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18.1 DRAWING REQUIREMENTS FOR NEW SUBDIVISIONS

18.1.1 Basic Drawing Requirements

Drawings are to contain the following details:

a) A list of "Construction Notes for Engineering Drawings". Note, all required reports associated with the design and as per Council Conditions, Approval Authority Conditions and Ontario Municipal Boards Conditions are to be listed onto the details drawings;

b) A general list of most common standards used [Ontario Provincial Standard Drawings (OPSD) & City of London]; and

c) A typical road and sewer trench cross-section detail identifying road, boulevard, sidewalk, curb & gutter, subdrains, watermain, forcemain sanitary & storm sewers, trench zones/slopes, bedding, together with all applicable dimensions and construction notes for the above.

18.1.2 Transportation Drawing Requirements

a) Road Plan Profiles

Road plan profiles are required for all roads constructed within or in conjunction with a plan of subdivision. As well, additional road profiles are required as follows:

60m Road Plan Profile of Adjoining Existing Street:
To ensure proper drainage is maintained and/or evaluated a profile extending into the existing subdivision is required.

120m Road Plan Profile of Adjoining Future Street:
To review future alignment extensions of existing ground and proposed finished ground.

b) Typical Road Cross-section Detail

A typical road cross-section detail, identifying recommended pavement structure and subgrade information (minimum to City of London standards, and as recommended by a Geotechnical Engineer) is required in conjunction with the typical sewer trench cross-section detail. Curb & gutter cross-sections to be incorporated into the typical combined road and sewer trench cross-section detail.

c) Driveway Locations

Driveway locations are to be identified where non-standard cul-de-sacs and curves in the roads are designed, adjacent to walkways, CICBs and the last lot on dead end streets.

d) Cul-de-sac Roads:

i. General

Minimum curb & gutter road grade around a cul-de-sac is 0.5%, and maximum road grade within the cul-de-sac is 3%.
ii. **Residential:**
   As per City of London Drawing Standard SR-5.0.

iii. **Industrial:**
   As per City of London Drawing Standard SR-5.1

e) **Ultimate Road Profile:**
   To achieve proper road design parameters on future/proposed arterial and collector road networks. Limitations and designs are to be reviewed and accepted by Transportation Division.

   **Note:** Existing abutting road plan & profiles are required for the full frontage of subdivision.

18.1.3 **Sewer Design**

a) **Connections To Future Subdivisions**

Sanitary and Storm sewers are to be extended to the edge of the subdivision limit for future servicing connections.

   **Note:** All active sewers/stubs require a maintenance hole. If sewer/stub not active maintenance hole is not required.

b) **Plan & Profile Details**

A plan & profile drawing is required for all sewer designs. A typical sewer trench cross-section and details are also required. This may be done in conjunction with the road cross section, if applicable and required when.

- For poured maintenance holes
- Unusual benching configurations within the maintenance holes

   **Note:** Trench construction to be in accordance with the latest specifications regarding trench widths (Occupational Health and Safety Act – Regulation 213/91).

c) **Steep Grades of Sewers**

   **Note:** Anchoring or concrete encased sewers are required for steep grades and/or velocities.
18.1.4 General

a) Drafting Standards

All drawings and calculations are to be completed, in metric units and to the City of London’s Engineering Record Drawings - Drafting Standards (Revised February 2018).

b) Layout Information

For all fire hydrants, maintenance holes, catch basins, etc., layout information is required or alternatively a note indicating the use of UTM Coordinates.

c) Temporary Measures

Temporary measures (i.e. DICB, ditches, maintenance holes, turning circles, grading, barricades, easements, etc…) may apply to some designs depending on the planning and future connections of the subdivision, and where applicable, these guidelines are to be adhered to, unless otherwise approved by the City Engineer.

Note: Details for the above should be provided on all pertinent drawings.

18.1.5 Urban Forestry

The following are to be shown on plan and profile drawings on existing streets and on the Tree Planting plan for new streets, as required by Urban Forestry:

a) Tree planting;
   b) Tree preservation; and
   c) Tree removal.

18.1.6 Parks Planning & Design Division

The following are to be shown on lot grading plans, tree preservation plans and/or detail drawings within lots/blocks and open space areas, as required by Parks Planning & Design Division:

a) Tree planting;
   b) Tree preservation;
   c) Tree removal;
   d) Park grading;
   e) Pedestrian system;
   f) Park design; and
   g) Landscaping plan.
18.1.7 **Other Nonstandard Drawing Requirements**

For more complex requirements, details drawings are required for the following:

<table>
<thead>
<tr>
<th>Design Elements</th>
<th>Drawing Requirements</th>
</tr>
</thead>
</table>
| **Stormwater Management Details and Notes**          | - Longitudinal and lateral cross-sections of the stormwater management pond and sediment forebay and details;  
- Inlet/outlet cross-section and details;  
- Perforated riser cross-section and details;  
- Maintenance/pedestrian access cross-section and details;  
- Water level gauge cross-section and details;  
- Outlet swale/ditch plan & profile and cross-section details;  
- Orifice plate cross-section and details |
| **Open Channels Details and Notes**                  | - Plan & profile; and  
- Frequent cross-sections and details                                                                                                                                                                                  |
| **Poured Concrete Box Culverts Details and Notes**   | - Plan & profile; and  
- Frequent cross-sections and details                                                                                                                                                                                  |
| **Poured Maintenance Hole Chambers**                 | - Plan & profile; and  
- Frequent cross-sections and details                                                                                                                                                                                  |
| **Noise Barrier Wall Details and Notes**             | - Typical profile view of noise barrier wall and footings;  
- Cross-section view of noise barrier wall and footings;  
- Cross-section view of brick pillars and footings; and  
- Cross-section view of wood posts and footings                                                                                                                |
| **Noise Barrier Berms**                              | - Plan & profile; and  
- Frequent cross-sections, details and notes.                                                                                                                                                                           |
| **Retaining Wall Details and Notes**                 | - Typical profile view of retaining wall and footings;  
- Profile required for relatively high (1.0m or greater) and long retaining walls; and  
- Cross-sections views of retaining wall.                                                                                                                                                                          |
| **Headwall Details**                                 | - A plan & profile detail is required for all headwall designs together with all pertinent details.                                                                                                                                 |
| **Traffic Calming Measures Details and Notes**       | - Plan & cross-section views of type of traffic calming measures and details; and  
- Curb cross-section details.                                                                                                                                                                                             |
| **Access Roads Details and Notes**                   | - Plan & profile of access road; and  
- Cross-section view of access road and details.                                                                                                                                                                          |
| **Abutting an existing or proposed arterial road**   | - Required where the common property line of the proposed subdivision plan abuts an existing or proposed arterial road, as per City of London Standard “Subdivisions Grading Along Arterial Roads” (See Chapter 9 Figure 9.1.). |
| **Construction Roads**                              | - Plan & profile of construction road; and  
- Cross-section view of construction road.                                                                                                                                                                                 |
| **Pedestrian Pathway Systems Details and Notes**     | - Plan & profile drawing and details; and  
- Cross-section view of pedestrian pathway systems.                                                                                                                                                                      |
| **Sediment & Erosion Control Measures**              | - Plan & profile of checkdams; and  
- Cross-section of all pertinent measures                                                                                                                                                                                 |
| **Other Non-standard Works or Services**             | - Plan & profile; and  
- Cross-section details; as required by the City Engineer.                                                                                                                                                              |
18.2 OTHER AGENCY APPROVALS

18.2.1 Utilities Coordinating Committee (U.C.C.)

Works on Existing Assumed Streets:

U.C.C. is to be advised about all works on existing assumed streets other than lateral connections.

Non-Standard Service Locations:

U.C.C. approval is to be obtained for all proposed services which are to be constructed in non-standard locations on new or existing streets.

Sub-Standard Boulevard Widths and/or Non-Standard Road Widths:

Consultant is to notify all utilities regarding sub-standard boulevard widths, non-standard R.O.W. widths and utility easements required adjacent to sub-standard boulevards through U.C.C..

18.2.2 Board of Education

Board of Education approval is required for all services which are constructed on their lands. As well their approval is required for proposed services to a proposed/existing school block.

18.2.3 Upper Thames River Conservation Authority (UTRCA)

Review and approval from UTRCA is required, prior to the construction, of works, services and sediment & erosion control measures within flood plain areas and in or adjacent to open watercourses, ravines and natural areas under the jurisdiction of UTRCA.

18.3 TEMPORARY MEASURE DESIGN REQUIREMENTS

18.3.1 Temporary Turning Circles

Temporary turning circles are required if no intersecting street is within 45.0m of a dead end street as per City of London Drawing Standard SR-5.2.

18.3.2 Dead End Street

If a temporary turning circle is not warranted, then a dead end barricade is required, as per OPSD-912.532.

Note: A driveway for maintenance vehicles must be provided on last lot of the dead end street, but not adjacent to the subdivision limit. Sufficient snow storage area must be provided at the end of a dead end street without a temporary turning circle.
18.3.3 Work on Existing City Streets

When proposed works from a subdivision are to extend and/or be constructed on existing City Streets, the following is required:

a) limits of construction;
b) sawcut/milling/steep milled joint;
c) backfill & compaction specifications; and
d) restoration details.

Note: Steeped milled joint is required for all proposed road widenings, and where proposed asphalt designs meet existing asphalt designs, as per City of London Drawing Standard SR-13.1.

18.4 SEDIMENT & EROSION CONTROL MEASURES

18.4.1 Rip Rap

Constructed in conjunction with an approved geotextile within inlet/outlet structures, overflow protection, channel banks, gabions and rockfill structures.

Graded in sizes ranging from 100mm to 200mm, as per Ontario Provincial Standard Specification (OPSS)-1004.05.06.01.

18.4.2 Rock Protection

Graded in sizes ranging from 100mm to 500mm, as per Ontario Provincial Standard Specification (OPSS)-1004.05.06.02

18.4.3 Turfstone

Constructed in conjunction with an approved geotextile, for use as over flow protection, channel lining, and/or surface access roads using City approved products.

Note: Turfstone voids are to be filled with topsoil and seeded.

18.4.4 Geotextile

Constructed within inlet/outlet structures, sub-drains, blanket drains, gabion lining, retaining walls, ditch lining, channel linings, access roads, rockfill structures, dykes and energy dissipaters. Type and sizing of geotextile is to be approved by the City.
18.5 PLANNING RELATED DESIGN REQUIREMENTS

18.5.1 Road Geometrics / Design

a) Road Widening

Where a subdivision abuts an existing City street, road widening may be required for future or present improvements to these streets. The City’s Official Plan Transportation Map and the City of London’s Zoning By-law Z-1 classifies roads throughout the City as secondary collectors, primary collectors or arterials. All other roads are considered to be local streets.

b) 0.3 metre Reserves (Blocks)

0.3 meter reserves along block frontages and at the rear and/or flankage of lots which are adjacent to arterial and collector road networks, where applicable (outside of right-of-way) and are also required at the dead end of proposed road networks which abut future proposed road networks and where roads in a subdivision abut lands outside the subdivision.

18.5.2 Minimum Lot Frontages

In most cases the zoning by-law adequately satisfies requirements for minimum frontages for single-family and semi-detached lots. However, where bends in streets occur or on cul-de-sacs, lots must be designed such that when side lot lines are projected to the fronting curb, an adequate frontage is provided at the curb line to avoid conflicting driveway locations. These minimum frontages at the curb line are as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Minimum Frontage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-family</td>
<td>5.5m</td>
</tr>
<tr>
<td>Semi-detached</td>
<td>9.0m</td>
</tr>
</tbody>
</table>

18.5.3 Noise Barrier Walls General

Noise barrier walls are required for residential developments which back onto or flank arterial road networks, or as otherwise required in accordance with the draft plan of subdivision conditions and City practices.

All noise barrier wall designs are to comply with the accepted Noise report and meet the minimum requirements and specifications of the Ministry of Transportation Noise Barrier Wall guidelines.

**Note**: Noise barrier walls for uses other than along arterial roads are to comply with Ministry of the Environment “Noise Assessment Criteria in Land Use Planning” requirements and approved by the Planning Division.

18.5.4 Noise Study/Report

Required when the proposed subdivision or development is situated within certain design setbacks from a Provincial Highway or Railway, as per the Ministry of the...
Environment “Noise Assessment Criteria in Land Use Planning” and/or as indicated in the draft plan conditions and/or subdivision agreement, all approved by Planning Division.

All recommendations and details from noise barrier wall studies/reports are to be reflected on the servicing drawings.

18.5.5 Noise Wall Location

Arterial Roads:

a) Masonry/Concrete:

Wall, posts and brick pillars are to be located on City property within the proposed 0.3m reserve and maintained by the City.

b) Wooden:

Wall, posts and brick pillars are to be located entirely on private property and maintained by the owner.

Other Situations:

Locations as per the approved Noise Study (i.e. berms/walls adjacent to railways, etc.).

18.5.6 Minimum Height

2.4 above ultimate centerline road profile design or as required by an accepted Noise Study.

18.5.7 Material Density

Ministry of Environment Criteria - Minimum surface density of 20 kg/sq.m. (4lbs/sq.ft.).

18.5.8 Materials

Masonry/Concrete:

Constructed of a concrete material with a surface density of 20kg/sq.m. (4lbs/sq.ft.). Previously accepted masonry/concrete walls: Durisol and bricked.

Wooden:

Constructed of a wood material with a surface density of 20kg/sq.m. (4lbs/sq.ft.). Previously accepted wooden walls: Western Red Cedar, Red Wood and Yellow Cyprus.
18.5.9 **Noise Wall/Retaining Wall Combined**

Where the property line along the road undulates requiring the use of retaining walls, the standard 2.4m wall can be reduced to a minimum of 1.1m wall in hill sections.

**Note:** the overall combined noise wall and retaining wall height, must be 2.4m above the ultimate centerline road profile design or as required in the accepted Noise Study.

18.5.10 **Site Lines**

Site lines to be maintained in accordance with Section 4.24 of Zoning By-Law Z-1.

18.5.11 **Return End Walls**

Required at the end of all proposed noise barrier walls which terminate at an abutting property which does not have an existing noise barrier wall present or where an opening is required (e.g. at a walkway).

18.5.12 **Gaps/Holes**

To be free of any holes or gaps within and at the bottom of all proposed noise barrier walls.

18.5.13 **Drainage**

Proper surface drainage to and away from the noise barrier wall is required for all proposed designs.

18.5.14 **Overland Flow Routes Through Noise Barrier Walls**

In exceptional situations, an adequately designed opening in the wall is required to allow overland flow route to pass through the wall, in conjunction with a toe wall or berm behind the opening in the wall to provide a supplemental noise attenuation measures at the opening.

18.5.15 **Details**

A typical profile view of the noise wall/footings is required together with cross-sections and details for any pertinent brick pillars/footings and wooden posts/footings, which are to comply with the Ontario Building Code.
18.6 STORM CHANNELS

18.6.1 General

Specifications and design information to be in accordance with the Ontario Provincial Standard Drawings the Municipal Works Design Manual (MEA) and as approved by SWM Unit.

18.6.2 Channel and Hydraulic Report

To be reviewed and accepted by SWM Unit. All recommendations and details from the report are to be shown on the servicing drawings.

18.6.3 Width/Depth/Freeboard/ Type

Dependent on accepted report by SWM Unit.

18.6.4 Side Slopes

3:1 side slopes maximum.

18.6.5 Linings/Material

Grass-lined slopes, and where velocities are high, gabion-lined, approved erosion protection mat, or rip/rock protection side slopes, and/or as per the accepted Channel/Hydraulics Report and Geotechnical Report.

18.6.6 Inlet/Outlet Structures

As per Headwall and Culvert Sections, 5.18.

**Note:** All inlet/outlet structures which are different from those identified in the Ontario Provincial Standard Drawings and Municipal Works Design Manual (MEA) are to have Structural Engineer’s certification.

18.6.7 Pedestrian System

Location, width and materials to be reviewed and approved by Parks Planning & Design Division, in conjunction with Development Services.

**Note:** Grades and drainage to be reviewed by Development Services.

18.6.8 Landscaping Plan

Reviewed and approved by Parks Planning & Design Division, in conjunction with Development Services.
18.6.9 Maintenance Access

A 3.0m to 4.6m wide topsoil and sodded access without any trees, plantings or other obstructions is required for maintenance vehicles and equipment used to service all inlets/outlets within the channel. Adequate curves and turn-around facilities are required for maintenance vehicles to maneuver. Slopes (10% maximum), cross-falls (2% minimum) and drainage of access roads are also to be addressed in the design.

Note: A 0.3m separation is required between the maintenance access and the top/bottom of any slopes; fences; and property line(s); and sufficient room is to be provided on the top of each side of the channel, generally 6.0m.

18.6.10 Details

A plan & profile is required for all storm channel designs together with frequent cross-sections and details. Plan view, cross-sections and details of the inlet/outlet structures or other pertinent design features within the channel are also required.

18.7 STORM CULVERT

18.7.1 General

Precast Box:
Constructed for access (i.e. road and pedestrian) crossings within a ditch, creek and/or river.

All major crossings, where applicable, are to be reviewed and approved by SWM Unit.

Corrugated Steel:
Same as precast box, where applicable.

18.7.2 Culvert Calculations and Report

Precast Box:
To be reviewed and accepted by SWM Unit.

All recommendations and details from the accepted report are to be reflected on the servicing drawings.

Corrugated Steel:
Same as box, where applicable.

18.7.3 Minimum Diameter/Size

Precast Box:
1800mm (span) x 900mm (rise).

Corrugated Steel:
450mm diameter
18.7.4 Minimum Depth of Cover

Precast Box:
As per OPSD-803.010.

**Note:** if depth of cover is less than the above, certification from a Structural Engineer is required.

Corrugated Steel:
300mm OR diameter divided by 6, whichever is greater. As per OPSD-805.01.

**Note:** If depth of cover is less than the above, certification from a Structural Engineer is required.

18.7.5 Culvert Crossings Over Services

Precast Box:
In addition to the City’s review and approval, where a culvert crosses an existing/proposed sewer and/or watermain, frost protection over the above existing/proposed services is warranted, and insulation is required, as per City of London Drawing Standard W-CS-68.

Corrugated Steel:
Same as box culverts.

18.7.6 Railings

Precast Box:
Required for concrete culverts where the drop is greater than 1.0m, as per the Ontario Building Code. As per OPSD-980.101.

Corrugated Steel:
Same as box culverts, where applicable.

18.7.7 Flood Plain Areas

Precast Box:
Upper Thames River Conservation Authority’s review and approval is required where storm culverts are constructed within flood plain areas.

Corrugated Steel:
Same as box culverts.
18.7.8 **Rip Rap/Rock Protection**

Precast Box:
Required at the inlet/outlet with high velocities. As per the Sediment & Erosion Control Section 10.

Corrugated Steel:
Same as box culverts, where applicable.

18.7.9 **Sediment & Erosion Control Measures**

Precast Box:
As per the Sediment & Erosion Control Section 10 and as per the Ministry of Natural Resources Guidelines on Erosion and Sediment Control for Urban Construction Sites.

Corrugated Steel:
Same as box culverts.

18.7.10 **Bedding**

Precast Box:
As per OPSD-803.010.

Corrugated Steel:
As per OPSD-802.010.

18.7.11 **Materials**

Precast Box:
Concrete.

Corrugated Steel:
Corrugated Steel Pipe.

**Note:** For 300mm to 600mm diameters, specified minimum wall thickness to be 1.6mm. All other diameters, minimum wall thicknesses as per OPSD-805.01.

18.7.12 **Maintenance Access**

A 3.0m to 4.6m wide topsoil and sodded access without trees, plantings or other obstructions is required for maintenance access and equipment used to service all culverts. Adequate curves and turn-around facilities are required for maintenance vehicles to manoeuvre.

Slopes (10% maximum), cross-falls (2% minimum) and drainage of access roads are also to be addressed in the design.

Note, a 0.3m separation is required between the maintenance access and the top/bottom of any slopes; fences; and property line(s).
18.7.13 **Details**

- Precast Box:
  Plan & Profiles are required for all culverts together with frequent cross-sections and details (e.g. inlets/outlets).

- Corrugated Steel:
  Same as box culverts.

### 18.8 STORM DITCHES

18.8.1 **General**

Required for existing road network surface drainage in rural road situations without existing or proposed storm drainage systems have not been warranted.

18.8.2 **Grade**

Minimum 0.3%. Maximum dependent on erosion velocity of soil and erosion protection provided.

18.8.3 **Depths**

Dependent on right-of-way widths, safety features and other design constraints.

18.8.4 **Slopes**

3:1 side slope maximum.

18.8.5 **Lining/Materials**

Grass-lined, and where velocities are high, approved erosion protection mat, if warranted.

18.8.6 **Inlets/Outlet Structures**

As per Types of Headwalls Section 5.18.1, Storm Culverts Section and Types of Catchbasins Section 5.16.4.

18.8.7 **Subdrains**

May be required to be constructed adjacent to and/or drain to ditches, as required by the Geotechnical Engineer and Transportation Division, as per City of London Standard Contract Documents, Section 405.07.01.

18.8.8 **Rip Rap/Rock Protection**

As per the Sediment & Erosion Control Section 10 and as per the Ministry of Natural Resources Guidelines on Erosion and Sediment Control for Urban Construction Sites.
18.8.9  **Sediment & Erosion Control Measures**

As per the Sediment & Erosion Control Section 10 and as per the Ministry of Natural Resources Guidelines on Erosion and Sediment Control for Urban Construction Sites.

18.8.10  **Details**

Plan & Profile required together with frequent cross-sections and details.