# 2 TRANSPORTATION

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2 TRANSPORTATION

2.1 ROADS DESIGN

2.1.1 Design Speed

Design speed shall be based on the following chart:

<table>
<thead>
<tr>
<th>Posted Speed (km/h)</th>
<th>Design Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 and below</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>90</td>
<td>110</td>
</tr>
<tr>
<td>100</td>
<td>120</td>
</tr>
</tbody>
</table>

In cases where development will lead to a lowered posted speed, it may be possible to use the future reduced posted speed.

2.1.2 Centreline Radii

a) Freeways, Expressways, and Arterials

Centreline horizontal curves for freeways, expressways and arterials shall be derived from Table C3-3 of the Geometric Design Standards for Ontario Highways. This chart is a summary of typical design speeds versus standard super elevation grades taken from C3-3.

<table>
<thead>
<tr>
<th>Design Speed (km/h)</th>
<th>Minimum Radius (m)</th>
<th>Normal</th>
<th>Reverse Crown 2%</th>
<th>Superelevation 4%</th>
<th>Superelevation 6%</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>700</td>
<td>500</td>
<td>160</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>1100</td>
<td>750</td>
<td>250</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>1600</td>
<td>1100</td>
<td>365</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>2200</td>
<td>1500</td>
<td>500</td>
<td>190</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>3000</td>
<td>2000</td>
<td>675</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>3500</td>
<td>2500</td>
<td>875</td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>4500</td>
<td>3500</td>
<td>1100</td>
<td>420</td>
<td></td>
</tr>
</tbody>
</table>

1. Source: Geometric Design Standards for Ontario Highways – Table C3-3
b) Collector and Local Streets For new Construction

i) Collector roads and local streets shall have centerline horizontal curves which meet or exceed the City of London Standard “Minimum Centreline Radii of Curvature for Roads in Subdivisions”. Refer to Fig.2.1.

ii) Local Streets with bends of approximately 90 degrees are to have a minimum inside street-line radius in accordance with the following:

<table>
<thead>
<tr>
<th>Road Allowance</th>
<th>Street Line Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.0m</td>
<td>9.0m</td>
</tr>
<tr>
<td>19.0m</td>
<td>9.5m</td>
</tr>
<tr>
<td>18.0m</td>
<td>10.0m</td>
</tr>
</tbody>
</table>

Note:
Bends of 90 degrees are only permitted on local streets. Refer to Fig.2.2

iii) For window street design information reference should be made to Section 1.1.3 b).

iv) The use of back to back horizontal curves or reverse curves will not be permitted on any new street. Straight tangents are required between curves, minimum tangents for varying road types will be determined by the City Engineer.

c) Reconstruction Projects

The reconstruction of existing roads are to have the centreline horizontal alignments reviewed by the applicable Project Manager on a site specific basis.

2.1.3 Radii for Curb & Gutter

a) Intersection Radii for curb and gutter should be measured at edge of pavement. The following chart illustrates the required radii.

<table>
<thead>
<tr>
<th>From:</th>
<th>Arterial</th>
<th>Collector</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>15m</td>
<td>15m</td>
<td>12m</td>
</tr>
<tr>
<td>Collector</td>
<td>15m</td>
<td>7.5m</td>
<td>7.5m</td>
</tr>
<tr>
<td>Local</td>
<td>7.5m</td>
<td>7.5m</td>
<td>7.5m</td>
</tr>
<tr>
<td>Industrial Streets</td>
<td>15m</td>
<td>15m</td>
<td>15m</td>
</tr>
</tbody>
</table>

b) Intersection Radii on Bus Routes & Daylighting Requirements

i) All intersections that have, or are proposed to be, future bus routes are to have 15.0m radii regardless of the classification of the road.

ii) a 3.0m daylighting triangle is required where a 15.0 m radius is needed at the intersection of a collector street to a collector street;
iii) a 6.0m daylighting triangle is required when on any road type connection to an arterial road.

c) Cul-de-sacs

The minimum required radii of curvature for curb & gutters for a residential and industrial cul-de-sac are as per City of London SR-5.0 and SR-5.1.

2.1.4 Lane Widths

For multi-lane roads or channelized intersections, minimum lane widths shall be based on the following chart.

<table>
<thead>
<tr>
<th>Description</th>
<th>Width (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Turn Lane</td>
<td>3.0</td>
</tr>
<tr>
<td>Left Turn Lane</td>
<td>3.0</td>
</tr>
<tr>
<td>Through Lane^{2}</td>
<td>3.5</td>
</tr>
<tr>
<td>Curb Lane^{1}</td>
<td>4.0</td>
</tr>
<tr>
<td>2-way Left Turn Lane</td>
<td>4.0</td>
</tr>
</tbody>
</table>

1 – Use this width only if there is no bike lane on the road; when a bike lane is present use the “Through Lane” width.

2 – No cap in rural areas where there are no curbs present, a 0.5m paved shoulder should be constructed in conjunction with the Through Lane to provide a 4.0m paved surface.

NOTE: In situations with higher design speeds or higher road classifications, wider lane widths may be required.
### 2.1.5 Right of Way, Pavement and Boulevard Widths

Pavement widths, right of way widths and boulevard widths shall be based on the following chart. (edge of pavement to edge of pavement)

<table>
<thead>
<tr>
<th>Category</th>
<th>Usage^3</th>
<th>R.O.W. (m)</th>
<th>Pavement (m)</th>
<th>Boulevard (m) Both Sides^6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major</td>
<td>Freeway</td>
<td>90</td>
<td>Varies</td>
<td>Varies</td>
</tr>
<tr>
<td></td>
<td>Expressway</td>
<td>60</td>
<td>Varies</td>
<td>Varies</td>
</tr>
<tr>
<td></td>
<td>Arterial (2 way)</td>
<td>36</td>
<td>Varies</td>
<td>Varies</td>
</tr>
<tr>
<td></td>
<td>Arterial (1 way)</td>
<td>26</td>
<td>Varies</td>
<td>Varies</td>
</tr>
<tr>
<td></td>
<td>Primary Collector</td>
<td>26</td>
<td>Varies</td>
<td>6.0</td>
</tr>
<tr>
<td>Minor – Residential</td>
<td>Secondary Collector¹</td>
<td>21.5</td>
<td>9.5</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>Local⁴ (greater than 60 units²)</td>
<td>20</td>
<td>8.0</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>(30 – 59 units)</td>
<td>19</td>
<td>7.0</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>(0- 29 units)</td>
<td>18</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Minor - Residential Window Street</td>
<td>Local⁴ (greater than 60 units⁵)</td>
<td>15.5</td>
<td>8.0</td>
<td>5.0/2.5</td>
</tr>
<tr>
<td></td>
<td>(30 – 59 units⁵)</td>
<td>14.5</td>
<td>7.0</td>
<td>5.0/2.5</td>
</tr>
<tr>
<td></td>
<td>(0- 29 units⁵)</td>
<td>14.5</td>
<td>7.0</td>
<td>5.0/2.5</td>
</tr>
<tr>
<td>Minor-industrial and Commercial</td>
<td>Cul-de-sacs (less than 185m)</td>
<td>20</td>
<td>8.0</td>
<td>6.0</td>
</tr>
<tr>
<td>All other usages</td>
<td>21.5</td>
<td>9.5</td>
<td>6.0</td>
<td></td>
</tr>
</tbody>
</table>

1. The pavement width of Secondary Collectors shall be widened to 11m when they connect to Primary Collectors and Arterials. The storage length shall be 45m, taken from the end of the curb and gutter radii and the return taper should be 30m. The right-of-way at these widening should be increased to 22.5 m

2. The pavement width of Local Roads serving 60 units or more shall be widened to 10m when they connect to Primary Collectors and Arterials. The storage length shall be 30m, taken from the end of the curb and gutter radii and the return taper should be 30m. The right-of-way at these widening should be increased to 21.5m.

3. For Road Classifications refer to Schedule C – Transportation Corridors – Official Plan of the City of London.

4. For reconstructed local roads: If the measurement of the existing road width is less than defined in the previous chart, then use the chart width. If the measurement of the existing road width is greater than 8m, then reconstruct at 8m.

5. Total number of units is based on number of units serviced by the local street including the window street units.

---

Note: Refer to Section 18 regarding additional design information for new subdivisions.
6. The boulevard widths are all to be in accordance with UCC-1M where applicable and UCC-2M. Refer to Section 1.1.3 a) for further UCC-1M design criteria and Section 1.1.3 b) for further UCC-2M design criteria.

2.1.6 K Values
On vertical curves, K factor shall be derived from the following table:

<table>
<thead>
<tr>
<th>Design Speed (km/h)</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crest Vertical Curve Minimum K¹</td>
<td>15</td>
<td>25</td>
<td>35</td>
<td>50</td>
<td>70</td>
<td>90</td>
<td>120</td>
</tr>
<tr>
<td>Sag Vertical Curve Minimum K²</td>
<td>18</td>
<td>25</td>
<td>30</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>60</td>
</tr>
</tbody>
</table>

1. Source: Geometric Design Standards for Ontario Highways, Table C4-6.
2. Source: Geometric Design Standards for Ontario Highways, Table C4-8.
For more information on design speed, refer to section 2.1.1.

2.1.7 Maximum and Minimum Road Grades

a) The maximum grades of roads shall be derived from the following table:

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Maximum Grade (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeway</td>
<td>3</td>
</tr>
<tr>
<td>Expressway</td>
<td>4</td>
</tr>
<tr>
<td>Arterial</td>
<td>6</td>
</tr>
<tr>
<td>Primary Collector</td>
<td>6</td>
</tr>
<tr>
<td>Secondary Collector</td>
<td>8</td>
</tr>
<tr>
<td>Local</td>
<td>8</td>
</tr>
</tbody>
</table>

The minimum road grades on all roads shall be 0.5%.

b) Flat see-saw profiles (identical high and low points) will not be allowed in either road profile designs or rear yard swale designs. See-saw profiles must slope in a cascade that allows major storm flows (Overland Flows) to drain along the road or lots to an acceptable Overland Flow Outlet.

c) In reconstruction projects within existing developed areas of the City, where the existing profile and driveway conditions cannot accommodate a cascading see-saw profile, the proposed profile must provide for adequate road drainage and be acceptable to the City Engineer.

2.1.8 Vertical Curves

When the numerical difference between two road grades exceeds 1% a vertical curve must be incorporated using the following criteria:

- Use k value from 2.1.6

Note: Refer to Section 18 regarding additional design information for new subdivisions.
2.1.9 **Drainage Issues**

a) **Overland Flow Routes**

i. The design of all road profiles for New Development Projects are required to accommodate and direct major overland flow routes (OLFR) to an acceptable outlet. This design element is to be considered at the earliest stages of design, coordinating with the SWM Unit for information, assistance, review and acceptance, all to the satisfaction of the City Engineer.

ii. The design of all major road profiles for Capital Works Projects (i.e. existing rural roads, Transportation EA's, etc.) are required to consider major overland flow routes (OLFR) and where possible, accommodate and direct the OLF’s to an acceptable outlet. This design element is to be considered at the earliest stages of design, coordinating with the SWM Unit for information, assistance, review and acceptance, all to the satisfaction of the City Engineer.

iii. In reconstruction projects within existing developed areas of the City, where the existing profile and driveway conditions cannot accommodate a formalized OLF Route, the proposed profile must provide for adequate road drainage and be acceptable to the City Engineer.

iv. In order of preference, OLFR should be directed along:
   a) arterial and primary collector roads;
   b) secondary collector roads;
   c) local streets;
   d) parks, open spaces;

b) **Culverts Under Roads**

i) New culverts or culverts that are being redesigned, replaced or impacted by road works/road widening must be designed to meet the hydraulic requirements established by MTO for inlet or outlet control culverts.

ii) City practice requires that culverts must convey the minimum storm events as specified below:

<table>
<thead>
<tr>
<th>Classification of Road</th>
<th>Minimum Storm Event To Be Conveyed By Culvert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local &amp; Secondary Collector</td>
<td>25 year storm event</td>
</tr>
<tr>
<td>Primary Collector &amp; Arterial</td>
<td>50 year storm event</td>
</tr>
<tr>
<td>Bridges</td>
<td>100 year storm event or Regional storm event (250 year), subject to the UTRCA conditions</td>
</tr>
</tbody>
</table>

*Note: Refer to Section 18 regarding additional design information for new subdivisions.*
iii) Further design information regarding culvert designs can be found in Section 18 – Drafting and Design Requirements for New Subdivisions

iv) Information, coordination and acceptance for this design element must be received from the SWM Unit, and should be considered at the earliest stages of design.

c) In the areas where parking bays are introduced, subdrain pipes should be installed longitudinally for the entire length of the parking bay. For material type and construction details refer to SW-3.1, located in the Supplemental O.P.S.S Sewers & Water section of Standard Contract Documents for Municipal Construction Projects Manual.

2.1.10 Rural Asphalt Lift Edge Taper

On rural roads, asphalt in all lifts shall be laid so that the edge of pavement is inclined at a 45-degree angle. Base lifts of asphalt shall be laid wider than surface lifts, so that a consistent slope is maintained.

2.1.11 Pavement Structure

a) Geotechnical Report
   A geotechnical report shall be completed unless otherwise noted by the City’s Project Manager.

b) Maximum Benkelmen Beam Spring Rebound

<table>
<thead>
<tr>
<th>CLASS OF ROAD</th>
<th>MAXIMUM SPRING BENKELMEN BEAM REBOUND (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local (Less than 60 units)</td>
<td>2.50</td>
</tr>
<tr>
<td>Local (60 or more units)</td>
<td>1.90</td>
</tr>
<tr>
<td>Secondary Collector</td>
<td>1.50</td>
</tr>
<tr>
<td>Primary Collector (incl. Industrial)</td>
<td>1.25</td>
</tr>
<tr>
<td>Arterial</td>
<td>0.64</td>
</tr>
<tr>
<td>Freeway</td>
<td>0.50</td>
</tr>
</tbody>
</table>
c) Municipal Projects

The pavement structure of all roads being constructed or repaired under a Municipal Project, and in New Subdivisions, shall be based on the following table:

<table>
<thead>
<tr>
<th>Subgrade Type</th>
<th>Component</th>
<th>Local</th>
<th>Collector</th>
<th>Arterial</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Weak&quot;</td>
<td>Asphalt</td>
<td>90</td>
<td>130</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Gran. A</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Gran. B</td>
<td>300</td>
<td>450</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>EGT</td>
<td>531</td>
<td>712</td>
<td>912</td>
</tr>
<tr>
<td>Lacustrin Clay</td>
<td>Asphalt</td>
<td>90</td>
<td>130</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Gran. A</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Gran. B</td>
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<td>450</td>
<td>450</td>
</tr>
<tr>
<td></td>
<td>EGT</td>
<td>531</td>
<td>712</td>
<td>812</td>
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<tr>
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<td>90</td>
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</tr>
<tr>
<td></td>
<td>Gran. A</td>
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<tr>
<td></td>
<td>Gran. B</td>
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<td>450</td>
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<tr>
<td></td>
<td>EGT</td>
<td>531</td>
<td>712</td>
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<td>&quot;Strong&quot;</td>
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<td></td>
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<td>300</td>
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<tr>
<td></td>
<td>EGT</td>
<td>330</td>
<td>511</td>
<td>711</td>
</tr>
</tbody>
</table>

If the geotechnical investigation determines the native material is stronger & free draining, a reduction in the Granular B thickness could be considered.

**Equivalency Factors:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt</td>
<td>2.00</td>
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<tr>
<td>Recycled Asphalt</td>
<td>1.80</td>
</tr>
<tr>
<td>Granular A</td>
<td>1.00</td>
</tr>
<tr>
<td>Granular B</td>
<td>0.67</td>
</tr>
</tbody>
</table>

1. Source: *TAC - Pavement Design and Management Guide*, Table 6.5, 6.6, 6.7

- Top-coat asphalt laid on Freeways, Expressways, Arterials, and Primary Collectors shall be placed over existing or freshly laid hot mix asphalt, cold in-place recycled, or milled asphalt, and shall have a minimum lift thickness of 50mm.
- Granular A shall be placed at a minimum depth of 150mm
- A tack coat shall be applied on all milled surfaces and in situations where placement of asphalt lifts is separated by more than two weeks.
d) Asphalt Selection by Road Classification

<table>
<thead>
<tr>
<th>Classification of Road</th>
<th>Binder Asphalt</th>
<th>Surface Asphalt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>HL 8</td>
<td>HL 3</td>
</tr>
<tr>
<td>Secondary Collector</td>
<td>HL 8</td>
<td>HL 3</td>
</tr>
<tr>
<td>Primary Collector</td>
<td>HL 8</td>
<td>HL 3</td>
</tr>
<tr>
<td>Arterial *</td>
<td>Superpave 19.0</td>
<td>Superpave 12.5 **</td>
</tr>
<tr>
<td>Freeway</td>
<td>Superpave 19.0</td>
<td>Superpave 12.5 FC1</td>
</tr>
<tr>
<td>Expressway</td>
<td>Superpave 19.0</td>
<td>Superpave 12.5 FC1</td>
</tr>
</tbody>
</table>

NOTE – Superpave Mix design as per OPSS MUNI 1151, Table 1 and Table 2.

* With approval from TP&D, Marshall Mixes (HL8, and HL3) may be used on arterial roads for minor tie-in work or slip-arounds for new Subdivisions, and maintenance repairs.

** Subject to Surface Course Asphalt Policy (section 2.1.11 e), this may need to be Superpave 12.5FC1

e) Surface Course Asphalt Policy

Transportation Planning & Design has set a criteria to establish a consistent application of asphalt selection on City Roads (based on traffic volumes and expected life span.

Superpave 12.5 FC1 is a premium surface asphalt mix with coarse aggregate that is more resistant to rutting and maintains good skid resistance. HL 4 is a coarser mix with slightly higher stability suitable for rural uses. HL3 and Superpave 12.5 are a finer mix with improved aesthetic qualities for use in urban applications with pedestrians and other active transportation uses.

Superpave 12.5 FC1

- > 20,000 AADT OR average daily truck traffic > 1,000
- Pavement life expectancy of at least 10 years

HL4 – rural applications

HL3 and/or Superpave 12.5 – all other applications

f) PGAC

All Superpave 12.5 FC1 applications shall use of PGAC 64-28 asphalt cement with a higher quality aggregate. The aggregate shall be on the MTO designated sources list and the City of London Standard Contract Documents for Municipal Projects.

HL3 and Superpave 12.5 shall use PGAC 58-28, unless a higher grade PGAC is specified by the City of London.
2.1.12 Transition Between Road Types

Transition from two lanes to four or from four lanes to six should be made using the taper dimensions noted in the table in Section 2.1.14 in relation to design speed. The transition should be clearly signed with a Wa-23 and a Wa-40 as per the Ontario Traffic Manual – Book 6. Transition from hard surface to loose surface should be signed with a Wa-25 and a Wa-25T.

2.1.13 Access and Sight Distance

As determined from Figure E3-8 of the Geometric Design Standards for Ontario Highways, the following stopping sight distances shall be provided at intersections and accesses:

a) On new intersections and major accesses such as large commercial or industrial development, the desirable decision sight distance shall be provided.

b) On all other new accesses, the minimum decision sight distance shall be provided.

c) For existing accesses and single family residences, the minimum stopping sight distance shall be provided.

This figure assumes a line of sight from the driver of a vehicle entering the intersection (1.05m above the pavement surface) to the headlights of an approaching vehicle (at a height of 0.38m). Design speeds for the intersecting roadways are listed in Section 2.1.1 of this manual. Note also that section 4.24 of City of London By-law Z-1 may require a further setback from the right-of-way of structures over 1m in height.

2.1.14 Length of Turning Lanes

Requirement for a turning lane shall be determined by the Transportation Division during the site plan review process, subdivision review, design or redesign of an arterial roadway.

Length of the tapered and parallel portions of the turn lane shall be determined using the following table:

<table>
<thead>
<tr>
<th>Design Speed (km/h)</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taper Length (m)</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Parallel Length1 (m)</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

1. Source: Geometric Design Standards for Ontario Highways, Table E9-1.

- For more information on design speed, refer to section 2.1.1. Note that distances should be increased for grades above 2% or unusual traffic conditions. Distances may be decreased if there are physical limitations on lane lengths.

- Storage requirements should be determined by a traffic study. The minimum storage on an arterial road intersection shall be 45m. On primary collectors and secondary collectors that intersect arterials, minimum storage shall be 45m. On all other types of intersections and accesses, minimum storage shall be 30m. In either case, storage distance starts 15m from the centreline of the cross street or at the stop bar.
Where constrained in an urban situation, parallel length may be reduced to 0m and taper length may be reduced to 45m.

2.1.15 Sidewalks, Bicycle Lanes and Pedestrian Walkways

a) Residential Subdivisions:
   i. Sidewalks are required on both sides of all collectors or arterial roads and where the road width is in excess of 8.0m measured edge of pavement to edge of pavement.
   ii. Sidewalks are required on both sides for the complete length of any road on which a school property fronts.
   iii. Sidewalks may be required on both sides of an entrance road to a subdivision from an arterial road as specified by the City Engineer.
   iv. Sidewalks are required on one side only of cul-de-sacs and streets containing or serving 40 or more units.
   v. Sidewalks are required on one side of abutting arterial and primary collector streets along the full frontage of the subdivision, or as otherwise specified by the City Engineer.
   vi. Sidewalks are to be located on the outside of a crescent street, unless approved otherwise by the City Engineer.
   vii. Sidewalk Gradient – All sidewalks should follow the road gradient in a residential subdivision. The minimum gradient of a sidewalk in a subdivision is 0.5% and the maximum gradient of a sidewalk is 8%.
   viii. All sidewalks constructed in residential subdivisions shall have a minimum crossfall of 2% and maximum crossfall of 4% consistent with the boulevard crossfall.

b) Industrial Subdivisions:
   Sidewalks are required on all streets within industrial subdivisions, and are required on abutting arterial and primary collector streets or as otherwise approved by the City Engineer.

At commercial, multi-family and industrial driveways the thickness shall be 150mm reinforced, together with a granular base, unless otherwise approved by the City Engineer.

c) General:
   Sidewalks may be required on one side of any street if it forms part of the pedestrian system of a particular area.

d) Sidewalks that are separated from the curb and gutter by a boulevard shall be constructed at 1.5m in width and 100mm in depth using concrete. Sidewalk constructed as curb-face, shall be constructed at 1.8m in width and 100mm in depth. Depth of concrete should be increased to 150mm when sidewalk crosses a commercial access or egress. Depth of concrete shall be increased to 150mm at ramps on collector roads and higher road classifications where a risk exists of vehicles driving over them (refer to City of London SR 1.0, 1.1, 1.2, 1.3, 1.4 & 1.5, and UCC-1M).

To review the City of London SR’s please follow the link below:
For window street design information reference should be made to Section 1.1.3 b).

e) Reconstruction projects are to have the sidewalk replaced or repaired if an existing sidewalk is in place. In the absence of a sidewalk the designer is to verify with the Transportation Division – Warranted Sidewalk List to determine if a new sidewalk is to be installed.

f) 1.5m wide on-street bicycle lanes are to be incorporated into the road network in accordance with the City of London Bicycle Transportation Network Plan. The designer is to review and confirm requirements with the Transportation Division.

Pavement structure for the on-street bicycle lanes are to be as per the required pavement structure for the class of road on which the bicycle lane is being constructed.

g) Pedestrian Walkways - are to be constructed as per City of London SR-7.0.

i. General & Widths – When designing a standard 3.0m or 4.6m width walkway, ensure that the full width of the walkway is sidewalk and no grassed area. As well, ensure that catch basins are located in a manner as not to disrupt walkway usage. An example is a catch basin at the end of a walkway, as per City of London Drawing Standards SR-7.0.

ii. Sidewalk – To have a crossfall of 20mm/m or alternative swales, as per City of London Drawing Standard 7.0.

iii. Removable Posts – Are to be installed at both ends of the walkway or as approved by the City Engineer, as per City of London Drawing Standard SR-8.0.

iv. Chain Link Fence – Chain link fences are to comply with the requirements of OPSS-541 and OPSD-900.01 except for the following amendments:
  - the height of the fence shall read 1.2m
  - the footing detail, part a: shall read in concrete.

v. Pedestrian Handrail – Where walkway grades exceed 8%, pedestrian handrails are to be constructed on one side of the walkway in line with the removable posts. Hot dipped galvanized handrails are to conform to OPSD-915.01.

vi. Stairs on Walkways – Where walkway grades exceed 10%, stairs with footings are to be constructed in accordance with City of London Drawing Standard SR-6.0.

vii. Rise and Run Dimensions for Stairs in Walkways – Are to comply with the following:
  - Minimum rise – 125mm
  - Maximum rise – 200mm
  - Minimum run – 255mm
  - Maximum run – 380mm

viii. Intermediate Landings – Where the total change in grade exceeds 1.8m, intermediate landings (no less than 1.5m) are to be provided.

ix. Sidewalk and Stair Concrete – To have at least a minimum strength of 30 MPa with 5% to 7% air entrainment and low slump.
x. **Stair Reinforcement** – To be #15M diameter bars with 40mm of cover in accordance with City of London Drawing Standard SR-6.0.

xi. **Driveway Locations** – To be located as far from the walkway as possible.

xii. **Details** – A plan & profile is required for all pertinent walkway designs together with all pertinent details.

xiii. **Sidewalk Alignment** – When there is a jog in the street line then a smooth transition (radius of 30.0m) should be shown between the two sidewalks.

xiv. **Barricade and/or Warning Sign** – A barricade and/or warning sign is required at the limit of a dead end street and/or end of a proposed sidewalk on an existing right-of-way where the sidewalk terminates (Refer to OPSD-912.532).

xv. **Sidewalk Termination** – A temporary sidewalk shall be constructed from the end of a proposed sidewalk to the adjacent road edge, at the curb & gutter and/or gravel shoulder as required by the City Engineer.

h) Trees to be planted in accordance with the “City of London Tree Planting Guidelines”.

i) **Sidewalk Ramps With Tactile Plates At Signalized and Non-Signalized Intersections**
   - All sidewalk ramps at signalized and non-signalized intersections shall have cast iron tactile plates installed on them to meet the needs of AODA as following:

**Exterior paths of travel, curb ramps**

In this section, “curb ramp” means a ramp that is cut through a curb or that is built up to a curb. O. Reg. 413/12, s.6.

Where a curb ramp is provided on an exterior path of travel, the curb ramp must align with the direction of travel and meet the following requirements:

1. The curb ramp must have a minimum clear width of 1,200 mm, exclusive of any flared sides.

2. The running slope of the curb ramp must,
   - Be a maximum of 1:8, where elevation is less than 75 mm, and
   - Be a maximum of 1:10, where elevation is 75 mm or greater and 200 mm or less.

3. The maximum cross slope of the curb ramp must be no more than 1:50.

4. The maximum slope on the flared side of the curb ramp must be no more than 1:10.

5. Where the curb ramp is provided at a pedestrian crossing, it must have tactile walking surface indicators that,
   - Have raised tactile profiles,
   - Have a high tonal contrast with the adjacent surface,
   - Are located at the bottom of the curb ramp,
   - Are set back between 150 mm and 200 mm from the curb edge, and
   - Are a minimum of 610 mm in depth. O. Reg. 413/12, s. 6.
Exterior paths of travel, depressed curbs

In this section, “depressed curb” means a seamless gradual slope at transitions between sidewalks and walkways and highways, and is usually found at intersections. O. Reg. 413/12, s.6.

Where a depressed curb is provided on an exterior path of travel, the depressed curb must meet the following requirements:
1. The depressed curb must have a maximum slope of 1:20.
2. The depressed curb must be aligned with the direction of travel.
3. Where the depressed curb is provided at a pedestrian crossing, it must have tactile walking surface indicators that,
   i. Have raised tactile profiles,
   ii. Have high tonal contrast with the adjacent surface,
   iii. Are located at the bottom portion of the depressed curb that is flush with the roadway,
   iv. Are set back between 150 mm and 200 mm from the curb edge, and
   v. Are a minimum of 610 mm in depth. O. Reg. 413/12, s.6.

For sidewalk ramp with tactile plate details for signalized intersections, please refer to drawings STS 11.01 to STS 11.09. Refer to the same drawings for non-signalized intersections as well, with the exception of not having a pedestrian push button poles. Approved manufacturers are as follows:

East Jordon Iron Works Inc.
Neenah Foundry Co.
Or; approved equivalent

2.1.16 Curb and Gutter

a. Types and Applications

i) Concrete Barrier Curb with Wide Gutter as per OPSD 600.01 shall be used on all arterial and primary collector roads, and within commercial and industrial subdivisions with a 21.5m road allowance.

ii) Concrete Barrier Curb with Wide Gutter as per OPSD 600.01 shall be used for all reconstruction projects unless otherwise noted by the City’s Contract Administrator. The designer is to verify curb and gutter type with the appropriate contract administrator.

iii) Concrete Barrier Curb with Standard Gutter as per OPSD 600.04 shall be used in the following locations:

   1. On both sides of a road adjacent to a school block, plus a length of 30m at each end;
   2. Along all park frontages and natural heritage features, plus a length of 30m at each end;
   3. Wherever curb extensions (i.e. parking bays) are utilized, as per Fig. 2.3;
   4. Wherever raised traffic calming measures are utilized, plus 30m at each end;
5. At all through intersections including tees and roundabouts, plus 30m in all directions;
6. On both side of a road where any centreline curvature is present;
7. Wherever a Parking Plan is implemented;
8. As required by the City Engineer.

iv) Concrete Semi-mountable Curb with Standard Gutter as per OPSD 600.06 shall be used in locations not specified in Section 2.1.16 a. iii) above or as required by the City Engineer.

v) Concrete Barrier Curb as per OPSD 600.11 shall be used on an island in a cul-de-sac and medians on roads.

b) Transition/Termination

i) A transition of 3.0m is required between curb types. Curb transitions must occur on the road with the lower classification, minimum 1.0m away from the end of the radius.

ii) Curb termination as per OPSD 608.01 shall be used within temporary turning circles and dead end streets or intersections which abut or are adjacent to a future phase of a subdivision.

c) Catchbasins

i) Refer to Storm Sewer Section 5.16 in this manual for design information regarding catchbasins.

ii) A concrete curb setback is required for all catchbasins and curb inlet catchbasins located on the right-of-ways. Refer to City of London SR-3.0.

iii) Curb inlet catchbasins shall be used exclusively on roads classified as Arterials or higher, or in areas where there is an interest to drain the road surface more quickly.

iv) Mini-catchbasins should be installed at low points in arterial roads and higher road classifications until placement of top asphalt. (see Section 5.16.15).

d) Curb Radii Elevations – Required at all Beginning of Curves (B.C.) and End of Curves (E.C) of curvatures of intersections, cul-de-sacs, islands and medians.

Note: a gutter elevation is required at the top end of all cul-de-sacs.

Curb Radii Grades – A minimum of 0.5%.

Curb & Gutter Around Full Radius – Required at all intersections of subdivision streets and boundary road works adjacent to existing and future development. The curb & gutter is to be extended around the full radius at the corner and the sidewalk is to meet.

Concrete Strength – Refer to OPSS 353.05.01
e) **New Access**

Any new accesses to existing roads are required to attain a permit from the Environmental Programs and Customer Relations Division.

2.1.17 **Erosion Control Blanket**

Straw mat and curled wood excelsior type erosion blankets shall conform to OPSS-804. For types not described in this standard, North American Green SC150 or approved equal shall be used. See also Sediment & Erosion Control, Section 10 in this manual.

2.1.18 **Pavement Markings**

All pavement markings are to be designed in accordance with the Ontario Traffic Manual and City of London Standards. Proposed designs shall be submitted to the Roads and Transportation for approval a minimum of two weeks prior to application. Temporary pavement markings shall include lane divider lines, lateral crosswalk lines and stop bars may be traffic paint. All final pavement markings shall be of a durable material as defined in OPSS. Green surface treatment for cycling facilities, longitudinal crosswalk markings and stop bars to have an anti-skid resistance of 50 BPN to 65 BPN (British Pendulum Number).

Pre-marking of top coat and base asphalt shall be completed within 24 hours. The application of the pavement markings shall be within 24 hours after acceptance of the pre-markings by Roads and Transportation. Temporary pavement markings will be required if the top coat of asphalt is scheduled more than 2 weeks after the base asphalt is complete.

Traffic signage shall be designed in accordance with the applicable Ontario Traffic Manual and City of London Standards. Cycling Facility Signs to be installed with the appropriate lane divider lines.

Pavement markings and traffic signs shall be shown on the same drawing. Traffic signs shall include the OTM reference number, a graphic of the sign and station/offset.

2.1.19 **Pavement Reinforcement**

Pavement reinforcement in the form of stepped milled joints shall be used for road widening, lane additions, and utility cuts greater than 1m in width and 3m in length.

Utilize the requirements noted in City of London SR-13.1: *Stepped Milled Joint Pavement Reinforcement Detail*. Joints should be out of the alignment where tires will normally track. The pavement and granular base for the reinforcement shall be identical to or greater than the existing road structure. Notwithstanding this, a minimum of 150mm of granular ‘A’ (to 98% Proctor) and 100mm of compacted hot mix asphalt (to 97% Marshall) shall be used. Where there is significant truck transport traffic, increase this minimum to 200mm of granular ‘A’.

2.1.20 **Roadside Protection**

Roadside protection shall be applied in accordance to the Ministry of Transportation’s Roadside Safety Manual.
2.1.21 Sediment & Erosion Control

The City of London requires an Erosion Sediment Control Plan (ESCP) be designed for most Capital Works, Operational and Development Projects. The complexity of the ESCP is determined by the sensitivity of the area that is to be protected.

For reconstruction or resurfacing of existing roads, or for infill sites less than 3.0 ha in land area within existing urbanized areas, that are not in close proximity to an open watercourse, woodlands, ESA’s, steep slopes or other natural area; an ESCP is not required, unless otherwise directed by the City Engineer. Where an ESCP is not required, all reasonable protective measures must be taken during construction to control sediment and prevent erosion from occurring.

For further information on the requirements of the ESCP, please refer to Section 10 – Sediment & Erosion Control, within this manual.

2.1.22 Bus Bays

Bus Bays shall be constructed at 200mm in depth of concrete. It shall have a cross fall of 2%. Standard Bus Bay shall have a minimum taper of 15.0m and minimum storage of 15.0m.

Storage dimensions are for one bus. Add 14.5m for each additional standard bus and 20.0m for each additional articulated vehicle.

Actual dimensions should be consulted with London Transit Commission.

See Figure 2.1.22 Concrete Bus Bay for details.

2.1.23 Access Configurations

i. **Single Family** accesses are to be in accordance with Standard Contract Documents Drawings SR-2.0.

   Should a conflict occur between the location of a driveway and the location of a curb inlet catchbasin (CICB), then the Owner shall correct the conflict by either relocating the driveway, except when a parking plan governs, or replacing the CICB with a twin inlet catchbasin in the same location as the original CICB, all to the specifications of the City Engineer and at no cost to the City.

ii. **Development blocks for site plan approvals** access configurations shall be in accordance with Ontario Provincial Standard Drawing 350.010 with dimensions as set out in the City’s Access Management Guidelines.

   No catchbasins, existing or proposed shall be located within the limits of site entrances. In situations where existing catchbasins would be within proposed site entrances, the access shall be realigned so to avoid catchbasins or the catchbasin shall be relocated outside the access curb return.
2.2 INTERSECTIONS

2.2.1 At Grade Road/Rail Intersections

All railway crossings at grade in built-up areas shall be protected by the text warning sign “Cyclists Use Caution Crossing Tracks”.

2.2.2 Road/Road Approach Grades

Refer to TAC – Geometric Design Guide for Canadian Roads – Figure 2.3.2.2.

2.2.3 Road Layouts

When two (2) streets connect at an intersection they should connect at 90 degrees with 6 metre straight sections measured back from the street line.

2.3 TRAFFIC CALMING

2.3.1 Application and Methodology

Traffic calming measures are applied on primary and secondary collectors in residential areas, and occasionally on local roads. They enhance residents’ quality of life by encouraging low traffic speeds and volumes, minimizing conflicts between types of street users, and discouraging through traffic. Traffic calming makes the area safer and more inviting for pedestrians and cyclists, without restricting local motorists’ access to the arterial road network.

To be effective, traffic calming shall be applied only after careful study of the local transportation network and land use. It should be implemented on an area-wide basis, considering impacts on the surrounding road system. Non-motorized modes of travel should not be impeded by the applied measures. Consultation on the impact of the measures on emergency services, transit, snow plowing, street cleaning and garbage removal shall be completed as part of the planning process.

Traffic calming is only one design tool for safer roads. The most effective traffic calming measures have modest negative impacts on some aspects of the area in which they are installed. Because of this, other techniques such as education and enforcement, and design factors such as pavement width and street network design, should be considered in any traffic calming study.

Generally, traffic calming features should be spaced no more than 200m apart to achieve maximum efficiency.
The following 6 measures can be used to obstruct through traffic.
The following 6 measures can be used to reduce vehicle speeds and through traffic.

<table>
<thead>
<tr>
<th>TRAFFIC CALMING MEASURES</th>
<th>TO REDUCE VEHICLE SPEEDS &amp; THROUGH TRAFFIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHICANE</td>
<td>CURB EXTENSIONS / PARKING BAYS</td>
</tr>
<tr>
<td></td>
<td>![CHICANE Image]</td>
</tr>
<tr>
<td>CURB RADIUS REDUCTION</td>
<td>RAISED MEDIAN ISLAND</td>
</tr>
<tr>
<td></td>
<td>![CURB RADIUS REDUCTION Image]</td>
</tr>
<tr>
<td>MID-BLOCK RAISED MEDIAN</td>
<td>TRAFFIC CIRCLE</td>
</tr>
<tr>
<td>WITH CROSSWALK</td>
<td>![MID-BLOCK RAISED MEDIAN Image]</td>
</tr>
</tbody>
</table>

Note: Refer to Section 18 regarding additional design information for new subdivisions.
2.3.2 Signage

a) Entrance points to areas in which traffic calming measures have been installed, shall be posted with the Traffic Calmed Neighbourhood sign. See section 4.5.2 in the T.A.C. Canadian Guide to Neighbourhood Traffic Calming.

The Transportation Division may elect to use appropriate regulatory signs from the Ontario Manual of Uniform Traffic Control Devices as a traffic calming measure. Appropriate signage may include, but is not limited to, Maximum Speed, Right or Left Turn Prohibited, One Way, and Stop signs.

b) Street Name Signing
   Refer to Figure 2.3.1

2.3.3 Curb Extensions and Reduced Radii

Curb extensions are the delineation of the parking lane through the addition of a roll-over curb and gutter. The impact is that the through lanes are visually and spatially constricted at all times like they are when vehicles are parked along one side of a roadway. Tangent sections should be 5m at intersections, fire hydrants and public walkways. Tangent sections should be 15m at bus stops. Tapers in and out of curb extension streets should be made over a minimum of 30m. Reduced radii are used on the inbound radius into a local street. The impact of the reduced radii is to force vehicles to slow down considerably before making the turn. This calms the traffic speeds on the collector road as well as the local street. Refer to Fig. 2.3 – Curb Extensions and Reduced Radius.

2.3.4.1 Speed Cushions

Speed cushions are used to reduce vehicle speeds, by causing discomfort to occupants of vehicles crossing them at high speeds. Speed cushions shall be made of HL3 Asphalt Mix, unless directed otherwise by the City Engineer
   Refer to Fig. 2.3.4 - Speed Cushions.

All sides of the cushions shall be ramped to allow drainage. All edges of the ramps should be formed and keyed into the existing asphalt to provide adequate drainage and a continuous road surface. The leading edge of the ramps shall be marked with durable solid white reflective triangles, with the point at the top of the ramp. A Speed Cushion sign (T.A.C. Canadian Guide to Neighbourhood Traffic Calming Wa-50) shall be installed beside the leading edge of the ramp.

2.3.4.2 Raised Crosswalk Design

Raised crosswalks are crosswalks constructed in concrete to a height of 150mm above the elevation of the street. Raised crosswalks are very effective at reducing vehicle speeds specifically where pedestrians will be crossing a street (see Figure 2.3.12)

Note: Catchbasins are to be provided at upstream end of raised crosswalks to allow for drainage.
2.3.5 **Diverter**

A diverter is a barrier placed diagonally across an intersection, to force turns and prevent travel in a straight line. It is used to reduce through traffic by prohibiting travel in some directions.

The diverter should be not less than 1.5m in width at its narrowest point. The barrier shall consist of semi-mountable curbs to allow emergency vehicles to negotiate the turn in an emergency, and either

a) bollards spaced at 1.5m intervals along its centreline, or

b) sufficiently dense landscaping to prevent crossing by vehicles.

2.3.6 **Rights In/Rights Out Raised Concrete Median (“Pork Chop”)**

a) A raised concrete median is used to prohibit straight-through and left turn movements both into and from the protected approach and shall be designed in accordance with the most current City of London Access Management Guidelines, section 2.1. To review the City of London Access Management Guidelines please follow the link below: [http://www.london.ca/residents/Roads-Transportation/Transportation-Planning/Pages/Transportation-Study-Guidelines.aspx](http://www.london.ca/residents/Roads-Transportation/Transportation-Planning/Pages/Transportation-Study-Guidelines.aspx)

b) A rights in/rights out island should only be used in locations where it is very difficult/or impossible to implement on street raised concrete median. A rights in/rights out island is roughly triangular, and placed in the centre of an intersection approach. A minimum size of 10m² is required to provide pedestrian refuge. Both the in and out lanes shall be not less than 6m in width. The island shall be protected by barrier curb OPSD 600.01, except at pedestrian crossings.

The signage shall be in compliance with Figure 4.16 in the *Canadian Guide to Neighbourhood Traffic Calming*, with equivalent signs for those required by the drawing.

2.3.7 **Directional Closure**

A directional closure is a concrete island or curb extension that physically obstructs one or more lanes of a roadway at an intersection. It may restrict entry or exit. The closure shall be protected by barrier curb OPSD 600.01, except at pedestrian crossings.

Signage shall be equivalent to the following:

a) for an exit-only closure, Figure 4.11(a), *Canadian Guide to Neighbourhood Traffic Calming*, or

b) for an entrance-only closure, Figure 4.11(b), *Canadian Guide to Neighbourhood Traffic Calming*

Equivalent signs shall be substituted for the signs required in the drawings.
2.3.8 In/Rights Out (“Banana”) Island

An In/Rights Out Island is a curved island positioned to discourage left turns and through traffic movements from the protected approach. The island shall be not less than 5m in length and 1.5m in width. A minimum size of 10m² is required to provide pedestrian refuge. Both the in and out lanes shall be not less than 6m in width. The island shall be protected by barrier curb OPSD 600.01, except at pedestrian crossings.

Where possible, the island should terminate so that it does not intersect the crosswalk. Signage shall consist of:

a) a Hazard Marker sign Wa-33L mounted under a Keep Right sign Rb-25 at the leading edge of the island, and

b) a Right Turns Only sign Rb-42 on the right hand side of the protected lane, opposite the signs in (a).

2.3.9 Roundabouts

A roundabout is a raised island located in the centre of an intersection, which requires vehicles to travel through the intersection in a counter-clockwise direction around the island.

Refer to Figures 2.5, 2.5A, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.14 and/or 2.15 as required for appropriate details.

All approaches to the circle shall be protected by a Yield sign, so that vehicles already traveling on the roundabout have right-of-way over vehicles entering it. A One Way sign Rb-21A, indicating a counter-clockwise direction of travel, shall be installed on the centre island opposite each approach.

For curb and gutter types within the roundabouts refer to Figure 2.7 Typical Roundabout Section.

For maintenance purposes, sanitary maintenance holes are not permitted to be located within the raised centre island of the roundabout. The sanitary maintenance hole is to be located within the apron of the island. Storm maintenance holes may be located within the centre island of the roundabout, provided the proposed landscaping does not hinder access to the maintenance hole.

2.3.10 Raised Median Traffic Islands

Raised median traffic islands may be installed in the centre of roads with at least 8m pavement width. A concrete island is used to reduce pavement width and thereby reduce the speed of passing traffic.

A minimum width of 3.5m shall exist between the curb faces on both sides of the island. The island shall be no less than 5m in length, with the maximum length dictated by local conditions. A longer island is desirable. The island shall be no less than 15m distance from all intersections. It should have barrier curb around its perimeter, except at pedestrian ramps and driveways. Wherever possible, the grade of the road should be restored so that water drains to the existing curb and gutter. In this case, gutter-less curb may be installed around
the perimeter of the island. Both ends of the island shall be marked with Keep Right Rb-25 sign, mounted over a Hazard Marker Wa-33L sign.

The median island can also have a pedestrian refuge feature. The requirement for such design should be determined in the planning stages by Transportation Planning and Design Division.

For Pedestrian Refugee Island Design refer to figures.

- Pedestrian Refuge Island - Figure 2.3.10
- Pedestrian Refuge Island – Sections - Figures 2.3.10A&B

A minimum width of 4.0m shall exist between the curb faces on both sides of the island. The island shall be not less than 5m in length, with the maximum length dictated by local conditions. A longer island is desirable. The island shall be not less than 15m distant from all intersections. It should have barrier curb around its perimeter, except at pedestrian ramps and driveways if not restricted by Transportation Division. Wherever possible, the grade of the road should be restored so that water drains to the existing curb and gutter. In this case, gutter-less curb may be installed around the perimeter of the island. Both ends of the island shall be marked with Keep Right Rb-25 sign, mounted over a Hazard Marker Wa-33L sign.

2.3.10.1 Raised Intersections

Raised intersections are raised areas covering an entire intersection, with ramps on all approaches. Raised Intersections rise above the road level to provide a “lip” that is detectable by the visually impaired. By modifying the level of the intersection, the crosswalks are more readily perceived by motorists to be “pedestrian territory”.

Raised intersections are good for intersections with substantial pedestrian activity, and areas where other traffic calming measures would be ineffective.

For Raised Intersection Design refer to figures.

- Raised Concrete Intersection - Figure 2.3.2
- Raised Concrete Intersection Detail and Cross-Section – Figure 2.3.2a

2.3.11 Subdivision Collector Road Entrance

In general, collector road entrances into subdivisions from arterial roads should be as per Fig. 2.16 (No median). Where a new collector road is proposed opposite an existing collector road which includes a widened gateway treatment, the new road is to be widened and aligned to be compatible with the existing road and consistent with Fig. 2.16B, to the satisfaction of the City Engineer.

2.3.12 Temporary Measures

Temporary traffic calming measures shall be reviewed and approved by the Transportation Division prior to installation.
2.3.13 Box Forms

When islands (medians) are being constructed, Box Forms are to be placed where future road signs or hazard markers are to be installed, when the sign or marker will be located in concrete or asphalt. The Box Form should be located approximately 1.0m from the end of the island, and centred in the island at this location (typical). The Box Forms are available, free of charge from the City of London Transportation Operations Division (661-2500 ext. 4923).

2.4 TRAFFIC SIGNALS

2.4.1 Traffic Control Signal Warrants

Traffic signals shall be considered warranted if:

a) intersection conditions meet or exceed the warrant requirements of Section 4.3 of the Ontario Traffic Manual – Book 12;

b) approval is granted by the Roadway Lighting and Traffic Control Division; and

c) approval is granted by City Council as per City Policy 25(15).

2.4.2 Intersection Pedestrian Signal (I.P.S.) Warrants

Intersection pedestrian signals shall be considered warranted if:

a) conditions meet or exceed the warrant requirements of Section 4.8 of the Ontario Traffic Control Manual – Book 12;

b) approval is granted by the Roadway Lighting and Traffic Control Division, and

c) approval is granted by City Council as per City Policy 25(15).

2.4.3 Electrical Design

Electrical design for intersections shall be governed by the following three documents, in order:

a) The City of London’s Traffic Signal and Street Lighting Specifications (STS);

b) items not addressed in (a) shall conform to the Ministry of Transportation Traffic Signal Design manual, where addressed; and

c) items not addressed in (a) or (b) shall conform to the Ontario Provincial Standards & Specifications (O.P.S.S.).

To review the City of London STS document, please follow the link below:
2.4.4 **Signal Plant Design**

The design of Traffic Signals, Temporary Traffic Signals and the Relocation of Existing Traffic Signals must be completed, signed and sealed by a fully qualified *Professional Electrical Engineer* that meets the criteria identified in the Registry, Appraisal and Qualification System (RAQS) list. Designs must be submitted to the Roadway Lighting and Traffic Control Division for review and acceptance prior to any construction work being undertaken.

2.4.5 **Pavement Markings**

Permanent pavement markings shall be designed in accordance with the Ontario Traffic Manual – Book 11. Proposed designs shall be submitted to the Roadway Lighting and Traffic Control Division for approval, prior to application.

2.4.6 **Materials**

Materials used for traffic signals shall be in conformance with the requirements of the City of London Traffic Signals and Street Light Specifications.

### 2.5 STREET LIGHTING

2.5.1 **Warrants**

Street lighting shall be considered warranted on all roads in urban areas. At isolated rural intersections with non-continuous lighting on the intersecting roads, street lighting shall be considered warranted if the roadway meets or exceeds the requirements of the warrant provided in the Transportation Association of Canada Illumination of Isolated Rural Intersections guide.

Reconstruction of a substandard, isolated rural intersection should be considered before illumination. Street lighting may also be installed at isolated rural intersections at the direction of the Roadway Lighting & Traffic Control Division. Situations when this is warranted may include but are not limited to the occurrence of rare but severe collisions, an inability to maintain adequate hazard markings for raised channelizing islands, or the presence of an unusual number of long combination vehicles with reduced accelerating and braking abilities.

2.5.2 **Materials**

All street and walkway light fixtures shall be LED, full cut-off, 120V, integrated dimming control capability utilizing an external 0-10VDC control signal. Fixtures on primary collector and higher classified roads must have a correlated colour temperature (CCT) of 4,000 +/- 500 K. The CCT of fixtures on secondary collector roads, local roads and walkway lights shall be 3,000 +/- 500 K. Materials used for street lights shall be in conformance with the City of London’s Traffic Signal and Street Light Specifications. The current list of accepted LED street light fixtures can be found on the [Design Specifications and Requirements Manual web page](#).
2.5.3 Street Light Designs

The design of street lights on Primary Collector/Main Street and higher classification roads must be designed, signed and sealed by a pre-qualified Professional Electrical Engineering Consulting Companies.

The design of street lights for Local Streets/Neighbourhood Streets & Secondary Collector/Neighbourhood Connectors roads must be designed, signed and sealed by a Professional Engineer.

The design of street illumination shall conform to the requirements set out by American National Standard Practice for Roadway Lighting (ANSI/IESNA RP-8-14)

1. Detailed photometric designs shall be submitted for all roads, intersections and sidewalks regardless of their classification demonstrating how the RP-8-14 standards have been satisfied without excessive over lighting. Illumination at intersections may require a higher wattage fixture than the remainder of the road. Contact the Roadway Lighting and Traffic Control Division to confirm the appropriate road classification and pedestrian conflict prior to undertaking the photometric design. In addition to the photometric drawings, the results of the photometric design must be displayed in a table similar to the following:

<table>
<thead>
<tr>
<th>Collector Road with Medium Pedestrian Conflict</th>
<th>L_{avg}</th>
<th>L_{avg}/L_{min}</th>
<th>L_{max}/L_{min}</th>
<th>L_{max}/L_{avg}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.6</td>
<td>3.5</td>
<td>6.0</td>
<td>0.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Luminaire name</th>
<th>RESULTS</th>
<th>RESULTS</th>
<th>RESULTS</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidewalk with Medium Pedestrian Conflict</td>
<td>E_{H} (lux/fc)</td>
<td>E_{min}(lux/fc)</td>
<td>E_{avg}/E_{min}</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0/0.5</td>
<td>2.0/0.2</td>
<td>4.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Luminaire name (near side)</th>
<th>RESULTS</th>
<th>RESULTS</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminaire name (far side)</td>
<td>RESULTS</td>
<td>RESULTS</td>
<td>RESULTS</td>
</tr>
</tbody>
</table>

2. Street light fixtures shall be located such that current and future tree canopies do not interfere with the distribution of the light.

3. The use of street light fixtures mounted over the travelled portion of the road is encouraged to avoid trees and to achieve improved street light spacing.

4. The drawings shall show the location of the street lights (indicated by an open circle), street light conductors, the location of transformers and the location of power disconnects. The drawings shall specify the type of pole, fixture, conduit, fixture wattage, conductor and 20kv 10ka breakers being used.

5. Street lights should be placed wholly on one lot at the property line whenever possible.
6. The maximum number of lights that can be attached to a single circuit is 10 unless voltage drop calculations are provided that demonstrate the circuit can accommodate the load.

7. Existing street lights shall be shown as solid black circles.

8. The street light cable should be indicated by a black line with an SL imposed on the line.

9. All street light wire road crossings shall be placed in a 50 mm RPVC duct with handholds at either end of the road crossing.

10. Designers should be aware of driveway locations and living room windows when determining the location of lights.

11. The design is to be drawn at a 1:500 scale.

12. Street light poles on secondary collector and local streets with residential dwelling units to utilize a maximum mounting height of 6.1m.

13. Final designs must be accepted by the City of London’s, Roadway Lighting & Traffic Control Division.

2.5.4 Walkway Lighting Design

Walkway lighting designs shall be comprised of the following:

1. 26 W Eaton AVS or 35 W Lithonia KAD LED fixtures.

2. 4.6m pole base mounted (black powder coated galvanized square tapered steel or aluminium).

3. The first light from the street should be 15m from the back of the sidewalk or 15m from the edge of pavement if no sidewalk is present;

4. Spacing along of the light along the walkway should be approximately every 30m, noting most walkways require only one additional light usually located at the rear of the residential property line; severe bends or stairs may require tighter spacing;

5. Walkway lights are to intersect street circuits at a junction box located at one end of the walkway.

6. Street light wire shall be placed in a 50mm RPVC duct.

7. The pole base shall be located immediately adjacent to the fence line so that the pole is placed as close as possible to the fence line.

8. Bollards located at either end of a lit walkway must be removable for maintenance purposes.
2.5.5 **Residential Street Light Installation & Inspection Guidelines**

1. The same or similar light standard must be used from one end of a street to the other regardless of how many phases of construction are involved. Acceptance of alternative designs by the City on a case by case review.

2. Poles and luminaries take a minimum of 8 weeks to be delivered. The City does not stock any residential street lights for new construction.

3. A power disconnect utilizing 20kv 10ka breakers must be installed at the first street light from the transformer. All installations must be inspected by the Electrical Safety Association (ESA) prior to London Hydro doing the power connection. The Contractor is responsible for arranging inspection with ESA.

2.6 **CONSTRUCTION SIGNAGE**

2.6.1 **General**

Use the Ontario Traffic Manual - Book 7 - Temporary Conditions for all construction signage applications.

2.6.2 **Traffic Management Plans**

2.6.2.1 **Definition**

The Traffic Management Plan (TMP) is a construction scheduling tool that effectively harmonizes the construction project’s physical requirements with the operational requirements of the City of London, the transportation needs of the road users within the City and access concerns of the local residents.

2.6.2.2 **Traffic Control Plan vs. Traffic Management Plan**

The requirements of the Ministry of Labour and the Ontario Traffic Manual Book 7 construction works (the requirements for a Traffic Control Plan (TCP) and Traffic Protection Plan (TPP)) are different from the City of London’s Traffic Management Plan (TMP). The TMP is a plan that shows the construction methodology that will ensure through traffic movement, utility services, pedestrian traffic and vehicular access to the areas adjacent to the construction site, while allowing for the construction of the desired works. TCP’s and TPP’s list specific temporary signs and barricades to be installed.

For basic, straightforward utility projects, the City will receive a TCP/TPP, review it for General Conformance with City of London Traffic Management Plan Requirements, and OTM Book 7, and decide whether or not to accept the TCP/TPP to allow for the issuance of a PAW. However, the City of London will not complete an in-depth review or accept a Contractor’s Traffic Control Plan or Traffic Protection Plan. For ALL Development related projects and complex, multi stage/multi-phase capital works or utility projects; a TMP is required. Please refer to Section 2.6.2.4 TMP Submission Requirements, for further information.
2.6.2.3 When is a TMP Required?

A TMP is required whenever development/utility related works (closure, resurfacing or reconstruction) affect any portion of the City roadway as itemized below:

a) A TMP is required:
   i) For any work being done on the paved portion of an Arterial Road, Primary Collector Road, or Secondary Collector Road;
   ii) Where a full road closure of any class of road (local, secondary & primary collector and arterial) is proposed for longer than ½ a day duration;
   iii) For any partial road closure on an Arterial or Primary Collector Road where the road closure is for any length of time; or
   iv) Any work on downtown core streets (as defined by the Official Plan).
   v) For any work that may affect LTC services, emergency services or will have direct impact on pedestrians.

b) A TMP is not required for work on secondary collector roads or local streets, except as noted in 2.6.2.3.a) ii), above, or in 2.6.2.3 c) exceptions, below.

c) Exceptions:
   Some exceptions due to depth of work, width of work, use of road (i.e. fronting a hospital, bus routes, school, etc.), may apply. In these site specific situations, discussion with the Transportation Division will be required to determine if a TMP is required.

TMP’s are required for both assumed and unassumed roads if there is an impact on traffic flow. For example, an undeveloped dead end unassumed street may have no public traffic and may not need a TMP.

2.6.2.4 Traffic Management Submission Requirements

The complexity of the TMP required is determined by the complexity of the proposed works.

2.6.2.4.1 For basic, straight forward UTILITY projects, the following information shall be provided:

a) a brief description of the work, including the anticipated duration of the work;

b) the location of the buildings/driveways and the municipal address, street names, including cross streets and intersections if any;

c) show all lanes for each road on the drawing and define the proposed lane widths;

d) state the impact on sidewalks, LTC bus stops/school bus stops, driveways (if any), and how they will be addressed.

e) submit 3 copies to the Transportation Planning & Design Division for review and acceptance, 14 days prior to applying for a PAW.

The Traffic Management Plan should be a reflection of a suitable layout from OTM Book 7; quote the Fig. No. for our reference, and refer to Table A for short duration work and Table B for long duration work. The signage and the distances between the signs should reflect the appropriate typical layout figure and tables1.
2.6.2.4.2 For ALL Development related projects, and complex, multi stage/multi-phase Capital Works or Utility projects, more detailed information shall be provided, and these plans should form part of the construction detailed design drawing package and tender:

a) The TMP is required to demonstrate the design staging in a set of drawings, sealed by a Professional Engineer;

b) written verification that all works will be conducted within the Ministry of Labour, OPSS and the Ministry of Transportation standards;

c) Full plan coverage of the work area that is drawn to scale, and shows:
   i) property lines
   ii) utility plant locations
   iii) proposed areas of removals (show all physical infrastructures to be removed, including bushes & trees)
   iv) planned restoration
   v) construction staging

d) Typical cross sections drawn to scale showing:
   i) widths of lanes (temporary pavement markings)
   ii) location of temporary traffic barriers & barricades (off set distances)
   iii) depth location and size
   iv) offset distances to 1:1 side slopes

e) The exact/specific location's road section or intersection affected

f) The type of closure required (e.g. sidewalk, bike path, one lane, two lanes, full closure, etc.), the duration of the closure

g) How the closure relates to the stages/phasing of the project (if applicable)

h) How the closure relates to stages of adjacent projects

i) How the closure protects the safe movement of pedestrians and traffic on the right of way, or accessing/egressing the right-of-way, including but not limited to:
   i) LTC bus stops
   ii) sidewalks
   iii) para transit stops
   iv) school bus stops
   v) illumination
   vi) edge drop-offs
   vii) emergency vehicle access

j) How the work accommodates: traffic signal operations, storm/sanitary sewer installations, and winter maintenance

k) How notification is planned to coordinate with the above agencies/departments of the public.

2.6.2.5 Specific Requirements of the Plan during Road Resurfacing or Reconstruction
a) On a two lane road section, one lane be open at all times and two-way traffic managed,
b) On a four lane road sections, two lanes (one in each direction) be open at all times,
c) Complete temporary pre-marking of the pavement marking plan, laid out on all new asphalt at the end of each construction day
d) Maintain all traffic signing (by the Contractor) throughout the duration of the project
e) Complete a pavement marking and traffic signing inventory (by the contractor) before and after the project and subsequent re-installation
f) Complete all required sidewalks, turn lanes, traffic islands, traffic signals, pavement marking, traffic signing and associated works/restoration prior to opening a facility to the public.
g) Detour Maintenance Plan that will ensure the quality of the temporary riding surface. Specifically, this shall detail
   i) If Hot Mix Asphalt: the type of asphalt, thickness of asphalt, smoothness of surface layer, frequency of cleaning, and any provision for emergency pothole repair in the detour.
   ii) If Gravel surface: The type of granular to be placed, the amount of compaction, the smoothness of the surface layer, frequency of maintenance and any provision for emergency grading (grader on site or standby), frequency of calcium to be added for dust suppression
h) A site specific paving schedule that will detail the Contractor’s paving schedule to ensure than on any of the roadway or portion thereof that is open to the public that all vertical deflections in the pavement are reduced to less than 10mm. This plan should include the contractor’s plans to place temporary asphalt, milling out of temporary asphalt and final paving.
i) In unique circumstances, alternative solutions will be considered for approval by the Director of Transportation.

2.6.3 Detour Plans

Detour plans must be authorized through the Transportation Division, two weeks prior to construction. Signs will be placed by the Contractor’s own forces.

2.6.4 Traffic Control Plan

Traffic Control plans must be submitted to Transportation for acceptance.

2.6.5 Pedestrian Safety

Construction Projects in proximity to high pedestrian areas, including schools, commercial areas and any other source of high pedestrian volumes should take extra precaution to separate construction activity from pedestrian movements.

Sidewalks that are closed or removed should have signed alternate detour routes.
Any material deliveries or construction vehicle movements crossing pedestrian areas should be carefully monitored by a traffic control person.

Schools in close proximity to projects should be notified in the preconstruction letters and kept informed of progress.
TRANSPORTATION

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Figure 2.16B Gateway with Island
NOTES:

1. PRIMARY COLLECTORS
2. SECONDARY COLLECTORS
3. LOCALS
   a) 90° BENDS (DESIRABLE – 2 MAX/CRES.)
   b) OTHER BENDS

C/L RADII

150 METRES
110 METRES
19 METRES

CITY OF LONDON STANDARD DRAWING

MINIMUM C/L RADII OF CURVATURE OF ROADS IN SUBDIVISIONS

DWG FIG. 2.1  DATE  2012 01 26  APPROVED BY CITY ENGINEER

Note: Refer to Section 18 regarding additional design information for new subdivisions.
1. For standard bus use 15.0m taper and 15.0m loading area.

2. Storage bay dimensions are for 1 bus; add 14.5m for each additional standard bus, 20.0m for each additional articulated vehicle.

3. When the bus bay surface is concrete on an asphalt road, it shall be extended by 3.0m.

4. All dimensions are in metres unless otherwise shown.

CITY OF LONDON STANDARD DRAWING

CONCRETE BUS BAY

Design Specifications & Requirements Manual
The Corporation of the City of London
Updated: July 2018

Note: Refer to Section 18 regarding additional design information for new subdivisions.
Design Specifications & Requirements Manual
The Corporation of the City of London
Updated: July 2018

Note: Refer to Section 18 regarding additional design information for new subdivisions.
NOTE:
1 – USE 6.0m INBOUND RADIUS FROM COLLECTOR TO LOCAL STREET
2 – TANGENTS SECTIONS SHOULD BE 5m AT INTERSECTIONS, FIRE HYDRANTS, AND PUBLIC WALKWAYS
3 – TANGENT SECTIONS SHOULD BE 15m AT BUS STOPS
4 – TAPER TO AND FROM REGULAR CROSS SECTIONS SHOULD BE MADE OVER 30m
5 – ACCESS RAMPS TO BE PROVIDED AT ALL APPROACHES AND TO BE DESIGNED IN ACCORDANCE WITH THE MOST CURRENT CITY OF LONDON STANDARD
6 – CONCRETE SIDEWALK APPROACHES SHOULD BE SEPARATED WHERE POSSIBLE AND THE AREA INBETWEEN GRASSED, OR CONCRETE CAPPED IF <0.5m² IN AREA
Design Specifications & Requirements Manual
The Corporation of the City of London
Updated: July 2018
Note: Refer to Section 18 regarding additional design information for new subdivisions.
Note: Refer to Section 18 regarding additional design information for new subdivisions.
Design Specifications & Requirements Manual
The Corporation of the City of London
Updated: July 2018

Note: Refer to Section 18 regarding additional design information for new subdivisions.
Design Specifications & Requirements Manual
The Corporation of the City of London
Updated: July 2018

Note: Refer to Section 18 regarding additional design information for new subdivisions.
SECTION 'A'-'A'

(LEFT SIDE)

NOTE:
1. IN AREAS WHERE BARRIER CURB IS ADJACENT TO
   A PROPOSED WALKWAY CROSSING, THE BOULEVARD
   IS TO HAVE A 2% FIXED GRADE TOWARDS THE ROAD

SECTION 'A'-'A'

(RIGHT SIDE)

CITY OF LONDON STANDARD DRAWING

PEDESTRIAN REFUGE ISLAND – SECTIONS

DWG: FIG. 23.10A SHEET 2 OF 3 DATE 2014 06 06 APPROVED BY CITY ENGINEER
NEW CONC. CURB TO
OPSD 800.110 STANDARD
(GUTTERLESS)

VARI ES IN WIDTH

EXISTING ASPHALT ROAD

RESTORE ASPHALT WITH
SUB-BASE AND TOP COAT

100mm DEPTH
OF CONCRETE
(TYP.)

300mm DEPTH
OF GRANULAR ‘A’

COMPACTED SUBGRADE

SECTION 'C'-'C'

LENGTH OF REFUGE ISLAND VARIES

RAISED CONC.
REFUGE ISLAND

4% MAX.
SLOPE

1.0m

TACTILE PLATE (TYP.)
(SEE STANDARD DWG.
STS-I.06 TO I.08)

4% MAX.
SLOPE

1.8m WIDE MINIMUM

SAFE PEDESTRIAN
CROSSING ROUTE

1.0m

CONCRETE BARRIER CURB
OPSD - 600J.0

CONC. SIDEWALK

1.0m

APPLIED ROAD SURFACE

SECTION 'B'-'B'

CITY OF LONDON STANDARD DRAWING

PEDESTRIAN REFUGE ISLAND - SECTIONS

DWG: FIG. 2.3.10B
SHEET 3 OF 3
DATE 2014 06 06
APPROVED BY
CITY ENGINEER:

NTS
The Corporation of the City of London

Updated: July 2018

Design Specifications & Requirements Manual
The Corporation of the City of London

Note: Refer to Section 18 regarding additional design information for new subdivisions.
NOTES:

1. NO DRIVEWAYS ARE TO HAVE THEIR ACCESS DIRECTLY TO THE ROUNDABOUT.

2. REFER TO FIGURES 2.12 AND 2.13 FOR STREET LIGHTING AND SIGNAGE INFORMATION.

3. FOR OTHER NOTES SEE FIG. 2.5A

4. FOR SPLITTER ISLAND DETAILS REFER TO FIGURE 2.9

5. TACTILE PLATES ARE REQUIRED AT ALL ROAD ENTRANCES.

6. FOR CURB AND GUTTER TYPES WITHIN THE ROUNDABOUT AND ISLAND VEGETATION ZONES REFER TO FIG. 2.7

CITY OF LONDON

ROUNDABOUT 17.0m RADIUS (COLLECTOR / COLLECTOR)

FIG 2.5  DATE 2009 06 19  APPROVED BY CITY ENGINEER

REV'D 2014 05 15
NOTES:

1. FOR STREETS THAT INTERSECT AT APPROXIMATELY 90° THE PROPERTY LINE MUST BE SET BACK 31.0m FROM THE INTERSECTION OF THE CENTRE LINE OF THE R.O.W. OR 8.5m FROM THE NOSE OF THE SPLITTER ISLAND FOR A 6.0m DRIVEWAY WIDTH.

OR

THE PROPERTY LINE MUST BE SET BACK 28.0m FROM THE INTERSECTION OF THE CENTRE LINE OF THE ROUNDABOUT OR 5.5m FROM THE NOSE OF THE SPLITTER ISLAND FOR A 3.0m DRIVEWAY WIDTH.

2. FOR ARTERIAL ROADS OR IF THE ROADWAYS DO NOT INTERSECT AT 90 DEGREES THE PROPERTY LINE MUST BE SET BACK 8.5m FROM THE NOSE OF THE SPLITTER ISLAND FOR A 6.0m DRIVEWAY WIDTH OR 5.5m FROM THE NOSE OF THE SPLITTER ISLAND FOR A 3.0m DRIVEWAY WIDTH.

3. ALL DIMENSIONS ARE TO EDGE OF PAVEMENT.

4. FOR COLLECTOR AND LOCAL ROADS THE SPLITTER ISLAND MUST BE A MINIMUM OF 5.5m IN LENGTH (FIG. 2.9). FOR ARTERIAL ROADS THE SPLITTER ISLAND MUST BE A MINIMUM OF 15.0m IN LENGTH (FIG. 2.8).

5. CROSSFALL SHALL BE AWAY FROM THE CENTER ISLAND.

6. FOR ISLAND VEGETATION ZONES AND TYPICAL CROSS-SECTION WITH CURB AND GUTTER TYPES REFER TO FIGURE 2.7 “TYPICAL SECTION AND LANDSCAPE OF CENTRE ISLAND”

7. FOR SIGNAGE DESIGN REFER TO ROUNDABOUT LIGHTING AND SIGNAGE DRAWINGS (FIG. 2.12 – FIG. 2.15).

8. SPLITTER ISLANDS SHALL BE CONSTRUCTED AT THE SAME TIME AS THE CENTER ISLAND IS CONSTRUCTED.

WHEN SPLITTER ISLANDS ARE BEING CONSTRUCTED:
BOX FORMS ARE TO BE PLACED WHERE FUTURE ROAD SIGNS OR HAZARD WARNING MARKERS ARE TO BE INSTALLED WHEN THE SIGN OR MARKER WILL BE LOCATED IN CONCRETE OR ASPHALT. THE BOX FORM SHOULD BE LOCATED APPROXIMATELY 1.0m FROM THE END OF THE ISLAND AND CENTERED IN THE ISLAND AT THIS LOCATION (TYPICAL).

THE BOX FORMS ARE AVAILABLE FREE OF CHARGE FROM:
THE CITY OF LONDON – TRANSPORTATION OPERATIONS DIVISION (661-2500 EXT. 4923).

CITY OF LONDON

ADDITIONAL ROUNDABOUT NOTES

<table>
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<tr>
<th>FIG 25A</th>
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Design Specifications & Requirements Manual
The Corporation of the City of London
Updated: July 2018

Note: Refer to Section 18 regarding additional design information for new subdivisions.
NOTES:
1. FOR CURB AND GUTTER TYPES WITHIN THE ROUNDABOUT AND ISLAND VEGETATION ZONES REFER TO FIGURE 2.7.
2. CROSSFALL SHALL BE AWAY FROM CENTRE ISLAND.
3. SIDEWALKS ARE REQUIRED ON ALL SIDES OF THE ROUNDABOUT.
4. REFER TO SECTION 2.1.15 FOR NUMBER AND LOCATION OF SIDEWALKS ON LOCAL STREETS.
5. NO DRIVEWAYS ARE TO HAVE THEIR ACCESS DIRECTLY TO THE ROUNDABOUT.
6. REFER TO FIGURES 2.14 AND 2.15 FOR STREET LIGHTING AND SIGNAGE INFORMATION.
7. TACTILE PLATES ARE REQUIRED AT ALL ROAD ENTRANCES.

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ROUNDABOUT 15.6m RADIUS (LOCAL/LOCAL)

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Note: Refer to Section 18 regarding additional design information for new subdivisions.
Note: Refer to Section 18 regarding additional design information for new subdivisions.
LEGEND

SIGN
SNS STREET NAME SIGN

CITY OF LONDON

ROUNDABOUT 17.0m RADIUS - SIGNAGE
(3-LEG INTERSECTION)

FIG. 2.12 DATE 2018 07 19 APPROVED BY

NOTES:
1. FOR ROAD GEOMETRY INFORMATION REFER TO FIG. 2.5
2. FOR ISLAND DESIGN NOTES REFER TO FIG. 2.5A
3. REFER TO THE ONTARIO TRAFFIC MANUAL FOR SIGN TYPES
4. FOR A 3.0m DRIVEWAY WIDTH REFER TO FIG. 2.5A.

FOR TRUCK APRON DETAILS SEE FIG. 2.7

Note: Refer to Section 18 regarding additional design information for new subdivisions.
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Note: Refer to Section 18 regarding additional design information for new subdivisions.
NOTE:

1 - Landscaping in the zone on the arterial and the collector side of the extension of the sight triangle is limited to 0.6m in height from edge of pavement.

2 - The sight triangles shall be calculated using the criteria outlined in Section 2.3.3.2, sight triangle, of the geometric design guide for Canadian roads Part II and clearly indicated on the construction drawing.

3 - All trees planted within the sight triangle shall be trimmed to at least 2.4 metres from the edge of pavement.

4 - All other landscaping heights are unlimited.

5 - Tree spacing is 10–12m.

6 - Street lighting as per STS–10.10 and STS–10.11 unless otherwise approved by City Engineer.
NOTE:

1. Landscaping in the zone on the arterial and the collector side of the extension of the sight triangle is limited to 0.8m in height from edge of pavement.

2. The sight triangles shall be calculated using the criteria outlined in section 2.3.3.2, sight triangle, of the geometric design guide for Canadian roads Part II and clearly indicated on the construction drawing.

3. All trees planted within the sight triangle shall be trimmed to at least 2.4 metres from the edge of pavement.

4. All other landscaping heights are unlimited.

5. Tree spacing is 10-12m.

6. Street lighting as per STS-10.10 and STS-10.11 unless otherwise approved by city engineer.

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CITY OF LONDON
GATEWAY WITH ISLAND

FIG 2.16B
DATE 2016 10 25

APPROVED
Note: Refer to Section 18 regarding additional design information for new subdivisions.