passenger Standing Area with Shelter and Waste Pad Behind Sidewalk (60-foot bus)
- YRT-1.04 Passenger Standing Area with Shelter Pad Behind Sidewalk
- YRT-1.04(B) Passenger Standing Area with Shelter Pad Behind Sidewalk (60-foot bus)
- YRT-1.05 Passenger Standing Area with Shelter Pad Behind Sidewalk
- YRT-1A Perforated Subdrain Configuration (Section)
- YRT-1B Subdrain Connection to Catchbasin (Plan)
- YRT-1B Soak Pit – Typical (Isometric)
- YRT Concrete Bus Pad Specifications
- Pedestrian and Cycling Planning and Design Guidelines (2018)
    - Subsection 6.1 Transit Stops

9 STORM DRAINAGE

9.1 Purpose

To ensure that the storm drainage and stormwater management facilities are designed to the standards and guidelines as prescribed by the Ministry of Environment, Conservation and Parks, the Ministry of Transportation of Ontario and The Regional Municipality of York.

Following these guidelines designers will ensure that the required design information is provided on the design drawings so that all storm drainage and stormwater management facilities can:

- Obtain MECP Environmental Compliance Approval (ECA)
- Meet environmental permit requirements - Department of Fisheries and Oceans (DFO) and Conservation Authorities
- Last minimum 50 years without need for rehabilitation or replacement
- Be constructible, cost effective and easily inspected and maintained
- Avoid flooding and erosion problems

There is no direct ECA Application submission to MECP for stormwater management facilities.

All ECA Applications for storm sewers and stormwater management facilities are to be reviewed under the MECP Transfer of Review Program and submitted to Environmental Services Engineer in Community Planning and Development Services Branch, Corporate Services.

- All new storm sewers and stormwater management facilities require Environmental Compliance Approval (ECA) from MECP.
- All storm sewer design applications must provide detailed design sheets and contributing drainage area plans, including all external contributing areas.
- Ensure design drawings show existing storm sewers, sanitary sewers and watermains in both plan and profile view.

9.2 Design References

- MTO Drainage Management Manual (1997)
- MTO Highway Drainage Design Standards (2008)

9.3 Culverts

- Entrance Culverts - 525 mm diameter minimum - HDPE (High-density Polyethylene)
- Road Culverts - 750 mm diameter minimum – Concrete and/or HDPE
    - HDPE pipe can be used for culverts up to 1500mm in diameter, provided it meets OPSS.MUNI 1840

- For watercourse culverts, flood line and fish passage requirements may restrict the use of HDPE culverts.

- Specify the class of all concrete and HDPE culverts based on the design cover for each pipe and ultimate grades.

- For pipe bedding requirements refer to OPSD 802 and 806 or use the recommendation from the geotechnical consultant.

- Provide adequate cover above proposed culvert to prevent a pipe failure from frost and traffic loads. Refer to the OPSD 800 Series for additional information.

- Culverts shall be straight and aligned with the natural stream/ditches. If it is necessary to break the culvert alignment, bends should be curved in plan or should have angular bends not exceeding 15 degrees at intervals of 15 metres to avoid possibility of debris blockage.

- Appropriate erosion control protection shall be designed at all culverts.

- Large Culverts - cut off walls shall be concrete.

- For design frequency refer to the 2008 MTO Highway Drainage Design Standards.

- For large structures Regional Flood should be considered and shall be based on cost benefit analysis.

- The Regional Flood criteria is generally considered if, under Regional Flood conditions, a facility designed to normal criteria would:

    - materially increase flood damage to buildings over that which would occur under existing conditions at the site; and/or

    - Create backwater which would materially reduce the area of developable land upstream, provided that he building development is expected within 20 years.

In all cases the probable benefit (tangible and intangible) should be considered with the added cost of the facility and should be discussed with the municipality and with the landowners adversely affected.

9.4 Storm Sewers

- Sewers larger than 1500 mm in diameter must be concrete pipe.

- Sewers up to and including 1500 mm diameter shall be concrete or HDPE pipes. HDPE pipe must meet OPSS.MUNI 1840.

- Specify the class of all concrete and HDPE sewers based on the design cover for each pipe and ultimate road grade.

- For pipe bedding requirements refer to OPSD 802 and 806 or use the recommendation from the geotechnical consultant.
- Grates shall be used on inlets and outlets where:
    - storm sewers are 600mm diameter and larger;
    - at headwall locations;
    - animal access control is anticipated; and
    - as requested by the Region.
- Appropriate erosion control protection shall be designed at all storm sewer inlets/outlets and ditch inlets/outlets.

9.5 Maintenance Holes, Catch Basins, Ditch Inlets and Gutter Outlets

- All Structures as per OPSD 700 Series, unless noted otherwise.
- Catch Basin Frame and Grates, use OPSD-400.110.
- Catch Basin Frame and Grates – side inlet, use OPSD-400.082 along with curb and gutter OPSD-600.04.
- Maintenance Holes Covers, use OPSD-401.010.
- Ditch Inlet Grates, use OPSD-403.010 (Specify slope, i.e., 3:1 or 2:1).
- Ditch Inlets shall set the bottom of grate at no more than 300 mm maximum below ditch invert.
- All shoulder rounding at gutter outlets shall have a paved apron, tapered at a 5:1 transition to prevent premature shoulder erosion during heavy rainfall events.

9.6 General Storm Sewer Design Criteria

- Mainline sewer system shall be aligned along the curb and constructed between catch basin maintenance holes. Alternative location may be considered when there is a conflict with existing underground utilities.
- Catch basins and catch basin maintenance holes shall be spaced at 50 metres and / or retrofitted with existing catch basin spacing.
- Catch basins shall be placed away from the radius of intersection corners where possible.
- Catch basins shall be placed on the upstream side of crosswalk at a minimum of 0.6 metres from crosswalk's drop curb.

- Storm sewers shall follow road grade to minimize depth of construction and have a minimum 1.2 metres cover.
- Sewers must have an adequate gradient to maintain a minimum velocity of 0.75 m/s and a maximum velocity of 6 m/s when flowing full.
- Use invert elevation difference in maintenance hole to dissipate energy.
- Drop structures shall be provided for sewer entering maintenance hole at elevation of 0.6 metres or more above outlet pipe invert as per OPSD 1003.010.
- Last sewer run must have a maximum grade of 0.5% - 1.0% to reduce flow velocity at the outlet and prevent erosion.
- Avoid construction of headwalls at the sewer outlets by using HDPE pipes for last sewer run.
- Catch basin leads are to be connected to maintenance hole structures. Catch basin leads can be connected directly to mainline storm sewers larger than 900 mm diameter.
- Sumps to be provided in catch basins and catch basin maintenance holes.
- Catch basin leads to be 300 mm diameter at 1% to 2% with a minimum of 1.2 metres of cover.
- Provide insulation as per OPSD 1109.030 for sewers and catch basin leads where required minimum 1.2 metre cover cannot be achieved.
- Catch basin leads to be minimum 375 mm diameter at double catch basin locations.
- Double catch basins shall be used at all low points. An extra catch basin with elevation set at a maximum of 0.15 metres higher than the actual vertical curve low point elevation shall be provided to ensure relief from flooding in the event of grate clogging at the low point.
- Double catch basins shall be used where the road grade is steeper than 4%.
- Overland flow route shall be designed at road low points to convey 100-year storm. Major flow can be accommodated in surcharged storm sewers, provided hydraulic grade line calculations confirm 100-year storm conveyance to the environment. Proper erosion protection.
- Appropriate erosion control protection shall be designed at all overland flow routes.
- Maximum spread on gutter = 1.5 metres in design storm event.

9.7 Subdrain

- Perforated 150 mm diameter rigid plastic, wrapped with geo-textile fabric shall be used in all curbed sections and in rural sections as required.

9.8 Stormwater Quality Control

- Provide stormwater quality control facilities for all road widening projects based on an entire impervious area, including retrofit projects where no stormwater quality control facilities exist.

- *York Region PM and Manager of Roads Maintenance shall be consulted when selecting Oil Grit Separator (OGS) products for the project to ensure it meets the Region's needs (e.g., cost of future maintenance, overall footprint and location within the ROW, spacing constraints during construction).*

- Oil Grit Separators approved under Canadian Environmental Technology Verification (ETV) Program are required.

9.9 Stormwater Quantity Control

- Provide stormwater quantity control facilities designed to control post development peak flows to existing conditions for all storms up to a 100-year storm event.

9.10 Hydraulic Considerations

- New storm sewers shall be designed using the Rational Method and a 10-year storm IDF curve.

- Retrofit situations may warrant a design using 5-year storm IDF curve.

- A minimum T_c = 10 min shall be used for all storm sewer designs.

- Provide all calculations for time of concentration (Tc) used in storm sewers if more than 10 minutes is used.

- Minimum runoff coefficient of 0.75 shall be used for all Regional road right-of-ways. When composite runoff coefficient is calculated for road right-of-way, runoff coefficient of 0.90 for paved area and 0.25 for grassed area are to be used.

- The **Bransby Williams Method** or **Airport Method** shall be used to calculate the initial T_c where applicable in rural or semi-rural areas. Refer to Design Chart 1.11, MTO Drainage Management Manual (1997) Part 4 for details.

9.11 Intensity – Duration – Frequency (IDF) Curves

Southern Quadrant: (South of Bloomington Road)

$I_5 = \frac{1045.41}{(t+4.9)^{0.83}}$ mm/hr

where t = 10 minutes, then I =111.10 mm/hr

Use 10 minutes as an initial inlet time

$I_{10} = \frac{1331.42}{(t+5.26)^{0.84}}$ mm/hr

$I_{25} = \left| \frac{1045.41}{(t+4.9)^{0.83}} \right| * 1.39$ mm/hr

$I_{50} = \left| \frac{1045.41}{(t+4.9)^{0.83}} \right| * 1.54$ mm/hr

$I_{100} = \left| \frac{1045.41}{(t+4.9)^{0.83}} \right| * 1.69$ mm/hr

Northern Quadrant: (North of Bloomington Road)

$I_5 = \frac{2464}{t + 16}$

where t = 10 minutes, then I = 94.77 mm/hr

Use 10 minutes as an initial inlet time

$I_{10} = \left| \frac{2464}{t + 16} \right| * 1.18$ mm/hr

$I_{25} = \left| \frac{2464}{t + 16} \right| * 1.39$ mm/hr

$I_{50} = \left| \frac{2464}{t + 16} \right| * 1.54$ mm/hr

$I_{100} = \left| \frac{2464}{t + 16} \right| * 1.69$ mm/hr

Intensity – Duration – Frequency (IDF) Curve for 25mm Storm

$I_{25\ mm} = 722.949 / (T_c + 7.503)^{.862}$

10 ENVIRONMENTAL PROTECTION

10.1 Legislation

- Lakes and Rivers Improvement Act
- Public Lands Act
- Fisheries Act
- TRCA - Ontario Regulation 166/06
- LSRCA - Ontario Regulation 179/06
- Environmental Assessment Act (Provincial and Federal)
- Environmental Protection Act (Provincial and Federal)
- Ontario Water Resources Act
- Clean Water Act
- Navigable Waters Protection Act
- Migratory Bird Convention Act
- Bill 27, Greenbelt Protect Act
- Oak Ridges Moraine Act
- Species at Risk Act (SARA)

10.2 Permits and Approvals

Obtain all applicable regulatory permits, approvals and amendments from following Agencies, Ministries, Authorities, and other governing bodies as required:

- Ministry of the Environment, Conservation and Parks
- Ministry of Natural Resources and Forestry
- Fisheries and Oceans Canada
- Toronto and Region Conservation Authority
- Lake Simcoe Region Conservation Authority

10.3 Design References

- Regulated Planting Standard Drawings

10.4 Construction Timing Windows

Refer to “In-water work timing window guidelines” as published by MNRF.

- https://www.ontario.ca/document/water-work-timing-window-guidelines
- https://www.ontario.ca/page/species-risk

10.5 Construction Timing Window Extensions

Requests for construction timing window extensions on Region led projects must be submitted in writing to the Region’s Transportation Environmental Specialist.

Any confirmations, extensions or exemptions must also be confirmed in writing by the Conservation Authority, prior to proceeding with work.

11 TRAFFIC SIGNALS

11.1 Design References

- Transportation Association of Canada Geometric Design Guide for Canadian Roads (2017)
- York Region Electrical Standard Drawings
- York Region Electrical Specifications and Bid Form

11.2 Handwells

- E-Drawings - 1 Series – Handwells

11.3 Pole Bases

- E-Drawings - 2 Series – Pole Bases

11.4 Traffic Signals

- Ontario Traffic Manual - Books 12
- E-Drawings - 3 Series – Traffic Signals

11.5 Wiring

- E-Drawings - 4 Series – Wiring
- Wiring of the electrical systems to be approved by Electrical Safety Authority.

11.6 Power Supply

- E-Drawings - 5 Series – Power Supplies
- Energizing of the electrical systems to be approved by Electrical Safety Authority.

11.7 Median Islands

- E-Drawings - 6 Series – Median Islands and Sidewalk

11.8 Design Requirements:

- Use raised median islands to provide refuge for pedestrians, protect traffic control devices, or prohibit undesirable traffic movements.
- Island setbacks vary with angle of intersection, sideroad width and AODA compliance. Use vehicle turning templates to confirm.
- Use concrete slab raised median islands in new construction.

11.9 Miscellaneous

- E-Drawings - 8 Series – Miscellaneous

12 ILLUMINATION

12.1 Design References

- York Region DS 300 Series Drawings – Illumination Design Standards
- York Region Electrical Specifications and Bid Form
- Standard RP-8, ANSI / IES American National Standard Practice for Roadway Lighting

12.2 Design Requirements:

- Partial illumination – intersections only
- Mid-block illumination is required when pedestrian and cycling facilities are planned and/or constructed.

- Mid-block illumination requires Region review, commenting and approval.

12.3 Responsibilities

- Partial illumination – York Region
- Mid-block illumination – generally Local Municipality

12.4 Design Considerations

- Region and local municipal standards
- Horizontal and vertical clearances (street trees, utilities, entrances, sidewalks, cycling facilities, etc.)
- Photometric design calculations (spacing, road curvature)
- Power supply

13 PAVEMENT MARKINGS

13.1 Design References

- Ontario Traffic Manual - Books 11
- Ontario Traffic Manual - Books 15
- Ontario Traffic Manual - Books 18
- York Region DS 400 Series Drawing – Pavement Marking Design Standards
- York Region Pavement Marking Specifications and Bid Form

14 SIGNAGE

14.1 Design References

- Ontario Traffic Manual - Books 5
- Ontario Traffic Manual - Books 6
- E-Drawings - 7 Series – Signs and Sign Assemblies
- York Region Electrical Specifications and Bid Form

15 STREETSCAPING

York Region has policy, design standards and guidelines to ensure that this vision becomes reality. Streetscape design standards and specifications provide clarity to consultants and developers on the expectations and level of design; this ensures quality materials and execution that is consistent throughout the Region's nine municipalities.

15.1 Design References

- Designing Great Streets Guidelines (2019)
- SS-100, SS-200, SS-300 Series Streetscape Standard Drawings
- AutoCAD Streetscape Standard Drawings
- Streetscape Specifications

Streetscape Program – policies available online

- Municipal Streetscape Partnership Policy
- Streetscape Design Review Manual
- Streetscape Design Review Manual Executive Summary
    - Appendix A: Sight Triangle Manual
    - Appendix B: Visual Guide to Streetscape Design
    - Appendix C: Streetscape Site Plan Checklist
    - Appendix D: Site Plans Examples
    - Appendix E: Streetscape Policies and Guidelines Map
- Enhanced Zebra Pavement Marking Detail at Signalized Intersections
- YRT Coordinated Site Furniture Design Guidelines

16 TREE PRESERVATION

16.1 Design References

- Street Tree and Forest Preservation Guidelines (January 2022)
- Street Tree and Horticultural Design Guidelines and Standards

16.2 Design Requirements

The Consultant is required to utilize design standards and guidelines developed by the Region to facilitate tree preservation during the design process.

Tree Inventory, Tree Protection Plan and Arborist Report are required deliverables for all projects that impact existing trees.

When canopy cannot be preserved, the design shall strive to replace and/or increase the lost canopy cover.

17 STREET TREE AND HORTICULTURAL DESIGN

17.1 Design References

- Street Tree and Horticultural Design Guidelines (January 2022)
- Street Tree and Horticultural Design Guidelines and Standards
- Designing Great Streets Guidelines (2019)
- Pedestrian and Cycling Planning and Design Guidelines (2018)
- Irrigation Design Guidelines – available upon request

17.2 Design Requirements

The Consultant is required to design new canopy cover as an essential asset on the boulevard. Both above and below ground spatial considerations which meet or exceed the Region's requirements as it relates to tree planting are to be considered while tree layout is integrated with other boulevard components such as streetscaping, active transportation, street and/or pedestrian lighting, etc.

Landscape Plan, an Irrigation Plan (if applicable), and a Master Plant List Table are required deliverables for all design projects.

York Region will enter into maintenance agreements with the adjacent property owner, including private property (residential/business), local municipalities, etc. when proposed plantings and/or landscape enhancements will not be maintained by York Region. This shall be clearly noted on Landscape Plans and subject to additional documentation for maintenance standards and responsibilities as reviewed and approved through York Region Public Works, Streetscaping.

18 PROPERTY

18.1 Design References

- York Region Official Plan - Map 11 - Street Network
- DS-107 Intersection - Regional Road with a Local Road
- DS-108 Intersection - Regional Road with a Regional Road
- DS-211 to DS-213 Property Requirement for Traffic Control Signals at Commercial Entrances
- Sight Triangle Manual

18.2 Design Requirements

- Planned street widths shown in Map 11 represent the maximum street widths required under the Official Plan.
- Notwithstanding the above, additional widths may be required for elements such as sight/daylight triangles, turning lanes, cuts, fills, extra turn lanes, structures, etc.

19 UTILITIES

19.1 Design References

York Region documents can be found at: www.york.ca/standards

- York Region Utility Coordination Training Manual (2020)
- York Region Standard Utility Locations Drawings
- York Region Municipal Consent Requirements

20 MATERIAL DENSITIES

- Open Friction Course – 28.1 kg / sq.m / 10mm thick
- Dense Friction Course – 27.0 kg / sq.m / 10mm thick
- Hot Mix HL-1 – 25.5 kg / sq.m / 10mm thick
- SP 12.5 - 24.5 kg / sq.m / 10mm thick
- FC1, FC2 and SMA (12.5) – 25.5 kg / sq.m / 10mm thick
- Hot Mix HL-2 – 22.8 kg/sq.m/10mm thick
- Hot Mix HL-3, 4 and 8 - 24.5 kg / sq.m / 10mm thick
- Heavy Duty Binder Course – 24.5 kg / sq.m / 10mm thick
- SP 19.0 - 24.5 kg / sq.m / 10mm thick
- SP 25.0 – 25.0 kg / sq.m / 10mm thick
- HL- 4 and 8 Modified – 23.5 kg / sq.m / 10mm thick
- Granular A – 2400 kg / cu.m (excludes the 15% shrinkage factor)
- Granular B – 2000 kg / cu.m (excludes the 15% shrinkage factor)

APPENDIX A – STORM SEWER DESIGN SHEET

Transportation, Public Works
Phone: 1-877-464-9675 ext. 75000
TTY: 1-866-512-6228
Email: transportation@york.ca
Website: york.ca

York Region