Standards and Specifications Manual
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**REVISION INFORMATION SHEET**

Name of Publication: Town of Richmond Hill Standards & Specifications

The current and future revisions are numbered consecutively. If maintaining a hardcopy version of this electronic document, users are required to remove and replace the applicable pages in the manual to ensure that copies of the manual are always up to date.

All future updates and revisions to this manual will be posted to this page. It is the user’s responsibility to visit this page periodically to check for changes to the manual. Individual notifications will not be sent to Consultants advising of new updates or revisions.

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<td>June 1998</td>
<td>Entire Hardcopy Manual reissued</td>
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<td>April 1999</td>
<td>Division &quot;A&quot; Sewers Section A2  (Page 1)</td>
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<td>Section C3 - Added new Pedestrian Ramp drawings R-8B</td>
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<td>Section C3 - Added new joint utility trench typical section standard drawings R-1B, R-2B and R-3B</td>
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<td>Division &quot;D&quot; Grading and Drainage Index (Page 1)</td>
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<td>6</td>
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<td>Division &quot;D&quot; Grading and Drainage Section D1 (Pages 1-5, Page 7, Page 9)</td>
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<td>Division &quot;D&quot; Grading and Drainage Section D2 - Page 14, Page 16</td>
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<td>8</td>
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<td>Materials, Standards and Specifications Executive Committee and Subcommittee Member Listing (Entire Section)</td>
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<td>Section C1 - (Entire Section)</td>
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<td>Division &quot;H&quot; Stormwater Management (New Division added)</td>
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<td>11</td>
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<td>Division “C” Transportation and Works, Section C3 - Revised standard depth for storm sewers on typical section drawings R-1A, R-2A, R-1B, R-2B and R-3B</td>
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<td>Division “H” Stormwater Management Design Criteria, Section H1 - (Entire Section)</td>
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<td>13</td>
<td>December 2005</td>
<td>Division “F” Development Submission Standards (Entire Section)</td>
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<td>November 2006</td>
<td>Division “F” Development Submission Standards (Section F6)</td>
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<td>January 2007</td>
<td>Division “F” Section 9.2 O.L.S. Certificate</td>
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<td>16</td>
<td>August 2007</td>
<td>Division “B” Watermain Section B6 – Procedures for Cleaning, Disinfecting, Testing and Sampling (entire section is new and added) New Watermain Standard Drawings W-7A,8A,9A added</td>
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<td>Division “F” Development Submission Standards Section 9.9 Letter of Undertaking</td>
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| 17              | October 2007    | Division “F” Development Submission Standards  
Section F6.2 – Pre-grading Requirements  
(new sentence added - for obtaining insurance form from Town website)  
Section F6.3 Pre-servicing Requirements  
(new sentence added - for obtaining insurance form from Town website and one new page added)  
Section F9.8 – Certificate of Insurance  
(Entire document edited)  
Division “H” Stormwater Management  
Section H1.10 – Stormwater Management Facility  
(whole paragraph deleted)                                                                                                                                                                                                                                                                                                                                                   |
| 18              | November 2007   | Division “E” Utilities  
Section E1 – Design Criteria – Utilities  
(Spelling mistake corrected see 1.2 re Traffic Analyst)                                                                                                                                                                                                                                                                                                                                                                                  |
| 19              | January 2008    | Division “F” Development Submission Standards  
Section 6.2 – Pre-grading Requirements  
(new requirement added – Site Alteration Permit, Letter of Credit edited - for Site Alteration, and requirement for Letter of Undertaking deleted)  
Section 6.3 – Pre-servicing Requirements  
(new requirement added – Site Alteration Permit, Letter of Credit edited - for Site Alteration, and requirement for Letter of Undertaking deleted)                                                                                                                                                                                                                   |
| 19              | January 2008    | Division “F” Development Submission Standards  
Section F9.9 – Letter of Undertaking (document deleted and is replaced by Letter of Credit - Site Alteration).  
Section F9.10 – Letter of Credit – Undertaking (document deleted and is replaced by Notice of Contractor)  
Section F9.11 (document deleted)                                                                                                                                                                                                                                                                                                                                                                                                   |
| 20              | February 2008   | Division “I” – Erosion and Sediment Control Criteria  
(New Division added)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 21              | March 2008      | Division “I” – Erosion and Sediment Control Criteria  
(whole Division corrected)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 22              | May 2008        | Division “F” Development Submission Standards  
Section F6.3 – Pre-servicing Requirements  
(add GST to Engineering Fees)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 23              | June 2008       | Division “F” Development Submission Standards  
Section F6.2 and F6.3 – Pre-grading and Pre-servicing Requirements  
(add one more liability item to Owner’s Certificate of Insurance)                                                                                                                                                                                                                                                                                                                                                                       |
| 24              | August 2008     | Division “F” Development Submission Standards  
Section F9.7 and F9.9 – Overall Letter of Credit and Site Alteration Letter of Credit (third paragraph of section corrected)                                                                                                                                                                                                                                                                                                                                                                             |
| 25              | September 2008  | Division “C” Section C1.1 Design Criteria Roadworks  
Section 1.1 Roads  
Section 1.3 Sidewalks and Walkways                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 26              | February 2009   | Division “C” – **Multiple changes in entire division – please reprint in full.** In Section C1, major changes relate to driveway design. In Section C2, major changes are on Page 5. In Section C4, major changes are on Pages 3-6 and Pages 10-11.  
In Section C3, drawings R-2A, R-2B and R-3B have been revised.  
In Section C3, drawings R-15A, R-15B and R-15C have been added in support of the new Driveway Apron By-Law                                                                                                                                                                                                                                                                                                                         |
<p>| 27              | February 2009   | Division “F” – Section F8 Item 8.6 has been revised                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |</p>
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<td>28</td>
<td>February 2009</td>
<td>Appendix “I” Materials, Standards &amp; Specifications Specialty Committees</td>
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<tr>
<td>29</td>
<td>August 2009</td>
<td>Division “F” – Section F9.7 Letter of Credit – Subdivision Agreement and Section F9.9 Letter of Credit – Site Alteration</td>
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<td>30</td>
<td>November 2009</td>
<td>Division “B” Section B4.2 Watermains Adopted OPSDs – OPSD 1105.01 Hydrant Installation – revised Notes 1 &amp; 6. Division “B” Section B5 List of Approved Manufacturers and Products for Water Systems – Fire Hydrants – added AVK and removed CV Century. Division “C” Section C3 Standard Drawings – Revised Drawing R-11A. Division “C” Section C4 Adopted O.P.S.D. – revised Note 2 under 310.020 Concrete Sidewalk Adjacent to Curb and Gutter. Division “F” Index – revised Page 2 to remove Insurance Certificate. Division “F” Section F6.2 Requirements for Pre-Grading and F6.3 Requirements for Pre-Servicing – removed references to insurance certificates being within document (can be found on website instead) and resulting changes to section numbers. Division “F” Section F9 Standard Documents – removed Insurance Certificate (formerly Section F9.8) and resulting changes to Letter of Credit (now Section F9.8) and Notice of Contractor (now Section F9.9).</td>
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<td>31</td>
<td>March 2010</td>
<td>Division “C” Section C3 Standard Drawings – Revised Drawing R-8A and R-9A – see revision notes on drawings for changes.</td>
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<td>32</td>
<td>May 2010</td>
<td>Division “B” Section B6 Watermain – Procedures for Cleaning, Disinfecting, Testing and Sampling – Added Heading 1.6 Calculation of Water Consumption and revised Form 5.1 to include “Calculation for estimated volume of water”. Division “B” Section B4.2 Watermains Adopted OPSDs – OPSD 1105.01 Hydrant Installation – revised Note 6 to be “Greater than 5,675: light blue”.</td>
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<td>33</td>
<td>February 2011</td>
<td>Division “B” Section B2 Watermain Specifications – added note to cover page regarding OPSS 701 Revisions and revised and added notes to Subsection No. 701.05.10.01. Division “F” Section F8.6 – changed requirements of asbuilt engineering submissions to two copies and changed requirements for PDF files. Division “C” Section C3 Standard Drawings – Drawing R-13A has been updated. Division “B” Section B6 – Chain of Custody Form 5.6 updated.</td>
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<td>34</td>
<td>April 2011</td>
<td>Division “F” Section F9.9 - Notice of Contractor Letter revised.</td>
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<td>36</td>
<td>May 2012</td>
<td>Division “B” Watermains Section B3 Standard Drawings Watermains – Updated Drawings W-1A, W-4A and W-5A</td>
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<td>37</td>
<td>August 2013</td>
<td>Division “B” Watermains Section B6 Amend Form 5.4 to update MEMO TO: line information and to expand selections on activity picklist.</td>
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<td>38</td>
<td>January 2014</td>
<td>Division “B” Watermains Section B6 Amend Form 5.6 to update contact information</td>
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<td>Date</td>
<td>Comments</td>
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<td>39</td>
<td>December 2015</td>
<td>Division “C” Transportation and Roadworks, Section C3 Standard Drawings - added Drawing R-16, “Private Road – “T” Turnaround Minimum Standard” and updated Index Section C3 to add drawing R-16 to list of drawings</td>
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<td>40</td>
<td>February 2016</td>
<td>1. Division “C1” Transportation and Roadworks, Roadworks – added new section, C1.7 “Pedestrian and Cycling Facilities”&lt;br&gt;2. Division “C3” Transportation and Roadworks, Standard Drawings – added 15 new drawings R17A to R22B which are related to Section C1.7&lt;br&gt;3. Division “C” Transportation and Roadworks, Index – updated index to include #1 and 2 above&lt;br&gt;4. Division “F” Development Submission Standards, Section F9 – updated Section F9.5 “Specifications for Digital Submission of Draft Approved M-Plan” – updates to Digital Plan Specifications and provided new contact information&lt;br&gt;5. Appendix “1” Committee Members updated with more current contacts</td>
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<td>41</td>
<td>April 2016</td>
<td>1. Street Lighting standards updated to reflect new LED requirements and moved to Division “E” Utilities, Section E4&lt;br&gt;2. Pedestrian &amp; Cycling Facilities, previously Section C1.7 in Division “C” changed to Section C1.6&lt;br&gt;3. Division “C” Index modified to reflect above changes&lt;br&gt;4. Parking Lot Lighting Standards added to Division “E Utilities as Section E5&lt;br&gt;5. Parks and Sports Lighting Standards added to Division “E” Utilities as Section E6&lt;br&gt;6. Division “E” Index modified to reflect above changes</td>
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<td>42</td>
<td>October 2016</td>
<td>1. Street Lighting standards, Division “E” Utilities, Section 4.2.1, updated to change the Correlated Colour Temperature (CCT) from 4000K to 3000K&lt;br&gt;2. Parking Lot Lighting Standards, Division “E Utilities, Section 5.2.1, updated to change the Correlated Colour Temperature (CCT) from 4000K to 3000K&lt;br&gt;3. Parks and Sports Lighting Standards, Division “E” Utilities, Section 6.2.1, updated to change the Correlated Colour Temperature (CCT) from 4000K to 3000K</td>
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<td>Date</td>
<td>Comments</td>
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| 43              | December 2016 | 1. Division “B” Section B1, Page 4, Section 4.3 Water Services – changed reference to Town Standard M-2 to M-2A and removed reference to Standard S-2A  
2. Division “G” Miscellaneous Drawings – updated Town Standard M-2A to reflect minimum water service size of 25mm increased from 19mm due to change in Ontario Building Code  
3. Division “C” Index Section C3 – Removed standard drawings R-8A and R-8B from the index list (replaced by OPSD 310.030, 310.031, 310.033 and 310.039)  
4. Division “C” Section C1.3, Page 1, “Sidewalks and Walkways” fifth paragraph modified to account for AODA requirements  
5. Division “C” Section C3 Town Standard Drawings – removed Drawings R-8A and R-8B  
6. Division “C” Section C4.2 Pages 5 and 6 – added OPSD 310.030, 310.031, 310.033 and 310.039 and added Note 5 to OPSD 350.01  
7. All pages subsequent to Pages 5 and 6 in #3 above were renumbered to accommodate extra page |
| 44              | April 2018  | 1. Division “B” Section B6, Form 5.5 revised to change who memo goes to (Water Quality Analyst) and to incorporate reporting on consumption of water used when testing watermain |
| 45              | May 2018    | 1. Division “E” Section E4 “Design Criteria For Street Lighting” – added the following: Table of Contents, 4.1 Lighting Design; 4.2.1 Straight Roadways, Streets and Sidewalks; 4.5 Decorative Design – Roads |
| 46              | October 2018 | 1. Added new division, Division “J” Waste Management Design and Collection Standards for Development – includes modifying Index page to add new division  
2. Division “C” Section C3 “Standard Drawings” – Drawing R-5A “Typical Vehicular Access for Condominiums and Private Developments” has updated notes and dimensions  
3. Division “C” Section C3 “Standard Drawings” – Drawing R-16 “Private Road – “T” Turnaround Minimum Standard” has updated notes and dimensions |
<p>| 47              | February 2019 | 1. Division “E” Section E4 – pages 18 and 19 revised due to change of contact information for Ameresco |
| 48              | May 2019    | 1. Updated Division “J”, Section 1.2.4 to require three separate waste chutes for multi-residential buildings and lowered the point load from 12,000 kg to 6,000 in Section 1.1.5. Pages 7 and 13 revised due to changes and subsequent pages 14-16 revised due to formatting changes |</p>
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| 49              | March 2020 | 1. Division “B” Watermains Section B6 Form 5.6 completely updated  
2. Division “B” Watermains Section B6 Form 5.5 updated to copy to additional staff  
3. Division “E” Section E5 and E6 - replaced the existing sections of the manual with the updated/approved versions.  
The major changes that have been made are as follows:  
  • Addition of City approved LED Luminaires for parking lots and parks  
  • Addition of requirements for smart lighting controls to be installed in the parking lot lighting and park lighting  
4. Division “E” Section E4 in sections 4.10 and 4.10.1: changed the name of the producer of the smart lighting control system from Silver Stream Networks (SSN) to Itron Inc.. |
DIVISION "A"

SEWERS
## DIVISION "A"

### SEWERS

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<td>- Pipes and Associated Drainage Items</td>
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<td>Town of Richmond Hill Standard Drawings Storm and Sanitary Sewers</td>
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<td>Typical Drop Structures for Standard Storm Manholes</td>
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<td>Frame and Grate for Rear Yard Catchbasin Only</td>
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<td>Pyramid Type C.B. Frame and Cover</td>
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<td>ST-4A</td>
<td>Ditch Inlet Catchbasin Grating</td>
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## DIVISION "A"

### SEWERS

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<td>ST-5A</td>
<td>Corrugated Steel Pipe Bedding For Roadway Culverts</td>
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<td>ST-6A</td>
<td>Precast Catchbasin For Side-Inlet Frame and Grate</td>
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<td>ST-7A</td>
<td>Inlet Control Device (Sliding Type)</td>
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<td>ST-8A</td>
<td>Manhole and Catchbasin Precast Concrete Adjustment Units</td>
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<td>Sewer Cleanout Detail</td>
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<td>Adopted Ontario Provincial Standard Drawings</td>
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<td>OPSD DIVISION 400 Frames and Grates</td>
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<td>OPSD DIVISION 700 Catchbasins and Maintenance Holes</td>
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<td>OPSD DIVISION 1000 Sanitary Sewers and Maintenance Holes</td>
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DIVISION "A"

SECTION A1

SEWERS

DESIGN CRITERIA

STORM SEWERS
DIVISION “A” SECTION A1

DESIGN CRITERIA STORM SEWERS

1. DESIGN FLOWS AND WATERSHED AREAS

The watershed area shall be determined from contour plans and will include all areas that naturally drain into the system and all external areas not provided for in adjacent storm drainage areas, as well as, other areas which may become tributary by reason of regrading. The former information may be obtained from the Town.

Maintenance holes will be the tributary points in design and areas tributary to each maintenance hole will be clearly outlined on the storm drainage area plan and the area in hectares (to the closest tenth) clearly shown, with the impervious coefficient as follows:

\[
\text{Thus } \frac{4.6 \text{ ha}}{0.5}
\]

In cases where the areas of different impervious coefficients may be tributary to one maintenance hole, the areas tributary to the maintenance hole will be individually outlined with small arrows from boundary line of the area showing the direction to the maintenance hole.

In determining tributary areas to maintenance holes, the proposed grading of lots must be considered and taken into account in order to maintain consistency in design.

In the case of large areas under single ownership, such as a shopping centres, apartment developments, schools etc., the design will be prepared on the basis of the entire area being tributary to a maintenance hole in an abutting storm sewer unless more than one sewer connection will be necessary to serve the property in question, in which case, the appropriate area tributary to each sewer connection will be clearly shown and taken into account in the design of the storm sewer.

In lieu of precise information on development on the whole or any part of a watershed area, reference will be made to the latest zoning plan issued by the Planning Department in order to select the correct values of impervious coefficient to be used in the design and the areas to which they will be applied.
2. **DESIGN**

2.1 **Runoff Quantity**

The design of the storm sewers shall be computed on the Town's Standard Design Sheet ST-9A. All storm sewer minor system designs shall be based on a 5 year frequency unless otherwise directed by the Town.

a) All storm sewers shall be designed according to the rational formula where:

\[
Q = \frac{Ai}{360}
\]

Where:
- \(Q\) = Runoff quantity in M3 /Sec.
- \(A\) = Area in hectares (ha)
- \(i\) = Average rainfall intensity in mm/hr.
- \(R\) = Runoff coefficient

b) The value for rain fall intensity shall be calculated in accordance with the following:

<table>
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<th>Return Frequency</th>
<th>Intensity</th>
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<tbody>
<tr>
<td>2 yr. :</td>
<td>(i = 641(T+4)^{-0.7821})</td>
</tr>
<tr>
<td>5 yr. :</td>
<td>(i = 991(T+4)^{-0.8080})</td>
</tr>
<tr>
<td>10 yr. :</td>
<td>(i = 1129(T+4)^{-0.8191})</td>
</tr>
<tr>
<td>25 yr. :</td>
<td>(i = 1530(T+4)^{-0.8287})</td>
</tr>
<tr>
<td>50 yr. :</td>
<td>(i = 1752(T+4)^{-0.8337})</td>
</tr>
<tr>
<td>100 yr. :</td>
<td>(i = 1977(T+4)^{-0.8382})</td>
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The Commissioner will determine which storm sewers will be designated as trunk storm sewers. Values for the runoff coefficient "R" are as follows:

- Commercial areas: 0.7 - 0.8
- Heavily developed areas: 0.7
- Industrial areas: 0.7 - 0.75
- Schools, churches, institutions: 0.5 - 0.7
- Apartments and medium density: 0.5
- Townhouses: 0.65
- Semi detached residential: 0.55
- Single family residential: 0.45
- Parks, cemeteries, recreation: 0.3

c) The design for minor water courses, associated culverts and structures will be designed to a twenty-five (25) year storm frequency unless otherwise directed by the Town of Richmond Hill or the Toronto and Region Conservation Authority.
2.2 **Pipe Capacity**

Manning's Formula will be used to compute the capacity of storm sewers. The capacity of the sewer will be calculated on a basis of the pipe flowing full. A 10 minute entry time will be allowed at the head of the system.

The sewers will be designed according to the Manning equation:

\[
Q = \frac{1.00 \times R^{2/3} \times S^{1/2} \times A}{n}
\]

and

\[
V = \frac{1.00 \times R^{2/3} \times S^{1/2}}{n}
\]

Where:
- \(Q\) = flow m³/sec.
- \(A\) = nominal cross-sectional area of the sewer (m²)
- \(R\) = hydraulic radius (m)
- \(S\) = slope of pipe (m/m)
- \(n\) = roughness coefficient as noted below

2.3 **Roughness Coefficients**

The roughness coefficients to be used for storm sewer pipes will be:

- a) concrete pipe: \(n=0.013\) for all sizes of pipes
- b) PVC pipe: \(n=0.013\) for all sizes of pipes
- c) corrugated metal (culvert use only): \(n=0.024\) for all sizes of pipes
- d) corrugated metal (culvert use only): \(n=0.021\) for all sizes of pipes
  (smooth flow)

2.4 **Velocity**

Minimum 0.8m per second
Maximum 5.0m per second

2.5 **Minimum Size of Pipe**

Sewer mains = 300 mm

Catch basin connections  
- single catch basin = 200 mm
- double catch basin = 250 mm
- rear lot catch basin = 250 mm
2.6 Minimum Depth

The depth will be sufficient to provide a suitable outlet for the building foundation weeping tile. The minimum cover to the pipe obvert will be 1.5m, or to provide 1.0m clearance between the 25 year hydraulic grade line (H.G.L.) and foundation drains whichever is greater.

2.7 Maintenance Holes

a) Maintenance holes shall be provided at each change in alignment, grade, material and at all junctions, except where radius pipe is used in sizes 1050 mm diameter and over.

b) Maintenance holes shall be spaced at a maximum of:
   • 110m for 300 mm diameter to 750 mm diameter
   • 120m for 825 mm diameter to 1200 mm diameter
   • 150m for pipe sizes over 1200 mm diameter

c) Type and size of maintenance holes shall be specified on the profiles and a detail of the benching will be shown on the plan portion of the drawing for cases when the benching differs from the Town Standard.

d) All maintenance hole openings shall be located on the upstream side of the manhole.

e) The change in direction of flow in any maintenance hole shall not be more than 90°.

f) The maximum change in direction of flow in maintenance holes for sewer sizes greater than 525mm shall be 45°.

g) The minimum drop across a maintenance hole for all straight runs is 30 mm, all junctions up to 45° - 75 mm and from 45° to 90° - 150 mm.

h) Where the difference in elevation between the inlet and outlet pipes requires a drop structure, it shall be as designed in accordance with Standard Drawing ST-1A.

i) Obvert elevations shall be matched at locations where pipe sizes change.

j) All maintenance holes shall be benched to the crown of all pipes on a vertical projection from the spring line.

k) All benching inside maintenance holes shall be a minimum of 230 mm in width.

l) No maintenance holes shall be located closer than 1.5m from any curb face or other utility.

m) Although the Standard Drawings provide details for maintenance holes up to certain maximum depths; the Consulting Engineer will analyze individually each application of the standards, related to soil conditions, loading and other pertinent factors to determine structure suitability. In all cases where the standards are not applicable, maintenance holes must be individually designed and detailed.
n) When any horizontal dimension of a maintenance hole exceeds 2.4m, the structure must be designed and individually detailed.

o) A minimum vertical clearance of 300 mm will be provided between the outside of all pipe barrels at all points of pipe crossings. Where the minimum clearance cannot be obtained, the crossing is to be encased in 15 MPa concrete.

2.8 Catchbasins

a) Standard catchbasin designs are illustrated on the Standard Drawings.

b) Special catchbasins and inlet structures will be fully designed and detailed.

c) Catchbasins shall be selected, located and spaced in accordance with the conditions of the design. The recommended maximum spacing is as follows:

<table>
<thead>
<tr>
<th>Pavement Width</th>
<th>Recommended Maximum Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3 m to 8.5 m</td>
<td>90m 60m</td>
</tr>
<tr>
<td>8.5 m to 9.80m</td>
<td>82m 55m</td>
</tr>
<tr>
<td>9.80m to 12.20m</td>
<td>73m 50m</td>
</tr>
<tr>
<td>12.20m to 14.00m</td>
<td>60m 40m</td>
</tr>
</tbody>
</table>

The spacing of catch basins may be altered for grades over 4% for special cases, by using side inlet catchbasins. Double catchbasins are required where drainage is received from more than one direction.

d) At street intersections, catchbasins shall be located immediately upstream of sidewalk or pedestrian crosswalks.

e) Catchbasins shall not be located within driveways or sidewalks and walkway curb depressions.

f) Catchbasins and connections shall be designed to capture the expected maximum flow.

For Single Catchbasins, the connection shall not be less than 200 mm diameter pipe laid at 0.70% minimum grade.

For Double Catchbasins, the connection shall not be less than 250 mm diameter pipe laid at 0.70% minimum grade.

g) Where concrete pipe is used all catchbasins shall have "Extra Strength" leads and Tees.
2.9 **Pipe**

a) The class of pipe and type of pipe bedding will be shown on the profile of all lengths of sewer.

b) All storm sewers will be located as shown on the appropriate road cross-section standard.

c) All storm sewers will be laid in a straight line between manholes except where radius pipe is permitted.

d) The pipe size will not decrease from a larger size upstream to a smaller size downstream regardless of the increase in grade.

e) Radius pipe will be permitted in sizes 1050 mm and over. The minimum radius will be 15 times the pipe diameter.

f) Pipe bedding and class will be designed to suit loading conditions. The class, strength, size and bedding will be shown on the profiles.

g) Risers will be constructed when the invert of a sewer exceeds 4.5m in depth. No riser will exceed 3.0m in height unless approved by the Town.

3.1 **MATERIALS**

a) All concrete sewer pipe shall conform to OPSS latest revision.

b) All mainline concrete sewer pipe shall be reinforced as per OPSS minimum 65D (Class III).

c) Catchbasin concrete sewer pipe less than 300mm dia. shall be non-reinforced as per OPSS Class 3 (extra strength).

3.2 Maintenance holes shall be constructed as follows:

i) Precast concrete according to OPSD

ii) Poured in place structures shall be individually designed and detailed by a qualified Structural Professional Engineer.

3.3 All frames and grates shall be cast iron and North American made.
4. **SPECIAL STRUCTURES**

4.1 Inlet and outfall structures, including headwalls shall be designed and detailed by a Structural Engineer.

4.2 Grates will be provided on all inlet and outlet structures and shall be designed and detailed when standard drawings are not appropriate. In general, inlet grates will consist of inclined parallel bars or rods set in a plane slope approximately 45° away from and in the direction of the flow. Outlet grates will consist of horizontal bars or rods. Spacing of bars or rods shall not exceed 150 mm clear. All metal parts will be adequately protected against rusting.

4.3 All drainage works will require sediment control during construction periods, and permanent installations may be required. Facilities shall be located for easy access by maintenance vehicles, and sediment shall be removed whenever the storage volume is reduced to 40% of required volume.

4.4 All drainage works shall be designed to control erosion and the impairment of water quality on receiving streams as a result of urban storm water run-off.

4.5 Connection of roof leaders to the storm sewer system is not permitted.
DIVISION “A” SECTION A1.1
DESIGN CRITERIA - STORM SERVICE CONNECTIONS

1. GENERAL

1.1 Storm service connections shall be installed to service each lot, block and unit in the subdivision. The connections are to be constructed to the property line.

1.2 The services shall be installed in accordance with Standard Drawings.

2. STORM SERVICE CONNECTIONS

2.1 The connection to the main line sewer will be made with an approved manufacturer's tee for main sewer sizes up to and including 450 mm.

2.2 The type and size of pipe shall be:

a) Single Family and Semidetached Units - minimum 150 mm extra strength concrete pipe (Class 3) with approved rubber gasket joints or white PVC DR-28 conforming to OPSS.

b) Multiple Family and Other Blocks, Commercial, Industrial and Institutional areas to be sized individually according to the intended use.

2.3 A 150 mm x 150 mm cast iron or PVC fitting with a test plate marked "Storm" shall be installed by the owner on the street line. A plugged stub section will be installed within the private property.

2.4 The minimum depth at the street line will be 1.8m and the maximum depth 2.4m measured from the final centre line road elevation.

Risers will be used when the invert depth of the sewer main exceeds 4.5m. Risers will not exceed 3.0m in height without approval of the Town.

2.5 Service connections shall not be connected to a catchbasin.

2.6 Parking lots, driveways and/or other hard surfaced areas servicing multiple family, commercial and other blocks, will be serviced by an internal drainage system (including catch basins, manholes and pipe) which will connect to the storm sewer system or other suitable out fall as determined by the Town.

2.7 A maintenance hole will be required for all connections to multiple family, industrial, commercial institutional and parks. The maintenance hole will be located at the street line. The connection obverts shall be matched with main sewer obvert wherever possible.

2.8 Minimum velocity - 0.75m/second
Maximum velocity - 3.65m/second
3. **LOCATIONS**

3.1 Residential storm sewer connections shall be located, as per Town Standard M-2A, (Section G) and S-2A.

3.2 Service connections shall not be constructed within driveways unless otherwise approved by the Town.
DIVISION "A"

SECTION A2

SEWERS

DESIGN CRITERIA

SANITARY SEWERS
DIVISION “A” SECTION A2

DESIGN CRITERIA - SANITARY SEWERS

1. DESIGN FLOW

The sanitary sewer flow shall be calculated in accordance with land use and population densities. This information may be obtained from the Town.

Maintenance holes will be the tributary points in design and areas tributary to each maintenance hole shall be clearly outlined on the sanitary sewer drainage area plan. In lieu of precise information on development on the whole or any part of a watershed area, reference will be made to the latest zoning plan issued by the Planning Department.

1.1 Residential

Sewage flows shall be calculated on the basis of:

Average Flow - 365 litres/person/day

Infiltration - 22,500 litres/gross/hectare/day when foundation drains are connected to the storm sewer.

Calculated on the number of gross hectares contributory to the sanitary sewers including parks and valley land, if they are tributary. Design flows will be calculated on the Town of Richmond Hill Design Sheet. All design flows and design criteria are in cubic metres.

2.1 POPULATION DENSITY

Peaking Factor

\[ KH = 1 + \frac{14}{4 + \sqrt{P}} \]

KH - Harmon peaking factor
P - Population in thousands

KH - Maximum 3.8
Minimum 1.5
2.2 **Pre-Draft Plan Lands**

<table>
<thead>
<tr>
<th>Type of Housing</th>
<th>Persons/Hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detached, Semidetached and Townhouse Mix</td>
<td>52</td>
</tr>
<tr>
<td>Apartment</td>
<td>99</td>
</tr>
</tbody>
</table>

2.3 **Post-Draft Plan Lands**

<table>
<thead>
<tr>
<th>Type of Housing</th>
<th>Persons/Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single &amp; Semi detached</td>
<td>3.8</td>
</tr>
<tr>
<td>Townhouses</td>
<td>3.4</td>
</tr>
<tr>
<td>Apartments</td>
<td>2.7</td>
</tr>
</tbody>
</table>

2.4 **Pre-Secondary Plan Lands**

Future land use and population will be based on official plans and secondary plans of the municipality.

When such information is not available for the land to be developed, the following standard will be used.

**Land Use for 100 Hectares of Developable Lands**

- Local Open Space: 10.3 gross residential hectare
- Residential: 74.3 gross residential hectare
- Commercial: 5.1 gross residential hectare
- Schools and Institutions: 10.3 gross residential hectare

3.1 **Commercial**

a) Average Flow: 180,000 litres/floor hectares/day including infiltration and peaking effect.

b) Floor space index: 0.50 of gross land area, unless designated otherwise in the secondary plan.
c) The area is calculated using the number of gross hectares of the commercial lot. The flow criteria will apply unless evidence exists which will require additional treatment or provide additional volume.

3.2 **Industrial**

Average Flow: 180,000 litres/floor hectares/day including infiltration and peaking effect.

The area is calculated using the number of gross hectares included in the industrial block or development.

The flow criteria will apply unless evidence exists which will require additional treatment or provide additional volume.

3.3 **Schools and Institutions**

Average Flow: 180,000 litres/gross hectare/day including infiltration and peaking effect.

Where the total floor area does not exceed the size of the lot, the area is calculated using the number of gross hectares included in the school or the institutional site.

This flow figure will apply unless evidence exists which will require additional treatment or the provision of additional volume.

4. **SEWER DESIGN**

4.1 **Pipe Capacities**

Sewer capacities will be computed by using Manning's Formula on a basis of sewer pipe flowing full.

4.2 **Roughness Coefficients**

For all sizes and pipe material, \( n = 0.013 \)

4.3 **Velocity and Grade**

Minimum velocity \( 0.75 \)m/second
Maximum velocity \( 3.65 \)m/second
Minimum grade \( 0.5\% \) for all local sewers
Minimum grade of the first upstream leg \( 1.0\% \)

Velocity change from one pipe to another in a manhole will not exceed \( 0.60 \)m/second.
4.4 Minimum Size

The first leg of a sanitary sewer will be sized at 200 mm. All other lengths will be a minimum of 250 mm diameter.

Measured from the final centerline, finished road elevation to the sewer obvert will be:

- Residential areas - minimum 2.5m
- Industrial areas - minimum 2.5m
- Commercial areas - minimum 3.65m

4.5 Maintenance Holes

a) Maintenance holes will be provided at each change in alignment, grade, material and at all junctions, except where radius pipe is used in sizes 1050m diameter and over.

b) Maintenance holes will be spaced at a maximum of 110m for 250 mm diameter to 750 mm diameter, a maximum of 120m for 825 mm diameter to 1200 mm diameter and a maximum of 150m for pipe sizes over 1200 mm diameter.

c) Type and size of maintenance holes will be specified on the profiles and a detail of the benching will be shown on the plan portion of the drawing for cases when the benching differs from the Town Standard.

d) All maintenance hole openings will be located on the upstream side of the chamber.

e) The maximum change in the direction of flow in any sanitary sewer maintenance hole shall be 90°.

f) A sufficient drop will be provided across the maintenance hole to compensate for energy losses due to changes in flow direction and velocity.

g) Where the difference in elevation between the maintenance hole inlet and outlet pipes exceed 600 mm, a drop structure shall be provided as per Standard Drawings. Where the drop is between 200 mm and 600 mm, the pipe grades shall be adjusted, such that the maximum drop is 200 mm. No internal drop structures will be permitted for main line sewer.

h) The obverts on the upstream side of a maintenance hole will in no case be lower than those on the downstream side.

i) All maintenance holes shall be benched to the spring line for pipe sizes up to 300mm and to the obvert level for pipes over 300 mm in diameter.

j) All benching inside maintenance holes shall be a minimum of 225 mm in width.
k) No maintenance hole shall be located closer than 1.50m from any curb face or other service.

l) Although the Standard Drawings provide details for maintenance holes up to certain maximum depths, the Consulting Engineer will analyze, individually, each application of the standards related to soil conditions, loading and other pertinent factors to determine structure suitability. In all cases where the standards are not applicable, maintenance holes must be individually designed and detailed.

m) When any dimension of a maintenance hole exceeds those on Standard Drawings, the maintenance hole must be designed and individually detailed.

n) A minimum clearance of 300 mm shall be provided between the outside of all pipe barrels at all points of pipe crossings. Where the minimum clearance cannot be obtained, the crossing is to be encased in 15 MPa concrete.

o) A minimum clearance of 2.5m horizontally shall be provided between the outside pipe barrels of sanitary sewer pipes and watermain pipes, as per the M.O.E. requirements.

p) Maintenance holes shall be required at the street line for all sanitary service connections to commercial, industrial, institutional and multiple residential blocks.
DIVISION “A” SECTION A2.1
DESIGN CRITERIA - SANITARY SERVICE CONNECTIONS

1. GENERAL

1.1 Complete sanitary service connections shall be installed in accordance with Town Standards to service each lot, block and unit.

2 SANITARY SEWER CONNECTION

2.1 The connection to the main sewer will be made with an approved manufacturer's tee.

2.2 The type of pipe and size will be:

   a) Single Family units  -  minimum 125 mm PVC
   b) Semidetached units  -  minimum 125 mm individual PVC
   c) Multiple Family and Other Blocks, Commercial/Industrial and Institutional areas will be sized individually according to the intended use and the requirements of the Ontario Plumbing Code.
   d) PVC sanitary service connections shall be of any color other than white or blue.

2.3 A 125 mm x 100 mm Cast Iron or PVC test fitting shall be installed by the owner on the street line and a stub section with a plug will be installed within the private property. The test plate located on top of the fitting will be clearly marked Ss "Sanitary".

2.4 The minimum depth of services for residential units at street line shall be 2.4m and the maximum depth 3.0m, measured from the final centerline road elevation. Risers will be used when the invert depth of the sewer main exceeds 4.5m. and will not exceed 3.0m in height without approval of the Town.

2.5 Minimum low flow velocity  -  0.75m/sec..
Maximum velocity          -  3.0m/sec..

2.6 The grade for sanitary sewer connection shall be a minimum of 2%.

2.7 A maintenance hole will be required for all connections to a multiple family, industrial, institutional, commercial and other blocks. The maintenance hole will be located at the street line. The connection obverts shall be matched with the main sewer overt.
3. **LOCATIONS**

3.1 Residential sanitary sewer connection shall be located, as per Town Standards.

3.2 Services will not be permitted within driveways unless otherwise approved by the Town.
DIVISION "A"

SECTION A3

SEWERS

SPECIFICATIONS

STORM AND SANITARY SEWERS
### DIVISION "A" SECTION A3.1
(OPS DIVISION 4)
CONSTRUCTION SPECIFICATIONS - DRAINAGE AND TUNNELS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>405</td>
<td>PIPE SUBDRAINS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>407</td>
<td>CONSTRUCTION OF MAINTENANCE HOLES, DITCH INLETS AND VALVE CHAMBERS</td>
<td>407.07.02</td>
<td>1. Delete references to C.S.P. as an alternative</td>
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<tr>
<td></td>
<td></td>
<td>407.07.14</td>
<td>1. Delete this section completely.</td>
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<tr>
<td></td>
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<td>407.07.17</td>
<td>1. Delete all reference to brick adjustment units.</td>
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<tr>
<td>408</td>
<td>ADJUSTING OR REBUILDING MAINTENANCE HOLES, CATCHBASINS, DITCH INLETS AND VALVE CHAMBERS</td>
<td></td>
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<tr>
<td>410</td>
<td>PIPE SEWER CONSTRUCTION BY OPEN CUT METHOD</td>
<td></td>
<td></td>
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<tr>
<td>412</td>
<td>SEWAGE FORCEMAIN CONSTRUCTION BY OPEN CUT METHOD</td>
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<tr>
<td>415</td>
<td>TUNNELLING</td>
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</tbody>
</table>
DIVISION "A" SECTION A3.1  
(OPSS DIVISION 4)  
CONSTRUCTION SPECIFICATIONS - DRAINAGE AND TUNNELS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>416</td>
<td>JACKING AND BORING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>421</td>
<td>PIPE CULVERTS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Asbestos cement, Vitried Clay, PVC and P.E. pipe products shall not be used for culvert installations.

2. Concrete pipe shall not be used for driveway culvert installations.
### DIVISION "A" SECTION A3.2
(OPSS DIVISION 5)
CONSTRUCTION SPECIFICATIONS - MISCELLANEOUS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>501</td>
<td>COMPACTING</td>
<td></td>
<td>1. All earth materials placed within 1.0m of road sub-base and in all fill areas shall be compacted to 98% Standard Proctor Density.</td>
</tr>
<tr>
<td>504</td>
<td>PRESERVATION, PROTECTION AND RECONSTRUCTION OF EXISTING FACILITIES</td>
<td></td>
<td>1. This specification shall be read in conjunction with the Town of Richmond Hill’s Works Department Manual of Construction Requirements for the Installation and Maintenance of Underground Utilities and Services.</td>
</tr>
<tr>
<td>507</td>
<td>SITE RESTORATION FOR UNDERGROUND UTILITIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>510</td>
<td>THE DEMOLITION AND REMOVAL OF STRUCTURES</td>
<td></td>
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<tr>
<td>511</td>
<td>RIP-RIP, ROCK PROTECTION AND GRAVEL SHEETING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>512</td>
<td>INSTALLATION OF GABIONS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>514</td>
<td>TRENCHING, BACKFILLING AND COMPACTING</td>
<td></td>
<td>1. All earth materials placed within 1.0m of a road sub-base and in all fill areas shall be compacted to 98% Standard Proctor Density.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. All granular material placed shall be compacted to 100% Standard Proctor Density.</td>
</tr>
</tbody>
</table>
# DIVISION "A" SECTION A3.2
(.OPSS DIVISION 5)
CONSTRUCTION SPECIFICATIONS - MISCELLANEOUS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>515</td>
<td>ROCK EXCAVATION FOR PIPELINES AND ASSOCIATED STRUCTURES IN OPEN CUT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>516</td>
<td>EXCAVATING, BACKFILLING AND COMPACTING FOR MAINTENANCE HOLES, CATCHBASINS, DITCHES AND VALVE CHAMBERS</td>
<td>516.05.04</td>
<td>Granular material Shall read: Granular &quot;B&quot; conforming to OPSS 1010 shall be used for backfill around all structures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>516.07.08</td>
<td>Within travelled portion of roadways granular backfill placed within 600mm of sub-grade shall be compacted to 98% Standard Proctor Density.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>516.07.11</td>
<td>1. Amend to read: &quot;for all rigid pipe installation.&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Amend to read: &quot;to be used as approved or as instructed by the Town's Engineer.&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Amend to read: &quot;for all flexible pipe installations.&quot;</td>
</tr>
<tr>
<td>517</td>
<td>DEWATERING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>518</td>
<td>CONTROL OF WATER</td>
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<tr>
<td>538</td>
<td>SHORING AND BRACING</td>
<td></td>
<td></td>
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<tr>
<td>539</td>
<td>PROTECTION SCHEMES</td>
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### DIVISION "A" - SECTION A3.3
(OPSS DIVISION 10)
MATERIAL SPECIFICATIONS - AGGREGATES

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO</th>
<th>COMMENT</th>
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<tbody>
<tr>
<td>1004</td>
<td>MATERIAL SPECIFICATION FOR AGGREGATES - MISCELLANEOUS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1010</td>
<td>MATERIAL SPECIFICATION FOR AGGREGATES - GRANULAR A, B, M AND SELECT SUBGRADE MATERIAL</td>
<td>1010.01</td>
<td>Reclaimed material shall not be used.</td>
</tr>
</tbody>
</table>
## MATERIALS SPECIFICATIONS - CEMENT AND CONCRETE

### DIVISION "A" - SECTION A3.4
(OPSS DIVISION 13)

### MATERIALS SPECIFICATIONS - CEMENT AND CONCRETE

<table>
<thead>
<tr>
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<th>SUBSECTION NO.</th>
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</thead>
<tbody>
<tr>
<td>1351</td>
<td>COMPONENTS FOR PRECAST CONCRETE</td>
<td>1351.05.06</td>
<td>Amend to read: &quot;Steel steps plastic encased or not, shall not be used in the Town&quot;</td>
</tr>
<tr>
<td></td>
<td>CATCHBASINS, MAINTENANCE HOLES, DITCH INLETS AND VALVE CHAMBERS</td>
<td></td>
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</tr>
<tr>
<td>1369</td>
<td>MATERIAL SPECIFICATION FOR UNSHRINKABLE BACKFILL</td>
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**DIVISION "A" - SECTION A3.5**  
(OPSS DIVISION 14)  
MATERIAL SPECIFICATIONS - METAL

<table>
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<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
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<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>1430</td>
<td>MATERIAL SPECIFICATION FOR GABION BASKETS AND MATS</td>
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</tbody>
</table>
### DIVISION "A" - SECTION A3.6  
(OPSS DIVISION 18)  
MATERIAL SPECIFICATIONS - PIPES AND ASSOCIATED DRAINAGE ITEMS

<table>
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<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
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<tbody>
<tr>
<td>1810</td>
<td>CLAY PIPE</td>
<td>1820</td>
<td></td>
</tr>
<tr>
<td>1820</td>
<td>CIRCULAR CONCRETE PIPE</td>
<td>1830</td>
<td></td>
</tr>
<tr>
<td>1830</td>
<td>ASBESTOS - CEMENT PIPE</td>
<td>1840</td>
<td>This product may be used for road sub-drain installations only.</td>
</tr>
<tr>
<td>1840</td>
<td>POLYETHYLENE PIPE PRODUCTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1841</td>
<td>POLYVINYL CHLORIDE (PVC) PIPE PRODUCTS</td>
<td></td>
<td>This product is not to be used for pipe culvert installations.</td>
</tr>
<tr>
<td>1842</td>
<td>POLYETHYLENE PRESSURE PIPE</td>
<td></td>
<td>This product is not to be used for watermain installations.</td>
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<tr>
<td>1850</td>
<td>FRAMES, GRATES, MAINTENANCE HOLES, COVERS AND WELDED AND RIVETTED STEEL GRATINGS.</td>
<td>1860</td>
<td></td>
</tr>
<tr>
<td>1860</td>
<td>MATERIAL SPECIFICATION FOR GEOTEXTILES</td>
<td></td>
<td></td>
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</tbody>
</table>
DIVISION "A"

SECTION A4

SEWERS

TOWN OF RICHMOND HILL
STANDARD DRAWINGS
STORM AND SANITARY
SEWERS
NOTES
1. DROP PIPE TO BE MINIMUM OF ONE SIZE SMALLER THAN INLET PIPE.
2. DROP PIPE TO BE CROWNS LEVEL WITH OUTLET PIPE AND BENCH TO CROWN.
3. DROP PIPE TO BLEND WITH FLOW.
4. DROP STRUCTURE TO BE ENCASE WITH A MINIMUM OF 150mm OF 20MPa CONCRETE & DOWELLED TO MANHOLE WITH 15mm DOWEL 460mm LONG, EITHER SIDE OF DROP PIPE & AT 305mm C TO C HORIZONTALLY.
5. VELOCITY TO BE CALCULATED ON ACTUAL DEPTH OF FLOW IN MAIN LINE NOT ON PIPE CAPACITY.
6. WHEN USED ON STORM SEWERS OR SANITARY SEWERS 375mm Dia. OR LARGER, A 15mm STOPPER MAYBE INSERTED IN THE INVERT OF THE MAIN LINE AS INDICATED.
7. ADJUSTMENT IN 'D' & 'L' TO BE MADE WITH PLAIN END STRAIGHT PIPE.
8. WHERE 'Y' FITTING JOINS PIPE, A 300mm X 150mm THICK 20MPa COLLAR IS TO BE CONSTRUCTED.
9. ALL CONCRETE IN DROP STRUCTURE TO BE 20MPa AT 28 DAYS.
10. MINIMUM DIMENSIONS BASED ON USE OF STANDARD CONCRETE FITTINGS AS PER LATEST INFORMATION BY SUPPLIERS.
11. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURER'S PERMISSIBLE VARIATIONS - ±50mm PER FITTING.
12. FOR SANITARY SEWER INSTALLATION SEE OPSD 1003.01
CATCH BASIN TOP
BURL-1 McCoy
FOUNDARY CO. LTD.
OR APPROVED EQUAL.

NOTE: ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

COVER DETAIL

FRAME DETAIL

SLOT DETAIL

PIN DETAIL

TOWN OF RICHMOND HILL
ENGINEERING DEPARTMENT

FRAME AND GRATE
FOR REAR YARD
CATCH BASIN ONLY

SCALE: N.T.S. DATE: NOV./86
DRAWN BY: L.B. DWG. NO.: ST-2A
SECTION C-C

NOTES:

1. THIS FRAME AND GRATE IS NOT TO BE USED FOR YARD DRAINAGE ON RESIDENTIAL PROPERTIES.

2. THIS STD. IS NOT TO BE USED FOR BOULEVARD DRAINAGE.

McCoy Foundry Co. Ltd.,
STD. 5-A13 OR APPROVED EQUAL

TOWN OF RICHMOND HILL
ENGINEERING DEPARTMENT

PYRAMID TYPE
C.B. FRAME & COVER

SCALE: N.T.S.  DATE: FEB./80
DRAWN BY: R.M.  DWG. NO.: ST-3A
NOTES:

1. MATERIALS:
Bearing bars - welding quality steel having the minimum tensile strength of SAE - 1015.

2. FINISH:
The grate shall be hot dipped galvanized in accordance with CSA STD G164.

3. TOLERANCES:
Tolerances shall be as shown in the Standard Specifications for Metal Grating and Metal Grating Trusses of the Metal Grating Institute.

4. Standard Metal Grating Institute marking:
RF - 37 - 5

5. WELDING:
End bearing bars to be welded to angle bar along both legs with a 5mm fillet weld. Other bearing bars to be spot welded on each end to the angle bar.

6. FASTENER:
After manufacture, assembly (except bolt) shall be hot dipped galvanized to CSA STD. G164. Bolt - only to receive a liberal coating of white non-staining grease.
LEGEND:

D = Diameter of pipe
W = Minimum width of bedding
D + 760 for D ≤ 1065
1.67 x D for D > 1065 and ≤ 1830
D + 1200 for D > 1830

NOTES:

1. Bedding to be taken to spring line of pipe.
2. Pipe bed to be carefully shaped to receive the lowest segment of pipe to a depth equal to 10% of the pipe diameter.
3. For culverts, the upstream end of the pipe must be bedded in clay & properly compacted to prevent seepage.
4. Bedding material to be granular A, B, C or D. Stone size within 1 ft. of the surface of the pipe shall not exceed 75.
5. Compaction of bedding material - 95%.
NOTES:

1. FOR STD. SIDE INLET CATCH BASIN FRAME & GRATE
   SEE OPSD 400.08
2. USE 30 MPa CONCRETE WITH 5% - 7% AIR
   ENTRAINMENT.
3. LIFT HOLES IF REQ'D SHALL BE GROUTED WITH
   CEMENT MORTAR PRIOR TO PLACING GRANULAR
   BACKFILL.
4. REINFORCING 100 x 100 x 5/5 mm WELDED WIRE MESH.
5. PRE-CAST CATCHBASIN EXCAVATION TO BE BACKFILLED
   WITH GRANULAR 'B'.
6. FOR SUBDRAIN DETAIL SEE ST-23.
7. SUBDRAIN IS TO BE LOCATED A MINIMUM OF 100 mm BELOW
   THE ROAD SUBGRADE.
8. ADJUSTMENT UNITS TO BE MAX. 300 mm

TOWN OF RICHMOND HILL
ENGINEERING DEPARTMENT

PRECAST CATCHBASIN
FOR SIDE INLET FRAME & GRATE

SCALE: N.T.S.    DATE: FEB./80
DRAWN BY: R.M.   DWG #: ST-6A
MTRIC
NOTES:

1. MATERIAL TO BE FIBERGLASS REINFORCED PLASTIC OR 3.6 STAINLESS STEEL UNLESS OTHERWISE DIRECTED.

2. ORIFICE OPENING TO BE DESIGN ON A SITE SPECIFIC BASES.

SECTION A-A

SAND ON OUTSIDE OF FRAME.

419 mm

OPEN

178 mm

356 mm

356 mm x 381 mm x 10 mm THICK PLATE

INLET VIEW

TOWN OF RICHMOND HILL ENGINEERING DEPARTMENT

INLET CONTROL DEVICE (SLIDING TYPE)

SCALE: N.T.S. DATE: OCT. 1988

DRAWN BY: P.G. DWG NO: ST-7 A

4.

3.

2 MISCELLANEOUS NOTES REVISED AUG 94

1 STANDARD NUMBER CHANGED FROM ST-24 AUG 94

NO. REVISION DATE AUTH.
SECTION THROUGH TAPER CONE

SECTION THROUGH FLAT CAP

SECTION THROUGH CATCH BASIN

NOTE:
1. Adjustment unit shall include ladder rungs to maintain the 300mm spacing between rungs as specified.
2. All dimensions are in millimetres unless otherwise shown.

TOWN OF RICHMOND HILL ENGINEERING DEPARTMENT

MANHOLE AND CATCH BASIN PRECAST CONCRETE ADJUSTMENT UNITS

SCALE: N.T.S. DATE: JAN/94

DRAWN BY: M.B. OWS NO.: ST-84
**TOWN OF RICHMOND HILL**  
ENGINEERING AND PUBLIC WORKS DEPARTMENT
STORM SEWER DESIGN SHEET

**Subdivision Name or Location of Project**
19T- __________

**10 MINUTE ENTRY TIME**
Q = AIR/360

<table>
<thead>
<tr>
<th>STREET</th>
<th>FROM N.H.</th>
<th>ELEV.</th>
<th>TO N.H.</th>
<th>ELEV.</th>
<th>AREA</th>
<th>ACCUM</th>
<th>P</th>
<th>Q</th>
<th>PIPES</th>
<th>GRADE</th>
<th>CAPACITY</th>
<th>VELOCITY</th>
<th>LENGTH</th>
<th>SECT. TIME</th>
<th>TOTAL TIME</th>
<th>COMMENTS</th>
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</tbody>
</table>

**RUNOFF COEFFICIENTS (R)**

- 0.30: PARK - OPEN SPACE - CEMETERIES
- 0.45: SINGLE FAMILY RESIDENTIAL
- 0.65: TOWN HOUSES
- 0.70 - 0.75: INDUSTRIAL
- 0.70: HEAVILY DEVELOPED AREAS
- 0.70: APARTMENTS & MEDIUM DENSITY
- 0.70: COMMERCIAL

**TOWN OF RICHMOND HILL**  
ENGINEERING AND PUBLIC WORKS DEPARTMENT
STORM SEWER DESIGN SHEET

<table>
<thead>
<tr>
<th>SHEET:</th>
<th>PREPARED BY:</th>
<th>CHECKED BY:</th>
<th>DATE:</th>
<th>FILE NO:</th>
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</tbody>
</table>

SCALE: NTS  DATE: APRIL, 1998
DRAWN BY: PVS  FILE: ST-9A.WK
DWG. No. ST-9A
NOTE:

1. SANITARY CONNECTION TO BE 125mm THROUGHOUT.

2. SERVICE CONNECTION IS NOT TO EXTEND INTO PRIVATE PROPERTY.

3. STORM CONNECTION TO BE 150mm THROUGHOUT UNLESS OTHERWISE DIRECTED
NOTE: L = 9.0m MAXIMUM.

1. CONNECTIONS TO BE DONE USING PREFABRICATED 'T' FOR NEW SEWERS. CAST IRON SADDLES FOR EXISTING SEWERS.
2. STORM & SANITARY CONNECTIONS TO BE ENGAGED IN 15 MPa CONCRETE AT MAIN SEWERS.
3. SEE OTHER APPLICABLE STANDARDS FOR ACCEPTABLE PIPE MATERIALS.
4. WHEN SERVICE LATERALS ARE INSTALLED AT DIFFERENT ELEVATIONS, GRANULAR 'B' BACKFILL TO BE PROVIDED FROM BOTTOM OF EXCAVATION TO SUPPORT UPPER LATERAL.
5. ALL TEST FITTINGS TO BE MARKED 'STORM' OR 'SANITARY'
6. CONNECTIONS TO EXISTING SEWERS SHALL BE CORED.

TOWN OF RICHMOND HILL
ENGINEERING DEPARTMENT

DUAL SEWER CONNECTIONS

DRAWN BY: K.M. DWG. NO.: S - 2 A

METRIC

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED
NOTE:

1. THIS STRUCTURE IS TO BE USED WHERE IT HAS BEEN SPECIFICALLY APPROVED BY THE TOWN OF RH.
2. BENCHING AS PER STD. S-10.
3. ALL MANHOLE EXCAVATIONS TO BE BACKFILLED WITH GRANULAR B.

MANHOLE IN SECTION
N.T.S.

FASTENER DETAIL
N.T.S.

DROP DETAIL
N.T.S.

ALT. DESIGN

TOWN OF RICHMOND HILL
ENGINEERING DEPARTMENT

SANITARY INSIDE DROP STRUCTURE

SCALE: N.T.S.
DRAFT: NOV. / 82
DRAWN BY: R.M.

DIMENSIONS:

SEWER

SET TOP OF DROP PIPE BELL TO SERVE AS WEIR
225 mm MAX. (TO FIRST STRAP)
ALUMINIUM STRAP

MANHOLE WALL
P.V.C. PIPE
(TO BE ONE SIZE LARGER THAN MAIN)
ALUMINIUM STRAP (AT ELBOW)

90° ELBOW BELL-SPIGOT TYPE

REBENCING AS DIRECTED

10 mm Ø ALUMINIUM STRAP ALLOY 6061-T6
19 mm REDHEAD FASTENER OR EQUAL

DRAWN BY: R.M.

S-3A
# TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPARTMENT
SANITARY SEWER DESIGN SHEET

Subdivision Name or Location of Project: 19T-

<table>
<thead>
<tr>
<th>STREET</th>
<th>FROM M.H.</th>
<th>TO M.H.</th>
<th>SINGLE FAMILY</th>
<th>COMMERCIAL OR MULTIPLE FAMILY</th>
<th>ACREAGE (Ha)</th>
<th>APARTMENTS</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>AREA (HA)</th>
<th>CUMULATIVE</th>
<th>MAXIMUM</th>
<th>CAPACITY</th>
<th>SEWER LENGTH</th>
<th>SEWER V.F.</th>
<th>SEWER V</th>
<th>VV</th>
<th>APURTENANCES</th>
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<tbody>
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<tr>
<th>STREET</th>
<th>FROM M.H.</th>
<th>TO M.H.</th>
<th>SINGLE FAMILY</th>
<th>COMMERCIAL OR MULTIPLE FAMILY</th>
<th>APARTMENTS</th>
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<tbody>
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</tbody>
</table>

**DESIGN COEFFICIENTS IN cm/m**

- 0.0015 - SINGLE FAMILY
- 0.0005 - APARTMENTS 148 UNITS/ha
- 0.0005 - APARTMENTS 247 UNITS/ha
- 0.0005 - APARTMENTS 296 UNITS/ha

---

**TOWN OF RICHMOND HILL**
ENGINEERING AND PUBLIC WORKS DEPARTMENT

**SANITARY SEWER DESIGN SHEET**

<table>
<thead>
<tr>
<th>No</th>
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<th>AUTH</th>
<th>DRAWN BY</th>
<th>FILE</th>
<th>DWG. No.</th>
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<tr>
<td>1</td>
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<td>05/08</td>
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<td>PVG</td>
<td>5-A-A</td>
<td>5-4-A</td>
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</table>
DIVISION "A"

SECTION A5

SEWERS

ADOPTED ONTARIO PROVINCIAL STANDARD DRAWINGS
DIVISION "A" SECTION A5.1  
(OPSD DIVISION 400)  
FRAMES AND GRATES

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN OF RICHMOND HILLS STD</th>
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</thead>
<tbody>
<tr>
<td>400.01</td>
<td>CATCHBASIN, CAST IRON, FRAME AND DISHED, SQUARE GRATE</td>
<td>1. Site specific approval for this frame and grate required.</td>
<td>ST-25</td>
</tr>
<tr>
<td>400.02</td>
<td>CATCHBASIN, CAST IRON, FRAME AND FLAT SQUARE GRATE</td>
<td>1. Site specific approval for this frame and grate required.</td>
<td>ST-13</td>
</tr>
<tr>
<td>400.08</td>
<td>CATCHBASIN, CAST IRON, SIDE INLET FRAME</td>
<td>1. Site specific approval for this frame and grate required.</td>
<td>ST-22</td>
</tr>
<tr>
<td>400.09</td>
<td>CATCHBASIN, CAST IRON, CURB INLET OVERFLOW PLATE</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>400.11</td>
<td>CATCHBASIN, CAST IRON, AND FLAT GRATE (PERFORATED) OVERFLOW TYPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>401.01</td>
<td>MAINTENANCE HOLE, CAST IRON, COVER AND SQUARE FRAME</td>
<td>1. Type &quot;A&quot; cover to be stamped &quot;Sanitary Sewer&quot; or &quot;FDC Sewer&quot;.</td>
<td>ST-20, S-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Type &quot;B&quot; cover to be used for Storm Sewer installations only.</td>
<td></td>
</tr>
<tr>
<td>401.03</td>
<td>MAINTENANCE HOLE, CAST IRON, WATERTIGHT COVER AND FRAME</td>
<td>1. To be used for all Storm and Sanitary Installations within Easements.</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Covers shall be clearly stamped as to type of sewer installation.</td>
<td></td>
</tr>
</tbody>
</table>
## DIVISION "A" SECTION A5.1  
(OPSD DIVISION 400)  
FRAMES AND GRATES

<table>
<thead>
<tr>
<th>OPSD</th>
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<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN OF RICHMOND HILL STD</th>
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<tr>
<td>402.01</td>
<td>CAST IRON CIRCULAR PLUG AND SQUARE FRAME FOR VALVE CHAMBERS</td>
<td>W-1</td>
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<tr>
<td>402.02</td>
<td>CAST IRON, RAISED FRAME WITH CIRCULAR COVER AND PLUG FOR VALVE CHAMBER</td>
<td>N/A</td>
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<tr>
<td>402.03</td>
<td>THREE PIECE VALVE AND METER CHAMBER COVER</td>
<td>N/A</td>
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<tr>
<td>404.020</td>
<td>SAFETY PLATFORMS ALUMINUM FOR CIRCULAR MAINTENANCE HOLES</td>
<td>1. Type &quot;B&quot; installations only are approved by Town.</td>
<td>ST-8</td>
</tr>
</tbody>
</table>
**DIVISION "A" SECTION A5.2**  
**(OPSD DIVISION 700)**  
**CATCHBASINS AND MAINTENANCE HOLES**

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
</tr>
</thead>
</table>
| 701.010 | PRE-CAST MAINTENANCE HOLE 1200 mm DIAMETER | 1. Backfill around manhole to be Granular "B".  
2. Adjustment units range to be 200mm minimum to 300mm maximum.  
3. For flexible pipe type D or E, pipe support at manhole as per OPSD 1001.01 is to be used.  
4. Benching, see OPSD 701.021; storm sewer benching to be to obvert of pipe.  
5. For sanitary sewers greater than 300mm dia. benching shall be to obvert of the pipe. | S-1 |
| 701.011 | PRECAST MAINTENANCE HOLE 1500mm DIAMETER | 1. Backfill around manhole to be Granular "B".  
2. Adjustment units range to be 200mm minimum to 300mm maximum.  
3. Benching, see OPSD 701.021; storm sewer benching to be to obvert of pipe.  
4. For sanitary sewers greater than 300mm dia. benching shall be extended to obvert of the pipe. | S-13 |
## DIVISION "A" SECTION A5.2  
(OPSD DIVISION 700)  
CATCHBASINS AND MAINTENANCE HOLES

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN OF RICHMOND HILL STD.</th>
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<tbody>
<tr>
<td>701.012</td>
<td>PRE-CAST MAINTENANCE HOLE 1800 mm DIAMETER</td>
<td>1. Backfill around maintenance hole to be Granular &quot;B&quot;.</td>
<td>S-14</td>
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<tr>
<td></td>
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<td>2. Adjustment units range to be 200mm minimum to 300mm maximum.</td>
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<td>3. For flexible pipe type D or E, pipe support at maintenance hole as per OPSD 1001.01 is to be used.</td>
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<td>4. Benching, see OPSD 701.021; storm sewer benching to be to obvert of pipe.</td>
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<tr>
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<td></td>
<td>5. For sanitary sewers greater than 300mm dia. benching shall be extended to obvert of the pipe.</td>
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</tbody>
</table>

| 701.013| PRE-CAST MAINTENANCE HOLE 2400 mm DIAMETER | 1. Backfill around maintenance hole to be Granular "B". | N/A                                 |
|        |                                          | 2. Adjustment units range to be 200mm minimum to 300mm maximum. |                                     |
|        |                                          | 3. For flexible pipe type D or E, pipe support at maintenance hole as per OPSD 1001.01 is to be used. |                                     |
|        |                                          | 4. Benching, see OPSD 701.021; storm sewer benching to be to obvert of pipe |                                     |
|        |                                          | 5. For sanitary sewers greater than 300mm dia. benching shall be extended to obvert of the pipe. |                                     |
### DIVISION "A" SECTION A5.2
(OPSĐ DIVISION 700)
CATCHBASINS AND MAINTENANCE HOLES

<table>
<thead>
<tr>
<th>OPSĐ</th>
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<th>REPLACES TOWN OF RICHMOND HILL STD.</th>
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<tr>
<td>701.021</td>
<td>MAINTENANCE HOLE BENCHING DETAIL</td>
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<tr>
<td></td>
<td>1. Storm sewer maintenance holes shall be benched to crown of pipe.</td>
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<tr>
<td></td>
<td>2. Sanitary sewer maintenance holes shall be benched to springline of pipe for 300mm dia. and smaller and to obvert of pipe for 300mm dia. and larger.</td>
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</tr>
<tr>
<td>701.030</td>
<td>PRECAST CONCRETE MAINTENANCE HOLE COMPONENTS</td>
<td>1. See 701.010</td>
<td>S-1</td>
</tr>
<tr>
<td></td>
<td>1200mm DIAMETER DEPTH TO 10.0m MAXIMUM</td>
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<tr>
<td>701.040</td>
<td>PRECAST CONCRETE MAINTENANCE HOLE COMPONENTS</td>
<td>1. See 701.011</td>
<td>S-13</td>
</tr>
<tr>
<td></td>
<td>1500mm DIAMETER DEPTH TO 10.0m MAXIMUM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Minimum 1.80m of head-room above spring line of sewer is required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>701.050</td>
<td>PRECAST CONCRETE MAINTENANCE HOLE COMPONENTS</td>
<td>1. See 701.012</td>
<td>S-14</td>
</tr>
<tr>
<td></td>
<td>1800mm DIAMETER DEPTH TO 10.0m MAXIMUM</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Minimum 1.80m of head-room above spring line of sewer is required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>701.060</td>
<td>PRECAST CONCRETE MAINTENANCE HOLE COMPONENTS</td>
<td>1. See 701.013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2400mm DIAMETER DEPTH TO 10.0m MAXIMUM</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2. Minimum 1.80m of head-room above spring line of sewer is required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>702.040</td>
<td>PRECAST CONCRETE DITCH INLET MAINTENANCE HOLE (TYPE A) 1200mm x 1200mm DIAMETER DEPTH TO 3.6m MAXIMUM</td>
<td>1. Cover to obvert of CB lead to be 760mm minimum.</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>2. Granular &quot;B&quot; backfill required around structure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. OPSĐ 403.01 Grating is not approved for use in the Town. Use Town Std. ST-4A.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## DIVISION "A" SECTION A5.2
(OPS D DIVISION 700)
CATCHBASINS AND MAINTENANCE HOLES

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<tbody>
<tr>
<td>703.010</td>
<td>PRECAST CONCRETE SINGLE AND TWIN INLET FLAT CAP 1500mm DIAMETER</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>703.020</td>
<td>PRECAST CONCRETE SINGLE INLET FLAT CAP 1800mm DIAMETER</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>703.030</td>
<td>PRECAST CONCRETE SINGLE AND TWIN INLET FLAT CAP 2400mm DIAMETER</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>705.010</td>
<td>PRECAST CONCRETE CATCHBASIN 600mm x</td>
<td>1. Min. 915mm cover (Type &quot;A&quot;) and min. 760mm 600mm cover (Type &quot;B&quot;) to obvert of catchbasin lead required.</td>
<td>ST-7, ST-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Backfill to be Granular &quot;B&quot; around structure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Weep holes are not be provided.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Perforated subdrains to be continuous from CB to CB (Type &quot;A&quot; only) and shall be 150mm diameter wrapped with filter fabric.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. OPSD 403.01 Grating is not approved for use in the Town. Town Std. ST-4A shall be used instead.</td>
<td></td>
</tr>
<tr>
<td>705.020</td>
<td>PRECAST CONCRETE TWIN INLET CATCHBASIN 600MM X 1450MM</td>
<td>1. Min. 915mm cover to</td>
<td>ST-9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Backfill to be Granular &quot;B&quot;.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Min. 250mm diameter lead required.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>4. Weep holes are not to be provided.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Perforated sub-drain to be continuous from CB to CB (Type &quot;A&quot; only) and shall be 150mm dia. wrapped with filter fabric.</td>
<td></td>
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</table>
## DIVISION "A" SECTION A5.2  
(OPSD DIVISION 700)  
CATCHBASINS AND MAINTENANCE HOLES

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<tbody>
<tr>
<td>705.030</td>
<td>PRECAST CONCRETE DITCH INLET 600mm x 600mm</td>
<td>1. Granular &quot;B&quot; backfill required around structure.</td>
<td>N/A</td>
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<tr>
<td></td>
<td></td>
<td>2. Min. catchbasin lead size is 250mm dia.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Min. 760mm cover to obvert of catchbasin lead is required.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. OPSD 403.01 grating is not approved for use in the Town. Town Std. ST-4A shall be used instead.</td>
<td></td>
</tr>
<tr>
<td>705.040</td>
<td>PRECAST CONCRETE DITCH INLETS 600mm x 1200mm</td>
<td>1. Min. 760mm cover to obvert of catchbasin lead required.</td>
<td>ST-10</td>
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<tr>
<td></td>
<td></td>
<td>2. Min. 250mm dia. lead required.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Backfill to be Granular &quot;B&quot; around structure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. OPSD 403.01 grating is not approved in the Town. Town Std. ST-4A is to be used instead.</td>
<td></td>
</tr>
<tr>
<td>706.010</td>
<td>PRECAST CONCRETE DITCH INLETS 600mm x 12mm WITH 1500mm DIAMETER FLAT CAP</td>
<td>1. OPSD 403.01 grating is not approved for use in the Town. Town Std. ST-4A shall be used instead.</td>
<td>N/A</td>
</tr>
<tr>
<td>706.020</td>
<td>PRECAST CONCRETE DITCH INLETS 600mm x 12mm WITH 1800mm DIAMETER FLAT CAP</td>
<td>1. OPSD 403.01 grating is not approved for use in the Town. Town Std. ST-4A shall be used instead.</td>
<td>N/A</td>
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### DIVISION "A" SECTION A5.2
(OPS D IVISION 700)
CATCHBASINS AND MAINTENANCE HOLES

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<td>706.030</td>
<td>PRECAST CONCRETE DITCH INLETS 600mm x 1200mm WITH 2400mm DIAMETER FLAT FLAT CAP</td>
<td>1. OPSD 403.01 grating is not approved for use in the Town. Town Std. ST-4A shall be used instead.</td>
<td>N/A</td>
</tr>
<tr>
<td>707.010</td>
<td>PRECAST CONCRETE MAINTENANCE HOLE TEE (DEPTH 10.0m MAXIMUM)</td>
<td>1. Granular &quot;B&quot; backfill required around structure.</td>
<td>N/A</td>
</tr>
<tr>
<td>708.01</td>
<td>CATCHBASIN CONNECTION RIGID PIPE SEWER</td>
<td>1. Mortar shall be 1:3 mortar mix</td>
<td>ST-1</td>
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<tr>
<td></td>
<td></td>
<td>2. Main sewers &gt; 450mm diameter require approved saddle or &quot;Cut-in&quot; tee using Kor-N-Tee method or approved equal.</td>
<td></td>
</tr>
<tr>
<td>708.02</td>
<td>SUPPORT FOR RIGID PIPE AT CATCHBASIN OR MANHOLE</td>
<td>1. Class &quot;A&quot; bedding not required when flexible pipe is used.</td>
<td>N/A</td>
</tr>
<tr>
<td>708.03</td>
<td>CATCHBASIN CONNECTION - FLEXIBLE PIPE SEWER</td>
<td>1. Class &quot;A&quot; bedding not required.</td>
<td>ST-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Main sewers &gt; 450mm diameter require approved saddle or &quot;Cut-in&quot; tee using Kor-N-Tee method or approved equal.</td>
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(OPSID DIVISION 800)
CULVERTS AND DRAINS

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<tbody>
<tr>
<td>802.010</td>
<td>FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION</td>
<td>1. Embedment material shall be Granular &quot;A&quot; conforming to OPSS 1010 unless otherwise approved by the Town.</td>
<td>S-19 W-12</td>
</tr>
<tr>
<td>802.013</td>
<td>FLEXIBLE PIPE EMBEDMENT AND BACKFILL ROCK EXCAVATION</td>
<td>1. Embedment material shall beGranular &quot;A&quot; conforming to OPSS 1010 unless otherwise approved by the Town.</td>
<td>S-19 W-12</td>
</tr>
<tr>
<td>802.014</td>
<td>FLEXIBLE PIPE EMBEDMENT IN EMBANKMENT ORIGINAL GROUND: EARTH OF ROCK</td>
<td>1. Embedment material shall be Granular &quot;A&quot; conforming to OPSS 1010 unless otherwise approved by the Town.</td>
<td>S-19 W-12</td>
</tr>
<tr>
<td>802.030</td>
<td>RIGID PIPE BEDDING COVER AND BACKFILL TYPE 1 OR 2 SOIL - EARTH EXCAVATION</td>
<td>1. Minimum bedding shall be Class &quot;B&quot; Granular &quot;A&quot; conforming to OPSS 1010 unless otherwise approved by the Town.</td>
<td>S-11 W-13</td>
</tr>
<tr>
<td>802.031</td>
<td>RIGID PIPE BEDDING COVER AND BACKFILL TYPE 3 SOIL - EARTH EXCAVATION</td>
<td>1. Minimum bedding shall be Class &quot;B&quot; Granular &quot;A&quot; conforming to OPSS 1010 unless otherwise approved by the Town.</td>
<td>S-11 W-13</td>
</tr>
<tr>
<td>802.032</td>
<td>RIGID PIPE BEDDING COVER AND BACKFILL TYPE 4 SOIL - EARTH EXCAVATION</td>
<td>1. Minimum bedding shall be Class &quot;B&quot; Granular &quot;A&quot; conforming to OPSS 1010 unless otherwise approved by the Town.</td>
<td>S-11 W-13</td>
</tr>
<tr>
<td>802.033</td>
<td>RIGID PIPE BEDDING COVER AND BACKFILL ROCK EXCAVATION</td>
<td>1. Minimum bedding shall be Class &quot;B&quot; Granular &quot;A&quot; conforming to OPSS 1010 unless otherwise approved by the Town.</td>
<td>S-11 W-13</td>
</tr>
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### DIVISION "A" SECTION A5.3
(OPSD DIVISION 800)
CULVERTS AND DRAINS

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<tr>
<td>803.01</td>
<td>GRANULAR BACKFILL FOR NON-RIGID FRAME OPEN OR BOX CONCRETE CULVERT</td>
<td>N/A</td>
</tr>
<tr>
<td>803.02</td>
<td>GRANULAR BACKFILL FOR RIGID FRAME BOX AND OPEN CONCRETE CULVERT</td>
<td>N/A</td>
</tr>
<tr>
<td>803.030</td>
<td>FROST TREATMENT - PIPE CULVERTS FROST PENETRATION LINE BELOW BEDDING GRADE</td>
<td>1. Plastic pipe shall not be used for culvert installations.</td>
</tr>
<tr>
<td>803.031</td>
<td>FROST TREATMENT - PIPE CULVERTS FROST PENETRATION LINE BETWEEN TOP OF PIPE AND BEDDING GRADE.</td>
<td>1. Plastic pipe shall not be used for culvert installations.</td>
</tr>
<tr>
<td>804.01</td>
<td>CONCRETE HEADWALL FOR SEWER OR CULVERT PIPE CSP 900mm DIA. AND GREATER</td>
<td>1. Where the finished grade difference between top of headwall and pipe invert ( \geq 1.20 \text{m} ), a fence or safety railing shall be installed on the headwall.</td>
</tr>
<tr>
<td>OPSD</td>
<td>DESCRIPTION</td>
<td>ADDITION OR REVISION</td>
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</tr>
<tr>
<td>804.02</td>
<td>CONCRETE HEADWALL FOR SEWER OR CULVERT PIPE 900mm DIAMETER AND GREATER</td>
<td>1. Where the finished grade difference between top of headwall and pipe invert ≥ 1.20m, a fence or safety railing shall be installed on the headwall.</td>
</tr>
<tr>
<td>804.030</td>
<td>CONCRETE HEADWALL FOR SEWER OR CULVERT PIPE LESS THAN 900mm DIAMETER</td>
<td>1. Where the finished grade difference between top of headwall and pipe invert ≥ 1.20m, a fence or safety railing shall be installed on the headwall.</td>
</tr>
<tr>
<td>804.04</td>
<td>CONCRETE HEADWALL FOR SEWER OR CULVERT PIPE</td>
<td>1. Where the finished grade difference between top of headwall and pipe invert ≥ 1.20m, a fence or safety railing shall be installed on the headwall.</td>
</tr>
<tr>
<td>804.05</td>
<td>GRATING FOR CONCRETE ENDWALL</td>
<td>1. Type &quot;C&quot; grating shall not be used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. All components of gratings shall be hot-dip galvanized conforming to CAN2-138.1-M, CAN2-138.2-M and CAN2-138.4-M</td>
</tr>
<tr>
<td>805.01</td>
<td>SPECIFIED MINIMUM THICKNESS CORRUGATED STEEL PIPE AND STRUCTURAL PLATE CORRUGATED STEEL PIPE</td>
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### DIVISION "A" SECTION A5.3
(OPS D DIVISION 800)
CULVERTS AND DRAINS

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<tr>
<td>805.02</td>
<td>SPECIFIED MINIMUM THICKNESS CORRUGATED STEEL PIPE ARCH AND STRUCTURAL PLATE CORRUGATED PIPE ARCH</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>806.06</td>
<td>MAXIMUM COVER TABLE PVC PIPE FOR DIFFERENT STANDARD DIMENSION RATIOS</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>807.01</td>
<td>SPECIFIED MINIMUM CLASS OF PIPE - REINFORCED CONCRETE PIPE CONFINED TRENCH CLASS: 50-D; 65-D; 100-D; 140-D</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>808.010</td>
<td>PIPE PROTECTION AGAINST HEAVY CONSTRUCTION EQUIPMENT</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>810.01</td>
<td>RIP-RAP TREATMENT FOR SEWER AND CULVERT OUTLETS</td>
<td>N/A</td>
<td></td>
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<tr>
<td>810.02</td>
<td>RIP-RAP TREATMENT FOR DITCH INLETS</td>
<td>N/A</td>
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(OPSĐ DIVISION 1000)  
SANITARY SEWERS AND MANHOLES

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<tr>
<td>1001.02</td>
<td>PRECAST MAINTENANCE HOLE 1500mm - 1800mm Dia.</td>
<td>1. Backfill around manhole to be Granular &quot;B&quot;</td>
<td>S-13, S-14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Adjustment units range to be 200mm minimum to 300mm maximum.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. For flexible pipe type D or E, pipe support at manhole as per OPSĐ 1001.01 is to be used.</td>
<td></td>
</tr>
<tr>
<td>1003.01</td>
<td>MAINTENANCE HOLE DROP STRUCTURE TEE</td>
<td>1. OPSĐ 1003.01 to be used for sanitary sewer installations only.</td>
<td>ST-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Town Std. ST-1A to be used for storm sewer installations.</td>
<td></td>
</tr>
<tr>
<td>OPSD</td>
<td>DESCRIPTION</td>
<td>ADDITION OR REVISION</td>
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<tr>
<td>1006.01</td>
<td>SEWER SERVICE CONNECTIONS - FOR RIGID PIPE</td>
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</tr>
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</table>

1. Cast iron test fittings (Crowle or approved equal) shall be installed at streetline for all sewer connections and clearly marked "Storm" or "Sanitary". Fitting shall be as follows:

   - Sanitary - 125 x 100mm
   - Storm    - 150 x 150mm

2. For vertical riser installations bedding and cover shall be HL8 graded limestone.

3. Maximum connection angle is 45° for both standard and vertical riser connections.

4. For sewer invert depths exceeding 4.5m, risers shall be used. Risers shall not exceed 3.0m in height without prior approval of the Town.

5. Bedding shall be as follows:

   - Storm - OPSD 802.03 Class "B"
   - Sanitary - OPSD 1005.01 Class "B"

unless otherwise directed by the Engineer.
### DIVISION "A" SECTION A5.4
(OPS DIVISION 1000)
SANITARY SEWERS AND MANHOLES

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</table>
| 1006.02 | SEWER SERVICE CONNECTIONS - FOR FLEXIBLE PIPE | 1. Cast iron test fittings (Crowle or approved equal) shall be installed at streetline for all sewer connections and clearly marked "Storm" or "Sanitary" fitting shall be as follows:  
- Sanitary - 125 x 100mm  
- Storm - 150 x 150mm | S-9, S-17, ST-2 |
|       |                                    | 2. For vertical riser installations bedding and cover shall be HL8 graded limestone. | |
|       |                                    | 3. Maximum connection angle is 45° for both standard and vertical riser connections. | |
|       |                                    | 4. For sewer invert depths exceeding 4.5m, risers shall be used. Risers shall not exceed 1.0m in height for flexible pipe installations without prior approval by the Town. | |
|       |                                    | 5. Bedding shall be as per OPSD 1005.02. | |
|       |                                    | 6. Dual sanitary sewer connections are not permitted. | |
| 1007.01 | UTILITY SUPPORTS - UP TO 300mm DIAMETER | N/A | |
DIVISION "B"

WATERMAIN
## DIVISION "B"

### WATERMAINS

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DIVISION "B"

SECTION B1

WATERMAIN

DESIGN CRITERIA
1. **GENERAL**

The water distribution system shall be designed as a network system to meet the water demand for each area under consideration. Long dead-end mains and single supply systems are to be avoided.

The system analysis is to be conducted, by the owner, to ensure that the existing and proposed water mains are of sufficient size to service the proposed subdivision and possible future development.

Pressure district boundaries, as established by the Region of York, shall be used as service area boundaries. The use of pumping stations and pressure reducing valves shall be limited to temporary installations, unless required for the Region’s scheme.

2. **DESIGN - WATER DEMAND**

All water supply systems are to be designed to satisfy the following demand conditions:


b) The Peak Hour demand.

c) The Peak Daily demand.

1.1 **Residential Consumption**

The following minimum values are to be used when calculating water demands for residential areas:

a) Average Daily Demand - 365 litres/capita/day

b) Peak Daily Demand - 545 litres/capita/day

c) Peak Hourly Demand - 910 litres/capita/day
2.2 Fire Flow Demand

The following flows are to be used when determining Fire Flow requirements:

<table>
<thead>
<tr>
<th>Residential</th>
<th>Litres/Second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single family, 30 metres separation</td>
<td>36</td>
</tr>
<tr>
<td>Single family, 15 metres separation</td>
<td>48</td>
</tr>
<tr>
<td>Single family, 6 metres separation</td>
<td>60</td>
</tr>
<tr>
<td>Single family or semi-detached, 3 metres separation</td>
<td>64</td>
</tr>
<tr>
<td>Townhouses, maximum 2-1/2 storey</td>
<td>68</td>
</tr>
<tr>
<td>Apartments, 3 storeys or with closed shafts, no exposure</td>
<td>72</td>
</tr>
<tr>
<td>Institutional, no exposure</td>
<td>120 - 190</td>
</tr>
<tr>
<td>Industrial, no exposure</td>
<td>72 - 190</td>
</tr>
<tr>
<td>Commercial, no exposure</td>
<td>185 - 480</td>
</tr>
</tbody>
</table>

2.3 Commercial and Institutional Flows

The water demands for commercial and institutional establishments may vary greatly, depending on the type of facilities present, and the type of population using the facilities. The following flows should be used in determining water consumption:

<table>
<thead>
<tr>
<th>Average Daily Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shopping Centres</td>
</tr>
<tr>
<td>Hospitals</td>
</tr>
<tr>
<td>Schools</td>
</tr>
</tbody>
</table>

2.4 Industrial Water Demands

Industrial water demands are to be expressed in terms of water requirements per gross hectare of industrial development. Such demands are dependent upon the type of industry in the area being considered. The average flows to be used are as follows:

<table>
<thead>
<tr>
<th>Average Daily Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Industry</td>
</tr>
<tr>
<td>Heavy Industry</td>
</tr>
</tbody>
</table>
3.1 **Selection of Watermain Sizes**

The Hazen-Williams formula shall be used for computing the size of the watermains. The formula is:

\[ V = 0.85 \ C r^{0.63} S^{0.54} \]

where

- \( V \) = velocity in the pipe (m/s)
- \( C \) = constant (pipe roughness)
- \( r \) = hydraulic radius of pipe (m)
- \( S \) = hydraulic gradient (m/m)

For new watermains, the following values of “C” shall be used:

<table>
<thead>
<tr>
<th>Diameter</th>
<th>“C”</th>
</tr>
</thead>
<tbody>
<tr>
<td>150mm</td>
<td>100</td>
</tr>
<tr>
<td>200 &amp; 250mm</td>
<td>110</td>
</tr>
<tr>
<td>300 to 600mm</td>
<td>120</td>
</tr>
<tr>
<td>over 600mm</td>
<td>130</td>
</tr>
</tbody>
</table>

The above values are to be used for all pipe materials (as indicated in the M.O.E. Guidelines for the Design of Water Distribution Systems).

All watermains in industrial areas are to be a minimum of 300mm in diameter and 150mm in residential areas except on cul-de-sacs where 50mm “K” type soft copper watermains will be permitted at the bulb.

The following minimum and maximum pressures shall apply to all watermains.

a) Minimum pressure during the peak hourly demand - 275 Kpa

b) Maximum pressure during the minimum hourly demand 690 Kpa

c) Minimum Fire Flow pressure when the system is tested for Fire Flow during peak daily flow - 275 KPa.

3.2 **Locations**

Watermains shall be offset as shown on the “Standard Drawing” and shall generally be located on the north and east sides.
3.3 **Depth**

Minimum cover over all watermains to be 1.7m from the obvert to the finished grade over the watermain.

At Watercourses, Creeks, Culverts, etc., 1.2m cover from the obvert to the finish grade will be permitted providing adequate frost protection is provided with 50mm high density SM Styro-foam insulation.

3.4 **Utility Crossings**

Where watermains cross over or under other utilities, 300mm minimum clearance respectively shall be provided. Where watermains cross under sewers, 500mm separation shall be required.

4. **LINE VALVE**

4.1 **Number, Location and Spacing**

Three valves are required on a cross-intersection and two valves are required on a tee intersection as M.O.E. minimum Guidelines with the valves being located on a line at a point where the streetline projected intersects the watermain.

Maximum spacing of line valves shall be 300m. Line valves shall be located such, that no more than 100 serviced residential units can be shut-off from another block and isolated from the system.

4.2 **Valve Boxes and Chambers**

All valves shall be installed in valve chambers. The top of chambers shall be set flush with finished grade.

4.3 **Water Services**

Water service connections for single and semi-detached dwellings will be individual service connections and will be constructed to the current requirements and standards of the Town of Richmond Hill, as per Town Standard M-2A.

4.4 **Curb Stop Valve Boxes**

Curb stop valve boxes to be provided for each dwelling and will not be permitted within driveways unless specifically approved by the Commissioner.
5. **FIRE HYDRANTS**

5.1 **Location and Spacing**

Fire hydrants shall be installed in the location as detailed on the Town Standard drawings for typical street cross sections.

The maximum acceptable spacing in a residential area shall be 150m.

The maximum acceptable spacing in non-residential areas shall be 75m.
Note to users: The Town of Richmond Hill is currently revising this section of its document to reflect conformity with the OPSS 701 revisions dated 11/2009 as issued 11/2010. In the interim all references to OPSS 701 shall be deemed to mean the appropriate corresponding OPSS 441 specification.
## DIVISION "B" SECTION B2.1
### (OPSS DIVISION 7)
### CONSTRUCTION SPECIFICATIONS - WATERMAINS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>701</td>
<td>CONSTRUCTION SPECIFICATION FOR WATERMAIN CONSTRUCTION BY OPEN CUT METHOD</td>
<td>701.05.02</td>
<td>Asbestos Cement Pipe - is not an accepted material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.05.05</td>
<td>Polyvinyl Chloride (P.V.C) pipe may be used for watermains from 150mm to 300mm diameter only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.05.06</td>
<td>Polyethylene Pipe - is not an accepted material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.05.07</td>
<td>Polybutylene Pipe - is not an accepted material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.05.08</td>
<td>Steel Pipe - is not an accepted material</td>
</tr>
</tbody>
</table>
|      |             | 701.05.10.01 | 1. All valves installed within chambers shall be flanged joint type.  
2. Direct bury valve installations can be completed utilizing mechanical type joints.  
3. All valves shall open counter clockwise |
|      |             | 701.05.10.02 | 1. All reference to AWWA C500 shall be deleted  
2. Only resilient seat valves are permitted  
3. Item 1 solid wedge type double faced and seated valve is not accepted  
4. Item 2 double disc type double face and seated valve is not accepted |
DIVISION "B" SECTION B2.1  
(OPSS DIVISION 7) 
CONSTRUCTION SPECIFICATIONS - WATERMAINS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>701</td>
<td>CONSTRUCTION SPECIFICATION (Continued)</td>
<td>701.05.11</td>
<td>Pumper port with Storz connection to be provided on all hydrants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.05.12.02</td>
<td>1. Service connections to watermains ≤ 250mm shall be fitted with double bolt stainless steel saddles - see OPSD 1104.01 and 1104.02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.05.14</td>
<td>Pipe bedding material shall be Granular “A”</td>
</tr>
</tbody>
</table>
|      |             | 701.05.15 | Pipe cover material shall be as follows:  
- flexible - as per OPSD 1102.02  
- rigid - approved select native material |
|      |             | 701.07.01.12 | Dead-end mains with hydrants to have hydrant nozzles installed perpendicular to the roadway |
|      |             | 701.07.04 | Saddle bolts to be torqued to manufactures specifications. |
|      |             | 701.07.05 | Revise Contract Administrator to:  
- “the direct supervision of the authority having ownership of same” |
|      |             | 701.07.06 | Revise Contract Administrator to:  
- “the direct supervision of the authority having ownership of same” |
### DIVISION "B" SECTION B2.1
(OPERATIONAL SPECIFICATIONS, SUBDIVISION 7)
CONSTRUCTION SPECIFICATIONS - WATERMAINS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
</tr>
</thead>
</table>
| 701 | CONSTRUCTION SPECIFICATION (Continued) | 701.07.08.01 | Revise Contract Administrator to:  
- “the direct supervision of the authority having ownership of same” |

Foam swabbing shall only be performed by an experienced pipeline cleaning company to the satisfaction the municipality.

| 701.07.09 | Foam swabbing will be the responsibility of the contractor and shall be performed on all new watermains |

A sufficient quantity of dense foam swabs by at least 50mm greater than the inside diameter of the largest size pipe being cleaned shall be passed through the entire length of the completed pipeline at a rate not exceeding 0.45m per second and shall be run through until debris or contaminants are removed. One swab shall exit out each fire hydrant.

The foam swabs used are to be a minimum medium density in the range of 7.32 kilograms per square metre.
DIVISION "B" SECTION B2.1  
(OPSS DIVISION 7)  
CONSTRUCTION SPECIFICATIONS - WATERMAINS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>701.09.01.04</td>
<td>Add “or as directed in the Contract”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.09.02.05</td>
<td>- Add “or as directed in the Contract”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.09.02.05</td>
<td>- Add “or as directed in the Contract”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>701.10.01</td>
<td>- Add “or as indicated otherwise in the Contract”</td>
</tr>
</tbody>
</table>
DIVISION "B"

SECTION B3

WATERMAIN

TOWN OF RICHMOND HILL
STANDARD DRAWINGS
WATERMAINS
NOTES:
1. VALVE CHAMBER EXCAVATION TO BE BACKFILLED WITH GRANULAR 'B'.
2. CHAMBER NOT TO BE LOCATED IN DRIVEWAY.
3. CAP TO BE DRILLED FOR SLIDING VALVE BOX TO BE SET AT GROUND ELEVATION.
4. VALVE CHAMBER LOCATED ON PROPERTY LINE.
5. ALL PIPES PASSING THROUGH PRE-CAST CHAMBER WALLS TO BE SEALED WITH EMBECO NON SHRINKABLE MORTAR OR EQUAL.
6. ALL VALVES 150mm AND LARGER SHALL BE INSTALLED IN VALVE CHAMBERS. THE TOP OF VALVE BOXES, CHAMBERS SHALL BE SET FLUSH WITH FINISHED GRASS.
7. ALL VALVES TO BE FLANGE TYPE WITH UNI-FLANGE SERIES 900 ADAPTER FLANGES.
8. FITTINGS SHALL BE CATHODICALLY PROTECTED AS PER TOWN STANDARDS AND OPSD 1109.011.
9. SUPP SHALL BE PLACED ON OPPOSITE SIDE OF CHAMBER AND POSITIONED TO AVOID ASSOCIATED APPURTENANCES.
10. TEMPORARY BLOW-OFF REQUIRED OUTSIDE CHAMBER WITHIN PRIVATE PROPERTY.
11. EXTEND TRACER WIRE THROUGH STEPS TO TOP OF CHAMBER AND FASTEN SECURELY AS PER TOWN SPECIFICATIONS.
NOTES:
(1) VALVE BOX TO BE ADEQUATELY BRACED WHILE BACKFILLING AND MUST REMAIN PLUMB.
(2) VALVE BOX EXTENSION TO BE USED ONLY IF REQUIRED.
(3) VALVE WILL BE OF THE APPROVED TYPE WITH NON-RISING STEM & A 50mm METRO TYPE OPERATING NUT OPENING COUNTERCLOCKWISE.

TOWN OF RICHMOND HILL
ENGINEERING DEPARTMENT

VALVE BOX INSTALLATION
100 TO 300 DIA. WATERMAINS

SCALE: N.T.S. DATE: FEB 80
DRAWN BY: S.P.
DWG. No. W-3A
METRIC
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. REINFORCED CONCRETE PRECAST CHAMBER TO MEET ASTM C-478 SPECIFICATION.
3. STEPS: FIRST STEP TO BE 300mm BELOW FINISHED ROAD GRADE, LAST STEP TO BE 300mm ABOVE BASE.
4. VALVE TO BE FLANGED.
5. PARGING MIX ON ALL BRICKWORK AND ADJUSTMENT UNITS TO BE 1:3 MORTAR MIX AND TO BE APPLIED 15mm THICK.
6. ALL JOINTS AND LIFTING HOLES IN CHAMBER SECTIONS TO BE COMPLETELY FILLED WITH 1:3 MORTAR MIX BEFORE BACKFILLING.
7. ADJUSTMENT UNITS SHALL CONFORM TO THE FOLLOWING:
   HEIGHT
   50mm UNITS 75mm UNITS
   200mm MIN. MAX. 2 MIN. 3
   300mm MIN. MAX. 2 MAX. 4
   NO MORE THAN TWO 50mm UNITS SHALL BE USED FOR ANY STRUCTURE. ADJUSTMENTS GREATER THAN 100mm SHALL USE COMBINATIONS OF ADJUSTMENT UNITS LARGER THAN 50mm THICKNESS.
8. VALVES SHALL BE FITTED WITH A 50mm CONICAL SQUARE OPERATING NUT OPENING COUNTERCLOCKWISE.
9. STEPS AND FRAME & COVER TO BE LOCATED ON SIDE OF CHAMBER FURTHEST FROM ROAD.
10. SUMP SHALL BE PLACED ON OPPOSITE SIDE OF CHAMBER STEPS AND POSITIONED TO AVOID ASSOCIATED APPURTENANCES.
11. FITTINGS SHALL BE CATHODICALLY PROTECTED AS PER TOWN SPECIFICATIONS AND OPSD 1109.11
12. EXTEND TRACER WIRE THROUGH STEPS TO TOP OF CHAMBER AND FASTEN SECURELY AS PER TOWN SPECIFICATIONS.

SECTION A-A
UNI-FLANGE SERIES 900 RESTRAINER OR APPROVED EQUIVALENT

NOTES

1. ALL MECHANICALLY RESTRAINED JOINTS TO BE COATED WITH TAPECOAT SEALER OR EQUIVALENT TO PREVENT CORROSION.

2. RESTRAINERS TO BE USED IN UNSTABLE SOIL AND FILL CONDITIONS AND WITH THE APPROVAL OF THE COMMISSIONER OF WORKS.
NOTE:
1. ALL DIMENSIONS ARE GIVEN TO THE CENTRELINE OF THE WATERMAIN.
REDUCED PRESSURE ZONE ASSEMBLY.
WATTS SERIES 009 OR APPROVED EQUIVALENT
MEETING AWWA STD. C511 AND B64.4

BACKFLOW DEVICE

50mm TEE AND BALL VALVE SOURCE TAP

GATE OR BALL TYPE VALVE (TYPICAL)

APPROVED SADDLE AND MAIN STOP

CAP

THRUST BLOCK

EXISTING WATERMAIN

NEW WATERMAIN

BYPASS 50mm (Minimum)

25mm SAMPLE TAP (ALSO USED FOR CHLORINE INJECTION AND PRESSURE TESTING)

GATE OR BALL TYPE VALVE (TYPICAL)

APPROVED SADDLE AND MAIN STOP

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

TOTAL ISOLATION OF EXISTING AND NEW SYSTEMS

DRAWN: W.B.W.                    DWG. No. W−9A
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

2. SAMPLING STATIONS SHALL HAVE A MIN. BURY OF 1.75m WITH A 19mm¹ FIP INLET AND A 19mm¹ HOSE OR UNTHEADED NOZZLE.

3. SAMPLING STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE ALUMINUM-CAST HOUSING. WHEN OPENED, THE SAMPLING STATION SHALL REQUIRE NO KEY FOR OPERATION.

4. SAMPLING STATION TO BE LOCATED WITH AN OFFSET OF 2m–3m FROM THE PROPERTY LINE. IF THIS OFFSET IS NOT ATTAINABLE DUE TO R.O.W. WIDTH CONSTRAINTS, PLACE SAMPLING STATION IN THE STANDARD OFFSET GIVEN FOR A HYDRANT OR HYDRO POLE.

5. WATER TO FLOW IN AN ALL BRASS WATERWAY. ALL WORKING PARTS AND EXTERIOR PIPING SHALL ALSO BE BRASS AND REMOVABLE FROM ABOVEGROUND WITHOUT DIGGING REQUIRED. EXTERIOR STANDPIPE SHALL BE BRASS.

6. COPPER VENT TUBE ENABLES SAMPLING STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE BACTERIA GROWTH. SAMPLES ARE DRAWN ABOVEGROUND TO AVOID CONTAMINATION.

7. SAMPLING STATION TO BE ECLIPSE NO. 88 MANUFACTURED BY KUFFLER FOUNDRY, ST. LOUIS, MO 63102.

8. CONCRETE PAD FOR SAMPLING STATION TO BE 1600mmx1600mm, 150mm THICK, 30MPa CONCRETE ON 75mm GRANULAR "A" BASE, STEEL FLANGE BOLTED TO CONCRETE PAD.
DIVISION "B"

SECTION B4

WATERMAIN

ADOPTED ONTARIO
PROVINCIAL
STANDARD DRAWINGS
DIVISION "B" SECTION B4.1  
(OPSD DIVISION 400)  
FRAMES AND GRATES

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN RICHMOND HILL STD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>401.01</td>
<td>MAINTENANCE HOLE CAST IRON COVER AND SQUARE FRAME</td>
<td>Type &quot;A' cover to be used for watermain installation only</td>
<td>ST-20,S-6</td>
</tr>
<tr>
<td>402.03</td>
<td>THREE PIECE VALVE AND METER CHAMBER COVER</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DIVISION "B" SECTION B4.2
(OPSD DIVISION 1100)
WATERMAINS

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN RICHMOND HILL STD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1101.01</td>
<td>CIRCULAR PRECAST CHAMBER FOR VALVES AND METERS</td>
<td></td>
<td>W-3</td>
</tr>
</tbody>
</table>

1. This standard not to be used for distribution main valves. Refer to Richmond Hill Standard W-4-A and W-6-A for distribution main valve chamber details.

2. Reference to 100 to 250mm watermain and 300 to 350mm watermain in table to be deleted.

3. Adjustment units shall follow the following:

<table>
<thead>
<tr>
<th>Height 50mm Units*</th>
<th>75mm Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>200mm min.</td>
<td>Max. 2</td>
</tr>
<tr>
<td>300mm max.</td>
<td>Max. 2</td>
</tr>
</tbody>
</table>

*No more than two 50mm units shall be used for any structure. Adjustments greater than 100mm shall use combinations of adjustment units larger than 50mm thickness.

4. Chambers shall be backfilled with Granular “B” conforming to OPSS 1010.

5. Valve support shall consist of a single solid concrete block.

6. In all installations, the valve stem shall be extended to 1200mm below grade.

7. A 50mm diameter drain from the sump to a 600 x 600mm gravel absorption pit shall be installed at the direction of the Town, depending on existing ground conditions.
DIVISION "B" SECTION B4.2  
(OPSD DIVISION 1100)  
WATERMAINS

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN RICHMOND HILL STD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1101.02</td>
<td>VALVE OPERATOR DETAIL</td>
<td>1. Auger or screw type valve box extension to be used for all installations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Valve shall be fitted with a 50mm conical square operating nut type, opening counter clockwise.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Steel extension stem with coupling to suit 50mm conical square operating nut type.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Valve to be approved type with iron rising stem.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Operating nut to be 1200mm from finished ground surface.</td>
<td></td>
</tr>
<tr>
<td>1101.030</td>
<td>PIPING LAYOUT FOR BUTTERFLY AND GATE VALVES 350mm DIAMETER AND SMALLER IN CIRCULAR PRECAST CHAMBERS</td>
<td>Not accepted refer to Richmond Hill Standard W-4-A and W-6-A for piping layout.</td>
<td></td>
</tr>
<tr>
<td>1102.01</td>
<td>TRENCH BEDDING FOR PRESSURIZED CONDUITS UP TO 900mm DIAMETER - RIGID PIPE</td>
<td></td>
<td>W-13</td>
</tr>
<tr>
<td>1102.02</td>
<td>BEDDING FOR PRESSURIZED CONDUITS - FLEXIBLE PIPE</td>
<td>1. Embedment material shall be Granular “A” conforming to OPSS 701 unless otherwise approved by the Town.</td>
<td></td>
</tr>
<tr>
<td>1103.01</td>
<td>CONCRETE THRUST BLOCKS FOR TEES, PLUGS AND HORIZONTAL BENDS</td>
<td></td>
<td>W-9, W-10</td>
</tr>
<tr>
<td>1103.02</td>
<td>CONCRETE THRUST BLOCKS FOR VERTICAL BENDS</td>
<td>1. Restraining rods and glands shall be installed from bend to bend as directed by the Engineer.</td>
<td>W-11</td>
</tr>
</tbody>
</table>
DIVISION "B" SECTION B4.2
(OPSD DIVISION 1100)
WATERMAINS

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN RICHMOND HILL STD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1105.01</td>
<td>HYDRANT INSTALLATION</td>
<td>1. Drain holes shall be plugged unless otherwise directed by the Town.</td>
<td>W-7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Mechanical Joint Anchor Type Tees shall be used on all hydrant installations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Minimum cover shall be 1.70m.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Pumper port with Storz connection to be provided on all hydrants.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Hydrant identification signs to be provided in all subdivisions which are under construction the sign is to be 300mm x 300mm black on yellow complete with T-bars and installed when the system has potable water.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Hydrant upper body shall be painted fire hydrant Red. Ports and cap shall be painted based upon measured flow capacity at 20 psi. The colour scheme is as follows for capacities listed in liters per minute.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Greater than 5,675: light blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3,785 to 5,675: green</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 1,900 to 3,784: orange</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Less than 1,900: red</td>
<td></td>
</tr>
<tr>
<td>1107.01</td>
<td>PIPING LAYOUT FOR WATER METERS 50mm AND SMALLER IN CHAMBERS</td>
<td>1. Chamber to be installed on private property within 1.5m of the streetline.</td>
<td>W-4</td>
</tr>
<tr>
<td>1107.02</td>
<td>PIPING LAYOUT FOR WATER METERS 75mm TO 250mm IN CHAMBERS</td>
<td>1. Chamber to be installed on private property within 1.5m of the streetline.</td>
<td>W-4</td>
</tr>
<tr>
<td>1107.03</td>
<td>INSTALLATION DETAILS FOR A COMPOUND WATER METER</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>1107.04</td>
<td>INSTALLATION DETAILS FOR DISC METER IN BUILDING</td>
<td>1. Meter to be installed 450mm above floor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. All valves to be gate valves.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Concrete base support to be provided for meter.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Eliminate all reference to screw end meter.</td>
<td></td>
</tr>
</tbody>
</table>
DIVISION "B"

SECTION B5

WATERMAIN

LIST OF APPROVED MANUFACTURERS AND PRODUCTS FOR WATER SYSTEMS
DIVISION "B" SECTION B5

LIST OF APPROVED MANUFACTURERS AND PRODUCTS FOR WATER SYSTEMS

SERVICE CONNECTIONS

Type “K” soft copper

MAINSTOPS

Mueller H15008  
Ford FB1000 - 3G  
EMCO Successor  
Canadian Brass Series 102

The above are to be supplied with one (1) piece tails.

BALL CURB STOPS

Mueller H15209  
Ford B44-3336  
EMCO Successor  
Century Ball Valve

The above are to be supplied with one (1) piece tails.

COUPLINGS

Mueller H15403  
Ford C44-336  
EMCO Successor  
Canadian Brass Series 118

The above are to be supplied with one (1) piece tails.

CURB STOP VALVE BOXES

Mueller A726  
Ford CB-7  
EMCO Series 7960  
Canadian Brass C161
DIVISION "B" SECTION B5

LIST OF APPROVED MANUFACTURERS AND PRODUCTS FOR WATER SYSTEMS

FIRE HYDRANTS

Canada Valve Century
McCavity
Concord Diagle
AVK

SERVICE SADDLES

Robar Double Bolt stainless steel saddle.
Cambridge Brass Double bolt stainless steel saddle.
DIVISION “B”

SECTION B6

WATERMAIN

PROCEDURES FOR CLEANING, DISINFECTING, TESTING AND SAMPLING
DIVISION “B” SECTION B.6
PROCEDURES FOR CLEANING, DISINFECTION, TESTING AND SAMPLING

1. GENERAL

1.2 Introduction
These procedures cover the cleaning, disinfection, hydrostatic testing and sampling of watermains. Unless specified otherwise this procedure applies to all new watermains and includes above ground by-pass watermains, cement relined watermains, commercial water connections, and private watermain systems.

Reference is made in this document to the Ontario Provincial Standard Specification 701 (OPSS 701), Ontario Regulation 403/97 (The Ontario Building Code (OBC)), and the American Waterworks Association (AWWA) standard procedures. These procedures are supplemental to OPSS 701 and supersede OPSS 701.

These procedures are to be used in conjunction with the Ontario Provincial Specifications (OPSS), the American Waterworks Association (AWWA).

Where there is a conflict of information this document governs and supercedes any other specification.

This document is to be used in conjunction with the forms entitled “New Watermain Disinfection, Hydrostatic Testing & Check List”, “Watermain Disinfection Report”, “Chlorine Residual Report”, “Operation of Isolation Valve” and “Opening of Isolation Valves”.

The chlorine residual is to be tested with an electronic tester such as a Hach® Pocket Colorimeter or equivalent.

1.3 Definitions

Owner – means the party to the contract for whom the work is being performed. This would generally refer to the registered owner constructing as part of a subdivision or development agreement, or the Town in the case of a system upgrade or replacement.

Project Engineer - shall be designated by the Owner, and could be the Consulting Engineer, or their designate.

Workforce - shall be a Specialized Watermain Disinfection Contractor whose personnel hold valid MOE licenses as Water Distribution Subsystem Class 1 Operator (minimum) under Ontario Regulation 128/04 or successors.

Contractor - the person or company, or their agent that is constructing the watermain system.

Town - refers to the Municipal Inspector, Plumbing Inspector, Maintenance and Operation Certified Operator, or their designate

Disinfectant - use only Calcium or Sodium Hypochlorite that meets or exceeds ANSI/AWWA Standard B300.

Neutralizing Agent - use only Sodium Thiosulfate that meets or exceeds AWWA Standard C651.
1.3 References

These procedures are based on, and should be used in conjunction with, the Ontario Provincial Standard Specifications (OPSS), Ontario Regulation 403/97 (The Ontario Building Code (OBC)), the American Waterworks Association (AWWA), and the American National Standards Institute (ANSI), O.Reg 169/03, O.Reg 170/03, Ontario Procedures for Disinfection, ANSI/AWWA C651-05

1.4 Supervision, Testing, and Records

The Project Engineer shall witness all cleaning, disinfection, hydrostatic testing and sampling activities. The Workforce carrying out the cleaning and disinfection in conjunction with the Project Engineer is to take and record measurements. All such records shall be submitted to the Town’s Municipal and/or Plumbing Inspector on the required forms.

1.5 Isolation Valve Operation

During swabbing, flushing, and removal of super chlorinated water procedures a Town’s Maintenance and Operations Certified Operator, certified under Ontario Regulation 128/04 will be on site to operate any isolation valve. The Project Engineer is to notify the Maintenance Operations Section 3 working days in advance to make arrangements for the operation of an isolation valve.

All valve operation requests shall be accompanied with an “Operation of Isolation Valve” form. The Project Engineer or his/her representative shall be on site to ensure that the proper valve is being operated.

1.6 Calculation of Water Consumption

The Workforce is to provide a final calculation of estimated water volume consumption during the commissioning process. This requirement is related to the Town’s annual water loss accounting, and has no associated costs. Estimates for flushing volumes will vary with each project.

Calculations can be made using the following guidelines, in cubic meters (m³):

\[
\begin{array}{|c|c|}
\hline
i. & Volume of water required to initially load main = \text{(length of main)} \times \text{(cross-sectional area)} \\
ii. & Volume of water required to swab, flush to remove turbidity/and for removal of superchlorinated water (provide separate calculation for each instance of flushing) = \text{(flushing velocity – assume minimum flushing velocity of 0.75m/s)} \times \text{(cross-sectional area of blow off)} \times \text{(number of hours flushed)} \times 3600 \\
\hline
\end{array}
\]

Final consumption totals are recorded on Form 5.1 – New Watermain Disinfection, Hydrostatic Testing & Check List, under item 13 (W8-A) or item 10 (W9-A).
2. PROCEDURE FOR CONNECTION AT EXISTING VALVE

2.1 General

The following procedures are to be applied in conjunction with the use of Standard Drawing W-8A.

2.2 Loading of Watermain

(AWWA C651.05 Section 4.3.9 Modified)

a) The new watermain is to be loaded via a bypass. The bypass with approved backflow device is to be installed around the isolation valve. The bypass is to be used for all water supply issues unless otherwise noted. Minimum size of the bypass shall be 50mm diameter around the isolation valve. All materials for the bypass shall conform to the Town’s approved material list. For details on the installation of the bypass see Town Standard drawing “Connection at Existing Valve, Standard (W-8A)”.

The bypass shall be removed once all testing is completed and accepted. For direct bury bypass installations outside the valve chamber, all appurtenances are to be removed and saddles shall be replaced with repair clamps. Bypass installations inside the chamber are to be removed by closing the main stops and removing all tubing and fittings between the main stops.

All site plan agreement applications which propose service connections 100 millimeters in diameter or larger shall have test point(s) installed at the isolation valve(s). The watermain shall be loaded from the isolation valve. The Town’s Maintenance and Operations Certified Operator shall operate the isolation valve once they have ensured there is a flow to the discharge. All direct bury test points within the Municipal Right-of-Way are to be removed and a repair clamp installed in its place once all testing has been completed and accepted.

2.3 Sample Request Drawings

Three (3) copies of sample request drawings are required to be submitted to the Municipal Inspections Section (Public Works) or to the Building Inspections Section (Private Works) a minimum of five (5) working days prior to disinfection, with consideration given to sectioning off areas as required. Full size copies of general servicing plans are acceptable for this purpose.

All proposed watermains shall be highlighted including all stubs and commercial services. Water supply source points and water sample points are to be indicated.

One copy of the sample request drawing will be returned to the Project Engineer subject to the approval of the Town’s Municipal and/or Plumbing Inspector.

Hydrostatic test boundaries are to be the same as any sectioned off areas identified on the sample request drawings unless otherwise directed.

All sample points are to be brought to the surface complete with a valve.
2.4 **Swabbing**

(AWWA C651-05 Sec. 4.3.6)

Request for Isolation Valve Operation is required for the swabbing procedure. The Town’s Maintenance and Operations Certified Operator will operate the isolation valve once they have ensured there is flow, via the bypass, to an open discharge.

All other work is to be performed by the designated Workforce.

All swabs shall be new and sized a minimum of one size larger than the watermain pipe diameter. All stub ends shall be provided with a temporary flushing hydrant to allow for the removal of the swabs. Open risers will be permitted only when watermain sizing is such that the appropriate sized swab cannot be physically extracted through a hydrant branch line.

All swabs inserted into the watermain shall be marked with an identification number and witnessed by the Project Engineer.

The Project Engineer shall maintain records of the swabs inserted and ensure that all swabs are retrieved. The watermain swabbing procedure shall be carried out such that all pipes within the system, including all hydrant leads, are swabbed.

Swabbing of site plans will be at the discretion of the Building Inspections Section.

2.5 **Flush to Remove Turbidity**

(OPSS 701.07.23 Modified; AWWA C651-05 Sec. 4.4.3.2)

Request for Isolation Valve Operation is required for the flushing procedure. The Town’s Maintenance and Operations Certified Operator will operate the isolation valve once they have ensured there is flow, via the bypass, to an open discharge.

All other work is to be performed by the designated Workforce.

The watermain shall be flushed to remove any remaining air pockets and foreign matter from the watermain.

The watermain is to be flushed through each hydrant for 5 to 10 minutes until the watermain achieves and sustains a turbidity of less than 1 NTU or no higher than that of the existing distribution system. The turbidity testing will be performed by the Workforce and recorded by the Project Engineer on the Watermain Disinfection Report Form. The locations where the turbidity samples are taken will be recorded by the Project Engineer and indicated on the sample request drawing.

2.6 **Disinfection Procedure**

(OPSS 701.07.23; OBC Appendix A – 7.6.2.2)

The method of disinfection to be used is the “continuous feed” method such that water from the existing distribution system shall be allowed to flow at a controlled rate into the new pipeline through the bypass. The isolation valve shall remain closed throughout this procedure.

The chlorine solution shall be prepared in a mixing tank as a super chlorinated disinfectant and water solution and shall be thoroughly mixed prior to pumping it into the
system. This solution shall be introduced into the system through the bypass sample tap continuously so that the required concentration of chlorine is distributed throughout the section being disinfected.

The solution shall be applied so that the chlorine concentration is a minimum of 50mg/l throughout the system and does not exceed 100mg/l. The chlorine solution is to be flowed through each hydrant, sample location and blow-off. The high chlorine residual is to be measured by the Workforce at each sample location and recorded by the Project Engineer on the Watermain Disinfection Report Form. The high chlorine will be isolated in the system for 24 hours.

Once the introduction of the disinfectant is complete, any residual solution in the mixing tank shall be treated with neutralizing agent and disposed of.

After the required contact time the chlorine residual is to be taken at each sample location by the Workforce and recorded by the Project Engineer on the Watermain Disinfection Report Form. Flow required to take the residuals shall be provided through the bypass. If the residual is above 50% of the original concentration the chlorine is ready to be discharged.

In the event that the residual is less than 50% the chlorine in the system is to be removed and disposed. The watermain is then required to be flushed, swabbed, and the disinfection procedure repeated.

2.7 Discharge Procedure: Removal and Disposal of Super Chlorinated Water

(AWWA C651.05 Sec. 4.5; OPSS 701.07.25)

Request for Isolation Valve Operation is required for the discharge procedure. The Town’s Maintenance and Operations Certified Operator will operate the isolation valve once they have ensured there is flow, via the bypass, to an open discharge.

All other work is to be performed by the designated Workforce.

The watermain is to be flushed to remove super chlorinated water. The watermain to be controlled to assure that the direction of the flow is known to promote the expedient and complete removal and neutralization of the chlorinated water. Water is to be flushed from the watermain through all hydrants and sample points with the chlorine residual being checked at each sample point by the workforce, and recorded by the Project Engineer on the Watermain Disinfection Report Form, until the chlorine residual matches that of the existing distribution system (supply location). Once this is achieved the system is to be flushed for an additional 30 minutes.

The Project Engineer is to ensure throughout the disposal process that residual chlorine in the neutralized water does not exceed 0.5mg/l. De-chlorinated water is normally disposed of into a sanitary sewer. Super chlorinated water may not be disposed of to a storm sewer or watercourse unless the residual is reduced to 0.0 mg/l.

Methods of disposal include flushing through a neutralizing dam, ensuring 0.5 mg/l being achieved, or flushing to a neutralizing tank. Neutralizing agents shall conform to AWWA C651.99, Appendix C.
2.8 **Initial Bacteriological Sampling**

(AWWA C651-05 Sec. 5.1 Modified)

The fresh supply water shall be left isolated within the system for a minimum of 24hrs. For above ground by-pass watermains the isolation period can be shortened to 16 hours.

The Municipal and/or Plumbing Inspection staff will ensure the bypass is open and take a bacteriological sample at each sample location and have it delivered to the York Durham lab. The isolation valve shall remain closed throughout this procedure.

The cost of all bacteriological sampling will be charged back to the Owner unless otherwise specified.

2.9 **Bacteriological Sample Results**

(OPSS 701.07.23 Modified; AWWA C651-05 Sec. 5.1 Modified; OBC Appendix A – 7.6.2.2 Modified)

The Municipal and/or Plumbing Inspection Section will receive the sample results from the approved laboratory 48 hours after the samples are delivered. The Town will notify the Project Engineer of the sample results. If sample results meet the Town’s requirements set out in **Table 4.1** (New Watermain Acceptance Criteria – Microbiological Testing), the Workforce may proceed with Flushing and Hydrostatic Testing.

If sample results do not meet the Town’s requirements set out in **Table 4.1** (New Watermain Acceptance Criteria – Microbiological Testing), the disinfection procedure must be repeated, and the watermain re-sampled at the predetermined sample locations.

2.10 **Hydrostatic Testing**

(OPSS 701.07.22; AWWA C600-99 Sec 5.2 Modified; C605-94 Sec 7.3 Modified)

All work is to be performed by the designated Workforce.

The watermain is to be pressurized to a minimum of 1035 kPa. The test pressure is to be maintained for 2 hours. The test section is not to exceed any of the isolated sections as indicated on the sample drawing. If the test pressure drops significantly the test section is to be isolated to a manageable area. At the end of the two-hour test period the volume of water used to maintain the 1035 kPa is to be recorded and compared against the allowable leakage.

The allowable leakage is 0.082 litres per millimetre of pipe diameter per kilometre of pipe for the 2-hour test period.

For High Density Polyethylene (H.D.P.E.) pipe the test section is not to include any other materials. A 3-4 hour deformation period, maintaining 1035kPa, will be required immediately prior to the hydrostatic testing. Acceptance of HDPE pipe is as per the acceptable leakage indicated in OPSS 701.07.22.02.

If the test fails, all leaks shall be located and repaired and the test section shall be retested until a satisfactory result is obtained.

The Project Engineer is required to provide a Hydrostatic Testing summary report to the Municipal or Plumbing Inspector.

**Note:** This item is not required for above ground by-pass watermains and cement relined watermains.
2.11 **Flushing Procedure to Introduce Fresh Water**

Request for Isolation Valve Operation is required for the discharge procedure. The Town’s Maintenance and Operations Certified Operator will operate the isolation valve once they have ensured there is flow, via the bypass, to an open discharge.

All other work is to be performed by the designated Workforce. The Project Engineer shall witness completion of this procedure.

The Watermain is to be flushed to introduce fresh water. Flushing of the watermain is to be controlled to assure that the direction of the flow is known to promote the expedient and complete removal of the stale water. Once the existing water has been removed from within the system and replaced with fresh water the system shall be isolated for a minimum of 24hrs.

2.12 **Final Bacteriological Sampling and Acceptance**

(OPSS 701.07.23 Modified; AWWA C651-05 Sec. 5.1 Modified; OBC Appendix A – 7.6.2.2 Modified)

Prior to sampling, the Project Engineer shall confirm to the Municipal Inspector that the proposed flushing and sampling program has described in section 2.14 has been reviewed and accepted by the Water and Wastewater Supervisor.

The Municipal and/or Plumbing Inspection Section will ensure the bypass is open and take a bacteriological sample at each sample location and have it delivered to the York Durham lab. The cost of all bacteriological sampling will be charged back to the owner unless otherwise specified.

The Municipal and/or Plumbing Inspection Section will receive the sample results, via fax, 48 hours after the samples are delivered. The Town will notify the Project Engineer, via fax and phone, of the sample results.

The testing laboratory will mail a hard copy of the sample results to the Town and the Project Engineer. If sample results meet the Town’s requirements set out in **Table 4.1** (New Watermain Acceptance Criteria – Microbiological Testing), the system will be put into service once a certified copy of the form entitled “New Watermain Disinfection, Hydrostatic Testing & Check List”, (Form 5.1) has been received and approved by the Town’s Municipal and/or Plumbing Inspector.

If sample results do not meet the Town’s requirements set out in **Table 4.1** (New Watermain Acceptance Criteria – Microbiological Testing) the disinfection procedure must be repeated, and the watermain re-sampled at the predetermined sample locations.

**Note:** This item is not required for above ground by-pass watermains and cement relined watermains.

2.13 **Potable Water**

Once the Owner has satisfied the requirements indicated on the “New Watermain Disinfection, Hydrostatic Testing & Check List” (Form 5.1), the Municipal Inspector will provide the “Opening of Isolation Valves” form to the Maintenance and Operations section together with plans highlighting the section of watermain or water service that will be put in service (providing potable water) and the location of the valves to be opened.
Note: In the event that the watermain is not put in service within 10 days from the date that the Final Bacteriological Sample had been taken, the Project Engineer or his/her representative shall take combined chlorine residuals tests from the predetermined sample locations indicated in Item 2.3.

Full compliance to Ontario Regulations 169/03 specifically combined chlorine residuals of 0.25 mg/L and greater must be achieved. Otherwise, the Watermain is to be flushed to introduce fresh water. A discharge is to be set up for the removal of the stale water prior to the Town’s Maintenance and Operations Certified Operator opening the isolation valve.

The watermain is to be controlled to assure that the direction of the flow is known to promote the expedient and complete removal of the stale water. Once the existing water has been removed from within the system and replaced with fresh water and the combined chlorine residual is greater than 0.25 mg/L, the Town’s Maintenance and Operations Certified Operator will fully open the isolation valves as requested by the “Opening of Isolation Valves” form.

The owner shall undertake to ensure the watermain system remains potable until such time as the Town has accepted the system and the Maintenance Period has begun.

The owner is to provide a flushing and sampling program to be performed by the Workforce until such time as 50% occupancy has been achieved along each street. Such that flushing and chlorine residuals are to be performed bi-weekly and Chlorine Residual results submitted to the Water and Wastewater Supervisor.

2.14 Sampling and Flushing Program

This program is required for municipal watermain infrastructure. This program is not required for private watermain infrastructure.

The Project Engineer shall prepare and submit to the Water and Wastewater Supervisor or their designate a proposed flushing and sampling program. The Water and Wastewater Supervisor will review and assign a Water Trax sampling number to each sampling point. Once established the assigned Water Trax number and corresponding sampling location will not change and the same numbers and locations are to be used for all future reporting of Chlorine Residual and Bacteriological Sample results.

The Owner shall undertake to ensure the watermain system remains potable until such time as the Town has assumed the system and the Maintenance Period has begun.

The Owner is to provide a flushing and bacteriological sampling program to be performed by the Workforce until such time as 50% occupancy has been achieved along each street.

Flushing and chlorine residuals are to be performed bi-weekly and Chlorine Residual results submitted on the Chlorine Residual Report Form to the Water and Wastewater Supervisor. Samples to be submitted in accordance with the York Durham Regional Environmental Laboratory Chain of Custody (Form 5.6) provided herein shall be taken every four weeks.

Failure to execute this program on a predetermined schedule will result in the program being carried out by Town forces at the expense of the Owner.
Note: This item is not required for above ground by-pass watermain and cement relined watermain.

2.15 Disinfection of By-pass Service Hoses

- All by-pass services hoses to be used will be of potable water grade.
- Service hoses to be chlorinated at 25mg/l continuous feed method.
- Service hoses to be isolated for a maximum 24hr contact time.
- Service hoses de-chlorinated, and residual to match that of existing water supply.
- Service hoses to be isolated for minimum 24hr incubation period.
- Bacteriological sample will be taken from each hose bundle.
- Service hoses to be capped on both ends with brass caps.
- Service hoses will not be installed on by-pass piping until the day of the change over from distribution watermain to the above ground by-pass watermain.
3. PROCEDURE FOR TOTAL ISOLATION OF EXISTING AND NEW SYSTEMS

3.1 General

The following procedures are to be applied in conjunction with the use of Standard Drawing W-9A.

3.2 Loading of Watermain

(AWWA C651.05Section 4.3.9 Modified)

a) The new watermain is to be loaded via a bypass. The bypass with approved backflow device is to be installed around the separation between the existing and new watermains. The bypass is to be used for all water supply issues and shall remain closed when not supplying water specific to these procedures. Minimum size of the bypass should be 50mm diameter and the size of the bypass installed shall be determined in reference to Table 4.2 (Bypass Requirements for Swabbing and Flushing of New Watermains). All materials for the bypass shall conform to the Town’s approved material list. For details on the installation of the bypass see Town Standard drawing W-9A “Total Isolation of Existing and New Systems”.

The bypass is to be removed once all testing is completed and accepted. For direct bury installations the saddles are to be removed and a repair clamp installed in their place.

3.3 Sample Request Drawings

Three (3) copies of sample request drawings are required to be submitted to the Municipal Inspections Section (Public Works) or to the Building Inspections Section (Private Works) a minimum of five (5) working days prior to disinfection, with consideration given to sectioning off areas as required. Full size copies of general servicing plans are acceptable for this purpose.

All proposed watermains shall be highlighted including all stubs and commercial services. Water supply source points and water sample points are to be indicated.

One copy of the sample request drawing will be returned to the Project Engineer subject to the approval of the Town’s Municipal and/or Plumbing Inspector.

Hydrostatic test boundaries are to be the same as any sectioned off areas identified on the sample request drawings unless otherwise directed.

All sample points are to be brought to the surface complete with a valve.

3.4 Swabbing

(AWWA C651-05 Sec. 4.3.6)

All work is to be performed by the designated Workforce.

All swabs shall be new and sized a minimum of one size larger than the watermain pipe diameter. All stub ends shall be provided with a temporary flushing hydrant to allow for the removal of the swabs. Open risers will be permitted only when watermain sizing is such that the appropriate sized swab cannot be physically extracted through a hydrant branch line.

All swabs inserted into the watermain shall be marked with an identification number and witnessed by the Project Engineer.
The Project Engineer shall maintain records of the swabs inserted and ensure that all swabs are retrieved. The watermain swabbing procedure shall be carried out such that all pipes within the system, including all hydrant leads, are swabbed.

3.5 **Hydrostatic Testing**

(OPSS 701.07.22; AWWA C600-99 Sec 5.2 Modified; C605-94 Sec 7.3 Modified)

All work is to be performed by the designated Workforce.

The watermain is to be pressurized to a minimum of 1035 kPa. The test pressure is to be maintained for 2 hours. The test section is not to exceed any of the isolated sections as indicated on the sample drawing. If the test pressure drops significantly the test section is to be isolated to a manageable area. At the end of the two-hour test period the volume of water used to maintain the 1035 kPa is to be recorded and compared against the allowable leakage.

The allowable leakage is 0.082 litres per millimetre of pipe diameter per kilometre of pipe for the 2-hour test period.

For High Density Polyethylene (H.D.P.E.) pipe the test section is not to include any other materials. A 3-4 hour deformation period, maintaining 1035kPa, will be required immediately prior to the hydrostatic testing. Acceptance of HDPE pipe is as per the acceptable leakage indicated in OPSS 701.07.22.02.

If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be retested until a satisfactory result is obtained.

The Project Engineer is required to provide a Hydrostatic Testing summary report to the Municipal or Plumbing Inspector.

3.6 **Flush to Remove Turbidity**

(OPSS 701.07.23 Modified; AWWA C651-05 Sec. 4.4.3.2)

All work is to be performed by the designated Workforce.

The watermain shall be flushed to remove any remaining air pockets and foreign matter from the watermain.

The watermain is to be flushed through each hydrant for 5 to 10 minutes until the watermain achieves and sustains a turbidity of less than 1 NTU or no higher than that of the existing distribution system. The turbidity testing will be performed by the Workforce and recorded by the Project Engineer on the Watermain Disinfection Report Form. The locations where the turbidity samples are taken will be recorded by the Project Engineer and indicated on the sample request drawing.

3.7 **Disinfection Procedure**

(OPSS 701.07.23; OBC Appendix A – 7.6.2.2)

The method of disinfection to be used is the “continuous feed” method such that water from the existing distribution system shall be allowed to flow at a controlled rate into the new pipeline through the bypass.
The chlorine solution shall be prepared in a mixing tank as a super chlorinated disinfectant and water solution and shall be thoroughly mixed prior to pumping it into the system. This solution shall be introduced into the system through the bypass sample tap continuously so that the required concentration of chlorine is distributed throughout the section being disinfected.

The solution shall be applied so that the chlorine concentration is a minimum of 50mg/l throughout the system and does not exceed 100mg/l. The chlorine solution is to be flowed through each hydrant, sample location and blow-off.

The high chlorine residual is to be measured by the Workforce at each sample location and recorded by the Project Engineer on the Watermain Disinfection Report Form. The high chlorine will be isolated in the system for 24 hours.

Once the introduction of the disinfectant is complete, any residual solution in the mixing tank shall be treated with neutralizing agent and disposed of.

After the required contact time the chlorine residual is to be taken at each sample location by the Workforce and recorded by the Project Engineer on the Watermain Disinfection Report Form. Flow required to take the residuals shall be provided through the bypass. If the residual is above 50% of the original concentration the chlorine is ready to be discharged.

In the event that the residual is less than 50% the chlorine in the system is to be removed and disposed. The watermain is then required to be flushed, swabbed, and the disinfection procedure repeated.

3.8 **Discharge Procedure: Removal and Disposal of Super Chlorinated Water**

(AWWA C651.05 Sec. 4.5; OPSS 701.07.25)

All work is to be performed by the designated Workforce.

The watermain is to be flushed to remove super chlorinated water. The watermain to be controlled to assure that the direction of the flow is known to promote the expedient and complete removal and neutralization of the chlorinated water. Water is to be flushed from the watermain through all hydrants and sample points with the chlorine residual being checked at each sample point by the workforce, and recorded by the Project Engineer on the Watermain Disinfection Report Form, until the chlorine residual matches that of the existing distribution system (supply location). Once this is achieved the system is to be flushed for an additional 30 minutes.

The Project Engineer is to ensure throughout the disposal process that residual chlorine in the neutralized water does not exceed 0.5mg/l. De-chlorinated water is normally disposed of into a sanitary sewer. Super chlorinated water may not be disposed of to a storm sewer or watercourse unless the residual is reduced to 0.0 mg/l.

Methods of disposal include flushing through a neutralizing dam, ensuring 0.5 mg/l being achieved, or flushing to a neutralizing tank. Neutralizing agents shall conform to AWWA C651.05, Appendix C.

**Note:** The fresh water shall be left isolated within the system for a minimum of 24hrs. For above ground by-pass watermains the isolation period can be shortened to 16 hours.
3.9 **Final Bacteriological Sampling and Acceptance**

(OPSS 701.07.23 Modified; AWWA C651-05 Sec. 5.1 Modified; OBC Appendix A – 7.6.2.2 Modified)

Prior to sampling, the Project Engineer shall confirm to the Municipal Inspector that the proposed flushing and sampling program has as described in section 3.11 has been reviewed and accepted by the Water and Wastewater Supervisor.

The Municipal and/or Plumbing Inspection Section will ensure the bypass is open and take a bacteriological sample at each sample location and have it delivered to the York Durham lab. The cost of all bacteriological sampling will be charged back to the owner unless otherwise specified.

The Municipal and/or Plumbing Inspection Section will receive the sample results, via fax, 48 hours after the samples are delivered. The Town will notify the Project Engineer, via fax and phone, of the sample results.

The testing laboratory will mail a hard copy of the sample results to the Town and the Project Engineer. If sample results meet the Town’s requirements set out in Table 4.1 (New Watermain Acceptance Criteria – Microbiological Testing), the system will be put into service once a certified copy of the form entitled “New Watermain Disinfection, Hydrostatic Testing & Check List” (Form 5.1) has been received and approved by the Town’s Municipal and/or Plumbing Inspector.

If sample results do not meet the Town’s requirements set out in Table 4.1 (New Watermain Acceptance Criteria – Microbiological Testing) the disinfection procedure must be repeated, and the watermain re-sampled at the predetermined sample locations.

**Note:** This item is not required for above ground by-pass watermains and cement relined watermains.

3.10 **Potable Water**

Once the Owner has satisfied the requirements indicated on the “New Watermain Disinfection, Hydrostatic Testing & Check List” (Form 5.1), the Municipal Inspector will provide the “Opening of Isolation Valves” form to the Maintenance and Operations section together with plans highlighting the section of watermain or water service that will be put in service (providing potable water) and the location of the valves to be opened.

**Note:** In the event that the watermain is not put in service within 10 days from the date that the Final Bacteriological Sample had been taken, the Project Engineer or his/her representative shall take combined chlorine residuals tests from the predetermined sample locations indicated in Item 2.3.

Full compliance to Ontario Regulations 169/03 specifically combined chlorine residuals of 0.25 mg/L and greater must be achieved. Otherwise, the Watermain is to be flushed to introduce fresh water. A discharge is to be set up for the removal of the stale water prior to the Town’s Maintenance and Operations Certified Operator opening the isolation valve.

The watermain is to be controlled to assure that the direction of the flow is known to promote the expedient and complete removal of the stale water. Once the existing water has been removed from within the system and replaced with fresh water and the combined chlorine residual is greater than 0.25 mg/L, the Town’s Maintenance and
Operations Certified Operator will fully open the isolation valves as requested by the “Opening of Isolation Valves” form.

The owner shall undertake to ensure the watermain system remains potable until such time as the Town has accepted the system and the Maintenance Period has begun.

The owner is to provide a flushing and sampling program to be performed by the Workforce until such time as 50% occupancy as been achieved along each street. Such that flushing and chlorine residuals are to be performed bi-weekly and Chlorine Residual results submitted to the Water and Wastewater Supervisor.

3.11 **Sampling and Flushing Program**

This program is required for municipal watermain infrastructure. This program is not required for private watermain infrastructure.

The Project Engineer shall prepare and submit to the Water and Wastewater Supervisor or their designate a proposed flushing and sampling program. The Water and Wastewater Supervisor will review and assign a Water Trax sampling number to each sampling point. Once established the assigned Water Trax number and corresponding sampling location will not change and the same numbers and locations are to be used for all future reporting of Chlorine Residual and Bacteriological Sample results.

The Owner shall undertake to ensure the watermain system remains potable until such time as the Town has assumed the system and the Maintenance Period has begun.

The Owner is to provide a flushing and bacteriological sampling program to be performed by the Workforce until such time as 50% occupancy has been achieved along each street.

Flushing and chlorine residuals are to be performed bi-weekly and Chlorine Residual results submitted on the Chlorine Residual Report Form to the Water and Wastewater Supervisor. Samples to be submitted in accordance with the York Durham Regional Environmental Laboratory Chain of Custody (Form 5.6) provided herein shall be taken every four weeks.

Failure to execute this program on a predetermined schedule will result in the program being carried out by Town forces at the expense of the Owner.

Note: This item is not required for above ground by-pass watermain and cement relined watermain.

3.12 **Disinfection of By-pass Service Hoses**

- All by-pass services hoses to be used will be of potable water grade.
- Service hoses to be chlorinated at 25mg/l continuous feed method.
- Service hoses to be isolated for a maximum 24hr contact time.
- Service hoses to be de-chlorinated, and residual to match that of existing water supply.
- Service hoses to be isolated for minimum 24hr incubation period.
- Bacteriological sample will be taken from each hose bundle.
- Service hoses to be capped on both ends with brass caps.
• Service hoses will not be installed on by-pass piping until the day of the change over from distribution watermain to the above ground by-pass watermain.

4. Tables

The following tables are to be used in conjunction with these procedures:

4.1 New Watermain Acceptance Criteria – Microbiological Testing

<table>
<thead>
<tr>
<th>Test Procedure</th>
<th>Acceptance Value (^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliforms</td>
<td>&lt;1 CFU / 100 millilitre</td>
</tr>
<tr>
<td>E. coli (&quot;escherichia coli&quot;)</td>
<td>&lt;1 CFU / 100 millilitre</td>
</tr>
<tr>
<td>Fecal coliforms</td>
<td>&lt;1 CFU / 100 millilitre</td>
</tr>
<tr>
<td>Background Bacteria (^1)</td>
<td>(\leq 5) CFU /100 millilitre</td>
</tr>
<tr>
<td>Heterotrophic Plate Count (^1)</td>
<td>(\leq 10) CFU / milliliter</td>
</tr>
</tbody>
</table>

Notes:

1. At Town’s discretion, the acceptance value for Background Bacteria and Heterotrophic Plate Count shall be equal to or lower than the sample result from the municipal source.

\(\text{CFU} = \text{colony forming unit}\)

Interpret <1 as equal to “zero”

Background Bacteria: general bacteria population expressed as background colony counts on the total coli form membrane filter.

Heterotrophic Plate Count: general bacteria population expressed as colony counts on a heterotrophic plate count.

4.2 Bypass Requirements for Swabbing and Flushing of New Watermains

<table>
<thead>
<tr>
<th>PIPE DIAMETER (mm)</th>
<th>FLOW REQUIRED TO PRODUCE 0.76 m/s (APPROX) VELOCITY IN MAIN</th>
<th>SIZE OF TAP (mm)</th>
<th>NUMBER OF OPEN 64 mm HYDRANT OUTLETS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>25</td>
<td>38</td>
</tr>
<tr>
<td>100</td>
<td>6.3</td>
<td>One 50 mm Ø minimum for bypass</td>
<td>1</td>
</tr>
<tr>
<td>150</td>
<td>12.6</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>200</td>
<td>25.2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>250</td>
<td>37.9</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>300</td>
<td>56.8</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>400</td>
<td>109.9</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES (276 kPa – 40 psi RESIDUAL PRESSURE IN WATERMAIN)
5. **FORMS**

The following forms are attached to this document:

5.1 New Watermain Disinfection, Hydrostatic Testing & Check List
5.2 Watermain Disinfection Report
5.3 Chlorine Residual Report
5.4 Operation of Isolation Valve
5.5 Opening of Isolation Valves
5.6 York Durham Regional Environmental Laboratory Chain of Custody

Notes:
- Revisions to forms 5.1 – 5.5 must be approved by the designated approved for Section B6.
- Form 5.6 is controlled by the York-Durham Regional Environmental Laboratory.
### New Watermain Disinfection, Hydrostatic Testing & Check List

(April 2010) (Form 5.1)

Date: __________ Project Name: __________________________ Town File No.: __________

Contractor/Workforce: __________________________ Project Engineer: __________________________

<table>
<thead>
<tr>
<th>Standard</th>
<th>Procedure</th>
<th>Action By</th>
<th>Completion Date</th>
<th>Witnessed or Received by (Initial)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>W-8A</td>
<td>W-9A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>1.</td>
<td>Loading of Watermain</td>
<td>Contractor or Workforce</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>2.</td>
<td>Sample Request Drawings</td>
<td>Project Engineer</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>3.</td>
<td>Swabbing</td>
<td>Workforce</td>
<td># In # Out</td>
</tr>
<tr>
<td>4.</td>
<td>5.</td>
<td>Flush to Remove Turbidity</td>
<td>Workforce</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>6.</td>
<td>Disinfection Procedure</td>
<td>Workforce</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>7.</td>
<td>Discharge Procedure: Removal and Disposal of Super Chlorinated Water</td>
<td>Workforce</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>N/A</td>
<td>Initial Bacteriological Sampling</td>
<td>Town/Workforce</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>N/A</td>
<td>Bacteriological Sample Results</td>
<td>Town</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>4.</td>
<td>Hydrostatic Testing and Summary Report</td>
<td>Workforce</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>N/A</td>
<td>Flushing Procedure to Introduce Fresh Water</td>
<td>Workforce</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>8.</td>
<td>Final Bacteriological Sampling and Acceptance</td>
<td>Town/Workforce</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>9.</td>
<td>Potable Water</td>
<td>Workforce</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>10.</td>
<td>Calculations for estimated volume of water consumed in the commissioning of watermain (signed by Workforce)</td>
<td>Workforce</td>
<td>_________ m³</td>
</tr>
<tr>
<td>14.</td>
<td>11.</td>
<td>Sampling and Flushing Program Proposal Acceptance</td>
<td>Workforce</td>
<td></td>
</tr>
</tbody>
</table>

*Please Note: This form is to be accompanied by Form 5.2 Hydrostatic Testing Summary, and all Bacteriological sample reports.

**Project Engineer’s Certification:** We hereby certify that the workforce carrying out the above noted works is licensed, by the MOE as an Operator, and that these works have been completed in accordance with the Town of Richmond Hill Procedures for New Watermains.

*Project Engineer and/or Representative’s Signature*  
*cc: (Town Municipal or Plumbing Inspector)*
The chlorine residuals are to be confirmed with a testing device; litmus paper is not acceptable.

<table>
<thead>
<tr>
<th>Location or Sample Number</th>
<th>Turbidity Count</th>
<th>High Count</th>
<th>24 hr. Count</th>
<th>Low Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town Supply</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
Chlorine Residual Report

Date: ________________

Project Name: ____________________________  Town File No.: ____________________________

Contractor/Workforce: ____________________________  Project Engineer: ____________________________

Watermain Location (Supply): ____________________________________________

The chlorine residuals are to be confirmed with a testing device; litmus paper is not acceptable.

<table>
<thead>
<tr>
<th>Location or WaterTrax Sample Number</th>
<th>Free Chlorine Residual (mg/L)</th>
<th>Total Chlorine Residual (mg/L)</th>
<th>Combined Chlorine Residual (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

__________________________________________

Project Engineer and/or Representative’s Signature
This is to notify the Maintenance and Operations, Water and Wastewater Section, that the isolation valves for the watermain and/or water service system as noted above need to be operated to perform the following activity:

- [ ] Swabbing  Date Requested: ________________
- [ ] Flushing & Turbidity  Date Requested: ________________
- [ ] Disinfection  Date Requested: ________________
- [ ] Removal of Super Chlorinated Water  Date Requested: ________________
- [ ] Initial Sampling  Date Requested: ________________
- [ ] Hydrostatic Testing  Date Requested: ________________
- [ ] Final Sampling  Date Requested: ________________
- [ ] Other ________________  Date Requested: ________________

Confirmation as to when the opening of the isolation valves by Certified Maintenance and Operations staff will be scheduled will be faxed to the party making the request.

The appropriate Project Engineer or his/her representative will be on site to verify the isolation valves to be operated.

Signature of Project Eng. or Representative  Plumbing / Municipal Inspector
MEMO TO:
Water Quality Analyst
CS - PWO – W&W Section

COPY TO:
Supervisors of Water & Wastewater
CS - PWO – W&W Section
Supervisor Mapping & Technical Support Services
EIS – Infrastructure Delivery Services

FROM:
Municipal Inspector or Plumbing Inspector

SUBJECT:
OPENING OF ISOLATION VALVE(S)
TOWN FILE NUMBER:
PROJECT NAME:

This is to notify Public Works Operations, Water and Wastewater Section, that the watermain and/or water service system as noted above has been successfully disinfected and passed sampling as per Ministry guidelines and that the requirements of the New Watermain Disinfection, Hydrostatic Testing & Check List (Form 5.1) have been completed.

The Isolation Valve(s) are hereby requested to be opened to place the system into service.

Data received from Form 5.1:
Estimated volume of water consumed in the commissioning of watermain: M³

Date Received: ____________________________

Date Requested For Opening Isolation Valves: ____________________________

Location of Isolation Valves:
(Plan Highlighting valves to open and section of watermain or water service to be put on line is attached)

Comments: ____________________________

Signature of Municipal Inspector or Plumbing Inspector
**Form 5.6**

**O.Reg 170/03 Regulated Facility**

**Chain of Custody Form**

<table>
<thead>
<tr>
<th>Drinking Water System (DWS) Information</th>
<th>Invoice To (leave blank if same as DWS info)</th>
<th>Report To (email address)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DWS Owner:</strong> City of Richmond Hill</td>
<td><strong>Company:</strong></td>
<td>1) <a href="mailto:slawomir.parol@richmondhill.ca">slawomir.parol@richmondhill.ca</a></td>
</tr>
<tr>
<td><strong>DWS Name:</strong> Richmond Hill Distribution System</td>
<td><strong>Quote #:</strong></td>
<td>2) <a href="mailto:barry.kyle@richmondhill.ca">barry.kyle@richmondhill.ca</a></td>
</tr>
<tr>
<td><strong>DWS Number:</strong> 260001968</td>
<td><strong>Tel:</strong> 905-780-2958</td>
<td>3) <a href="mailto:steve.duthie@richmondhill.ca">steve.duthie@richmondhill.ca</a></td>
</tr>
<tr>
<td><strong>DWS Address:</strong> 225 East Beaver Creek Road, Richmond Hill, ON L4B 3J0</td>
<td><strong>Fax:</strong> 905-884-0395</td>
<td>4)</td>
</tr>
</tbody>
</table>

**DWS Contact Information**

| Contact: Slawomir Parol | Email: slawomir.parol@richmondhill.ca | Tel: 905-780-2958 |

**Project Information** (if applicable)

- **Description:** Standard Turnaround Time (TAT) is 10 business days
- | | | |
- | | | |
- | | | |

**Sample(s) Information**

<table>
<thead>
<tr>
<th>Lab ID Information</th>
<th>Type</th>
<th>Collection</th>
<th>Container</th>
<th>Chlorine</th>
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</thead>
<tbody>
<tr>
<td>(lab use only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Field ID</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location/Description/Comment(s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RW TW DS TAP</td>
<td>mm-dd-yy</td>
<td>HH:MM</td>
<td>Test Group(s)</td>
<td>Type</td>
</tr>
</tbody>
</table>

---

**Adverse Notification Information** (leave blank if same as DWS info)

<table>
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<tr>
<th>Sampled By:</th>
<th>Tel:</th>
<th>Relinquished By</th>
<th>Date/Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact:</strong></td>
<td>Tel:</td>
<td>Email:</td>
<td>Cell:</td>
</tr>
<tr>
<td><strong>Tel (After Hours):</strong></td>
<td></td>
<td><strong>Fax:</strong></td>
<td></td>
</tr>
</tbody>
</table>

**LABORATORY USE ONLY**

<table>
<thead>
<tr>
<th>Delivery Method:</th>
<th>Courier</th>
<th>Drop Off</th>
<th>YDREL Pickup</th>
<th><strong>Affix YDREL WO Barcode label here</strong></th>
<th>Received Date/Time:</th>
<th>Received By:</th>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorted by:</td>
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<td></td>
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<td></td>
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<td>Checked by:</td>
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<tr>
<td>Proofed by:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>WO #:</td>
<td></td>
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</table>

REL-COC-OREG170-NOV-2019-REV-1
DIVISION "C"

TRANSPORTATION
AND
ROAD WORKS
DIVISION "C"

TRANSPORTATION AND ROADWORKS

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<td>OPSS Division 13 Material Specifications – Cement and Concrete</td>
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<td>OPSS Division 14 Material Specifications – Metal</td>
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<td>C2.8</td>
<td>OPSS Division 15 Material Specifications – Safety Related</td>
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**TRANSPORTATION AND ROADWORKS**

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<th>DESCRIPTION</th>
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<tr>
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<td>Town of Richmond Hill Standard Drawings - Roadworks</td>
</tr>
<tr>
<td>R-1A</td>
<td>Typical Street Cross-Section &gt;18.0m Right-of-Way</td>
</tr>
<tr>
<td>R-1B</td>
<td>Typical Cross Section with Joint Utility Trench 20m R.O.W. and greater</td>
</tr>
<tr>
<td>R-2A</td>
<td>Typical Street Cross-Section 18.0m R.O.W.</td>
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<tr>
<td>R-2B</td>
<td>Typical Cross Section with Joint Utility Trench 18m R.O.W.</td>
</tr>
<tr>
<td>R-3A</td>
<td>Typical Cul-de-sac</td>
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<tr>
<td>R-3B</td>
<td>Typical Cross Section with Joint Utility Trench 17m R.O.W.</td>
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<td>R-4A</td>
<td>Typical 90° Crescent</td>
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<td>R-5A</td>
<td>Typical Vehicular Access for Condominiums and Private Developments</td>
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<td>R-9A</td>
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<td>Street Light Pole Numbering</td>
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<td>Top Mounted Decorative Street Light Pole Installation</td>
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<td>R-13A</td>
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## DIVISION "C"

### TRANSPORTATION AND ROADWORKS

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<th>SECTION</th>
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<td>R-15A</td>
<td>Residential Driveway Aprons Town Highway with Curb</td>
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<tr>
<td>R-15B</td>
<td>Residential Driveway Aprons Town Highway without Curb</td>
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<td>R-15C</td>
<td>Residential Driveway Apron Corner Lot</td>
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<td>Private Road – “T” Turnaround Minimum Standard</td>
</tr>
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</tr>
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<tr>
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</tr>
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</tr>
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</tr>
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<td>R-19B</td>
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</tr>
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<td>R-19C</td>
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</tr>
<tr>
<td>R-20A</td>
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</tr>
<tr>
<td>R-20B</td>
<td>Access Barrier Gate Layout</td>
</tr>
<tr>
<td>R-21A</td>
<td>Typical Multi-Use Trail Trailhead at Local Road</td>
</tr>
<tr>
<td>R-21B</td>
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</tr>
<tr>
<td>R-21C</td>
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<td>R-22A</td>
<td>Multi-Use Trail Asphalt Pavement Structure</td>
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<tr>
<td>R-22B</td>
<td>Multi-Use Trail Concrete Pad Pavement Structure</td>
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</tbody>
</table>
DIVISION "C"

TRANSPORTATION AND ROADWORKS

INDEX SECTION C4

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<thead>
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<th>Description</th>
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DIVISION "C"

SECTION C1

TRANSPORTATION
AND
ROAD WORKS

DESIGN CRITERIA
ROAD WORKS
DIVISION "C" SECTION C1.1

DESIGN CRITERIA ROADWORKS

1. GENERAL REQUIREMENTS

1.1 ROADS

All roads shall be designed to maximize safe usage by vehicles and pedestrians.

Rocks shall be designed to:

a) facilitate projected traffic conveyance
b) satisfy their functional classification, see Table "Alignment Standards"
c) facilitate public transit

In order to ensure acceptable and safe winter maintenance on all Town roads, the Town will not permit any raised or ramped structures (manhole lids, catch basin lids, or valve chamber lids etc.) within the roadway pavement surface between the dates of November 1st and March 31st, unless specifically authorized by the Town.

1.2 BUS BAYS

Bus bays, landing pads and shelters shall be provided as directed by the Commissioner of Environment and Infrastructure Services.

1.3 SIDEWALKS AND WALKWAYS

Sidewalks are required on at least one side of all local roads and on both sides of all collector and arterial roads.

Sidewalks may not be required on cul-de-sacs as determined by the Commissioner of Environment and Infrastructure Services.

In subdivision developments sidewalks shall only be constructed when they can be installed continuous from intersection to intersection. Boulevards shall be graded to match the installed sidewalk immediately following sidewalk installation.

The maximum desirable sidewalk or walkway gradient shall be 5.0% with an allowable 1.0% variance subject to site specific approval of the Commissioner of Environment and Infrastructure Services.

All sidewalks and walkways shall be designed in accordance with the Ontario Integrated Accessibility Standards Regulation – Design of Public Spaces Standard to accommodate the needs of physically and/or sensory impaired individuals including tactile warning plate ramps – see Section C4.2 for OPSD Adopted Standards.

Sidewalks shall not be constructed through commercial or industrial driveways.
1. GENERAL REQUIREMENTS CON’T.

1.4 STREET LIGHTING

Street lighting shall be provided on all roadways as directed by the Town.

1.5 DRAINAGE

All roadways shall be designed to convey major storm events.
DIVISION "C" SECTION C1.2

DESIGN CRITERIA ROADWORKS

2. GEOMETRICS

2.1 ALIGNMENT & ROAD ALLOWANCE REQUIREMENTS

2.1.1 General

The criteria provided in this section may not cover all potential types of roadways. Where this is the case, the designer is directed to follow the requirements outlined by the Ministry of Transportation of Ontario Publication "Geometric Design Standards for Ontario Highways and Streets" (latest revision).

2.1.2 Alignment - Horizontal

All roads shall be designed to conform to table "Alignment Standards".

Minimum tangent length between horizontal curves shall be 60m.

2.1.3 Alignment - Vertical

All roads shall be designed to conform to table "Alignment Standards".

The minimum gradient on any roadway shall be 0.5%. The maximum desirable gradient shall be 5.0% with an allowable variance of 1.0% subject to site specific approval by the Commissioner of Environment and Infrastructure Services. For maximum gradient at intersections see (Section C1.3).

The minimum gutter grades for cul-de-sacs and elbows shall be 1.0%. The cul-de-sac bulb shall drain away from the end to catchbasins located at the junction of the bulb and the normal road cross-section. Where the aforementioned condition is unattainable, a double catchbasin shall be installed at the low point and a suitable overland flow outlet shall be provided in an easement if necessary.

All grade changes in excess of 1.5% shall be designed with vertical curves.

Boulevards from property line to the roadway will be graded to provide a minimum of 2% and a maximum of 4% gradient towards the roadway, irrespective of whether a sidewalk is required or not.

2.1.4 Road Allowance Requirements

Road allowances shall be designed to conform to table "Alignment Standards".
# DIVISION "C" SECTION C1.2
## DESIGN CRITERIA ROADWORKS

<table>
<thead>
<tr>
<th>ROAD CLASSIFICATION</th>
<th>ROAD TYPE</th>
<th>ROAD ALLOWANCE (m) *1</th>
<th>NO. OF LANES</th>
<th>DESIGN SPEED (km/hr)</th>
<th>*6 MINIMUM PAVEMENT WIDTH (m)</th>
<th>PARKING NO. OF SIDES</th>
<th>MINIMUM CENTRELINE RADIUS (m)</th>
<th>MINIMUM STOPPING SIGHT DISTANCE (m)</th>
<th>MINIMUM SAG K</th>
<th>MINIMUM CREST K</th>
<th>MINIMUM ILLUMINATION SAG K</th>
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<tbody>
<tr>
<td>LOCAL</td>
<td>ULU</td>
<td>18-20</td>
<td>2</td>
<td>50</td>
<td>8.5</td>
<td>1</td>
<td>90</td>
<td>65</td>
<td>12</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>RLU</td>
<td>23</td>
<td>2</td>
<td>50</td>
<td>8.5</td>
<td>1</td>
<td>90</td>
<td>65</td>
<td>12</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>MINOR COLLECTOR</td>
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<td>23</td>
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<td>50</td>
<td>9.75</td>
<td>1</td>
<td>90</td>
<td>65</td>
<td>12</td>
<td>8</td>
<td>5</td>
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<tr>
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<td>UCU</td>
<td>26</td>
<td>3-4</td>
<td>60</td>
<td>10.5</td>
<td>0</td>
<td>130</td>
<td>85</td>
<td>18</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>UCD</td>
<td>28</td>
<td>4</td>
<td>60</td>
<td>7</td>
<td>0</td>
<td>130</td>
<td>85</td>
<td>18</td>
<td>15</td>
<td>8</td>
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<td>26</td>
<td>3-4</td>
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<td>85</td>
<td>18</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>UID</td>
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<td>7.5</td>
<td>0</td>
<td>130</td>
<td>85</td>
<td>18</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>CUL-DE-SAC</td>
<td>23</td>
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<td>50</td>
<td>10</td>
<td>0</td>
<td>130</td>
<td>65</td>
<td>12</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>ARTERIAL</td>
<td>UAU</td>
<td>36</td>
<td>3-6</td>
<td>90</td>
<td>10.5</td>
<td>0</td>
<td>340</td>
<td>160</td>
<td>40</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>UAD</td>
<td>36</td>
<td>4-6</td>
<td>90</td>
<td>7</td>
<td>0</td>
<td>340</td>
<td>160</td>
<td>40</td>
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<td>20</td>
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<tr>
<td></td>
<td>RAU</td>
<td>36</td>
<td>3-6</td>
<td>90</td>
<td>10.5</td>
<td>0</td>
<td>340</td>
<td>160</td>
<td>40</td>
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<td>RAD</td>
<td>36</td>
<td>4-6</td>
<td>90</td>
<td>7</td>
<td>0</td>
<td>340</td>
<td>160</td>
<td>40</td>
<td>50</td>
<td>20</td>
</tr>
</tbody>
</table>

Additional road allowance width may be required at intersections to accommodate turning lanes.

Legend (Road Type)
- **U** Urban
- **R** Rural
- **L** Local
- **C** Collector
- **I** Industrial
- **A** Arterial
- **U** Undivided
- **D** Divided

---

2 For ULU streets – 18m road allowances are permitted for:
   a) Cul-de-sacs servicing no more than 20 dwelling units
   b) Crescents with two access points and no more than 40 dwelling units
   c) "P" type road alignments with one access point are to be treated as cul-de-sacs

3 For RLU cul-de-sac streets the ROW can be reduced to 20.0m

4 Minimum island width of 2.0m is required to accommodate landscaping

5 Minimum island width of 1.5m is required and shall be finished with asphalt or concrete

6 All lane widths shall be 3.5m minimum except for industrial roads where lane widths shall be 3.75m minimum
DIVISION "C" SECTION C1.2

DESIGN CRITERIA ROADWORKS

2   GEOMETRICS

2.1   ALIGNMENT & ROAD ALLOWANCE REQUIREMENTS

2.1.4   Road Allowance Requirements - (Cont'd)

The typical road allowance cross-section shall be as detailed on the Standard Drawings. Details shall be provided for any approved special provisions required due to unique physical conditions on site or for existing or future design conditions, such as; retaining walls, slope protection, culverts, bridges or special cross fall conditions.

Temporary turn-a-rounds as per Standard R-9A are required where a road will be continued in the future and shall have complete services to the street line. Land easements within the subdivision must be deeded to the Town to facilitate this installation, if necessary.
DIVISION "C" SECTION C1.3

DESIGN CRITERIA ROADWORKS

3 INTERSECTION DESIGN

Definitions

Daylighting or Sight Triangle: means a triangular area of land on or abutting a corner lot formed by measuring from the point of intersection of the street boundaries (street lines) the distance required by Table C1.3A "Intersection Geometry".

3.1 General

Intersection designs, including lane configuration and vehicle storage details shall be determined by an Intersection Analysis prepared by a Traffic Engineer using the following:

"Geometric Design Standards for Ontario Highways" (Latest Revision)

3.2 INTERSECTION GEOMETRY AND GRADING

Daylighting triangles and curb radii shall conform to Table C1.3A "Intersection Geometry".

The minimum horizontal angle between street centre lines shall be 80° - 100°.

At the intersection of two roads, the transition of the minor classification road, shall not interfere with the normal cross-fall of the major road.

In all cases, the minor road shall have a minimum 20.0m transition grade equivalent to the cross-fall of the higher order road. This distance shall be measured from the edge of pavement of the higher order road.

Where the major road is super-elevated, the transition grade shall not exceed 2.0%.
### DIVISION "C" SECTION C1.3

**DESIGN CRITERIA ROADWORKS**

**TABLE C1.3A – INTERSECTION GEOMETRY**

<table>
<thead>
<tr>
<th>ROAD CLASSIFICATION</th>
<th>INTERSECTING ROAD CLASS</th>
<th>DAYLIGHTING DIMENSION (m)</th>
<th>CURB RADII (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL</td>
<td>LOCAL</td>
<td>4.5</td>
<td>7.5</td>
</tr>
<tr>
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<td>MINOR COLLECTOR</td>
<td>4.5</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>MAJOR COLLECTOR</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>INDUSTRIAL</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>ARTERIAL</td>
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<td>7.5</td>
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<td>LOCAL</td>
<td>4.5</td>
<td>7.5</td>
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<tr>
<td></td>
<td>MINOR COLLECTOR</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
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<td>MAJOR COLLECTOR</td>
<td>9.5</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
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<td>9.5</td>
<td>9</td>
</tr>
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<td>12</td>
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<td>MAJOR COLLECTOR</td>
<td>LOCAL</td>
<td>7.5</td>
<td>7.5</td>
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<tr>
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<td>15</td>
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<td>7.5</td>
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</tr>
<tr>
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<td>15</td>
<td>15</td>
</tr>
<tr>
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<td>LOCAL</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>MINOR COLLECTOR</td>
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</tr>
<tr>
<td></td>
<td>MAJOR COLLECTOR</td>
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<td>15</td>
</tr>
<tr>
<td></td>
<td>INDUSTRIAL</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>ARTERIAL</td>
<td>15</td>
<td>15</td>
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</tbody>
</table>
DIVISION "C" SECTION C1.4

DESIGN CRITERIA ROADWORKS

4 DRIVEWAY DESIGN

Definitions:

Driveway Apron: The driveway apron is that portion of a driveway contained within the municipal road allowance.

4.1 General

All driveways shall be finished with a permanent stable surface material such as asphalt or paving stone from the edge of the road to the garage.

Driveway aprons and curb depressions shall not encroach onto the projection of any side lot line except in the case of driveways deemed in the opinion of the Commissioner of Environment and Infrastructure Services, to be mutual or common.

In the case of a corner lot, no portion of a driveway shall be located within a daylighting or sight triangle.

Maximum residential driveway apron and curb depression widths shall conform to Table C1.4A "Residential Driveway Apron Standard Table".

The minimum driveway gradient is 2.0% and the maximum desirable driveway gradient is 5%. The absolute maximum gradient change permissible at the street line or back of sidewalk shall be 3.0% subject to the site specific approval of the Commissioner of Environment and Infrastructure Services. This maximum gradient change is not recommended and shall be employed only in exceptional cases where physical conditions prohibit the use of a less severe change in gradient.

Commercial and High Density underground garage driveway ramps shall have a maximum 10% grade (unheated) and a maximum 15% grade (heated). All entrances shall have a maximum 6.0m level approach to the ramp.
### C1.4A: Residential Driveway Apron Standard Table

<table>
<thead>
<tr>
<th>Lot Frontage Width measured along Front Lot line Dimension &quot;A&quot;</th>
<th>Town Highway with Curb</th>
<th>Town Highway without Curb</th>
<th>Any Town Highway</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Curb Depression</td>
<td>Second Curb Depression</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum width Dimension &quot;B&quot;</td>
<td>Maximum width Dimension &quot;D&quot;</td>
<td></td>
</tr>
<tr>
<td>Less than 9.0 meters One driveway apron is permitted.</td>
<td>4.25 meters</td>
<td>Not Permitted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.0 meters</td>
<td>Not Permitted</td>
<td></td>
</tr>
<tr>
<td>Greater than or equal to 9.0 meters but less than 18.0 meters One driveway apron is permitted.</td>
<td>6.0 meters</td>
<td>Not Permitted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.0 meters</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td>Greater than or equal to 18.0 meters but less than 30.0 meters Where one driveway apron is permitted.</td>
<td>6.0 meters</td>
<td>4.25 meters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.0 meters</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td>Greater than or equal to 30.0 meters Where one driveway apron is permitted.</td>
<td>9.0 meters</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.0 meters</td>
<td>6.0 meters</td>
<td></td>
</tr>
<tr>
<td>Greater than or equal to 30.0 meters Where two driveway aprons are permitted.</td>
<td>9.0 meters</td>
<td>6.0 meters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.0 meters</td>
<td>6.0 meters</td>
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</tr>
</tbody>
</table>

Maximum width at Edge of Traveled Road Dimension "B" or "D" or "C" or "E"
DIVISION "C" SECTION C1.4

DESIGN CRITERIA ROADWORKS

4.1 DRIVEWAY DESIGN GENERAL - Cont'd

Mutual or common driveways may receive a continuous curb depression at the sole discretion of the Commissioner of Environment and Infrastructure Services.

All apartment, commercial and industrial driveways shall be provided with curb and gutter constructed in accordance with details as outlined on the Standard Drawings contained herein.

For Commercial, Industrial and High/Medium Residential Development driveway entrances, the curb radii shall be 7.5m minimum and the entrance width shall be a minimum 7.5m. The minimum driveway entrance curb radii and width shall be increased were determined necessary and required by the Commissioner of Environment and Infrastructure Services.

New Commercial, Industrial and Residential Development driveways constructed on existing urban roadways shall have the existing curb removed and replaced with depressed, reinforced curb as per the standards contained herein. Sawcutting of curbs will not be permitted.

Where a driveway apron crosses the municipal storm ditch drainage system the installation of culvert headwalls or wing-walls will not be permitted.

A minimum clear distance of 1.20 m shall be maintained between the edge of any portion of a driveway and any above ground municipal or utilities infrastructure.
DIVISION "C" SECTION C1.5

DESIGN CRITERIA ROADWORKS

5  STRUCTURAL REQUIREMENTS FOR ROADWORKS AND DRIVEWAYS

5.1  General

All pavement designs shall be supported by a Geotechnical report prepared by a Professional Engineer which recommends a minimum pavement structure design required to support the anticipated traffic loading. The pavement design shall consider whether the street is a Transit route.

Table "Structural Requirements for Roads" provides the Town's minimum pavement structure requirements by road classification. Where the Geotechnical report and pavement design noted above exceed the minimum requirements in Table "Structural Requirements for Roads", the designer shall specify the higher strength pavement structure.

The Town will not accept increased base or sub-base granular equivalence's in lieu of thinner asphalt.

All construction practices and materials shall conform to the Ontario Provincial Standard Specifications adopted (as amended) contained herein.

Table "Structural Requirements for Driveway Aprons" provides the Town's minimum structural requirements.

The top course asphalt for residential driveways shall not be placed until the base course asphalt has been in place for one winter season, unless otherwise specifically approved by the Commissioner of Environment and Infrastructure Services.
### DIVISION "C" SECTION C1.5

### DESIGN CRITERIA ROADWORKS

#### TABLE STRUCTURAL REQUIREMENTS FOR ROADS

<table>
<thead>
<tr>
<th>ROAD CLASSIFICATION</th>
<th>GRANULAR ‘A’ SUBBASE (mm DEPTH)</th>
<th>20mm CRUSHER RUN LIMESTONE BASE (mm DEPTH)</th>
<th>HL8 ASPHALT BASE COARSE (mm DEPTH)</th>
<th>HL3 ASPHALT SURFACE COARSE (mm DEPTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL</td>
<td>300</td>
<td>150</td>
<td>75</td>
<td>40</td>
</tr>
<tr>
<td>LOCAL – BUS ROUTE</td>
<td>400</td>
<td>150</td>
<td>75</td>
<td>40</td>
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<tr>
<td>MINOR COLLECTOR</td>
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<td>150</td>
<td>75</td>
<td>40</td>
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<tr>
<td>MAJOR COLLECTOR</td>
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<td>INDUSTRIAL</td>
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<td>150</td>
<td>100</td>
<td>40</td>
</tr>
<tr>
<td>ARTERIAL</td>
<td>450</td>
<td>150</td>
<td>100</td>
<td>40</td>
</tr>
</tbody>
</table>

#### TABLE – STRUCTURAL REQUIREMENTS FOR DRIVEWAY APRONS

<table>
<thead>
<tr>
<th>DRIVEWAY CLASS</th>
<th>GRANULAR ‘A’ SUBBASE (mm DEPTH)</th>
<th>200mm CRUSHER RUN LIMESTONE BASE (mm DEPTH)</th>
<th>HL8 ASPHALT BASE COARSE (mm DEPTH)</th>
<th>HL3F ASPHALT SURFACE COARSE (mm DEPTH)</th>
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<tbody>
<tr>
<td>RESIDENTIAL *1</td>
<td>N/A</td>
<td>150</td>
<td>50</td>
<td>25</td>
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<tr>
<td>LIGHT INDUSTRIAL</td>
<td>200</td>
<td>200</td>
<td>75</td>
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<tr>
<td>COMMERCIAL APARTMENT</td>
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<td></td>
<td></td>
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<tr>
<td>RESIDENT/CONDO</td>
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<tr>
<td>HEAVY INDUSTRIAL</td>
<td>300</td>
<td>300</td>
<td>100</td>
<td>40</td>
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</tbody>
</table>

*1) Paving stone driveway aprons shall be constructed in accordance with standard R-7A.
DIVISION "C" SECTION C1.6

ON ROAD BICYCLE FACILITIES

1. ON ROAD BICYCLE FACILITIES

1.1 DEFINITION

All roadways, unless cycling is specifically restricted, are considered to be shared roadways regardless of the presence specific signage. For the purpose of this document, an On Road Bicycle Facility shall be defined as a roadway or a section of roadway that has been designated for shared or exclusive use by cyclist with means of signage, pavement marking or both. The facilities are intended for one-way travel typically in the same direction as the adjacent traffic lane.

1.2 TYPES OF ON ROAD BICYCLE FACILITIES

- Shared Roadways
- Designated Bicycle Lanes
- Paved Shoulders – this facility shall be implemented only as directed by the Town

1.3 SHARED ROADWAYS

Shared roadways including signed routes and sharrows (pavement marking) are preferred routes for cycling, but no physical changes are made to the roadway.

Shared roadways shall be implemented where a road design speed is less than or equal to 50km/hr. and where a designated bicycle lane cannot be provided. Shared roadways typically apply to local and minor collector roads.

1.3.1 General Requirements for Shared Roadways Signage

Shared Roadways signage shall be in accordance with the TAC Bikeway Traffic Control Guidelines for Canada, 2012 (or latest version), Sections 2.4.2 Standard Sign Placement and 4.0 Warning Signs or equivalents in accordance to Ontario Traffic Manual (OTM) Book 18:

- Bicycle Route Signs (M511)

(Bicycle Route Signs M511 shall be installed at all designated bicycle routes as a minimum.)
DIVISION "C" SECTION C1.6

ON ROAD BICYCLE FACILITIES

1.3 SHARED ROADWAYS

1.3.1 General Requirements for Shared Roadways Signage - (Cont’d)

Any shared roadway signage shall be installed where road configuration or road classification changes. Signs shall be installed between each intersection and a minimum 15m distance from the end of the curb radius return. Maximum signage spacing shall be 200m where distance between intersections is greater than 200m. Additional signage may be installed as required.

- Share the Road Signs (WC-19 and WC-19t)

![WC-19 and WC-19t](source)

Share the road signs WC-19 and WC-19t are the required signage.

- Shared Use Lane Single File Signs (WC-24 and WC-24t)

![WC-24 and WC-24t](source)

Shared use lane single file signs WC-24 and WC-24t shall be used where the travelled roadway width is less than 8.0m wide.
1.4 **DESIGNATED BICYCLE LANE**

Designated bicycle lanes are a dedicated space for cyclists located in the travelled portion of the roadway for one-way cyclist traffic.

Designated bicycle lanes shall be implemented where a road design speed is greater than or equal to 60km/hr. and where a designated bicycle lane can be provided. Designated bicycle lanes apply to collector road and arterial road.

The designated bicycle facility width shall provide an operating space of 1.5m as shown in the figure below.

![Diagram of designated bicycle lane](Source: OTM Book 18: Cycling Facilities, December 2013, Figure 2.2, Page 15)

### 1.4.1 General Requirements for Designated Bicycle Lane Signage

Designated Bicycle Lane signage shall be in accordance with the *TAC Bikeway Traffic Control Guidelines for Canada, 2012 (or latest version)*, Sections 2.4.2 Standard Sign Placement, 3.0 Regulatory Signs and Section 4.0 Warning Signs or equivalents in accordance with Ontario Traffic Manual (OTM) Book 18.
DIVISION "C" SECTION C1.6
ON ROAD BICYCLE FACILITIES

1.4 DESIGNATED BICYCLE LANE

1.4.1 General Requirements for Designated Bicycle Lane Signage – (Cont’d)

- Reserved Bicycle Lane Signs (RB-84A, RB-85t, WB-10)

![Reserved Bicycle Lane Signs](image)

(Source: OTM Book 18: Cycling Facilities, December 2013, Figure 4.20a, Page 63 and TAC Bikeway Traffic Control Guidelines for Canada, 2012, Section 4.5.4, Page 36)

RB-84A shall be installed between each intersection, a minimum 15m distance from the end of the curb radius return. Maximum signage spacing shall be 200m where the distance between intersections is greater than 200m. Additional signage may be required as directed by the Town.

End sign RB-85t shall be installed with RB-84A at the end of a designated bicycle lane.

WB-10 shall be installed where a designated bicycle lane is introduced on the far side of an intersection. The sign shall be installed at a minimum 30m distance prior to the curb radius return.

Reserved Bicycle Lane Signs shall be installed as illustrated in Figures under Section 1.5 and Standard Drawings R-16, R-17A and R-17B.

- Turning Vehicles Yield to Bicycles Sign (RB-37)

![Turning Vehicles Yield to Bicycles Sign](image)

(Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012, Section 3.2.3, Pages 15)

Turning Vehicles Yield to Bicycles Sign shall be installed at intersections where motorists are required to cross a designated bicycle lane. The sign shall be installed a minimum distance of 30m prior to the curb radius return, adjacent to the start of the dashed designated bicycle lane lines, or at the introduction of the right turn lane taper.

Turning Vehicles Yield to Bicycles Sign shall be installed as shown in Figures in Section 1.5.
DIVISION "C" SECTION C1.6
ON ROAD BICYCLE FACILITIES

1.5 DESIGNATED BICYCLE LANE FIGURES

1.5.1 Bicycle Lane Adjacent to a Combined Through/Right Turn Lane

(Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012, Figure 11, Page 72)

1.5.2 Bicycle Lane Adjacent to Introduced Right Turn Lane

(Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012, Figure 12, Page 73)
DIVISION "C" SECTION C1.6

ON ROAD BICYCLE FACILITIES

1.5  DESIGNATED BICYCLE LANE FIGURES – (Cont’d)

1.5.3  Bicycle Lane Adjacent to Merge Lane with Island

(Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012, Figure 15, Page 74)

1.5.4  Bicycle Lane Passing a Transit Stop

(Source: OTM Book 18: Cycling Facilities, Figure 5.19, Page 145)
DIVISION "C" SECTION C1.6

DESIGNATED MULTI-USE FACILITIES

2. DESIGNATED MULTI-USE FACILITIES

A Multi-Use Facility is a shared active transportation facility designed and specifically designated through signage or pavement marking or both for shared use by a variety of users including pedestrians, cyclists and in-line skaters.

Multi-Use Facilities shall conform to the requirements of the Accessibility Standard for the Design of Public Spaces, part of Ontario Regulation 191/11 under the Accessibility for Ontarians with Disabilities Act (AODA). If there are any discrepancies between the following Town of Richmond Hill Design Standards, the Design of Public Spaces Standards and the AODA, the Accessibility Standard for the Design of Public Spaces and the AODA shall take precedence.

2.1 TYPE OF MULTI-USE FACILITIES

- In-Boulevard Multi-Use Trails: Bi-directional trail located within the boulevard and parallel to the adjacent roadway. Use is restricted to the boulevards of collector and arterial classification roads.

- Off Road Multi-Use Trails: Bi-directional trail located in open space, valley land and parkland.

2.2 MULTI-USE FACILITIES – DESIGN CRITERIA

2.2.1 General

A multi-use facility shall require a minimum 1.0m horizontal clear zone and 2.5m vertical clear zone either side of the trail to provide an unobstructed safety buffer to trail users.

Minimum signage shall be provided to promote bi-directional trail and safety for users.

At the time of construction, a multi-use facility shall not be constructed within the minimum protection zone (MPZ) of a tree. A multi-use facility shall maintain a minimum 1.0m clearance from the MPZ where possible. If this is not achievable, the minimum clear zone shall be reviewed and approved by the Town prior to construction.
DIVISION "C" SECTION C1.6

DESIGNATED MULTI-USE FACILITIES

2.2 MULTI-USE FACILITIES – DESIGN CRITERIA – (Cont’d)

2.2.2 In-Boulevard Multi-Use Trails

The width of in-boulevard multi-use trail is 4.0m with a minimum 1.5m separation from the face of curb of the adjacent roadway. Where the 4.0m width cannot be achieved, a minimum width for in-boulevard multi-use trail is 3.0m. A minimum 1.0m horizontal clear zone, 2.5m vertical clear zone and 2.1m to 2.5m signage height shall be provided on either side of the multi-use trail to provide an unobstructed safety buffer as shown in the figure below:

2.2.3 Off Road Multi-Use Trails

The minimum desirable width for off road multi-use facilities is 3.0m. A minimum 1.0m horizontal clear zone and 2.5m vertical clear zone shall be provided on either side of the multi-use trail to provide an unobstructed safety buffer as shown in the figure below:
2.3 GENERAL REQUIREMENTS FOR MULTI-USE FACILITY SIGNAGE

Multi-Use Facility signage shall be in accordance with the *TAC Bikeway Traffic Control Guidelines for Canada, 2012* (or latest version), Sections 2.4.2 Standard Sign Placement, 3.0 Regulatory Signs and Section 4.0 Warning Signs or equivalents in accordance with *Ontario Traffic Manual (OTM) Book 18*.

- **Shared Pathway Signage (RB-93)**

  ![Shared Pathway Signage](Image)

  (Source: OTM Book 18: Cycling Facilities, December 2013, Fig. 4.90, Page 117)

  Shared pathway sign RB-71 shall be installed to inform users to share the multi-use trails. This sign shall be installed after road intersections, a minimum 15m distance from the end of the curb radius return, and other road connection points where cyclists and pedestrians can access the multi-use facility as illustrated on Standard Drawings R-17A, R-17B, R-18A, R-18B, R-19A, R-19B, and R-19C.
DIVISION "C" SECTION C1.6

DESIGNATED MULTI-USE FACILITIES

2.3 GENERAL REQUIREMENTS FOR MULTI-USE FACILITY SIGNAGE – Cont’d

- Pedestrian and Cyclist Crossing Ahead Signs (WC-15 and WC-32t)

![WC-15 (OTM)](image1)

![WC-32t (OTM)](image2)

(Source: OTM Book 18: Cycling Facilities, December 2013, Figs. 4.94 and 4.95, Pages 118 and 119)

The pedestrian and cycling crossing ahead sign shall be installed to inform motorists of a multi-use facility crossing ahead.

Crossing sign WC-32t shall be installed with WC-15 to convey the meaning of the sign. The signs shall be installed at a minimum 95m distance prior to the curb radius return as illustrated on Standard Drawings R-17A, R-17B, R-18A and R-18B.

For uncontrolled mid-block multi-use facility crossings, the signs shall be installed at a minimum 95m distance prior to the crossing or where visibility and sight lines permit as illustrated on Standard Drawings R-19A and R-19C.

- Pedestrian and Cyclist Crossing Side Street Sign (WC-44L and WC-44R)

![WC-44L](image3)

![WC-44R](image4)

(Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012 Section 4.6.5, Page 38 and OTM Book 18: Cycling Facilities, December 2013, Figs. 4.95 & 4.96, Page 119)

Pedestrian and cyclist crossing side street signs shall be installed to warn motorists where cyclists may be crossing the side street at the approaching intersection.

Crossing signs shall be installed at a minimum 15m distance prior to the curb radius return as illustrated on Standard Drawings R-17A, R-18A, R-18B and R-18C.
DIVISION "C" SECTION C1.6

DESIGNATED MULTI-USE FACILITIES

2.3 GENERAL REQUIREMENTS FOR MULTI-USE FACILITY SIGNAGE – Cont’d

- **Cyclists Yield to Pedestrians Sign (RB-73)**

  (Source: OTM Book 18: Cycling Facilities, December 2013, Figs. 4.92, Page 118)

Cyclists yield to Pedestrians sign shall be installed where the multi-use trail intersects with a pedestrian sidewalk or pedestrian crossing to warn cyclists to yield to other trail users, for example, at bus stops and at trailhead connections. The sign shall also be installed on off road multi-use trails at trailhead and as directed by the Town where sight lines are limited to 25 metres or less as a result of sharp vertical or horizontal curves and areas of thick woodlands, shrubs and tall meadow grasses.

The signs shall be installed at a minimum 15m distance prior to bus stop.

- **Dismount and Walk Sign (RB-70)**

  (Source: OTM Book 18: Cycling Facilities, December 2013, Figs. 4.93, Page 118)

Cyclists dismount and walk signs shall be installed where the cyclists are required to dismount and walk their bicycle at bridge crossings, boardwalk crossings and uncontrolled midblock crossings.

Dismount and Walk sign RB-70 shall be installed at a minimum 15m distance prior to bridge crossings and boardwalk crossings.
2.4 GRADING AND DRAINAGE REQUIREMENTS

2.4.1 In-Boulevard Multi-use Trails

The minimum longitudinal gradient on multi-use trail shall be 0.6%. The maximum desirable gradient shall be 5.0%. Multi-use trail where the adjacent roadways gradient is greater than 5.0% must be no steeper than the roadways gradient.

In-boulevard multi-use trail shall have positive grade towards the adjacent roadway with a minimum cross slope of 2.0% and a maximum of 5.0%.

Grading alignment and drainage requirements shall be in accordance with the Town of Richmond Hill Standards and Specifications Manual, Division “C” – Transportation and Roadworks.

2.4.2 Off Road Multi-use Trails

The minimum longitudinal gradient on off road multi-use trail shall be 0.6%. The maximum desirable gradient shall be 5.0%. Multi-use trails where existing gradient is greater than 5% must be no steeper than 8.0% slope for relatively short sections of trail.

The existing surrounding area drainage patterns shall be maintained and surface run-off shall not be channeled to cross or flow along multi-use trail surface. Trails shall have a minimum cross slope of 2.0% and a maximum of 5.0%.

Where site conditions dictate, multi-use trails may include subdrains to prevent saturation of the granular base material. Subdrains shall be 100mm diameter perforated PVC pipe completed with filter sock.

2.5 HANDRAIL

Handrails shall be incorporated in multi-use trails design where the longitudinal slope is greater than 5.0%.
DIVISION "C" SECTION C1.6

DESIGNATED MULTI-USE FACILITIES

2.6 SAFETY BARRICADE

Safety barricades shall be incorporated in multi-use trail design where specified as follows:

- Equal to or flatter than 3:1 slope with vertical height greater than 0.60m from adjacent ground and less than a minimum 1.0m clearance unobstructed buffer zone
- Steeper than 3:1 slope with vertical height greater than 0.60m from adjacent ground
- All slopes where vertical height is greater than 1.20m from the adjacent ground
- On the edge of a retaining wall or boardwalk with a vertical height greater than 0.60m from the adjacent ground.
- To separate the multi-use facility user from environmentally sensitive areas.
- To prevent multi-use facility users from taking short-cuts down steep slopes.
- As a barrier between the multi-use facility and adjacent watercourses and ponds.

2.7 ACCESS BARRIER GATE

Multi-use facilities shall be constructed to allow access to maintenance and operation and emergency services vehicles. Access must be controlled to restrict other vehicular entry but allow pedestrians and cyclists access. The barrier gate must be easily opened and closed in all seasons.

Access Barrier Gate shall be placed as close to the facility trailhead as possible without encroaching onto the road allowance or impeding in order to provide visual awareness to users that they are approaching the roadway.

The Standard Drawing R-20A and R-20B detail a “P-Type” access barrier gate installation that shall be installed at all multi-use facility trailheads.

The staggered formation of the gates shall allow access for wheelchairs and other mobility aids but restrict access of other vehicles including, but not limited to snowmobiles, recreational vehicles and small cars.

The gate shall overlap one another in the staggered configuration by 150mm regardless of the facility width.
DIVISION "C" SECTION C1.6

DESIGNATED MULTI-USE FACILITIES

2.8 RETAINING WALL

Retaining walls shall be incorporated in multi-use trail design where:
- side slope is steeper than 2:1 slope and can’t be stabilized with vegetation
- to save and protect existing trees
- to reduce the possibility of erosion

Where the height of a retaining wall exceeds 1.5m, the wall shall be structurally designed by a Professional Engineer.

Where the height of a retaining wall exceeds 1.5m, the railing is required.

Where possible, retaining walls shall not be constructed within required 1.0m horizontal clearance zone. Where it is not possible to achieve, requirements for safety barricades specified under Section Safety Barricades must be implemented.

2.9 EDGE PROTECTION

Edge protection shall be incorporated in multi-use trail design where safety barricades are not required, but where the facility runs adjacent to a watercourse or adjacent to a drop in elevation.

Edge protection is site specific and it will be incorporated in the design as directed by the Town.

2.10 BRIDGE AND BOARDWALK

Bridge, Boardwalk or both shall be incorporated in multi-use trail design at all watercourse crossings.

Bridge and boardwalk shall be incorporated in multi-use trail as directed and approved by the Town.

2.11 OFF ROAD MULTI-USE TRAIL TRAILHEAD ELEMENTS

A trailhead facilitates access to a multi-use facility. Trailheads shall be where a facility intersects a road and any other significant or appropriate locations as directed. Standard Drawings R-21A, R-21B and R-21C represent the basic requirements for a typical multi-use facility trailhead adjacent local, minor/major collector and arterial roads. The final layout and elements of a trailhead design shall be determined on a site specific basis.

Site specific design landscape features shall be constructed in conjunction with access barrier gates to deter facility users from circumventing the gates.
DIVISION "C" SECTION C1.6

DESIGNATED MULTI-USE FACILITIES

2.11 OFF ROAD MULTI-USE FACILITY TRAILHEAD ELEMENTS – (Cont’d)

2.11.1 Trailhead Entrance Feature Signage

Trailhead entrance feature signage shall be provided at each trailhead and shall identify as minimum following information:

- Trail length
- Surface type, construction material
- Average and minimum trail width
- Average and maximum running slope and cross slope
- Location of amenities

2.11.2 Bicycle Racks

Bicycle racks shall be provided at each trailhead with following standards:

- To be made of stainless steel
- To have an eight (8) bike capacity
- Constructed with heave duty high quality steel
- Mainframe C.R.W. outside diameter: 1 3/8” H.S.: ¾ round bar
- Pin to Pin width approximately 48 inches
- Triangle Hangers 5/8 inch solid hot rolled rod
- Racks to have Town Logos which will be provided by the Town

2.11.3 Bicycle Lockers

Bicycle Lockers shall be installed as directed by the Town with following standards:

- To be made of durable fiberglass reinforced plastic, each to hold a single bike
- Approximate overall dimensions 74 ½”L x 30”W x 48”H
- Each is to have a 16”W x 18”H steel mesh front
- Supply “C-struct” channels, 2”x4” to be used as risers for installation
- Doors to have swing handles to permit cyclist to lock with cyclist owned padlock
- Colour of locker to be Green
- Lockers to have Town and Cycling Logos which will be provided by the Town

2.11.4 Bicycle Pedestals

Bicycle Pedestals shall be installed as directed by the Town with following standards:

- To be made of galvanized dipped steel
- Approximate overall dimensions 19”L x 6”W x 42”H
- To be mounted on ground with plate
- Mainframe outside diameter: 2 3/8” and rounder outside diameter: 1.9”
3. PAVEMENT STRUCTURE AND MARKINGS

3.1 PAVEMENT STRUCTURE

3.1.1 Multi-Use Facility Structural Requirements

The intent of a multi-use facility is that it be well used by cyclists, pedestrians and other users. Facilities shall be designed for a durable life span and low maintenance and operation costs. Multi-use facilities shall be constructed to permit accessibility to vehicles for routine maintenance and inspections.

The “Multi-Use Facility Structural Requirements Table” provides the Town’s minimum pavement structure requirements by multi-use facility functions and locations.

The Town will not accept increased base or sub-base granular equivalents in lieu of reduced asphalt thicknesses.

The edges of the multi-use facility shall be hand tamped to 45° at edges.

- In-Boulevard Multi-Use Trail and Off Road Multi-Use Trail with Winter Maintenance

Medium duty asphalt surfacing shall be used for in-boulevard multi-use trails and off road multi-use trail where winter maintenance is required. Refer to Standard Drawing R-22A for the construction details.

- Off Road Multi-Use Trail without winter maintenance

Light duty asphalt pavement structure shall be used for off-road multi-use trails where winter maintenance is not required. Refer to Standard Drawing R-22A for the construction details.

- Multi-Use Trail Crossing Industrial/Commercial/Institutional Entrances

The pavement structure of a multi-use trail carried through industrial/commercial/institutional entrances shall be in accordance with the Structural Requirement for Driveway Aprons under Section C1.4.
3.1 PAVEMENT STRUCTURE

3.1.1 Multi-Use Facility Structural Requirements – (Cont’d)

MULTI-USE FACILITY STRUCTURAL REQUIREMENTS TABLE

<table>
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<tr>
<th>Location</th>
<th>Granular ‘A’ Sub-base (mm Depth)</th>
<th>20mm Crusher Run Limestone Base (mm Depth)</th>
<th>HL 8 Asphalt Base Course (mm Depth)</th>
<th>HL 3 Asphalt Surface Course (mm Depth)</th>
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<td>150</td>
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<td>75</td>
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</tbody>
</table>

*[^1] Terrafix 270R Filter Fabric (or approved equivalent) shall be placed to separate the undisturbed or compacted subgrade from the granular base.

3.1.2 Trailhead Structural Requirement

- **Concrete Pad: Light Duty**

Concrete pad Light duty on a granular base shall be used for multi-use facility trailheads as directed by the Town. The Standards R-22C illustrates the construction details and the thickness of the required materials including:

- 150mm compacted depth Granular ‘A’
- 125mm compacted concrete

- **Concrete Pad: Medium Duty**

Concrete pad Medium duty on a granular base shall be used for multi-use facility trailhead as directed by the Town. The Standards R-22C illustrates the construction details and the thickness of the required materials including:

- 200mm compacted depth Granular ‘A’
- 180mm compacted concrete
DIVISION "C" SECTION C1.6

PAVEMENT STRUCTURE AND MARKINGS

3.2 PAVEMENT MARKINGS

The use of pavement marking shall be minimized. Signage is the desired means of communicating with bicycle facility and multi-use facility users.

Pavement markings shall be white thermoplastic material in accordance with OPSS 1713.

3.2.1 On Road Bicycle Facility Pavement Markings

- Solid/Dashed White Lines
  - Solid White Line:
  - Dashed White Line:

  (Source: OTM Book 18: Cycling Facilities, December 2013, Fig. 4.24 and 4.25, Page 65)

Solid white pavement markings shall be used to delineate designated bicycle lane.

Dashed white pavement markings shall be used to delineate a section of a designated bicycle lane where a vehicle may cross over. Refer to SECTION C1.6.1.5 for reference where a dashed line shall be used.

- Shared Use “Sharrow” Pavement Markings

  (Source: OTM Book 18: Cycling Facilities, December 2013, Fig. 4.6, Page 47)
DIVISION "C" SECTION C1.6

PAVEMENT STRUCTURE AND MARKINGS

3.2.1 On Road Bicycle Facility Pavement Markings – (Cont’d)

   o Shared Use “Sharrow” Pavement Markings – (Cont’d)

Shared use “sharrow” pavement markings include two white chevron markings and a white bicycle marking constructed to the dimensions shown above. Sharrow pavement markings shall be used in conjunction with shared roadway signage on collector roads. Shared use “sharrow” pavement marking shall be placed immediately before and following an intersection and/or designated bicycle facility transition to shared roadway. Sharrows shall be placed at 75m intervals.

Where on-street parking is not permitted, the centre of the sharrow marking shall be laterally placed a minimum 0.75m and a maximum 1.0m from the face of curb.

Where on-street parking is permitted, the centre of the sharrow marking shall be laterally placed 1.3m from the edge of the parking lane.

   o Designated Bicycle Lane Pavement Markings

Designated bicycle lane pavement markings shall include a bicycle symbol and a diamond symbol constructed to the dimensions shown. The markings shall be used in conjunction with designated bicycle lane signage, as described in SECTION C1.6.1.4.

The markings shall be placed immediately following intersections and segments of designated bicycle lane delineated with dashed lines where vehicles may cross over. Refer to SECTION C1.6.1.5 for reference where pavement markings shall be used.

Designated bicycle lane pavement markings shall be placed at minimum 200m distance where intersections are spaced more than 400m apart. Site specific factors shall apply where the markings may be placed more frequently to identify the presence of cyclist.

(Source: OTM Book 18: Cycling Facilities, December 2013, Fig. 4.26, Page 65)
DIVISION "C" SECTION C1.6

PAVEMENT STRUCTURE AND MARKINGS

3.2.2 In-Boulevard Multi-Use Trail Pavement Markings

- **Elephant’s Feet Pavement Markings at Intersection/Road Crossings**

  ![Elephant’s Feet Pavement Markings](image)

  (Source: OTM Book 18: Cycling Facilities, December 2013, Fig. 4.100, Page 120)

  Elephant’s Feet pavement markings shall be used to delineate the cyclist section of a multi-use facility intersection and roadway crossing, as illustrated on Standard Drawings R-17A, R-17B, R-18A and R-18B.

- **Zebra Crosswalk Pavement Markings at Intersection/Road Crossings**

  ![Zebra Crosswalk Pavement Markings](image)

  (Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012 (Table 7-1, Page 55)

  Zebra Crosswalk pavement markings shall be used to delineate the pedestrian section of a multi-use facility intersection and roadway crossing, as illustrated on Standard Drawings R-17A, R-17B, R-18A and R-18B.
DIVISION "C"

SECTION C2

TRANSPORTATION
AND
ROAD WORKS

SPECIFICATIONS

ROADWORKS
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(OPSS DIVISION 2)  
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(OPSS DIVISION 3)
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CONSTRUCTION SPECIFICATIONS  
PAVEMENT (FLEXIBLE AND RIGID)

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<td>CONSTRUCTION SPECIFICATION FOR UNTREATED GRANULAR, SUBBASE, BASE, SURFACE, SHOULDER AND STOCKPILING</td>
<td></td>
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<tr>
<td>315</td>
<td>CONSTRUCTION SPECIFICATION FOR UNTREATED GRANULAR, SUBBASE, BASE, SURFACE, SHOULDER AND STOCKPILING</td>
<td></td>
<td></td>
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<tr>
<td>316</td>
<td>CONSTRUCTION SPECIFICATION FOR EXTRUDED EXPANDED POLYSTYRENE FROST HEAVE TREATMENT</td>
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<tr>
<td>320</td>
<td>CONSTRUCTION SPECIFICATION FOR ASPHALT CEMENT TREATED OPEN GRADED DRAINAGE LAYER</td>
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<tr>
<td>330</td>
<td>CONSTRUCTION SPECIFICATION FOR IN-PLACE FULL DEPTH RECLAMATION OF BITUMINOUS PAVEMENT AND UNDERLYING GRANULAR</td>
<td></td>
<td></td>
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<tr>
<td>341</td>
<td>CONSTRUCTION SPECIFICATION FOR ROUTING AND SEALING CRACKS IN HOT MIX ASPHALT PAVEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>336</td>
<td>CONSTRUCTION SPECIFICATION FOR MICROSURFACING</td>
<td></td>
<td></td>
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<tr>
<td>350</td>
<td>CONSTRUCTION SPECIFICATION FOR CONCRETE PAVEMENT, CONCRETE BASE AND LEAN CONCRETE BASE</td>
<td></td>
<td></td>
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<tr>
<td>351</td>
<td>CONSTRUCTION SPECIFICATION FOR CONCRETE SIDEWALK</td>
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<td>OPSS</td>
<td>DESCRIPTION</td>
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<tr>
<td>405</td>
<td>CONSTRUCTION SPECIFICATION FOR PIPE SUBDRAINS</td>
<td></td>
<td>Shall be 150 mm dia. Polyethylene Pipe with Geotextile pre-wrap.</td>
</tr>
<tr>
<td>501</td>
<td>CONSTRUCTION SPECIFICATION FOR COMPACTING</td>
<td></td>
<td>Earth materials to be compacted 98% Standard Proctor Density to 600mm below road subbase and 95% Standard Proctor density at depths in excess of 600mm below the road subbase.</td>
</tr>
<tr>
<td>502</td>
<td>CONSTRUCTION SPECIFICATION FOR WEIGHING OF MATERIALS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>506</td>
<td>CONSTRUCTION SPECIFICATION FOR DUST SUPPRESSANTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>507</td>
<td>CONSTRUCTION SPECIFICATION FOR SITE RESTORATION FOR UNDERGROUND UTILITIES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>510</td>
<td>CONSTRUCTION SPECIFICATION FOR REMOVAL</td>
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<td></td>
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# DIVISION "C" SECTION C2.4  
(OPSS DIVISION 10)  
MATERIAL SPECIFICATIONS - AGGREGATES

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
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<tbody>
<tr>
<td>1001</td>
<td>MATERIAL</td>
<td>1001</td>
<td>Reclaim of concrete shall not be used</td>
</tr>
<tr>
<td></td>
<td>SPECIFICATION AGGREGATES - GENERAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1002</td>
<td>MATERIAL</td>
<td>1002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPECIFICATION FOR AGGREGATES - CONCRETE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1003</td>
<td>MATERIAL</td>
<td>1003</td>
<td>Reclaim of concrete shall not be used.</td>
</tr>
<tr>
<td></td>
<td>SPECIFICATION FOR AGGREGATES - HOT MIXED, HOT LAID, ASPHALTIC CONCRETE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1010</td>
<td>MATERIAL</td>
<td>1010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SPECIFICATION FOR AGGREGATES, GRANULAR A, B, M AND SELECT SUBGRADE MATERIAL</td>
<td></td>
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</table>
### DIVISION "C" SECTION C2.5
#### (OPSS DIVISION 11)
#### MATERIAL SPECIFICATIONS - BITUMENS

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>1101</td>
<td>MATERIAL SPECIFICATION FOR ASPHALT CEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1102</td>
<td>MATERIAL SPECIFICATION FOR LIQUID ASPHALT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1103</td>
<td>MATERIAL SPECIFICATION FOR EMULSIFIED ASPHALT</td>
<td></td>
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</tr>
<tr>
<td>1149</td>
<td>MATERIAL SPECIFICATION FOR HOT MIX, HOT LAID AND ASPHALT CONCRETE, INCLUDING RECYCLED AND SPECIALTY MIXES</td>
<td></td>
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<tr>
<td>1150</td>
<td>MATERIAL SPECIFICATION FOR HOT MIXED, HOT LAID ASPHALT CONCRETE</td>
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<td></td>
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<tr>
<td>1151</td>
<td>MATERIAL SPECIFICATION FOR DENSE GRADED THIN BITUMINOUS HOT MIX</td>
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<tr>
<td>1152</td>
<td>MATERIAL SPECIFICATION FOR SC-800 PATCHING MATERIAL</td>
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<tr>
<td>1153</td>
<td>MATERIAL SPECIFICATION FOR EMULSIFIED ASPHALT PATCHING MATERIAL</td>
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</table>
**DIVISION "C" SECTION C2.5**  
**(OPSS DIVISION 11)**  
**MATERIAL SPECIFICATIONS - BITUMENS**

<table>
<thead>
<tr>
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<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>1154</td>
<td>MATERIAL SPECIFICATION FOR HOT MIXED, HOT LAID, ASPHALTIC CONCRETE CONTAINING RECLAIMED ASPHALT PAVEMENT</td>
<td>a) Max. use of re-claimed asphalt shall be 25% in binder courses. b) Re-claimed asphalt is not permitted in surface course asphalt.</td>
<td></td>
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<tr>
<td>1155</td>
<td>MATERIAL SPECIFICATION FOR MEDIUM DUTY BINDER COURSE ASPHALTIC CONCRETE</td>
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## DIVISION "C" SECTION C2.6
### (OPSS DIVISION 13)
#### MATERIAL SPECIFICATIONS - CEMENT AND CONCRETE

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>1303</td>
<td>MATERIAL SPECIFICATION FOR AIR ENTRAINING AND CHEMICAL ADMIXTURES FOR PORTLAND CEMENT CONCRETE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1305</td>
<td>MATERIAL SPECIFICATION FOR MOISTURE VAPOUR BARRIERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1306</td>
<td>MATERIAL SPECIFICATION FOR BURLAP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1308</td>
<td>MATERIAL SPECIFICATION FOR JOINT FILLER (CONCRETE)</td>
<td>Section 1308.05.01</td>
<td>Type &quot;C&quot; wood is not approved</td>
</tr>
<tr>
<td>1312</td>
<td>MATERIAL SPECIFICATION FOR LATEX MODIFIERS FOR USE IN PORTLAND CEMENT CONCRETE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1315</td>
<td>MATERIAL SPECIFICATION FOR WHITE PIGMENTED MEMBRANE CURING COMPOUNDS FOR CONCRETE</td>
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<tr>
<td>1350</td>
<td>MATERIAL SPECIFICATION FOR CONCRETE - MATERIALS AND PRODUCTION</td>
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DIVISION "C" SECTION C2.7  
(OPSS DIVISION 14)  
MATERIAL SPECIFICATIONS - METAL

<table>
<thead>
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<tr>
<td>1440</td>
<td>MATERIAL SPECIFICATION FOR STEEL REINFORCEMENT FOR CONCRETE</td>
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DIVISION "C" SECTION C2.8  
(OPSS DIVISION 15)  
MATERIAL SPECIFICATIONS - SAFETY RELATED

<table>
<thead>
<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
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<th>COMMENT</th>
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<tbody>
<tr>
<td>1504</td>
<td>MATERIAL SPECIFICATION FOR STEEL BEAM GUIDE RAIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1505</td>
<td>MATERIAL SPECIFICATION FOR CHANNEL COMPONENTS (STEEL BEAM GUIDE RAIL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1506</td>
<td>MATERIAL SPECIFICATION FOR TIMBER POSTS AND BLOCKS (STEEL BEAM GUIDE RAIL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1508</td>
<td>MATERIAL SPECIFICATION FOR ROUND WOOD POSTS</td>
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</table>
DIVISION "C"

SECTION C3

TRANSPORTATION
AND
ROAD WORKS

TOWN OF RICHMOND HILL
STANDARD DRAWINGS
ROADWORKS
NOTES:

1) THIS STANDARD TO BE USED FOR CUL-DE-SAC'S OR CRESCENTS WITH TWO ACCESS POINTS ON TO THE SAME STREET.

2) THIS STANDARD TO BE USED IN CONJUNCTION WITH "CONSTRUCTION REQUIREMENTS FOR THE INSTALLATION AND MAINTENANCE OF UNDERGROUND UTILITIES AND SERVICES POLICY."

CONSTRUCTION DETAIL @ DRIVEWAY

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

TYPICAL STREET CROSS - SECTION
18.0m R.O.W.

SCALE: N.T.S.
DATE: NOV. 1996

DRAWN: A.J.V.
DWG. No. R-2A
NOTES:

1) THIS STANDARD TO BE USED FOR CUL-DE-SACS OR CRESCENTS WITH TWO ACCESS POINTS ON TO THE SAME STREET.

2) THIS STANDARD TO BE USED IN CONJUNCTION WITH "CONSTRUCTION REQUIREMENTS FOR THE INSTALLATION AND MAINTENANCE OF UNDERGROUND UTILITIES AND SERVICES POLICY."

3) MAX. WIDTH OF JOINT UTILITY TRENCH IS 1.6m. IF TRENCH WIDTH IS LESS THAN 1.6m, THIS OFFSET FROM PROPERTY LINE SHALL BE INCREASED ACCORDINGLY. THE OFFSET TO THE OPPOSITE EDGE OF TRENCH SHALL REMAIN FIXED AT 2.1m.
NOTES:
1) THIS STANDARD TO BE USED FOR CUL-DE-SACS OR CRESTS WITH TWO ACCESS POINTS ON TO THE SAME STREET.

2) THIS STANDARD TO BE USED IN CONJUNCTION WITH "CONSTRUCTION REQUIREMENTS FOR THE INSTALLATION AND MAINTENANCE OF UNDERGROUND UTILITIES AND SERVICES POLICY."

3) MAX. WIDTH OF JOINT UTILITY TRENCH IS 1.6m. IF TRENCH WIDTH IS LESS THAN 1.6m, THIS OFFSET FROM PROPERTY LINE SHALL BE INCREASED ACCORDINGLY. THE OFFSET TO THE OPPOSITE EDGE OF TRENCH SHALL REMAIN FIXED.
BOULEVARD WIDTH VARIES AROUND BULB.

RESIDENTIAL

<table>
<thead>
<tr>
<th>R.O.W.</th>
<th>R1</th>
<th>R2</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>18m</td>
<td>19.75m</td>
<td>3.75m</td>
<td>4.75m</td>
<td>8.5m</td>
</tr>
<tr>
<td>20m</td>
<td>20.75m</td>
<td>30.75m</td>
<td>5.75m</td>
<td>8.5m</td>
</tr>
</tbody>
</table>

INDUSTRIAL

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<tr>
<th>R.O.W.</th>
<th>R1</th>
<th>R2</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>23m</td>
<td>21m</td>
<td>40m</td>
<td>6.5m</td>
<td>10m</td>
</tr>
</tbody>
</table>

NOTE:
GUTTER ELEVATIONS AND GRADES AROUND CUL-DE-SAC SHALL BE DETAILED ON THE ENGINEERING DWG'S.

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

TYPICAL CUL-DE-SAC

SCALE: N.T.S. DATE: NOV. 1996
DRAWN: A.J.V. DWG. No. R-3A
NOTE:
GUTTER ELEVATIONS AND GRADES TO BE SPECIFIED ON PLANS

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

TYPICAL 90° CRESCENT

SCALE: N.T.S.  DATE: NOV. 1996
DRAWN: A.J.V.  DWG. No. R-4A
NOTES:

1. MINIMUM ROADWAY WIDTH,
   NO PARKING - ONE WAY = 4.0m
   NO PARKING - TWO WAY = 6.0m
   ONE SIDE PARKING - ONE WAY = 6.0m
   ONE SIDE PARKING - TWO WAY = 8.5m

2. GRADE ON ROADWAY 5.0% MAX., 0.5% MIN.

3. THE REQUIREMENTS FOR SIDEWALK WILL BE DETERMINED BY THE TOWN.

SECTION A-A

TOWN OF RICHMOND HILL
ENVIRONMENT & INFRASTRUCTURE SERVICES

TYPICAL VEHICULAR ACCESS FOR CONDOMINIUMS AND PRIVATE DEVELOPMENTS

SCALE: N.T.S.       DATE: NOV. 1996
DRAWN: A.J.V.       DWG. NO. R-5A

1. UPDATED TURNING RADIUS 08/18 SW
REV: DATE APP'D
TREE AND/OR SHRUB PLANTINGS TO PARKS DEPARTMENT REQUIREMENTS (BOTH SIDES)

150mm COMPACTED THICKNESS GRANULAR "A"

50mm H/L 3A ASPHALT OR CONC. AS PER OPSD 3/0.010 OR INTERLOCKING PAVING STONE (STD R-7A)

6.0m WALKWAY

150mm COMPACTED THICKNESS GRANULAR "A"

50mm H/L 3A ASPHALT OR CONC. AS PER OPSD 3/0.010 OR INTERLOCKING PAVING STONE (STD R-7A)

3.0m WALKWAY

NOTES:
1. SODDED SWALES SHALL FLOW INTO ROADSIDE DITCH, OR INTO CURB & GUTTER, WITH A MINIMUM GRADE OF 2.00%
2. FENCING SHALL BE AS PER OPSD 900.01 AS AMENDED BY THE TOWN

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

PEDESTRIAN WALKWAYS

SCALE: N.T.S. DATE: NOV. 1996
DRAWN: A.J.V. DWG. No. R-6A
NOTES:
1. USE STANDARD, EDGING AND 1/2 EDGING STONES AS REQUIRED.
2. ALL CUT PAVING STONES SHALL HAVE TRUE EVEN EDGES.
3. PAVER EDGE RESTRAINTS AS PER MANUFACTURERS SPECIFICATION OR AS APPROVED BY THE TOWN.
NOTES:

1. ALL CURB AND GUTTER SHALL BE CONCRETE BARRIER TYPE AS PER OPSSD-600.04

2. CURB STANDARD AT SIDEWALK SHALL CONFORM TO TOWN STD. R-8A

3. PROPOSED DRIVEWAYS SHALL BE LOCATED AS INDICATED ON THIS STANDARD. CONSIDERATION WILL NOT BE GIVEN TO ALTERNATIVE LAYOUTS

4. SERVICE CONNECTIONS SHALL BE LOCATED IN ACCORDANCE WITH TOWN STD. M-2A
NOTES

1. BUS SHELTER BASE AND LANDING PADS SHALL CONFORM TO SIDEWALK STD OPSD 310.010.

2. BUS SHELTER SHALL BE LOCATED BEYOND THE PROJECTION OF DAYLIGHTING TRIANGLE AT INTERSECTIONS.

3. BUS STOPS SHALL BE LOCATED ON NEAR SIDE OF INTERSECTIONS.

4. MID BLOCK BUS STOPS TO HAVE LANDING PAD CONSTRUCTED AS PER THIS DETAIL.
1. MINIMUM INTENSITY OF NUMERALS IS:
   ASTM D 4956-90 TYPE 1
2. PLATES AND NUMBERS AVAILABLE AT:
   ALPINE GRAPHICS 34 MAGNUM DRIVE, SCHOMBERG, ON
NOTES:
1. USE COMPRESSION TYPE CONNECTORS THROUGHOUT.
2. POLE HOLE TO BE 600mm DIA. BY AUGER METHOD ONLY.
3. BACKFILL POLE HOLE TO BASE OF CABLE PORTS WITH LIMESTONE SCREENINGS IN 100mm WELL COMPACTED LAYERS 150mm OF SAND AROUND S/L CONDUCTOR AND FINISH WITH LIMESTONE SCREENINGS IN 100mm WELL COMPACTED LAYERS UP TO 100mm OF FINISHED GRADE.
NOTES:

1. USE COMPRESSION TYPE CONNECTORS THROUGHOUT.
2. POLE HOLE TO BE 607mm DIA. BY AUGER METHOD ONLY.
3. BACKFILL POLE HOLE TO BASE OF CABLE PORTS WITH LIMESTONE SCREENING IN 102mm WELL COMPACTED LAYERS: 150mm OF SAND AROUND S/L CONDUCTOR AND FINISH WITH LIMESTONE SCREENING IN 100mm WELL COMPACTED LAYERS UP TO 100mm OF FINISHED GRADE.
4. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SHOWN.

| "X"  | 9.9m | 12.2m |
| "Y"  | 1.6m | 1.8m |
NOTES

1. BUS SHELTER BASE, BENCH BASE AND LANDING PADS SHALL CONFORM TO SIDEWALK STD OPSD 310.010.

2. BUS SHELTER SHALL BE LOCATED BEYOND THE PROJECTION OF DAYLIGHTING TRIANGLE AT INTERSECTIONS.

3. BUS STOPS SHALL BE LOCATED ON NEAR SIDE OF INTERSECTIONS.

4. MID BLOCK BUS STOPS TO HAVE LANDING PAD CONSTRUCTED AS PER THIS DETAIL.
NOTES:

1) To be read in conjunction with Table C1.4A – "Allowable Driveway Apron Widths", Division 'C', Section 1.4 of the Roadworks Design Criteria.

2) All dimensions are in meters unless otherwise noted

1) \( \Delta' = 60' \) Minimum \( \Delta' = 120' \) Maximum
NOTES:

1) To be read in conjunction with Table C1.4A - “Allowable Driveway Apron Widths”, Division 'C', Section 1.4 of the Roadworks Design Criteria.

2) All dimensions are in meters unless otherwise noted

1) $\Delta = 60^\circ$ Minimum  $\Delta' = 120^\circ$ Maximum
NOTES:

1) POINT "X": Intersection point of the projected lateral highway property lines

2) LINE "Y": A straight line joining the two points established using dimension "Z"

3) DIMENSION "Z": To be Determined in accordance with Table C1.3A - Intersection Geometry, Division 'C', Section C1.3, Design Criteria Roadworks

4) No portion of a driveway apron shall be located within a sight triangle or situated in such a way that a vehicle parked on any portion of a driveway impedes the line of sight across a sight triangle.

5) All dimensions are in meters unless otherwise noted.
Notes:

1. Arrows and numbers on drawing indicates sequence and direction of vehicle movement.
2. Walkway shall be provided along any portion of the private road and the turnaround which has units front on to it or as directed by the Town.
3. Dedicated snow storage area is not included in turnaround area.
4. Playground area shall not be located at either end of turnaround area.
NOTES:

1. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE A MINIMUM 610mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE, TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.

2. PAVEMENT MARKINGS TO BE WHITE THERMOPLASTIC MATERIAL IN ACCORDANCE WITH OPSS 1713.

3. FOR PAVEMENT MARKING DETAILS, REFER TO SECTION C1.7.3 - PAVEMENT STRUCTURE AND MARKINGS.

4. FOR DESIGNATED BICYCLE LANE SIGNAGE DETAILS, REFER TO SECTION C1.7.1 - ON ROAD BICYCLE FACILITIES.

5. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.

6. WC-15 TO BE INSTALLED IN ACCORDANCE WITH OTM BOOK 6, TABLE 4. ROADWAY CONFIGURATION MAY CONSTRAIN THE DISTANCE FROM THE CROSSING TO A NON-STANDARD DISTANCE.
NOTES:

1. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE A MINIMUM 610mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE, TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.

2. PAVEMENT MARKINGS TO BE WHITE THERMOPLASTIC MATERIAL IN ACCORDANCE WITH OPSS 1713.

3. FOR PAVEMENT MARKING DETAILS, REFER TO SECTION C1.7.3 - PAVEMENT STRUCTURE AND MARKINGS.

4. FOR DESIGNATED BICYCLE LANE SIGNAGE DETAILS, REFER TO SECTION C1.7.1 - ON ROAD BICYCLE FACILITIES.

5. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.

6. Wc-15 TO BE INSTALLED IN ACCORDANCE WITH OTM BOOK 6, TABLE 4. ROADWAY CONFIGURATION MAY CONSTRAIN THE DISTANCE FROM THE CROSSING TO A NON-STANDARD DISTANCE.
NOTES:

1. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE A MINIMUM 600mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE. TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.

2. PAVEMENT MARKINGS TO BE WHITE THERMOPLASTIC MATERIAL IN ACCORDANCE WITH OPSS 1713.

3. FOR PAVEMENT MARKING DETAILS, REFER TO SECTION C1.7.3 - PAVEMENT STRUCTURE AND MARKINGS.

4. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.

5. WC-15 TO BE INSTALLED IN ACCORDANCE WITH OTM BOOK 6, TABLE 4. ROADWAY CONFIGURATION MAY CONSTRAIN THE DISTANCE FROM THE CROSSING TO A NON-STANDARD DISTANCE.
NOTES:

1. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE A MINIMUM 610mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE. TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.

2. PAVEMENT MARKINGS TO BE WHITE THERMOPLASTIC MATERIAL IN ACCORDANCE WITH OPSS 1713.

3. FOR PAVEMENT MARKING DETAILS, REFER TO SECTION C1.7.3 - PAVEMENT STRUCTURE AND MARKINGS.

4. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.

5. Wc-15 TO BE INSTALLED IN ACCORDANCE WITH OTM BOOK 6, TABLE 4. ROADWAY CONFIGURATION MAY CONSTRAIN THE DISTANCE FROM THE CROSSING TO A NON-STANDARD DISTANCE.
1. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE A MINIMUM 610mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE. TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.
2. PAVEMENT MARKINGS TO BE WHITE THERMOPLASTIC MATERIAL IN ACCORDANCE WITH OPSS 1713.
3. FOR PAVEMENT MARKING DETAILS, REFER TO SECTION C1.7.3 - PAVEMENT STRUCTURE AND MARKINGS.
4. PAVEMENT STRUCTURE FOR A MULTI-USE TRAIL THROUGH A INDUSTRIAL/COMMERCIAL/INSTITUTIONAL ENTRANCE SHALL BE IN ACCORDANCE WITH SECTION C1.7.3 - PAVEMENT STRUCTURE AND MARKINGS.
5. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.
6. WC-15 TO BE INSTALLED IN ACCORDANCE WITH OTM BOOK 6, TABLE 4. ROADWAY CONFIGURATION MAY CONSTRAIN THE DISTANCE FROM THE CROSSING TO A NON-STANDARD DISTANCE.
NOTES:
1. UNCONTROLLED MID-BLOCK MULTI-USE TRAIL CROSSINGS SHALL CONFORM TO THE REQUIREMENTS DETAILED IN OTM BOOK 15 - PEDESTRIAN CROSSING FACILITIES.
2. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE A MINIMUM 610mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE, TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.
3. FOR ACCESS BARRIER GATE DETAILS, REFER TO R-20A AND R-20B.
4. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.
5. Wo-15 TO BE INSTALLED IN ACCORDANCE WITH OTM BOOK 6, TABLE 4. ROADWAY CONFIGURATION MAY CONSTRAIN THE DISTANCE FROM THE CROSSING TO A NON-STANDARD DISTANCE.
NOTES:

1. FOR ACCESS BARRIER GATE DETAILS, REFER TO R-20A AND R-20B.
2. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE MINIMUM 610mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE. TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.
3. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.
4. FOR SHARED ROADWAY SIGNAGE DETAILS, REFER TO SECTION C1.7.1 - ON ROAD BICYCLE FACILITIES.
5. TRAILHEAD ELEMENTS AT LOCAL ROADS SHALL BE IN ACCORDANCE WITH R-21A.
NOTES:
1. UNCONTROLLED MID-BLOCK MULTI-USE TRAIL CROSSINGS SHALL CONFORM TO THE REQUIREMENTS DETAILED IN OTM BOOK 15 - PEDESTRIAN CROSSING FACILITIES.
2. TACTILE WALKING SURFACE INDICATORS (TWI) TO BE A MINIMUM 610mm DEPTH AND EXTEND THE FULL WIDTH OF THE CURB RAMP. TWI TO BE SET BACK 150mm - 200mm FROM THE CURB EDGE. TWI BASE TO BE LEVEL WITH ADJACENT SURFACE WITH TACTILE PROFILES RAISED ABOVE THE GROUND SURFACE. TWI TO BE COLOUR CONTRASTED WITH ADJACENT SURFACES.
3. FOR ACCESS BARRIER GATE DETAILS, REFER TO R-20A AND R-20B.
4. FOR MULTI-USE TRAIL SIGNAGE DETAILS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.
5. FOR SHARED ROADSIGNAGE DETAILS, REFER TO SECTION C1.7.1 - ON ROAD BICYCLE FACILITIES.
6. TRAILHEAD ELEMENTS AT LOCAL ROADS SHALL BE IN ACCORDANCE WITH R-21A.
7. Wc-15 TO BE INSTALLED IN ACCORDANCE WITH OTM BOOK 6, TABLE 4. ROADWAY CONFIGURATION MAY CONSTRAIN THE DISTANCE FROM THE CROSSING TO A NON-STANDARD DISTANCE.
HOLE TO ALLOW LAGGING TO CONCRETE WITH 19mm THREADED RODS AND ACORN NUTS.

PLAN OF BASE

BOLLARD IS SITE SPECIFIC. TO BE APPROVED BY THE TOWN OF RICHMOND HILL

LOCKING PIN (TO BE ACCESSIBLE YEAR ROUND)

SWING GATE IS SITE SPECIFIC. TO BE APPROVED BY THE TOWN OF RICHMOND HILL

SLOPE OUTER EDGE OF TOP OF FOOTING TO FACILITATE DRAINAGE

REMOVE VISIBLE PORTION OF SONO-TUBE PRIOR TO BACKFILLING

CONCRETE FOOTING; Poured-IN-PLACE CONCRETE WITH SONO-TUBE (OR EQUIVALENT) USED FOR TOP 600mm OF FOOTING

#3 HORIZONTAL REBAR TIES @ 300 O.C

4 #5 VERTICAL REBAR

UNDISTURBED OR COMPACTED SUBGRADE 98% S.P.D.

NOTES:
1. ACCESS GATES TO BE MANUFACTURED BY:
   a.) MAGLIN SITE FURNITURE
   b.) PARIS Equipment Manufacturing Ltd.
   OR APPROVED EQUIVALENT.
2. ACCESS GATES COLOUR SHALL BE BLACK AND MATTE FINISH.
3. ALL DIMENSIONS SHOWN IN MILLIMETRES
4. CONCRETE TO BE 32 MPa @ 28 DAYS
5. REFER TO R-208 FOR ACCESS BARRIER GATE LAYOUT.

TOWN OF RICHMOND HILL
ENVIRONMENT & INFRASTRUCTURE SERVICES

ACCESS BARRIER GATE

SCALE: N.T.S.
DATE: JAN 2016

DRAWN: A&A
DWG. No. R-20A
NOTES:
1. ACCESS GATES TO BE MANUFACTURED BY:
   a.) PARIS EQUIPMENT MANUFACTURING LTD.
   b.) MAGLIN SITE FURNITURE
   OR APPROVED EQUIVALENT.
2. ALL DIMENSIONS SHOWN IN MILLIMETRES
3. CONCRETE TO BE 32 MPa @ 28 DAYS
4. REFER TO R-20A FOR ACCESS BARRIER GATE DETAIL.
NOTES:
1. TOWN OF RICHMOND HILL REGULATORY AND SAFETY SIGNAGE IS SITE SPECIFIC.
2. FOR TRAILHEAD ELEMENT DETAILS, INCLUDING SIGNAGE REQUIREMENTS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.
3. FOR MULTI-USE TRAIL ALIGNMENT, REFER TO R-19A, R-19B, AND R-19C.
4. TRAILHEAD WIDTH TO BE NO LESS THAN TWICE THE WIDTH OF THE TRAIL.
5. THE LAYOUT OF TRAILHEAD ELEMENTS IS SITE SPECIFIC.
6. FOR ACCESS BARRIER GATE DETAILS, REFER TO R-20A AND R-20B.
NOTES:
1. TOWN OF RICHMOND HILL REGULATORY AND SAFETY SIGNAGE IS SITE SPECIFIC.
2. FOR TRAILHEAD ELEMENT DETAILS, INCLUDING SIGNAGE REQUIREMENTS, REFER TO SECTION C1.7.2 - DESIGNATED MULTI-USE FACILITIES.
3. FOR MULTI-USE TRAIL ALIGNMENT, REFER TO R-19A, R-19B, AND R-19C.
4. THE LAYOUT OF TRAILHEAD ELEMENTS IS SITE SPECIFIC.
5. FOR ACCESS BARRIER GATE DETAILS, REFER TO R-20A AND R-20B.
LIGHT DUTY ASPHALT SURFACING

MEDIUM DUTY ASPHALT SURFACING

NOTES:
1. CONSTRUCTION SPECIFICATIONS FOR HOT MIX ASPHALT SHALL BE IN ACCORDANCE WITH OPSS 310.
2. CONSTRUCTION SPECIFICATIONS FOR GRANULAR MATERIAL SHALL BE IN ACCORDANCE WITH OPSS 314.
3. MULTI-USE TRAIL SHOULD BE CONSTRUCTED A MINIMUM OF 1.0m FROM THE MINIMUM PROTECTION ZONE OF A TREE.
4. A MULTI-USE TRAIL CROSSING THROUGH A INDUSTRIAL/COMMERCIAL/INSTITUTIONAL ENTRANCE SHALL HAVE 200mm COMPACTED DEPTH GRANULAR ‘A’ SUB-BASE, 200mm COMPACTED DEPTH 20mm CRUSHER RUN LIMESTONE BASE, 75mm DEPTH HL8 BASE COURSE ASPHALT AND 40mm DEPTH HL3 SURFACE COURSE ASPHALT.
CONCRETE JOINTS DETAIL

- 25mm TOOLED JOINT WITH 10mm RADIUS
- 12mm TOOLED JOINT 1/4 DEPTH OF CONCRETE THICKNESS
- EXPANSION JOINT - BITUMINOUS FIBRE TO BOTTOM OF CONCRETE

NOTES:
1. EXPANSION JOINT SPACING @ 6000mm O.C., UNLESS OTHERWISE SHOWN ON DRAWINGS.
2. CONTROL JOINT SPACING @ 2000mm O.C., UNLESS OTHERWISE SHOWN ON DRAWINGS.

LIGHT DUTY CONCRETE PAVING

- 125mm
- 150mm
- TOOLED EDGE
- POURED CONCRETE - CONTINUOUS BROOM FINISH PATTERN ACROSS PATH
- REFER TO INSET FOR JOINTS DETAIL
- 150mm COMPACTED DEPTH
- 20mm CRUSHER RUN LIMESTONE
- UNDISTURBED OR COMPACTED SUBGRADE

MEDIUM DUTY CONCRETE PAVING

- 160mm
- 200mm
- TOOLED EDGE
- POURED CONCRETE - CONTINUOUS BROOM FINISH PATTERN ACROSS PATH
- REFER TO INSET FOR JOINTS DETAIL
- 200mm COMPACTED DEPTH
- 20mm CRUSHER RUN LIMESTONE
- UNDISTURBED OR COMPACTED SUBGRADE

NOTES:
1. CONSTRUCTION SPECIFICATIONS FOR CONCRETE PAVEMENT SHALL BE IN ACCORDANCE WITH OPSS 350.
2. CONSTRUCTION SPECIFICATIONS FOR GRANULAR MATERIAL SHALL BE IN ACCORDANCE WITH OPSS 314.
DIVISION "C"

SECTION C4

TRANSPORTATION AND ROADWORKS

ADOPTED ONTARIO PROVINCIAL STANDARD AND MINISTRY OF TRANSPORTATION DRAWINGS
## DIVISION "C" SECTION C4.1 (OPSD DIVISION 200) GRADING SECTIONS

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<td>BOULDER TREATMENT - CUT SECTIONS</td>
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<td>205.01</td>
<td>TRANSITION TREATMENT - EARTH CUT TO EARTH FILL</td>
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<td>TRANSITION TREATMENT - EARTH FILL TO ROCK FILL</td>
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<td>FROST HEAVE TREATMENT</td>
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<td>206.01</td>
<td>GRANULAR COURSES UNDIVIDED RURAL</td>
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<td>209.01</td>
<td>WIDENING GRANULAR BASE</td>
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<td>210.02</td>
<td>SUPER ELEVATED SHOULDERS RURAL</td>
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<tr>
<td>211.010</td>
<td>PARTIALLY PAVED SHOULDER - EXISTING PAVEMENT MAINTAINED</td>
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<tr>
<td>211.020</td>
<td>PARTIALLY PAVED SHOULDER - EXISTING PAVEMENT RESURFACED</td>
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<tr>
<td>212.01</td>
<td>RESURFACING WITH CROSSFALL CORRECTION TANGENT SECTION</td>
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DIVISION "C" SECTION C4.1
(OPSD DIVISION 200)
GRADING SECTIONS

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<td>212.02</td>
<td>RESURFACING WITH CROSSFALL CORRECTION SUPER ELEVATED SECTION</td>
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<td>212.03</td>
<td>RESURFACING EXISTING CROSSFALL MAINTAINED</td>
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<tr>
<td>213.01</td>
<td>PAVEMENT WIDENING ON CURVES, WIDENING ON BOTH SIDES OF CURVE WITH OR WITHOUT SPIRALS</td>
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<tr>
<td>213.02</td>
<td>PAVEMENT WIDENING ON CURVES, WIDENING ON INSIDE OF CURVES WITH OR WITHOUT SPIRALS</td>
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<tr>
<td>216.010</td>
<td>BOULEVARD TREATMENTS - URBAN SECTION</td>
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### DIVISION "C" SECTION C4.2
**(OPSD DIVISION 300)**
**GRADING SECTIONS**

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<td>300.01</td>
<td>SIDE ROAD ENTRANCE ON FILL</td>
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</tr>
<tr>
<td>300.02</td>
<td>SIDE ROAD ENTRANCE EARTH CUT</td>
<td></td>
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</tr>
<tr>
<td>301.01</td>
<td>RURAL ENTRANCES TO ROADS ON FILL</td>
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<td></td>
</tr>
<tr>
<td>301.02</td>
<td>RURAL ENTRANCES TO ROADS IN EARTH CUT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>310.010</td>
<td>CONCRETE SIDEWALK</td>
<td>1. Sidewalks are not to be constructed through commercial or industrial driveways.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Note 2 shall be revised to read as follows “sidewalk width shall be increased to a minimum of 1.80 m”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Sidewalk bays shall be 1.5m to 2.0m maximum in length. Contraction joints shall be constructed on either side of residential driveways.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Granular base under sidewalks shall be 75mm minimum - Granular &quot;A&quot; material and shall be increased to 150mm minimum under driveways.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Sidewalk concrete depth shall be increased to 250mm for 1st panel from curb returns at all commercial and industrial driveways.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Polyethylene membrane shall be used on sub-grade unless otherwise directed.</td>
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</tr>
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</table>
## ADDITION OR REPLACES TOWN OF RICHMOND HILL STD.

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</thead>
<tbody>
<tr>
<td>310.020</td>
<td>CONCRETE SIDEWALK ADJACENT TO CURB AND GUTTER</td>
<td>1. Sidewalks are not to be constructed through commercial or industrial driveways.</td>
</tr>
<tr>
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<td></td>
<td>2. Note 2 shall be revised to read as follows &quot;sidewalk width shall be increased to a minimum of 1.80 m.&quot;</td>
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<td>3. Sidewalk bays shall be 1.5m to 2.0m maximum in length. Contraction joints shall be constructed on either side of residential driveways.</td>
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<td>5. Sidewalk concrete depth shall be increased to 250mm for 1st panel from curb returns at all commercial and industrial driveways.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Sidewalks constructed adjacent to an existing curb shall be set in to a 50mm x 100mm key cut in to the back of the curb as directed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Polyethylene membrane shall be used on sub-grade unless otherwise directed.</td>
</tr>
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</table>
### DIVISION "C" SECTION C4.2  
(OPSD DIVISION 300)  
SIDE ENTRANCES

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<tr>
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<tbody>
<tr>
<td>310.030</td>
<td>CONCRETE SIDEWALK RAMPS AT SIGNALIZED INTERSECTIONS</td>
<td>1. Dropped curb ramp width shall be a minimum of 1.5m</td>
<td>R-8A and R-8B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. If sidewalk width is greater than 1.5m, curb ramp width shall match sidewalk width</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Note # 6 shall be revised as follows: “Minimum thickness of ramp is 250mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 250mm.</td>
<td></td>
</tr>
<tr>
<td>310.031</td>
<td>CONCRETE SIDEWALK RAMPS AT SIGNALIZED INTERSECTIONS WITH INTERSECTING CROSSWALKS</td>
<td>1. Dropped curb ramp width shall be a minimum of 1.5m</td>
<td>R-8A and R-8B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. If sidewalk width is greater than 1.5m, curb ramp width shall match sidewalk width</td>
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</tr>
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<td></td>
<td>3. Note # 6 shall be revised as follows: “Minimum thickness of ramp is 250mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 250mm.</td>
<td></td>
</tr>
<tr>
<td>310.033</td>
<td>CONCRETE SIDEWALK RAMPS AT UNSIGNALIZED INTERSECTIONS</td>
<td>1. Dropped curb ramp width shall be a minimum of 1.5m</td>
<td>R-8A and R-8B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. If sidewalk width is greater than 1.5m, curb ramp width shall match sidewalk width</td>
<td></td>
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### DIVISION "C" SECTION C4.2  
(OPSD DIVISION 300)  
SIDE ENTRANCES

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<td>ADDITION OR REPLACES TOWN OF RICHMOND HILL STD.</td>
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3. Note # 5 shall be revised as follows: “Minimum thickness of ramp is 250mm. Minimum thickness of sidewalk and flared sides adjacent to ramp is 250mm.

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<tr>
<th>Code</th>
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<tr>
<td>310.039</td>
<td>CONCRETE SIDEWALK RAMPS TACTILE WALKING SURFACE INDICATORS COMPONENT</td>
<td>R-8A and R-8B</td>
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<tr>
<td>310.050</td>
<td>SIDEWALK DRIVEWAY ENTRANCE DETAILS</td>
<td>1. Remove note 1 - no sidewalk shall be constructed through commercial or industrial driveways.</td>
</tr>
<tr>
<td>350.01</td>
<td>URBAN INDUSTRIAL, COMMERCIAL AND APARTMENT ENTRANCES</td>
<td>1. Remove all reference to driveway widths.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Sidewalks to terminate at curb returns.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Curb return depression to terminate 0.45m either side of sidewalk.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. All entrance radii to be 7.5m minimum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Sidewalk concrete depth shall be increased to 250mm for 1st panel from curb returns for all commercial and industrial driveways</td>
</tr>
<tr>
<td>352.01</td>
<td>ROAD ACCESS DETAILS FOR RESIDENTIAL DEVELOPMENTS</td>
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<td>OPSD</td>
<td>DESCRIPTION</td>
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<tr>
<td>501.01</td>
<td>BUS BAYS</td>
<td>1. &quot;Bus bays shall be constructed on the far side of intersections&quot;.</td>
</tr>
<tr>
<td>504.01</td>
<td>RAISED TRAFFIC ISLAND</td>
<td>1. Note 2 to be removed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Sod is not permitted</td>
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<tr>
<td>507.01</td>
<td>END TREATMENT FOR PAVEMENT PATCHING</td>
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<tr>
<td>509.010</td>
<td>PAVEMENT REINSTATEMENT FOR UTILITY CUTS</td>
<td>1. This standard is adopted mix asphalt pavement only.</td>
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<td>600.04</td>
<td>CONCRETE BARRIER CURB WITH STANDARD GUTTER FOR FLEXIBLE PAVEMENT</td>
<td>1. 2-15m bars to be placed in industrial and commercial driveways and extend 600mm beyond each side of driveway.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Dropped curb to be maximum 75mm.</td>
</tr>
<tr>
<td>600.06</td>
<td>CONCRETE SEMI-MOUNTABLE WITH GUTTER</td>
<td>1. 2-15m bars to be placed in industrial and commercial driveways and extend 600mm beyond each side of driveway.</td>
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<td>2. Dropped curb to be maximum 75mm.</td>
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<td>600.07</td>
<td>CONCRETE BARRIER CURB WITH STANDARD GUTTER - TWO STAGE CONSTRUCTION</td>
<td>1. Dropped curb to be maximum 75mm.</td>
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<td>600.10</td>
<td>CONCRETE MOUNTABLE CURB WITH NARROW GUTTER</td>
<td>1. 2-15m bars to be placed in industrial and commercial driveways and extend 600mm beyond each side of driveway.</td>
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<td></td>
<td>2. Dropped curb to be maximum 75mm.</td>
</tr>
<tr>
<td>600.11</td>
<td>CONCRETE BARRIER CURB</td>
<td>1. 2-15m bars to be placed in industrial and commercial driveways and extend 600mm beyond each side of driveway.</td>
</tr>
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<td></td>
<td>2. Dropped curb to be maximum 75mm.</td>
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### DIVISION "C" SECTION C4.4  
**(OPSD DIVISION 600)**  
**CURBS AND GUTTERS**

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<td>STANDARD PRECAST CONCRETE CURB</td>
<td>1. Anchors to be minimum 450mm in length.</td>
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SECTION D1

GRADING
AND
DRAINAGE

DESIGN CRITERIA
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.1 Objectives

• That the area grading and resulting drainage patterns shall not adversely affect adjacent lands.

• That all areas shall be graded in such a manner as to ensure compliance with Town Standards, facilitate ease of maintenance and maximize use of the land.

• All existing perimeter ground elevations of the subject property shall remain undisturbed.

• All existing drainage run-off entering the subject property from adjacent lands shall be accommodated by the grading and drainage proposal presented for review to the Commissioner of Engineering and Public Works.

• That storm drainage shall be self contained within the subject property until it can be discharged to an existing municipal drainage system or natural watercourse in a manner acceptable to the Town of Richmond Hill.

• To minimize the use of rear lot catchbasins.

• To minimize the use of retaining walls and/or terracing.

• To preserve existing trees wherever practicable.
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.2 General Requirements

- Minimum acceptable gradient = 2.0%
- Maximum acceptable gradient = 5.0%
- Maximum acceptable slope = 3 parts horizontal to 1 part vertical.
- The average gradient of rear yard surfaces shall not exceed 10.0% and shall be measured by dividing the elevation difference by the measured distance using the following methods:
  
  i) From the rear of the house to the rear lot line.
  
  ii) Or, from the rear of the house to the lowest invert elevation of the rear swale.
  
  iii) And, from side lot line to side lot line over the full width of the lot.

  Should the average gradient exceed 10.0%, the Town shall require construction of a retaining wall to reduce the average gradient to an acceptable amount.

- No alterations to existing boundary elevations or adjacent lands shall be undertaken unless written agreement with the adjacent property owner is obtained and submitted in a format acceptable to the Town.

- All semi-detached lots shall utilize split lot drainage patterns only. Reference Town Standards G-3A and G-4A.

- Through draining lots are only permitted where lots backing onto each other have common rear lot corners and there is no change in direction of the matching side lot lines.

1.3 Swales

- Swales shall have a minimum gradient of 2.0%.

- Swale depths shall conform to the following requirements:
  
  i) Minimum depth = 150mm
  
  ii) Maximum side yard depth = 300mm
  
  iii) Maximum rear yard depth = 400mm
  
  iv) Maximum side slopes 3 parts horizontal to 1 part vertical
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.3 Swales (Cont'd)

- All swales or ditches having a velocity in excess of 1.5m/sec. shall be designed to incorporate erosion protection.

- Maximum Swale Flows
  
  i) The maximum flow allowable in a sideyard swale shall be that volume contributed from a drainage area of 0.05ha.

  ii) The maximum flow allowable in a rear yard swale shall be that volume contributed from a drainage area of 0.36 ha.

  iii) The maximum flow in any swale, which may be discharged directly onto any road allowance shall be that from a maximum area of 0.05ha of contributory area. Areas in excess of 0.05ha necessitate installation of an inlet structure to intercept run-off prior to its entering the road allowance.

- In no case shall any rear yard swale exceed 90m in length.

- The maximum distance from any rear lot line to the centre of any rear lot swale shall be 1.2m.

1.4 Driveways

- The minimum gradient on any driveway shall be 2.0%.

- The recommended maximum gradient on any driveway is 5.0%.

- The maximum gradient on any driveway shall be 7.5%. Proposed driveway gradients in excess of 5.0% will only be considered upon receipt of written justification from the owner's consultant.

- Driveway gradients shall be calculated based upon the back edge of a sidewalk constructed at the Town's Standard location and elevation regardless of whether or not the sidewalk actually in fact exists.

1.5 Transition Slopes

- Transition slopes located adjacent to property lines shall be constructed such that the top of slope is adjacent to the property line.

- Transition slopes between 5.0% and 3:1 shall not be used to maximize usable land.
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

- Transition slopes shall not be located within the side yard area between dwellings, except for walkouts. Within the rear yard area, transition slopes shall be offset 0.6m from the property line to maintain common side yard or rear yard swales.

- The maximum vertical grade transition across a front or rear yard shall be 1.2m. For walkout lots, the maximum vertical grade transition within the side yard between dwellings shall be 2.5m.

- 3:1 slopes shall not exceed a maximum height of 0.6m within the rear yard area. Two transition slopes may be used, one offset from each property line, to accommodate grade transitions exceeding 0.6m within the rear yard area.

1.6 Retaining Walls

- Retaining walls shall be constructed entirely on the upper property so that tie backs (if required) do not cross property boundaries.

- Wood used in retain wall construction shall conform to OPSS 1601 latest amendment.

- The applicant shall contact the Town of Richmond Hill, Building Services Division, regarding any proposed retaining wall(s) in order to determine the review, certification, permit issuance, and inspection process required for "Designated Structures".

- The proposed wall location (ties to lot lines), length, height (complete with sufficient top of wall and footing elevations) type, and material shall be specified on plans submitted to the Town for review.

- Upon completion of the construction of a retaining wall, a signed and sealed certification (see Schedule "F") of the wall is required by the Town prior to the release of any grading securities.

  Note: Schedule "F" is not to be used for retaining walls deemed to be "Designated Structures" by the Building Services Division.

- The Town of Richmond Hill, Building Services Division, shall be notified at least 48 hours prior to the start of construction of any "Designated Structure" in order to arrange for any site inspection that may be required. Any inspection carried out by a member of Town staff does not relieve the applicant or his consultant of the obligation to provide Schedule "F".
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.7 Catchbasins

- Front yard catchbasins are not permitted and shall not be specified.
- All rear lot catchbasins and leads shall be constructed in easement.
- Rear lot catchbasins and leads shall be constructed entirely within a single property wherever possible.
- The maximum offset from the centreline of any catchbasin to any rear lot line shall be 1.50m. The minimum offset shall be 0.9m.
- The offset from the centreline of any catchbasin lead to any side lot line shall be 0.60m.
- Easements shall be 3.0m in width, centred on side lot lines. Where zoning by-laws permit less than 1.5m sideyard setbacks, the easement width shall be reduced to comply with the zoning by-laws for the depth of the "as-constructed" building footprint only.

Reference Town standard G-7A.

- In cases where a catchbasin is constructed on one property and its lead is constructed passing through another or other properties a 1.2m (min) maintenance access easement from the municipal road allowance to the catchbasin is required over the property containing the catchbasin. Reference Town Standard G-7A.

- Residential lots requiring rear lot catchbasins and that abut park lands shall be allowed free draining rear yards into the park where the drainage shall be collected by means of swale construction and catchbasin installations within the park lands.

1.8 Fencing

- Fencing constructed adjacent to municipal and regional road allowances shall be constructed on private property and not within the road allowance.
- Gate installations allowing direct access from private property to public lands (parks, open space etc.) are not permitted.
- Fencing installed on school blocks shall be galvanized in accordance with the current Town Standards and Specifications.
- Park fencing shall have a fabric width of 1200mm facing "in" (fabric on park side of post installations).
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

- Separate school fencing shall have a fabric width of 1500mm facing "in" (fabric on private side of post installations).

- Public School fencing shall have a fabric width of 1800mm facing "in".

- Fencing shall be installed completely within the property of the ultimate owner. The minimum acceptable offset from property line to centreline of fence post shall be one half the footing diameter plus 25mm.

- All chain link fencing construction shall conform to the amended Ontario Provincial Standards and Specifications listed in Sections D3 and D5 of this manual.
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.9 Park and Private Block Grading and Drainage - Subdivisions

- All dead trees and other obstructions which the Town deems to pose a potential hazard or do not conform to the end use of the lands, shall be removed and disposed of to the satisfaction of the Commissioner of Engineering and Public Works and where required, the Commissioner of Parks, Recreation & Culture.

- The Developer/Owner shall be responsible for the maintenance of all blocks in accordance with the terms of his agreement with the Town and the current Property Standards By-law(s).

- Grading shall be completed in accordance with the overall grading plan(s) as reviewed by the Commissioner of Engineering and Public Works and where required by the Commissioner of Parks, Recreation & Culture.

- When compliance with the originally reviewed overall grading and drainage plan(s) cannot be achieved until the block is fully developed, an "interim" grading and drainage plan shall be prepared for review by the Commissioner of Engineering and Public Works. Upon completion of the review process, said plan shall be incorporated as an amendment to the developer/owners original agreement with the Town.

- Any and all areas of a block that have been disturbed as a result of construction activity, shall be topsoiled and seeded in accordance with current Town Standards immediately upon completion of said activity.

- Park blocks are to be topsoiled and seeded to the satisfaction of the Commissioner of Parks, Recreation & Culture with the exception of the following areas which shall be topsoiled and sodded:
  i) all swales
  ii) all slopes in excess of 4 parts horizontal to 1 part vertical

- The Developer/Owner shall provide, in a format satisfactory to the Commissioner of Parks, Recreation & Culture, documentation confirming that the Park soils are free of contamimates and have soil stability suitable for development.
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.10 Subdivision Building Permit Applications

- A siting, servicing and grading plan conforming to current Town Standards and design criterion shall be prepared by the applicants consultant for each lot at a scale of not less than 1:250 (metric). Reference STD G-6A as a "sample format".

- The plan shall first be submitted for review directly to the developers consulting engineer.

- The following executed certification for each lot submitted shall be included on any plan(s) prior to submission to the Town's Building Services Division.

- "I hereby certify that the building type, appurtenant grading, drainage and servicing works proposed for Lot ______, Plan 65M-______ complies with sound engineering design and that the proposed grading is in conformity with the overall grading plans reviewed as schedules to the subdivision agreement and with adjacent lands for both drainage and relative elevations.

  Date: ________________ Reviewed: ________________

  Developers Consultant Company Name and Engineers Stamp.

- Upon receipt of the above, the plan shall be submitted to the Building Services Division of the Town of Richmond Hill as part of the Building Permit Application package. The applicant is advised to consult with the Building Services Division in order to determine the requirements of a complete submission package.
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.11 Committee of Adjustment - Severance Applications

- The objectives outlined in Section D1.1 of the Grading and Drainage Design Criterion shall apply.

- Submission of a general concept grading and servicing plan conforming to current Town Standards and Design Criterion, detailing the overall grading, drainage and servicing proposal for a property under severance application may be required by the Engineering and Public Works Department as a condition of severance that must be satisfied by the applicant prior to clearance of said condition.

- The required plan(s) must be prepared and certified by a Registered Professional Engineer of Ontario Land Surveyor on behalf of the applicant.

- The minimum drawing detail requirements are outlined in Schedule "C". In the event that the actual proposed building footprints are not known, the building envelopes as dictated by the appropriate zoning by-laws shall be indicated.

- The following certification, signed and sealed by the applicants consultant, shall appear on each plan submitted for review by the Town.

   "I have prepared this plan to indicate the compatibility of the proposal with all adjacent properties and existing municipal services. It is my belief that adherence to the proposed elevations and gradients as shown will produce adequate surface drainage and proper facility of the municipal services without detrimental effect to the existing drainage patterns or adjacent properties".

   SIGNATURE AND SEAL OF REGISTERED PROFESSIONAL ENGINEER OR ONTARIO LAND SURVEYOR IS REQUIRED.

The applicant shall submit the required plan for review to the Engineering and Public Works Department, Development Section to the Attention of the Grading and Fill Technologist.

- As determined by the Town during the review process, the applicant may be required to enter into one of the following types of agreements.

  i) Grading and Drainage
  ii) Grading and Servicing

The general concept Grading and Servicing Plan shall be attached as a schedule to the appropriate agreement. Said agreement, if required, shall be Registered against Title of both the retained and severed portions of the subject lands.
1.11 Committee of Adjustment - Severance Applications (Cont'd)

- Approval from other "external" agencies may be required as part of the review package submitted to the Town.

NOTE: It is the applicant's responsibility to obtain approval from these authorities.

Some examples of areas requiring external agency approvals are:

i) Lands adjacent to or within the flood plains of watercourses or within valleylands.

ii) Areas within Schedule "B" of Fill Regulation By-Law No. 66-91.

iii) Areas within the Oak Ridges Moraine.

iv) Areas identified as environmentally sensitive or of specific natural interest in any of the Town's Zoning By-Laws, Official Plan etc.
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.12 Infill Construction - Building Permit Applications

- The objectives outlined in Section D1.1 of the Grading and Drainage Design Criterion and the current Town grading policy shall apply.

- A site servicing and grading plan conforming to current Town Standards and Design Criterion shall be prepared and certified by a Registered Professional Engineer of Ontario Land Surveyor at a scale of not less than 1:250 (metric).

- The minimum drawing detail requirements and standard notes are outlined on Schedules "B" and "D" to this document. Reference Standard G-5A as a sample "format".

- The following certification, signed and sealed by the applicants consultant, shall appear on each plan submitted for review:

  "I have reviewed the plans for the construction of (type of building) located at (municipal address) and have prepared this plan to indicate the compatibility of the proposal with all adjacent properties and existing municipal services. It is my belief that adherence to the proposed elevations and gradients as shown will produce adequate surface drainage and proper facility of the municipal services without detrimental effect to the existing drainage patterns or adjacent properties".

  SIGNATURE AND SEAL OF A REGISTERED PROFESSIONAL ENGINEER OR ONTARIO LAND SURVEYOR IS REQUIRED.

- Said plan shall be submitted for review to the Building Services Division of the Town of Richmond Hill and forms part of the applicants Building Permit Application.

- The applicant is advised to contact the Building Services Division in advance in order to determine the exact requirement of a complete submission package.

- Approval from other "external" agencies may be required as part of the review package submitted to the Town.

NOTE: It is the applicant's responsibility to obtain approvals from these authorities. Some examples of areas requiring external agency approvals are:

i) Lands adjacent to or within the flood plains of watercourses or within valleylands.

ii) Areas within Schedule "B" of Fill Regulation By-Law No. 66-91.

iii) Areas within the Oak Ridges Moraine.

iv) Areas identified as environmentally sensitive or of specific natural interest in any of the Town's Zoning By-Laws, Official Plan etc.
DIVISION "D" SECTION D1
DESIGN CRITERIA
GRADING AND DRAINAGE

1.13 Fill Permit Applications

- Council for the Town of Richmond Hill has adopted a by-law to regulate the placing or dumping of fill (By-Law No. 66-97 and amendment(s)).

- The intent of the By-Law is to provide an additional tool to the municipality to protect the environment, existing drainage patterns, and natural topography in areas not regulated by other agencies.

- In the By-Law, fill is defined as, "any type of material deposited or placed on lands and includes, soil, stone, concrete, asphalt, sod or turf, either singly or in combination".

- By-Law No. 66-91 prohibits or regulates through permit approval, the placing or dumping of fill on lands to establish a finished grade, difference from the existing grade or the deposit of fill in a location other than where the fill was obtained.

- Any person or company applying for a permit to place or dump fill must complete and submit an application, along with the appropriate application fee to the Town's Grading and Fill Technologist.

- Specific requirements may include, but are not necessarily limited to following:
  
  i) Submission of a detailed plan conforming to current Town Standards and Design Criterion showing existing elevations on the subject and abutting properties, watercourses, buildings and trees, etc.
  
  ii) Details of proposed retaining walls.
  
  iii) Proposed final elevations and drainage systems, including erosion and siltation control measures to be implemented.
  
  iv) The above items may require certification from a Professional Engineer or Ontario Land Surveyor.
  
  v) Description of proposed fill, including source and quantity.
  
  vi) Testing of the proposed fill to ensure that same is clean and free of contaminants may be required.

  vii) Approval of external agencies may be required prior to issuance of the permit, such as, the M.N.R., M.T.R.C.A., M.O.E.E., M.T.O., and the Region of York and C.N.R., etc.

A complete Fill Permit Information Package can be obtained from the Engineering & Public Works Department, Development and Technical Services Division.
DIVISION "D"

SECTION D2

GRADING
AND
DRAINAGE

SCHEDULES
"A" THROUGH "F"
DIVISION "D" SECTION D2
DESIGN CRITERIA GRADING AND DRAINAGE

SCHEDULE "A"

SUBDIVISION BUILDING PERMIT APPLICATION
ENGINEERING & PUBLIC WORKS DEPARTMENT
LOT GRADING PLAN MINIMUM REQUIREMENT CHECKLIST

With reference to Town Standard G-6A as a sample "Format"

<table>
<thead>
<tr>
<th>GENERAL PLAN REQUIREMENTS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Title Block</td>
<td>Consultant's Stamp</td>
</tr>
<tr>
<td>North Arrow</td>
<td>Signature &amp; Date</td>
</tr>
<tr>
<td>Scale 1:250 (MIN)</td>
<td>Certification</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BASE / LOT INFORMATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot Dimensions / Boundary</td>
<td>Existing elevations</td>
</tr>
<tr>
<td>Easements</td>
<td>Proposed Elevations</td>
</tr>
<tr>
<td>Set Backs indicated</td>
<td>Driveway Location</td>
</tr>
<tr>
<td>Adjoining lot information</td>
<td>Service Connections (Inverts)</td>
</tr>
<tr>
<td>House footprint</td>
<td>Utilities - St. Hardware</td>
</tr>
<tr>
<td>Entrances and no. of risers</td>
<td>Adjoining House FFE's</td>
</tr>
<tr>
<td>Catchbasin &amp; Grate invert elev.</td>
<td>Existing Swales, elevations</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRAINAGE PATTERN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing drainage indicated</td>
<td>Are perimeter lands effected?</td>
</tr>
<tr>
<td>Lot corner elevations (Exist / Prop)</td>
<td>Swale gradients 2 to 5 %</td>
</tr>
<tr>
<td>High point Elevations</td>
<td>Slopes @ 3H to 1V</td>
</tr>
<tr>
<td>Drainage direction indicated</td>
<td>Non-walkout slopes 1.5 m high MAX</td>
</tr>
<tr>
<td>Intercepting / crescent swales</td>
<td>Driveway grades 2 to 5 %</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOUSE ELEVATIONS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished floor Elevation (FFE)</td>
<td>Underside of footing elev. (USF)</td>
</tr>
<tr>
<td>Top of Foundation Wall (TFW)</td>
<td>(1.2 m minimum cover to footing)</td>
</tr>
<tr>
<td>Finished Basement Slab (FBS)</td>
<td>Opening Elevations (where specified)</td>
</tr>
<tr>
<td>Walk-out elevations</td>
<td>House Types</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RETAINING WALLS (if applicable)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Top and Bottom of wall elevations</td>
<td>Wall type / material specified</td>
</tr>
<tr>
<td>Ties to lot line</td>
<td>Maximum wall height detailed</td>
</tr>
</tbody>
</table>
DIVISION "D" SECTION D2
DESIGN CRITERIA GRADING AND DRAINAGE

SCHEDULE "B"

INFILL CONSTRUCTION BUILDING PERMIT APPLICATION
ENGINEERING & PUBLIC WORKS DEPARTMENT
LOT GRADING PLAN MINIMUM REQUIREMENT CHECKLIST

With reference to Town Standard G-5A as a sample "Format"

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<th>Plan Title Block</th>
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<tbody>
<tr>
<td>Standard General Notes</td>
</tr>
<tr>
<td>Lot and Registered Plan Number</td>
</tr>
<tr>
<td>Municipal Address</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Existing Conditions Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal Boundary and Dimensions</td>
</tr>
<tr>
<td>Easements</td>
</tr>
<tr>
<td>Surveyed Elevations to Define Drainage</td>
</tr>
<tr>
<td>Structures for Demolition</td>
</tr>
<tr>
<td>Significant Features - trees, watercourse, valley</td>
</tr>
<tr>
<td>TRCA Fill Line or Flood Line</td>
</tr>
<tr>
<td>Municipal Road Centerline and Elevations</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Drainage and Servicing Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Contained within Property</td>
</tr>
<tr>
<td>Maintain Existing Drainage Patterns</td>
</tr>
<tr>
<td>Side Yard and Rear Yard Containment Swales</td>
</tr>
<tr>
<td>Perforated Subdrain for Swale &lt; 2.0%</td>
</tr>
<tr>
<td>Driveway Grade 2 to 5% - 7.5% max.</td>
</tr>
<tr>
<td>Water Box Outside Driveway</td>
</tr>
<tr>
<td>Service Connections Outside Driveway</td>
</tr>
<tr>
<td>Max Driveway Width-Single 4.25m Double 6.0m</td>
</tr>
<tr>
<td>Min. Swale Depth is 0.15 m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proposed Conditions Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwelling Location including Decks, Walkway</td>
</tr>
<tr>
<td>Front, Side and Rear Yard Set Backs</td>
</tr>
<tr>
<td>Finished Floor Elevation</td>
</tr>
<tr>
<td>Garage Floor Elevation</td>
</tr>
<tr>
<td>Underside of Foundation Elevation</td>
</tr>
<tr>
<td>Top of Foundation Wall Elevation</td>
</tr>
<tr>
<td>Entrance Location and Risers</td>
</tr>
<tr>
<td>Elevations at Foundation Wall</td>
</tr>
<tr>
<td>Swale Elev. at Building Corners/High Points</td>
</tr>
<tr>
<td>Side Yard and Rear Yard Swale Gradients</td>
</tr>
<tr>
<td>Easements for Rear or Front Yard CB</td>
</tr>
<tr>
<td>Rear or Front Yard CB Location/Elevation</td>
</tr>
</tbody>
</table>
DIVISION "D" SECTION D2
DESIGN CRITERIA GRADING AND DRAINAGE

SCHEDULE "C"

COMMITTEE OF ADJUSTMENT SEVERANCE APPLICATION
ENGINEERING & WORKS DEPARTMENT
CONCEPT GRADING PLAN MINIMUM REQUIREMENT CHECKLIST

GENERAL PLAN REQUIREMENTS

Mandatory General Notes & scale ☐ Geodetic Benchmark Reference ☐
North Arrow ☐ Consultants Certification ☐
Lot and Registered Plan No's. ☐ Municipal Address ☐

BASE / LOT INFORMATION

All lotting Fabric and dimensions ☐ Sufficient existing spot elevations ☐
Easements ☐ Existing swales and invert elevations ☐
Adjacent lot elevations ☐ All existing Street Hardware ☐
Existing vegetation, fencing, walls...etc ☐ Adjacent property buildings & FFE's ☐
Proposed CB stds & elevations ☐ Existing municipal infrastructure ☐
Existing wells / septic systems ☐

DRAINAGE PATTERN

Existing drainage patterns indicated ☐ Perimeter of lands remain undisturbed. ☐
Lot corner elevations (Exist / Prop) ☐ Subject property drainage self contained ☐
Gradient change point Elevations ☐ Downspout locations shown ☐
Length /gradient / inverts all swales ☐ Slopes @ 3H to 1V (1.5m max height) ☐

BUILDING ENVELOPE or FOOTPRINT

Recommended future FFE ☐ Recommended future USF ☐
Recommended future TFW ☐ Minimum zoning setbacks indicated ☐
Walk-out elevations (if applicable) ☐ House Types indicated ☐

RETAINING WALLS (if applicable)

Top and Bottom of wall elevations ☐ Wall type / materials specified. ☐
Ties to lot line detailed ☐ Maximum wall height detailed ☐

Note: Plans submitted for review that do not satisfy the above noted minimum requirements will be returned to the applicant stamped "Revise and Resubmit" without benefit of any in-depth review or further comment.
DIVISION "D" SECTION D2
DESIGN CRITERIA GRADING AND DRAINAGE

SCHEDULE "D"

Mandatory Standard Notes for Infill Building Permit Grading Plans

1. All footing formwork elevations and setbacks are to be confirmed by a registered Professional Engineer or registered Ontario Land Surveyor prior to the placing of any concrete.

2. Prior to the superstructure works proceeding and the release of the Completion Stage Permit, the Owner's consultant must certify that the top of foundations are in conformity with the grading plan reviewed by the Town.

3. All rainwater leaders shall discharge onto splash pads at ground level at the locations indicated on this plan.

4. Existing boundary elevations along the site perimeter shall remain undisturbed. Drainage received from adjacent properties shall be accommodated and drainage from the subject lands shall be self contained.

5. No trees are to be removed without prior receipt of written consent from the Town Arborist.

6. The applicant shall contact the Operations Section of the Engineering & Public Works Department and make all arrangements necessary for driveway access and site service connections.

7. All yard areas shall receive a minimum of 100mm of topsoil plus sod.

8. The applicant shall contact the Town's Building Services Division a minimum of 48hrs in advance of construction of any retaining wall deemed to be a "designated structure" in order to arrange for any necessary inspections.

9. CERTIFICATION

"I have reviewed the plans for the construction of (type of building) located at (municipal address) and have prepared this plan to indicate the compatibility of the proposal with all adjacent properties and existing municipal services. It is my belief that adherence to the proposed elevations and gradients as shown will produce adequate surface drainage and proper facility of the municipal services without detrimental effect to the existing drainage patterns or adjacent properties."

10. Existing sewers and watermains shown on this plan have been field verified at the location and elevation.

SIGNATURE AND SEAL OF A REGISTERED PROFESSIONAL ENGINEER OR ONTARIO LAND SURVEYOR IS REQUIRED.
DIVISION "D" SECTION D2
DESIGN CRITERIA GRADING AND DRAINAGE

SCHEDULE "E"

SAMPLE

Final Grading Certification for Lot Grading

Note: Additional Certificates are required for properties containing retaining walls.

Date:

The Town of Richmond Hill
Planning & Development Department
Building Services Division
P.O. Box 300
Richmond Hill, ON
L4C 4Y5

Attention: Chief Building Official

Dear Sirs:

Re: (Property Description as per proposed grading)
   (Certification and Deposit Receipt), (Deposit Number)
   Certification of Building and Final Grading

I have determined the field elevations with respect to the final grading on the above lands, viewed the finished building thereon, and do hereby certify that the building constructed and the grading of the lands are in conformity with the previously submitted and reviewed grading plan and "Certification of Proposed Building and Grading."

Yours truly,

(Signature and Stamp of Professional Engineer
or Ontario Land Surveyor)

for (Name of Certifying Firm)

cc: Grading & Fill Technologist
DIVISION "D" SECTION D2  
DESIGN CRITERIA GRADING AND DRAINAGE  

SCHEDULE "F"  

Not to be used for certification of "Designated Structures."  
Contact Building Services Division  

Date:  

Town of Richmond Hill  
Engineering & Public Works Department  
P.O. Box 300  
225 East Beaver Creek Road  
Richmond Hill, Ontario  
L4C 4Y5  

Attention: Commissioner of Engineering and Public Works  

RE: Retaining Wall Construction  

Lot__________, R.P. ____________________  

Municipal Address:________________________  

Retaining Wall Constructed of _______________  

Maximum Height _______ m _______________  

This serves to certify that the above retaining wall has been designed and constructed in  
accordance with sound engineering principals, to support the dead and live loads applied  
upon the structure, in conformance with all applicable Town standards, regulations and to  
"as-built" elevations in conformance with the certified building and grading plan  
previously reviewed by the Town.  

Sincerely,  

Company Name  

Engineer's Signature and Stamp  

cc: Director of Building Services  
Grading & Fill Technologist
DIVISION "D"

SECTION D3

GRADING AND DRAINAGE SPECIFICATIONS
DIVISION "D" SECTION D3.1
OPSS DIVISION 2
CONSTRUCTION SPECIFICATIONS - GENERAL GRADING

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<th>OPSS</th>
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<th>COMMENT</th>
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<tr>
<td>201</td>
<td>CONSTRUCTION SPECIFICATION FOR CLEARING, CLOSE CUT CLEARING...........</td>
<td>201</td>
<td></td>
</tr>
<tr>
<td>206</td>
<td>CONSTRUCTION SPECIFICATION GRADING</td>
<td>206</td>
<td></td>
</tr>
<tr>
<td>OPSS</td>
<td>DESCRIPTION</td>
<td>SUBSECTION NO.</td>
<td>COMMENT</td>
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<td>-------------</td>
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</tr>
<tr>
<td>540</td>
<td>CONSTRUCTION SPECIFICATION HIGHWAY FENCE</td>
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<tr>
<td>541</td>
<td>CONSTRUCTION SPECIFICATION CHAIN LINK FENCE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>565</td>
<td>CONSTRUCTION SPECIFICATION FOR THE PROTECTION OF TREES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>570</td>
<td>CONSTRUCTION SPECIFICATION TOPSOIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>571</td>
<td>CONSTRUCTION SPECIFICATION SODDING</td>
<td>570.07.03</td>
<td>Uniform topsoil depth shall read 100mm</td>
</tr>
<tr>
<td>572</td>
<td>CONSTRUCTION SPECIFICATION SEEDING, MULCHING, TEMPORARY COVER AND EROSION CONTROL BLANKET</td>
<td></td>
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## DIVISION "D" SECTION D3.3
### OPSS DIVISION 15
#### MATERIAL SPECIFICATIONS
##### SAFETY RELATED

<table>
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<tr>
<th>OPSS</th>
<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
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</thead>
<tbody>
<tr>
<td>1508</td>
<td>MATERIAL SPECIFICATION ROUND WOOD POSTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1540</td>
<td>MATERIAL SPECIFICATION STANDARD HIGHWAY FENCE COMPONENTS</td>
<td></td>
<td></td>
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#### OPSS DIVISION 16
#### MATERIAL SPECIFICATIONS FOR WOOD

<table>
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<tr>
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<th>DESCRIPTION</th>
<th>SUBSECTION NO.</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1601</td>
<td>MATERIAL SPECIFICATION FOR WOOD</td>
<td>N/A</td>
<td>NIL</td>
</tr>
</tbody>
</table>
DIVISION "D"

SECTION D4

GRADING AND DRAINAGE

TOWN OF RICHMOND HILL
STANDARD DRAWINGS
NOTES:
1. USE CONSTRUCTION GRADE CEDAR OR APPROVED PRESSURE TREATED WOOD.
2. ZINC COATED ARDOX STEEL NAILS 4mm x 75mm SHALL BE USED.
3. FOR INSTALLATIONS ADJACENT TO REGIONAL AND MUNICIPAL ROADS FENCING SHALL BE WITHIN PRIVATE PROPERTY.
4. PRESERVATIVE TREATMENTS SHALL CONFORM TO OPSS.1601.06 TYPES C & D AND AWPA STD.P5.

ALL DIMENSIONS IN mm UNLESS NOTED OTHERWISE.
FLOW TO BE CARRIED AROUND THE HOUSE IN DEFINED SWALES

ELEV 'A'–SWALE HIGH POINT ELEVATION

2.0%MIN. SWALE GRADE BEHIND APRON. LOCATION OF FLOW DIVISION POINT VARIES WITH THE ROAD GRADE.

ELEVATION OF REAR LOT CORNER

ELEV. 'A'–SWALE HIGH POINT ELEVATION

ELEVATION OF HIGH FRONT LOT CORNER

SPECIFIED LOT ELEV.

FINISHED FLOOR

2.0%MIN.–5.0%MAX. SWALE GRADE

SPECIFIED LOT ELEVATION = 'A' + 150mm

SETBACK

DEPTH OF HOUSE

3.0m MIN.

NOTES

1. THE SPECIFIED LOT ELEVATION SHALL BE CALCULATED AS FOLLOWS:
   A SWALE GRADIENT OF 2.0%MIN. TO 5.0%MAX. FROM THE FRONT HIGH LOT CORNER AT THE STREETLINE TO THE SWALE HIGH POINT ELEVATION "A". THE SPECIFIED LOT ELEVATION SHALL THEN BE SET A MINIMUM OF 0.150m HIGHER THAN SWALE ELEVATION "A".

2. DRIVEWAYS ARE NOT TO BE USED AS AN OUTLET FOR SIDEYARD SWALES.
1. THE SPECIFIED LOT ELEVATION SHALL BE CALCULATED AS FOLLOWS:
   A SWALE GRADIENT OF 2.0% MIN. TO 5.0% MAX. FROM THE FRONT
   HIGH LOT CORNER AT THE STREETLINE TO THE SWALE HIGH POINT
   ELEVATION "A". THE SPECIFIED LOT ELEVATION SHALL THEN BE SET
   A MINIMUM OF 0.150m HIGHER THAN SWALE ELEVATION "A"

2. DRIVEWAYS ARE NOT TO BE USED AS AN OUTLET FOR SIDEYARD SWALES.
NOTES

1. THE SPECIFIED LOT ELEVATION SHALL BE CALCULATED AS FOLLOWS:
   A SWALE GRADIENT OF 2.0% MIN. TO 5.0% MAX. FROM THE FRONT
   HIGH LOT CORNER AT THE STREETLINE TO THE SWALE HIGH POINT
   ELEVATION "A". THE SPECIFIED LOT ELEVATION SHALL THEN BE SET
   A MINIMUM OF 0.150m HIGHER THAN SWALE ELEVATION "A"

2. DRIVeways ARE NOT TO BE USED AS AN Outlet FOR SIDEYARD SWALES.
"I hereby certify that the building type, and appurtenant grading and drainage works proposed for Lot ___ Plan 85M--- comply with sound engineering design and that the proposed grading is in conformity with the overall grading plans for the subdivision and with those of adjacent lands for drainage and relative elevations."

Date: __________ Reviewed By: __________

Company name and Engineers Stamp: (Developers Consultant)

QUALITY HOMES
NAME OF SUBDIVISION, 19T-12345
LOT: ____________ REG. PLAN No: 85M-0000

BUILDERS CONSULTANT

PROJECT NO. 1234

ADDRESS

PHONE

DRAWN BY: J.D.T.

CHECKED BY: T.D.J.

REVISIONS

1. LOT 189 GRADING AS PER TOWN COMMENTS.

SCALE: 1:250 (MIN)

DATE: NOV/97

NOTES:
1. THIS SAMPLE DRAWING IS NOT TO SCALE.
2. PAPER FORMAT SHALL BE LEGAL SIZE (8.5" x 14")
DIVISION "D"

SECTION D5

GRADING AND DRAINAGE

ADOPTED ONTARIO PROVINCIAL STANDARD DRAWINGS
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<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN OF</th>
</tr>
</thead>
<tbody>
<tr>
<td>218.01</td>
<td>SODDING OF SIDE SLOPES</td>
<td></td>
<td>RICHMOND HILL STD.</td>
</tr>
<tr>
<td>220.01</td>
<td>BARRIER FOR TREE PROTECTION</td>
<td></td>
<td>M-3</td>
</tr>
</tbody>
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DIVISION "D" SECTION D5.2
OPSD DIVISION 900
FENCING, GUIDE RAILS

<table>
<thead>
<tr>
<th>OPSD</th>
<th>DESCRIPTION</th>
<th>ADDITION OR REVISION</th>
<th>REPLACES TOWN OF RICHMOND HILL STD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>900.01</td>
<td>CHAIN LINK FENCE</td>
<td>i) Top wire installation is not approved for use in the Town.</td>
<td>F-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) This standard shall be used for both 1.2m and 1.8m installations without change to post and rail detailing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) For fabric width of less than 1.8m install knuckled edge at top of fence.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv) All fabric shall be black vinyl coated in accordance with OPSS 541.05.01, Class B, Style 2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>v) All posts, rails and braces shall be black vinyl coated for Town owned installations.</td>
<td></td>
</tr>
<tr>
<td>901.01</td>
<td>HIGHWAY FENCE</td>
<td>Site specific use only as directed by the Commissioner of Transportation and Works.</td>
<td></td>
</tr>
<tr>
<td>900.02</td>
<td>INSTALLATION OF BARBED WIRE</td>
<td>Site specific use only at the direction of the Commissioner of Transportation and Works</td>
<td></td>
</tr>
<tr>
<td>900.03</td>
<td>CHAIN LINK FENCE GATES</td>
<td></td>
<td></td>
</tr>
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DIVISION "E"

UTILITIES
## DIVISION "E" UTILITIES

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<td>TOWN OF RICHMOND HILL STANDARD DRAWINGS - UTILITIES</td>
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<td>OPSD SERIES 200 GRADING SECTIONS</td>
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<td>PARKING LOT LIGHTING STANDARDS</td>
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<td>PARKS AND SPORTS LIGHTING STANDARDS</td>
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DIVISION "E"

SECTION E1

UTILITIES

DESIGN CRITERIA
UTILITIES
DIVISION "E" SECTION E1
DESIGN CRITERIA - UTILITIES

1. General

- The developer and/or his consultants are required to submit to the Town, for its approval, a complete set of Utility Coordination drawings which are to be included as a schedule to the agreement between the Town and the owner. All Utility Coordination drawings shall be to a scale of 1:500 minimum.

- At the second submission stage for the Municipal drawings, two copies of the Utility Coordination plan and all engineering drawings are to be forwarded to Bell Canada. Bell Canada will then identify whether or not duct structures are required and, if so, indicate the location and nature of same on one copy of the drawings. Upon return of the drawings to the consultant, the consultant shall incorporate the duct structure design on the originals.

- The drawings are to be circulated to and approved by each right-of-way user prior to submission to the Town for review. Each approval is to be indicated on a stamp that is to be included on each drawing.

- Approved drawings to be circulated to all signing Right-of-way users. Once the drawings have final approval, a Molar copy of each is to be provided to all right-of-way users for their use.

1.1 Utility Hierarchy

- The following hierarchy of utilities and municipal servicing will apply when determining plant locations (in descending order):

  i) Municipal watermains, sewers and appurtenances

  ii) Hydro

  iii) Bell Telephone

  iv) Consumers Gas

  v) Cable TV

  vi) Other
DIVISION "E" SECTION E1

DESIGN CRITERIA - UTILITIES

1.2 Information Required

- The following information is to be shown on the drawings:
  - Valve chambers - Hydro transformers
  - Hydrants - Street light poles
  - Water service boxes - Bell pedestals
  - Blowoffs, etc. - Cable TV pedestals
  - Sewer maintenance hole - Consumers Gas valves
  - Catchbasins - All utility road crossings
  - Driveways - Street name and regulatory signs
  - Easements - Underground plant locations
  - Walkways - Supermail boxes
  - Sidewalks - Other features as may be directed

- In addition to the above information, each utility coordination drawing shall have a signature block provided for approval of each of the utilities listed.

<table>
<thead>
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<th>DATE</th>
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<tr>
<td>CANADA POST</td>
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1.3 Location Limitations

1.3.1 Driveways

- Clearance between driveway and lot lines to be a minimum of 1.2m.
- Driveways are not to encroach the projected property lines.
- Driveways are to be differentiated as being single or double driveways.
- Driveways on corner lots are to be located on front lot line farthest from intersecting street.
- Waterboxes are not to be located within driveways. Where a conflict between the water service box and driveway exists, the water box is to be relocated.
DIVISION "E" SECTION E1

DESIGN CRITERIA - UTILITIES

1.3.2 Utility Hardware

- Utility hardware, etc., are to be located one per lot. Where circumstances do not permit, then one item of hardware opposite each lot line will be considered.

- Where possible, all hardware is to be located on opposite side of lot to driveway location. Under no circumstances is any hardware to be located within 1.0m of any driveway.

- Hardware is not to be located within projected limits of easements.

- Hardware within Cul-de-Sacs and street Knuckles are to be avoided where possible.

1.3.3 Road Crossings

- Road crossings are to be placed 90 degrees to road allowance and opposite lot lines where possible.

- A minimum of 1.0m clearance is to be maintained between road crossings and manholes or catchbasins.
NOTES

1. ALL UTILITY CO-ORDINATION DRAWINGS ARE TO BE APPROVED AND SIGNED BY ALL UTILITY COMPANIES PRIOR TO APPROVAL BY THE TOWN.

2. MINIMUM 1.0m CLEARANCE BETWEEN DRIVEWAYS AND ANY ABOVE GROUND FIXTURES.

3. DRIVEWAYS ARE NOT TO ENCLOSE PROJECTED PROPERTY LINES.

4. ABOVE GROUND FIXTURES TO BE LOCATED ONE PER LOT AND/OR ONE OPPOSITE ANY LOT LINE WHERE POSSIBLE.

5. WATERBOXES ARE NOT TO BE LOCATED WITHIN DRIVEWAYS.

6. DRIVEWAYS ON CORNER LOTS ARE TO BE LOCATED ON LOT LINE FARTHEST FROM INTERSECTING STREET.

7. ALL EASEMENTS ARE TO BE SHOWN ON UTILITY CO-ORDINATION DRAWINGS.

8. THIS DRAWING IDENTIFIES DETAIL REQUIRED FOR A TYPICAL UTILITY CO-ORDINATION PLAN BUT DOES NOT REPRESENT A STANDARD DESIGN.

9. FOR STANDARD DIMENSIONS REFER TO DRAWINGS R-1A, R-2A, AND M-2A.

10. LOCATION OF SUPER MAILBOXES TO BE SHOWN.

LEGEND

- SUPERMAIL BOX
- BELL PEDESTAL
- BELL O.P.I. - CONC BASE
- HYDRO TRANSFORMER
- HYDRO SWITCH CUBICLE
- GAS VALVE
- CABLE TV PEDESTAL
- LIGHT STANDARD
- FIRE HYDRANT
- VALVE CHAMBER
- SANITARY MAINTENANCE HOLE
- STORM MAINTENANCE HOLE
- CATCHBASIN

- EXISTING U/G HYDRO
- EXISTING U/G BELL
- EXISTING GAS MAIN
- EXISTING U/G CABLE TELEVISION
- SANITARY SEWER
- STORM SEWER
- WATERMAIN
- STORM SERVICE
- SANITARY SERVICE
- WATER SERVICE
- DRIVeway
- TRAFFIC SIGN

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

UTILITY CO-ORDINATION DRAWING

SCALE: N.T.S.
DATE: APRIL 1998
DRAWN: P.V.G.
DWG. No. UT-1A
DIVISION "E"

SECTION E3

ADOPTED ONTARIO
PROVINCIAL
STANDARD DRAWINGS
**DIVISION "E" SECTION E3.1**  
**(OPSD DIVISION 200)**  
**GRADING SECTIONS**

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<tr>
<td>217.06</td>
<td>UTILITY POLE SETTING DEPTH AT DITCH LOCATIONS</td>
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</tbody>
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DIVISION "E"

SECTION E4

UTILITIES

DESIGN CRITERIA FOR STREET LIGHTING
DIVISION "E" SECTION E4

DESIGN CRITERIA FOR STREET LIGHTING

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4.0 GENERAL REQUIREMENTS

4.0.1 Introduction

The purpose of these guidelines is to outline general design criteria and best practices for the design and construction, of Municipal Street Lighting Systems within the Town of Richmond Hill. The guidelines provide direction and outline expectations to the Design Engineers and Contractors and are based on existing and recommended practices for roadway lighting published by the Illuminating Engineering Society of North America (IESNA) and the Transportation Association of Canada (TAC). These guidelines are not to be considered absolute and following these guidelines shall not relieve the Owner/Design Engineer of the responsibility of the design, constructing, and completing the municipal street lighting system as a finished product of competent engineering design, construction, and good engineering practices. This document is not intended to be a complete instruction manual for the design of lighting. The Design Engineers are encouraged to refer to the referenced publications for additional information.

The Town of Richmond Hill reserves the right to require different lighting levels for certain areas of the Town based on intended future use.

4.0.2 References

The following published documents have been used as the basis for establishing lighting design criteria:

- ANSI standard C78.377- 2008 “Specifications for the Chromaticity of Solid State Lighting”.
- ANSI/IES RP-08-14: Recommended Practice for Roadway Lighting.
- ANSI/IES RP-33-14: Recommended Practice for Lighting for Exterior Environments.
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- IES LM-80-08: Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- IES LM-82-12: Approved method for the Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature.
- IESNA TM-10-00: Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunction with Roadway Lighting.
- IESNA TM-11-00: Light Trespass; Research, Results and Recommendations.
- IES TM-21-11: Projecting Long Term Lumen Maintenance of LED Light Sources.
- IES / IDA MLO: Model Lighting Ordinance with user’s guide.
- Town of Richmond Hill Light Pollution By-law, as amended.
- CSA C22.2 NO. 250.0-08 (R2013) – Luminaires.

Contractor shall be responsible to ensure that latest version of each standards is utilized.

4.0.3 Professional Certification

Street and walkway lighting system designs shall be completed by a Professional Engineer in good standing with the Professional Engineering Society of Ontario (PEO) who is licensed to practice professional engineering in the Province of Ontario with expertise in the field of street and roadway lighting.

All drawings submitted to the Town for acceptance shall be signed and sealed by a Professional Engineer of a Design Engineering Firm. The Town shall be accepting the drawings as to form, in reliance upon the professional skill and ability of the Design Engineering firm, as to design and specification.
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DESIGN CRITERIA FOR STREET LIGHTING

4.0.4 Definitions

4.0.4.1 Roadway Classifications and Definitions (per ANSI/IES RP-08-14)

Arterial (Major)
That part of the roadway system that serves as the principal network for through-traffic flow. The routes connect areas of principal traffic generation and important rural roadways entering and leaving the city. These routes primarily serve through traffic and secondarily provide access to abutting property.

Collector
Roadways servicing traffic between arterial and local streets. These are streets used mainly for traffic movements within residential, commercial and industrial areas. They do not handle long, through trips. Collector streets may be used for truck or bus movements and give direct service to abutting properties.

Local
Local streets are used primarily for direct access to residential, commercial, industrial, or other abutting property. They make up a large percentage of the total street system, but carry a small proportion of vehicular traffic.

Sidewalk
A paved or otherwise improved area for pedestrian use, located within public street rights-of-way, which also contain roadways for vehicular traffic.

Pedestrian Walkway and Bikeway
A facility intended for pedestrian traffic and/or cyclists, not within the right-of-way of a vehicular traffic roadway or detached from the roadway (distance greater than 5.0 metres). Included are skywalks (pedestrian overpasses), sub-walks (pedestrian tunnels), and walkways giving access to parks or through block interiors.

Lanes
For the purposes of this document, lanes are defined as a public road providing secondary access to a property. Public lanes are named and commonly used for vehicles to access garages located at the rear of a property.

Pedestrian Underpasses
A facility intended for pedestrian traffic and/or cyclists, within the right-of-way of a vehicular traffic roadway.

4.0.4.2 Pedestrian Conflict Area Classifications (per ANSI/IES RP-08-14)

The Arterial, Collector and Local Street classifications appropriately describe general conditions of vehicular traffic conflict in urban areas. A second type of conflict, which is responsible for a
disproportionate number of nighttime fatalities, is the vehicle/pedestrian interaction. The magnitude of pedestrian flow is nearly always related to the abutting land use. The criteria used in selecting an appropriate amount of lighting is based on the total number of nighttime pedestrians present on both sides of the roadway in a typical block (or 200m section) over a given one-hour period (during the first hour of darkness (typically 18:00 to 19:00 hours), the actual hour considered, however, may vary). There are three classifications of pedestrian night activity levels and the types of land use with which they are typically associated:

**High**
Areas with significant numbers of pedestrians expected to be on the sidewalks, pedestrian walkways or crossing the streets during darkness. Examples are downtown retail areas, near theaters, concert halls, stadiums, and transit terminals.
(As a guideline the number of pedestrians expected on sidewalks or crossing the street during darkness, in a typical block or 200 meter section, for a high pedestrian conflict area is over 100 pedestrians/hour).

**Medium**
Areas where lesser numbers of pedestrians utilize the streets at night. Typical are downtown office areas, blocks with libraries, apartments, neighborhood shopping, industrial parks, and streets with transit lines.
(As a guideline, the number of pedestrians expected on sidewalks or crossing the street during darkness, in a typical block or 200 meter section, for a medium pedestrian conflict area is 11 to 100 pedestrians/hour).

**Low**
Areas with very low volumes of night pedestrian usage. These can occur in any of the cited roadway classifications but may be typified by suburban streets with single family dwellings, very low density residential developments, and rural or semirural areas.
(As a guideline, the number of pedestrians expected on sidewalks or crossing the street during darkness, in a typical block or 200 meter section, for a low pedestrian conflict area is 10 or fewer pedestrians/hour).

The choice of the appropriate pedestrian activity level for a street will be determined through pedestrian forecast as determined by the design engineer subject to the Town’s approval.

### 4.1 Lighting Design

The design criteria are based on various roadway and pedestrian classification types within the Town’s jurisdiction. The minimum required lighting levels are based on the IESNA and TAC recommendations for drivers’ visual needs while travelling on these various classes of roadways. The visual need or task changes with the classification of the roadway and the level of pedestrian usage - higher lighting levels required for higher classification of the roadways and/or pedestrian usage and lower lighting levels required for the lower classification of roadways and/or pedestrian usage.
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DESIGN CRITERIA FOR STREET LIGHTING

Please be advised that the requirements based on IESNA and TAC recommendations are periodically revised and updated. All lighting design criteria shall be in accordance with latest American National Standards Institute/Illuminating Engineering Society standards ANSI/IES. The latest Standard Recommended Practices for Roadway Lighting (RP-08) and TAC.

4.1.1 Basic Principles of Street Lighting Design

There are five basic principles to consider when carrying out street lighting design:

a) Safety - pedestrian and driver safety. Creating sufficient lighting level, uniformity, and glare control so that drivers are aware of any pedestrians and /or objects on or near the roadway.

b) Security - providing a setting that will deter some forms of criminal activity through the use and placement of lights.

c) Limit the amount of Light Trespass - avoiding over lighting of areas such as in residential neighborhoods where the backlight may shine on houses.

d) Energy Efficiency Considerations/Environmental Responsibility - consideration shall be given to minimizing energy consumption while meeting the minimum lighting levels required by this standard. Since LED luminaires are available in many wattage variations, vendors shall base their designs on the most efficient use of power that meets the Town of Richmond Hill’s lighting standards, while minimizing the number of SKUs.

e) Provide uniformity and consistency in street lighting designs throughout the Town of Richmond Hill while meeting the standards.

4.1.2 Design Considerations

a) It is the responsibility of the Design Engineer doing a street lighting design to make sure they are making reference to ANSI / IES RP-8-14 or any later edition.

b) When starting a street lighting design, attention to the surrounding area and any special requirements must be taken into consideration, i.e. schools, shopping districts, or community centers.

c) It is important to note that only the Luminance design method may be used for calculating the roadway lighting levels within the Town. Exceptions allow for the use of the Illuminance design method for curved road sections, sidewalks, cul-de-sacs and intersections. These methods are fully explained in the 2014 edition of the ANSI / IES RP-8-14, American National Standard Practice for Roadway Lighting. The appropriate application stating when and where to use each design method is stated in Section 4.2 – Street lighting Design Methodology.

4.1.3 Pavement Classification

Pavement classification is described by the type of pavement surface. Reflectivity (R) tables are listed in ANSI/IES RP-8-14 and are a measure of the reflectivity characteristics of the roadway surface. A typical Town of Richmond Hill roadway is represented by an R3 pavement.
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DESIGN CRITERIA FOR STREET LIGHTING

4.2  STREET LIGHTING DESIGN CRITERIA AND RECOMMENDED VALUES

4.2.1  Straight Roadways, Streets and Sidewalks

Luminance is the recommended method for roadway lighting calculations. The luminance levels, uniformity and veiling luminance ratios to be used in Richmond Hill are provided in Table 1 below. Illuminance is the recommended method for sidewalk lighting calculations. The illuminance levels to be used in Richmond Hill are provided in Table 1 below.

TABLE 1

<table>
<thead>
<tr>
<th>Roadway Classification</th>
<th>Pedestrian Conflict</th>
<th>Avg. Luminance Lavg (cd/m²)</th>
<th>Avg. Uniformity Ratio (Lavg/Lmin)</th>
<th>Max. Uniformity Ratio (Lmax/Lmin)</th>
<th>Max. Veiling Luminance Ratio (LVmax/Lavg)</th>
<th>Sidewalk Average Illuminance Eavg (lux)</th>
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</thead>
<tbody>
<tr>
<td>Local</td>
<td>Low</td>
<td>0.3</td>
<td>6.0</td>
<td>10.0</td>
<td>0.4</td>
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<td></td>
<td>Medium</td>
<td>0.5</td>
<td>6.0</td>
<td>10.0</td>
<td>0.4</td>
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<tr>
<td></td>
<td>High</td>
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<td>6.0</td>
<td>10.0</td>
<td>0.4</td>
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<tr>
<td>Collector</td>
<td>Low</td>
<td>0.4</td>
<td>4.0</td>
<td>8.0</td>
<td>0.4</td>
<td>3.0</td>
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<tr>
<td></td>
<td>Medium</td>
<td>0.6</td>
<td>3.5</td>
<td>6.0</td>
<td>0.4</td>
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<td>High</td>
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<td>5.0</td>
<td>0.4</td>
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<td>0.3</td>
<td>3.0</td>
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<td>3.0</td>
<td>5.0</td>
<td>0.3</td>
<td>10.0</td>
</tr>
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</table>

(This table is extracted from IESNA RP-08-14)

Where:
Lavg - minimum maintained average pavement luminance
Lmin - minimum pavement luminance
LVmax - maximum veiling luminance (a measure of the glare produced by the lighting system)
Sidewalk Average Illuminance - minimum maintained average horizontal illuminance (lux)

Notwithstanding the requirements of Table 1, please note that when the Town of Richmond Hill is converting its outdoor lights from HPS to LED, without adding or moving poles, the minimum light level on sidewalks shall be 2.0 lux average maintained illuminance. This is only applicable in circumstances where the light levels listed in Table 1 cannot be achieved due to existing pole layout/orientation.

For certain areas the Town may require dedicated sidewalk lighting. For these areas, the use of both horizontal and vertical illuminances is recommended for design as specified in RP-08.

4.2.2  Intersections

The primary method of design for intersections is illuminance. The values included in Table 2 are the recommended minimum average maintained illuminance levels for fully lighted
intersections based on road classification and pedestrian volumes. The values for full intersection lighting represent the sum of the recommended values for the intersecting streets.

### TABLE 2

<table>
<thead>
<tr>
<th>Street Functional Classification</th>
<th>Average Maintained Illumination at Pavement by Pedestrian Area Classification in [Lux/FC]</th>
<th>Uniformity Ratio Eavg/Emin</th>
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<tbody>
<tr>
<td></td>
<td>High (cd/m²)</td>
<td>Medium (cd/m²)</td>
</tr>
<tr>
<td>Arterial/Arterial</td>
<td>26/2.6</td>
<td>18/1.8</td>
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<tr>
<td>Arterial/Collector</td>
<td>22/2.2</td>
<td>15/1.5</td>
</tr>
<tr>
<td>Arterial/Local</td>
<td>20/2.0</td>
<td>13/1.3</td>
</tr>
<tr>
<td>Collector/Collector</td>
<td>18/1.8</td>
<td>12/1.2</td>
</tr>
<tr>
<td>Collector/Local</td>
<td>16/1.6</td>
<td>10/1.0</td>
</tr>
<tr>
<td>Local/Local</td>
<td>14/1.4</td>
<td>8.0/0.8</td>
</tr>
</tbody>
</table>

(This table is extracted from IESNA RP-08-14)

#### 4.2.3 Curves and Cul-de-Sacs

- **Cul-de-sac (Dead-end Street)**

  Due to the irregular shape and terminal nature of cul-de-sacs, it is impractical to apply the luminance design method to those roadway areas. Illuminance is therefore the required method of design for a cul-de-sac. The area of a cul-de-sac begins at the start of the cul-de-sac curb return radius. The requirements for cul-de-sac lighting are determined by targeting the illuminance values for the approach roadway. Where the approach street has been designed using the luminance method, the equivalent illuminance can be calculated using the ratio of 1 cd/m² = 15 lux for an R3 pavement or 1 cd/m² = 10 lux for an R1 pavement.

- **Curves**

  Lighting systems along streets with gradual curves (radius greater than or equal to 600m) shall be designed using the luminance method and shall have luminaires positioned so that they are aimed 90 degrees to the tangent of the curve. This assures a balanced light distribution on the pavement. Luminaires may require closer spacing in order to achieve the required lighting levels/uniformities. The design criteria shall be according to the road classification and pedestrian conflict level.

In cases where there are sharp curves (radius less than 600m), the designer shall provide an analysis of the lighting and assess the site conditions. The design shall be based on the illuminance method. The equivalent average maintained illuminance level requirement can be calculated using the ratio of 1 cd/m² = 15 lux for an R3 pavement or 1 cd/m² = 10 lux for an R1 pavement.

#### 4.2.4 Pedestrian Walkways and Bikeways

The primary method of calculation for lighting of Pedestrian Walkways and Bikeways is illuminance.
DIVISION "E" SECTION E4
DESIGN CRITERIA FOR STREET LIGHTING

Note: For pedestrian walkways and bikeways within municipal parks please refer to the Design Criteria for Municipal Parks and Sport Facilities Lighting” located in the Towns Standards and Specifications Manual.

TABLE 3

<table>
<thead>
<tr>
<th>Pedestrian Area Classification</th>
<th>Sub-category</th>
<th>Eavg [Lux/FC]</th>
<th>EVmin [Lux/FC]</th>
<th>Eavg/Emin *</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>N/A</td>
<td>10.0/1.0</td>
<td>5.0/0.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Medium</td>
<td>N/A</td>
<td>5.0/0.5</td>
<td>2.0/0.2</td>
<td>4.0</td>
</tr>
<tr>
<td>Low</td>
<td>Rural/Semi-Rural Areas</td>
<td>2.0/0.2</td>
<td>0.6/0.06</td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td>Low Density Residential (2 or fewer dwelling units per acre)</td>
<td>3.0/0.3</td>
<td>0.8/0.08</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>Medium Density Residential (2.1 to 6.0 dwelling units per acre)</td>
<td>4.0/0.4</td>
<td>1.0/0.1</td>
<td>4.0</td>
</tr>
</tbody>
</table>

(This table is based on IESNA RP-08-14)

Where:
Rural/Semi-Rural - Areas with very low residential density away from urban areas; cities or large towns or areas that are partly rural; between rural and urban.
Eavg - minimum maintained average horizontal illuminance at pavement
Emin - minimum horizontal illuminance at pavement
EVmin - minimum vertical illuminance at 1.5m above pavement
*Horizontal illuminance only

Notwithstanding the requirements of Table 3, where security of pedestrians and cyclists may be of concern, illumination levels should be at least 10.0 Lux (1.0 FC) at ground level, with an average-to-minimum uniformity ratio no greater than 4 to 1.
4.2.5 Pedestrian/Vehicular Underpass Areas

Lighting design criteria for pedestrian/vehicular underpass areas shall be as per Table 4 below.

<table>
<thead>
<tr>
<th>Description</th>
<th>Eavg [Lux/FC]</th>
<th>EVmin [Lux/FC]</th>
<th>Eavg/Emin *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime</td>
<td>100.0/10.0</td>
<td>50.0/5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Night time</td>
<td>40.0/4.0</td>
<td>20.0/2.0</td>
<td>3.0</td>
</tr>
</tbody>
</table>

(This table is extracted from IESNA RP-08-14)

Where:
Eavg - minimum maintained average horizontal illuminance at pavement
Emin - minimum horizontal illuminance at pavement
EVmin - minimum vertical illuminance at 1.5m above pavement
*Horizontal illuminance only

4.3 MATERIAL SPECIFICATIONS

4.3.1 Source Type

All light sources shall be of the Light Emitting Diode (LED) type.

4.3.2 LED Luminaires

4.3.2.1 General Requirements

Wattages of LED luminaires will be selected based on lighting design criteria and site conditions. LED luminaires shall have a minimum service life of 100,000 hours (including the driver and light source life). The LED Luminaire should have the following general specification:

- 0-10 Volt DC Dimming LED Driver
- Operating voltages as a minimum 120V or 347 VAC +/- 10 percent, 60 Hz.
- Equipped with Surge protective device (SPD) in case of lightning or electrical storms. The SPD for luminaires wired at 120V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C High operation and ANSI/IEEE C62.45. The SPD for luminaires wired at 347V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C Low operation and ANSI/IEEE C62.45.
- The housing shall be painted with a durable polyester powder coat. Castings shall be pre-treated using a five-stage iron phosphate system to assure adhesion.
- Tool-less entry feature for quick and easy maintenance.
- 7-PIN NEMA twist lock photo control receptacle.
- Correlated Colour Temperature (CCT): 3000K ± 200K.
- Colour Rendering Index (CRI): 70 or greater.
- Operate at an ambient temperature range of -40°C to +40°C.
- Approved by CSA or ULC
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DESIGN CRITERIA FOR STREET LIGHTING

The detailed mechanical, photometric and electrical specifications for LED luminaires are provided in Appendix A, B and C. These specifications are used by the Town for approving the LED luminaires for outdoor lights. The current, Town approved LED luminaires can be found under section 4.11.

4.3.2.2 Manufacturers’ Warranty

- Provide a 10 year manufactures’ warranty certificate, in the Town’s name, for LED luminaires and components confirming that the luminaire housing and all of its internal components, including but not limited to LED drivers and light engines shall be covered against defective workmanship, material, and premature light source failures.
- Warranty period shall begin on date of receipt of material from the supplier. The supplier/manufacturer shall provide the Town with appropriate warranty certificates and shipping documents as proof of date of shipment.
- Provide a manufacturer’s certificate indicating that the service life of the LED luminaires is 100,000 hours of operation or greater.

4.4 STANDARD DESIGN - ROADS

4.4.1 Local & Collector Road

Luminaire: Shall be of the "Cobra Head" type.

Colour shall be grey, polyester powder coat compatible with pole.

Luminaire Mounting Height: 9.14m minimum

Mast Arm: 1.8m (6ft) tapered elliptical aluminum with a rise of 0.9m (3ft). Mast Arms shall be bolted directly to the pole with 16 mm galvanized steel through bolts, nuts, and 50 x 50 mm square washers (banding is prohibited). Mast Arm lengths shall be as required to position the luminaire within ± 0.6m beyond the near edge of the traveled portion of the road.

Mast arm shall be manufactured to ANSI C136.13 and shall be in general conformity to OPSD 2420.010.

Pole: Shall be 9.9m (32.5ft) direct bury, Class “B” spun concrete. Hand-hole cover plates shall have tamper proof screws and be affixed with a warning label. Pole shall be affixed with an identification plate containing manufacturer's name, class, pole height, date of manufacturer and a C.S.A. stamp.

Cross Section: Tapered round
Finish: Smooth Mould
Colour: Natural concrete grey
Pole shall be StressCrete Model # E325-BPR-G-MOO S/F 120 C/W Capseal or approved equal.
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DESIGN CRITERIA FOR STREET LIGHTING

4.4.2 Lanes

Luminaire: Shall be of the "Cobra Head" type

Colour shall be grey, polyester powder coat compatible with pole.

Luminaire Mounting Height: 4.6m minimum

Pole: Shall be 6.4m (21 Ft.) direct buried Class “B” spun concrete. Hand-hole cover plates shall have tamper proof screws and be affixed with a warning label. Pole shall be affixed with an identification plate containing manufacturer's name, class, pole height, date of manufacturer and a C.S.A.

Cross Section: Tapered round
Finish: Smooth Mould
Colour: Natural concrete grey

Pole shall be StressCrete Model # E21-BPR-G-MOO S/F 120 C/W Capseal or approved equal.

4.4.3 Arterial Road

Luminaire: Shall be of the "Cobra Head" type.

Colour shall be grey, polyester powder coat compatible with pole.

Luminaire Mounting Height: 11m minimum

Mast Arm: 3.7m (12ft) tapered elliptical aluminum with a rise of 1.5m (5ft). Mast Arms shall be bolted directly to the pole with 16 mm galvanized steel through bolts, nuts and 50 x 50mm square washers (banding is prohibited).

Mast arm shall be manufactured to ANSI C136.13, and shall be in general conformity to OPSD 2420.010.

Pole: Shall be 12.2m (40 ft.) direct bury, C.S.A. Class "B" spun concrete. Hand-hole cover plates shall have tamper proof screws and be affixed with a warning label. Pole shall be affixed with an identification plate containing manufacturer's name, class, pole height, date of manufacturer and a C.S.A. stamp.

Cross Section: Tapered round
Finish: Smooth Mold
Colour: Natural Concrete grey

Pole shall be StressCrete Model #E40-BPR-G-MOO S/F 120 C/W Capseal or approved equal.
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4.5 DECORATIVE DESIGN – ROADS

4.5.1 Traditional

Luminaire: Shall be of the "Traditional Lantern" Type, side mounted.

   Colour shall be black polyester powder coat, compatible with pole

Luminaire Mounting Height: 8.25m minimum

Mast Arm: 1.8m (6ft) single bend aluminum decorative scroll arm with a rise of 0.45m (1.5ft). Mast Arms shall be bolted directly to the pole with 16 mm galvanized steel through bolts, nuts and 50 x 50mm square washers and painted black to match the luminaire (banding is prohibited).

   Colour shall be black polyester powder coat, compatible with pole

Mast arm shall be manufactured to ANSI C136.13, and shall be the KA170 series by StressCrete or approved equal

Pole: Shall be 9.9m (32.5ft) direct bury, Class “B” tapered, octagonal spun concrete pole with a 4-fin cap painted black to match. Hand-hole cover plates shall have tamper proof screws and be affixed with a warning label. Pole shall be affixed with an identification plate containing manufacturer's name, class, pole height, date of manufacturer and a C.S.A. stamp.

   Cross Section: Tapered octagonal
   Finish: Etched
   Colour: Eclipse

Pole shall be StressCrete Model #E325-BPO-G-S11 S/F KA176-S C/W FC or approved equal.
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4.6 PEDESTRIAN WALKWAYS, SIDEWALKS AND BIKEWAYS DESIGN

Luminaire: Shall be of the Contemporary "Shoe Box" type using a 15cm (6in) arm. Colour shall be bronze polyester powder coat compatible with pole.

Luminaire Mounting Height: 4.6m minimum

Pole: Shall be 6.4m (21 Ft.) direct buried decorative, tapered, octagonal, spun concrete pole. Hand-hole cover plates shall have tamper proof screws and be affixed with a warning label. Pole shall be affixed with an identification plate containing manufacturer's name, class, pole length, date of manufacture and a C.S.A. stamp.

Cross Section: Tapered octagonal
Finish: Etched
Colour: Saluki Bronze

StressCrete Model #E21-APO-G-E90 C/W 140-25/35

4.7 POLE LOCATIONS

Both one-sided and staggered pole arrangements will be permitted. At locations with wider pavement widths, especially at intersections, opposite arrangements will be permitted to achieve the Luminance/Illuminance design levels. Poles shall be installed as per Town of Richmond Hill Standard Drawings R-1A and R-4A. For the erection of poles, construction shall be as OPSS 615 - unless otherwise specified in the contract, concrete encasement is not a requirement. Pole hand hole locations as per OPSD 2220.01.

On roadways with residential frontages, poles are to be placed at lot lines and at ends of walkways where possible. A minimum separation of 1.2 m shall be required from driveways and municipal services.

4.8 UNDERGROUND SERVICES

All wiring to be underground, the lighting completed and energized prior to Occupancy.

All electrical Contractors/Subcontractors must meet Electrical Safety Authority and local electricity utility company requirements and are subject to their approval.

For electrical work in general, construction shall be as per OPSS 601. For the installation of ducts, construction shall be as per OPSS 603. For the installation of cable, construction shall be as per OPSS 604.

For the installation of a grounding system, construction shall be as per OPSS 609. For the removal of electrical equipment, construction shall be as per OPSS 610. For the installation of roadway luminaires, construction shall be as per OPSS 617.
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All trench restoration shall be compacted to a minimum of 100% standard proctor density and is subject to the approval of the Town of Richmond Hill's Contract Administrator.

Contractor shall construct a complete circuit to include all electrical connections in accordance with local electricity utility company, O.P.S.S., C.S.A. and Ontario Electrical Safety Code requirements to the supply points.

Streetlight Cables from Pedestal or disconnect to hand hole in pole shall be 2 # 6 Copper RWU-90 complete with 1 # 6 stranded copper green jacketed ground wire [NOTE: Jacket colours shall be Black (Line), White (Neutral), and Green (Ground)]. Streetlight cable to be installed in 50mm Rigid PVC Conduit (CSA 22.2#211.2) with solvent weld fittings. The direct buried conduit system shall be as per OPSD 2100.01 at 900mm (minimum) below finished grade and protected by red plastic warning tape buried at 300mm below finished grade.

Streetlight Cables from hand hole in pole to fixture shall be 2 # 12 Copper RWU-90 complete with 1 # 12 stranded copper green jacketed ground wire [NOTE: Jacket colours shall be Black (Line), White (Neutral), and Green (Ground)] such that the entire circuit has an acceptable voltage drop. Compression type connectors shall be used throughout. All wiring connections shall be made in the hand holes of streetlight poles. A waterproof C.S.A. fused connector kit complete with a 10 Amp ceramic midget fuse shall separate the line end from the load end.

Road crossings must not terminate under driveways and shall be installed at right angles with respect to the boulevard. A minimum clearance of 1m shall be maintained from the edge of driveway to the road crossing. The location of the road crossings with reference to a fixed point (e.g. Property line, transformer etc.) must be indicated on construction drawings.

Contractor is required to provide adequate surplus cable to allow the local electrical utility company to make connections to the existing supply. All other connections are to be complete.

Final Installation shall be inspected by and subject to Electrical Safety Authority and Town of Richmond Hill approval.

4.8.1 Fusing

Each fixture shall be protected through the use of in-line fuses. The line side of the streetlight circuit shall be individually fused utilizing 10 Amp KTK in-line fuse holder. The requirement for fusing is covered under previous section.

4.9 POLE NUMBERING

All poles to be numbered as per Town of Richmond Hill Standard Drawing R-11A.
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4.10 SMART LIGHTING CONTROL SYSTEM

Richmond Hill has converted its outdoor lighting network to LED technology and installed a state of the art smart lighting control and monitoring (SLCM) system. The SLCM system, produced by Itron Inc., is a proprietary communication network formed by SELC External CMS Modules (Nodes) installed on each light which communicate wirelessly to the central management server via Access Points (Gateways). It is the intent of the Town to continue to utilize the latest Itron Inc. technology for any new outdoor municipal lights installed in the Town of Richmond Hill as described below. The Design Engineer shall consult with the appropriate Town staff to confirm the equipment to be deployed for a specific geographical location.

4.10.1 Access Points (Gateways)

- The existing Itron Inc’s SLCM utilizes Generation 5.0 Access Points to connect the radio frequency (RF) mesh formed by the SELC External CMS Modules (Nodes) installed on each light. The nodes report the status of the lights and allow for remote control dimming and scheduling from the central management server. Six Access Points have been installed throughout the Town as part of the Town’s ‘Conversion of Outdoor Lighting Network to LED Project’.
- For new developments, the Developer shall install new Access Points at their own cost, if the Town deems it necessary to ensure adequate connectivity and response time. The Access Point shall be mounted on the roof or wall of the Town facility or on streetlight poles. The Town’s Public Work Operations Division, in consultation with IT and Facility Design, Construction and Maintenance Divisions shall determine the appropriate location of any new Access Points.

4.10.2 Smart Control Nodes

- All new municipal light fixtures installed shall be equipped with GPS enable Nodes mounted on the fixture’s 7-pin NEMA twist lock receptacle. The specification for the Nodes approved by the Town and corresponding luminaire type can be found in the chart below:

<table>
<thead>
<tr>
<th>Manufacturer /Part Number</th>
<th>Part Description</th>
<th>Luminaire Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELC/ 8S57102-001004-3-RCH</td>
<td>SELC RF Photocell 5 PIN 0-10v Blue ROTA V2 GPS</td>
<td>LED Cobra Head</td>
</tr>
<tr>
<td>SELC/ 8S57107-001004-3RCH</td>
<td>SELC RF Photocell 5 PIN 0-10v Black ROTA V2 GPS</td>
<td>LED Contemporary (Square pack/Shoe box) &amp; Traditional (Lantern/Coach)</td>
</tr>
</tbody>
</table>
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- Blue Node shall be used for the cobra head style luminaire and Black Node shall be used for the black decorative style luminaire (i.e. Coach/Lantern and Square pack/Shoebox).
- For new developments, the Developer shall purchase and install the Nodes at their own cost. The Node shall be purchased from Ameresco Canada using the contact information below:

  Ameresco Canada Inc.
  30 Leek Crescent, Suite 301
  Richmond Hill, Ontario, L4B 4N4
  Phone: 647-788-6026; Facsimile: 416-218-2288
  Email: info@ameresco.com

- Each node will be initialized into the central management system by the Town during the subdivision assumption process. If needed, the Town’s Public Work Operations staff will provide a list of locations that are reporting fixture or node faults to the Design Engineer/Developer/Contractor. All faults/malfunctions shall be addressed before the Town assumes responsibilities for new lights.

4.10.3 Procedure for Installing Nodes on Luminaires

- The Node shall be mounted on each LED luminaire. Once installed the Node will act as a regular photocell until initialized by the Town.
- To properly initialize the nodes the Town needs to know which node was installed at each location. To assist with this, each node is labeled with a unique QR Code sticker which includes the Node’s Serial number and unique MAC ID. The Node also comes with a detachable QR Code Sticker. During field installation, the installer shall paste the detachable QR Code sticker on the Smart Control Nodes Installation Form below and record the corresponding Pole Coordinates and Pole Number (from the installation drawings):

<table>
<thead>
<tr>
<th>Pole #</th>
<th>Pole Coordinates*</th>
<th>Node Sticker (Paste here)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
</tbody>
</table>

*The permissible level of accuracy for the Pole Coordinates is ± 3m.

- Once completed the design engineer shall submit this information to the Town including the chart above and design/installation drawings that indicate the pole numbers and locations. The Town’s PWO staff will remotely initialize the node using this information.
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The developer/contractor shall inform the Town representative as soon as the lights are energized.

4.11 APPROVED MANUFACTURERS AND PRODUCTS

4.11.1 Town Approved LED Luminaires for Streetlights

Table 7 lists the Town approved cobra head and traditional styled LED luminaires that meet the Town’s lighting standards and shall be used for the Town’s streetlights. The requirements illustrated in Appendix A, B and C are used in approving these LED luminaires.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Style</th>
<th>Base Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRL</td>
<td>Cobra Head</td>
<td>L0-XXX-X-7-2ES-X-S-GY-3-UL-2-S-A</td>
</tr>
<tr>
<td>LRL</td>
<td>Cobra Head</td>
<td>NXT-XXS-X-7-XXX-X-GY-3-UL-X-2H</td>
</tr>
<tr>
<td>LRL</td>
<td>Cobra Head</td>
<td>NXT-XXM-X-7-XXX-X-GY-3-UL-X-2H</td>
</tr>
<tr>
<td>GE Lighting</td>
<td>Cobra Head</td>
<td>ERL1 X XX XX 30 A GRAY ILT</td>
</tr>
<tr>
<td>GE Lighting</td>
<td>Cobra Head</td>
<td>ERLH X XX XX 30 A GRAY ILT</td>
</tr>
<tr>
<td>GE Lighting</td>
<td>Cobra Head</td>
<td>ERL2 X XX XX 30 A GRAY ILT</td>
</tr>
<tr>
<td>Acuity AEL</td>
<td>Cobra Head</td>
<td>ATB0 XXBLEDEXX XXX RX 3K 20 NL P7</td>
</tr>
<tr>
<td>Acuity AEL</td>
<td>Cobra Head</td>
<td>ATB2 XXBLEDEXX XXX RX 3K 20 NL P7</td>
</tr>
<tr>
<td>King Luminaire</td>
<td>Traditional Lantern</td>
<td>K601D-S-P4-NL-X-X-SSL-120V-X-3K-BK-F4-PR7</td>
</tr>
<tr>
<td>Amerlux</td>
<td>Traditional Lantern</td>
<td>CSL-A-XM-3K-TX-7P-BLK</td>
</tr>
<tr>
<td>Acuity AEL</td>
<td>Traditional Lantern</td>
<td>GRSCL-X-MVOLT-3K-X-PCLL-NL</td>
</tr>
</tbody>
</table>

4.11.2 Town Approved Smart Control System Components

Refer to section 4.10 (Smart Lighting Control System) above.

4.12 STANDARD DRAWINGS

Refer to Standard Drawings Section (Division “E” Section E3 and Division “C” Section C3).
4.13 SUBMISSION REQUIREMENTS

4.13.1 Street Lighting Design Submission Requirements

Street lighting design submissions requirements to the Town shall include two hard copies and one electronic copy of the following:

a) A Design Engineer Certification Letter confirming that the Streetlight design has been completed in accordance with ANSI/ IESNA Recommended Practice RP-8-14, TAC: Guide for the Design of Roadway Lighting – 2006, and the Electrical Safety Authority (ESA) requirements.

b) Details of proposed luminaires, poles, and arms including Manufacturers’ technical data sheets, photometric file and TM-21 data.

c) For each Luminaire type, product cut-sheets shall be submitted that include the Luminaire input current, LED drive current, nominal Correlated Color Temperature (CCT) and the Light Loss Factor (LLF) and associated calculations.

d) Smart Controls – Details (i.e. color and quantity) of the Town approved Nodes that will be used, as stated in Section 4.10.2 (Smart Control Nodes).

e) Pole setback from curb and maximum pole spacing based on Roadway Optimizer calculation. Actual pole spacing not to exceed 95% of the optimized value.

f) Calculations and distribution diagrams as per the Town’s Standards including photometric analysis (AGI32) in electronic format for all streets and intersections.

g) Street lighting layout and electrical drawings in AUTOCAD and PDF format showing streetlight design results compared to the Town criteria and showing location and full description of poles, luminaires, standard drawings and specifications used.

h) Photometric files in electronic IES format from the luminaire manufacturer.

i) Load Summary.

4.13.2 Certification and Documentation Requirements

The following documents shall be submitted to the Town at various stages:

4.13.2.1 Stage 1: Building Permit/Occupancy Stage

The following documents shall be submitted to the Town at the Building Permit/Occupancy Stage:

1) The Design Engineer Certification Letter confirming that:
   a) The street lighting system has been installed in accordance with the approved street lighting drawings, specifications, and the Town Standards, Electrical Safety Authority (ESA) requirements and all applicable electrical code
   b) All street lighting poles have the appropriate buried depth.
   c) All streetlights are functional and operational on all streets, lanes, and walkways.

2) If the actual pole location deviates more than one (1) meter from the proposed design location, the Design Engineer shall carry out the photometric analysis again to confirm
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that the required lighting levels are met as per the Town ANSI/IES RP-08 Standards latest version.

3) The Smart Control Nodes Installation Form that includes the Global Position System (GPS) X, Y Co-ordinates of newly installed poles and the QR Code stickers for the SLCM nodes as required in section 4.10.3 ‘Procedure for Installing Nodes on LED Luminaires’. This information will be used by the Town to initialize the nodes and connect them to the SLCM system.

Upon receiving Smart Control Nodes Installation Form, Town’s PWO staff will remotely initialize the nodes and connect them to the SLCM system. The developer/contractor shall be responsible for correcting any deficiencies associated with the pole, lights and SLCM nodes.

4.13.2.2 Stage 2: Assumption Stage

The following documents shall be submitted to the Town at the Assumption Stage:

1) As-Constructed drawings - 1 hard copy + electronic files in AUTOCAD and PDF format:
   a) As-Constructed drawings shall be in accordance with the Town’s Design Criteria
   b) Global Position System (GPS) X, Y Co-ordinates of newly installed poles in a tabular format. The permissible level of accuracy for the pole coordinates is ± 3m.
   c) Include offsets, if streetlight cables are not installed in joint utility trench

2) The Design Engineer Certification Letter confirming that:
   a) All street lighting poles are plumb / straight
   b) All pole identification tags are installed
   c) All street lighting luminaries are washed and provision of date of wash
   d) All pedestals have been locked
   e) Grades around poles and pedestals have not settled
   f) All hand hole cover plates are secured
   g) All poles, mounting hardware, and streetlights are visually inspected
   h) All deficiencies are corrected

4.13.2.3 Stage 3: End of Maintenance Stage

The following documents shall be submitted to the Town at the End of Maintenance Stage:

1) A Design Engineer Certification Letter certifying the following:
   a) The street lighting system has been installed in accordance with the approved street lighting drawings, specifications, and the Town Standards, Electrical Safety Authority (ESA) requirements and all applicable electrical code
   b) All streetlights are functional and operational on all streets, lanes, and walkways
   c) All street lighting poles are plumb / straight
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D E S I G N  C R I T E R I A  F O R  S T R E E T  L I G H T I N G

d) All pole identification tags are installed
e) All pedestals have been locked
f) Grades around poles and pedestals have not settled
g) All hand hole cover plates are secured
h) All poles, mounting hardware, and streetlights are visually inspected
i) All deficiencies are corrected
Appendix A: Materials Specifications – Cobra Head Style LED Luminaires

Mechanical:
- The luminaire housing shall be of rugged, highly corrosion resistant, light weight die cast low copper aluminum alloy.
- The housing shall be painted with a durable polyester powder coat. Castings shall be pre-treated using a five-stage iron phosphate system to assure adhesion. Colour shall be Grey.
- Luminaire components and applied finishes shall pass the 1,000 hour salt test per ASTM B117 standard.
- Luminaire shall be horizontal mast arm mountable.
- Luminaire shall be designed to mount on matching pole davit arms.
- Where small metal machine screw fastening hardware is utilized in the luminaire assembly it shall be of a material that is corrosion resistant and compatible with the housing material. The hardware will have a Robertson or hex-head drive. Slot or Phillips head drives are not acceptable. All externally exposed hardware shall be painted to match the exterior of the luminaire.
- Access to the electrical compartment shall be made without the use of tools. Internal system components, clamping assembly and terminal blocks shall be accessible without the use of tools. Drivers and LED array modules must be mounted internally and be easily accessible for replacement.
- The luminaire shall be CSA or cUL listed for wet locations. The LED optical module shall be sealed and tested to IEC spec 529 to meet a rating of IP66 for particulate and moisture ingress. Power supply/driver unit shall also be rated IEC IP66.
- The luminaire and all subcomponents are to be free of designated hazardous substances that would otherwise prevent it from being disposed of in a normal regulated Ontario landfill site or recycled without any special type of treatment or disassembly.
- The luminaire shall operate within specifications in an ambient temperature range of -40 degree Celsius to + 40 degree Celsius.
- Luminaire shall be safety certified to CSA C22.2 # 250.0-08 or have an equivalent listing from a recognized testing laboratory for the approved sale and use in Canada. Applicable labels shall be applied inside each unit.
- Each luminaire shall have a label permanently fixed inside the unit that identifies the manufacturer’s essential product information including, date of manufacture, electrical schematic diagram, and operating specifications.
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Photometric Performance:

- Wattages of LED luminaires will be selected based on lighting design criteria and site conditions.
- The luminaire LED light source shall emit white to cool white light with a nominal CCT in the range of 3,000°K ± 200°K. Colour variation from the nominal luminaire rating over the operating life is to observe tolerance ranges consistent with ANSI standard C78.377-2008 “Specifications for the Chromaticity of Solid State Lighting”.
- Ensure compliance with the Town’s Light Pollution Bylaw. BUG ratings (Backlight, Up-light & Glare) must be addressed during the selection of luminaires. Ensure that up-light from cobra head style luminaires is zero (U=0), backlight (B) and glare (G) shall be reviewed and selected in accordance with design criteria and site conditions.
- Colour Rendering Index (CRI) shall be ≥ 70.
- The luminaire shall be tested for photometric and electrical performance in accordance with the IES LM-79-08 “Approved Method for the Electrical and Photometric Measurements of Solid State Lighting Products”. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure.
- A copy of the manufacturer’s LM-79 photometric report shall be submitted for review.
- The luminaire shall maintain a minimum of 85 percent of initial lumen output (L85) at 90,000 hours when operated within specified operating parameters at an ambient temperature of 25° Celsius. The manufacturer shall indicate the actual lamp lumen depreciation (LLD) at 90,000 hours and at an ambient temperature of 25° Celsius as calculated using procedures outlined in IES TM-21-11 (Projecting Long Term Lumen Maintenance of LED Light Sources). The manufacturer shall provide a total assembled luminaire system (LED package, housing, optical and electrical components) lumen depreciation curve for each separate wattage, drive current and distribution type proposed.
- The LED chip manufacturer shall have tested the lumen maintenance characteristics of the LED chip in accordance with the guidelines of IES LM-80-08 “Approved Method for Lumen Maintenance Testing of LED Light Sources”. A copy of the manufacturer’s LM-80 reports shall be submitted for review.

Electrical:

- The Luminaire shall contain a surge protection device (SPD) to protect all electrical and electronic components from harmful line transient voltage surges as a result of utility line switching, lightning strikes, or other electrical supply system disturbances. The SPD for luminaires wired at 120V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C High operation and ANSI/IEEE C62.45. The SPD for luminaires wired at 347V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C Low operation and ANSI/IEEE C62.45. SPDs shall be designed to fail in the off position so as to help identify failed units and to continue to protect LED drivers and light
DIVISION "E" SECTION E4

DESIGN CRITERIA FOR STREET LIGHTING

- Utility supply wiring to the luminaire shall terminate in a barrier-type terminal block secured to the housing. The terminal block shall have wire grips suitable for # 14 AWG to # 6 AWG wire sizes. All internal wiring shall be copper, 600V rated.
- The Luminaire shall be provided with a NEMA photoelectric control receptacle. The receptacle shall be a seven-prong twist lock type conforming to ANSI standard C136.41 and capable of being adjustable directionally such that any photoelectric control device may be pointed to the north.
- The nominal operating voltage shall be 120 or 347 VAC +/- 10 percent, 60 Hz.
- The LED driver shall be designed to operate maintenance-free for a minimum of 100,000 hours at 25 degree Celsius ambient. Provide a manufacturer’s certificate indicating that the service life of the LED luminaires is 100,000 hours of operation or greater.
- The LED driver shall have a power factor ≥ 0.90.
- The THD (current and voltage) induced into the AC supply line shall not exceed 20 percent.
- Luminaire driver electrical/electronic component devices shall comply with Industry Canada ICES Interference Causing Equipment Standards for RF emissions.
- Drivers shall be provided with 0 – 10VDC dimmable drive current operation over the 20 year expected life of the luminaires.
Appendix B:  Materials Specifications–Traditional (Coach/Lantern) Style LED Luminaires

Mechanical:

- The upper housing and lower cage shall be of rugged, highly corrosion resistant, light weight die cast low copper aluminum alloy.
- The upper housing and lower cage shall be painted with a durable polyester powder coat. Castings shall be pre-treated using a 5-stage iron phosphate system to assure adhesion. Colour shall be semi-gloss black, or some other colour which may from time to time be specified by the Town.
- Luminaire components and applied finishes shall pass the 1,000 hour salt test per ASTM B117 standard.
- The bottom section of the housing shall be hinged to the top section and allow access to the electrical compartment without the use of tools.
- Luminaires shall be either horizontal mast arm mountable or post-top mountable.
- Post-top mounted luminaires shall be designed to mount on existing pole tenons.
- Where small metal machine screw fastening hardware is utilized in the luminaire assembly it shall be of a material that is corrosion resistant and compatible with the housing material. The hardware will have a Robertson or hex head drive. Slot or Phillips head drives are not acceptable. All externally exposed hardware shall be painted to match the exterior or the luminaire except for any quarter-turn fasteners.
- Internal system components, clamping assembly and terminal blocks shall be accessible without the use of tools. Drivers and LED array modules must be mounted internally and be easily accessible for replacement.
- The luminaire shall be CSA or cUL listed for wet locations. The LED optical module shall be sealed and tested to IEC spec 529 to meet a rating of IP66 for particulate and moisture ingress. Power supply/driver unit shall also be rated IEC IP66. The upper housing shall contain measures that prevent the entry of birds and insects.
- Outer side and bottom lenses are not required by the Town. If supplied and required for the correct optical performance of the luminaire, they shall be made of impact resistant glass and attached to the frame with reinforcing channels and sealed to prevent ingress of dirt or moisture.
- The luminaire and all subcomponents are to be free of designated hazardous substances that would otherwise prevent it from being disposed of in a normal regulated Ontario landfill site or recycled without any special type of treatment or disassembly.
- The luminaire shall operate within specifications in an ambient temperature range of -40 degree Celsius to + 40 degree Celsius.
- Luminaire shall meet ANSI C136.31 (current version) for 3.0 G vibration for use on normal roadways and bridges.
- Luminaire shall be safety certified to CSA C22.2 # 250.0-08 or have an equivalent listing from a recognized testing laboratory for the approved sale and use in Canada. Applicable labels shall be applied inside each unit.
• Each luminaire shall have a label permanently fixed inside the unit that identifies the manufacturer’s essential product information including, date of manufacture, electrical schematic diagram, and operating specifications.

Photometric Performance:

• Wattages of LED luminaires will be selected based on lighting design criteria and site conditions.
• The luminaire LED light source shall emit warm white light with a nominal CCT in the range of 3,000°K ± 200°K. Colour variation from the nominal luminaire rating over the operating life is to observe tolerance ranges consistent with ANSI standard C78.377-2008 “Specifications for the Chromaticity of Solid State Lighting”.
• Ensure compliance with the Town’s Light Pollution Bylaw. BUG ratings (Backlight, Up-light & Glare) must be addressed during the selection of luminaires. The luminaire zonal lumen distribution above 90° vertical shall comply with the “U” rating for the geographical and land usage zones as defined by IES technical memorandum TM-15-11, "Luminaire Classification System (LCS) for Outdoor Luminaires". Backlight (B) and glare (G) shall be reviewed and selected in accordance with design criteria and site conditions.
• Colour Rendering Index (CRI) shall be ≥ 70.
• The luminaire shall be tested for photometric and electrical performance in accordance with the IES LM-79-08 “Approved Method for the Electrical and Photometric Measurements of Solid State Lighting Products”. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure.
• A copy of the manufacturer’s LM-79 photometric report shall be submitted for review.
• The luminaire shall maintain a minimum of 85 percent of initial lumen output (L85) at 90,000 hours when operated within specified operating parameters at an ambient temperature of 25° Celsius. The manufacturer shall indicate the actual lamp lumen depreciation (LLD) at 90,000 hours and at an ambient temperature of 25° Celsius as calculated using procedures outlined in IES TM-21-11 (Projecting Long Term Lumen Maintenance of LED Light Sources). The manufacturer shall provide a total assembled luminaire system (LED package, housing, optical and electrical components) lumen depreciation curve for each separate wattage, drive current and distribution type proposed.
• The LED chip manufacturer shall have tested the lumen maintenance characteristics of the LED chip in accordance with the guidelines of IES LM-80-08 “Approved Method for Lumen Maintenance Testing of LED Light Sources”. A copy of the manufacturer’s LM – 80 reports shall be submitted for review.
DIVISION "E" SECTION E4

DESIGN CRITERIA FOR STREET LIGHTING

**Electrical:**

- The Luminaire shall contain a surge protection device (SPD) to protect all electrical and electronic components from harmful line transient voltage surges as a result of utility line switching, lightning strikes, or other electrical supply system disturbances. The SPD for luminaires wired at 120V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C High operation and ANSI/IEEE C62.45. The SPD for luminaires wired at 347V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C Low operation and ANSI/IEEE C62.45. SPDs shall be designed to fail in the off position so as to help identify failed units and to continue to protect LED drivers and light.

- Utility supply wiring to the luminaire shall terminate in a barrier-type terminal block secured to the housing. The terminal block shall have wire grips suitable for # 14 AWG to # 6 AWG wire sizes. All internal wiring shall be copper, 600V rated.

- The Luminaire shall be provided with a NEMA photoelectric control receptacle. The receptacle shall be a seven-prong twist lock type conforming to ANSI standard C136.41 and capable of being adjustable directionally such that any photoelectric control device may be pointed to the north.

- The nominal operating voltage shall be 120 VAC or 347 VAC +/- 10 percent, 60 Hz.

- The LED driver shall be designed to operate maintenance-free for a minimum of 100,000 hours at 25 degree Celsius ambient. Provide a manufacturer’s certificate indicating that the service life of the LED luminaires is 100,000 hours of operation or greater.

- The LED driver shall have a power factor ≥ 0.90.

- The THD (current and voltage) induced into the AC supply line shall not exceed 20 percent.

- Luminaire driver electrical/electronic component devices shall comply with Industry Canada ICES Interference Causing Equipment Standards for RF emissions.

- Drivers shall be provided with 0 – 10VDC dimmable drive current operation over the 20 year expected life of the luminaires.
DIVISION "E" SECTION E4
DESIGN CRITERIA FOR STREET LIGHTING

Appendix C: Materials Specifications – Contemporary Style (Shoe Box) LED Luminaires

**Mechanical:**

- The luminaire housing shall be of the Contemporary (Shoe Box) type, and shall be manufactured using rugged, highly corrosion resistant, light weight die cast low copper aluminum alloy.
- The luminaire shall be side mounted using a 15cm (6in) arm.
- The housing shall be painted with a durable polyester powder coat. Castings shall be pre-treated using a five-stage iron phosphate system to assure adhesion. Colour shall be bronze, compatible with pole.
- Luminaire components and applied finishes shall pass the 1,000 hour salt test per ASTM B117 standard.
- Access to the electrical compartment shall be made without the use of tools.
- Where small metal machine screw fastening hardware is utilized in the luminaire assembly it shall be of a material that is corrosion resistant and compatible with the housing material. The hardware will have a Robertson or hex-head drive. Slot or Phillips head drives are not acceptable. All externally exposed hardware shall be painted to match the exterior or the luminaire.
- Internal system components, clamping assembly and terminal blocks shall be accessible without the use of tools. Drivers and LED array modules must be mounted internally and be easily accessible for replacement.
- The luminaire shall be CSA or cUL listed for wet locations. The LED optical module shall be sealed and tested to IEC spec 529 to meet a rating of IP66 for particulate and moisture ingress. Power supply/driver unit shall also be rated IEC IP66.
- The luminaire and all subcomponents are to be free of designated hazardous substances that would otherwise prevent it from being disposed of in a normal regulated Ontario landfill site or recycled without any special type of treatment or disassembly.
- The luminaire shall operate within specifications in an ambient temperature range of -40 degree Celsius to + 40 degree Celsius.
- Luminaire shall be safety certified to CSA C22.2 # 250.0-08 or have an equivalent listing from a recognized testing laboratory for the approved sale and use in Canada. Applicable labels shall be applied inside each unit.
- Each luminaire shall have a label permanently fixed inside the unit that identifies the manufacturer’s essential product information including, date of manufacture, electrical schematic diagram, and operating specifications.

**Photometric Performance:**

- Wattages of LED luminaires will be selected based on lighting design criteria and site conditions.
- The luminaire LED light source shall be warm white with a nominal CCT in the range of 3,000°K ± 200°K. Colour variation from the nominal luminaire rating over the operating
DIVISION "E" SECTION E4

DESIGN CRITERIA FOR STREET LIGHTING

- Life is to observe tolerance ranges consistent with ANSI standard C78.377-2008 “Specifications for the Chromaticity of Solid State Lighting”.
- Ensure compliance with the Town’s Light Pollution Bylaw.
- Colour Rendering Index (CRI) shall be ≥ 70.
- The luminaire shall be tested for photometric and electrical performance in accordance with the IES LM-79-08 “Approved Method for the Electrical and Photometric Measurements of Solid State Lighting Products”. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure.
- A copy of the manufacturer’s LM-79 photometric report shall be submitted for review.
- The luminaire shall maintain a minimum of 85 percent of initial lumen output (L85) at 90,000 hours when operated within specified operating parameters at an ambient temperature of 25° Celsius. The manufacturer shall indicate the actual lamp lumen depreciation (LLD) at 90,000 hours and at an ambient temperature of 25° Celsius as calculated using procedures outlined in IES TM-21-11 (Projecting Long Term Lumen Maintenance of LED Light Sources). The manufacturer shall provide a total assembled luminaire system (LED package, housing, optical and electrical components) lumen depreciation curve for each separate wattage, drive current and distribution type proposed.
- The LED chip manufacturer shall have tested the lumen maintenance characteristics of the LED chip in accordance with the guidelines of IES LM-80-08 “Approved Method for Lumen Maintenance Testing of LED Light Sources”. A copy of the manufacturer’s LM-80 reports shall be submitted for review.

Electrical:

- The Luminaire shall contain a surge protection device (SPD) to protect all electrical and electronic components from harmful line transient voltage surges as a result of utility line switching, lightning strikes, or other electrical supply system disturbances. The SPD for luminaires wired at 120V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C High operation and ANSI/IEEE C62.45. The SPD for luminaires wired at 347V shall meet application and testing requirements per ANSI/IEEE C.62.41.2 for Category C Low operation and ANSI/IEEE C62.45. SPDs shall be designed to fail in the off position so as to help identify failed units and to continue to protect LED drivers and light.
- Utility supply wiring to the luminaire shall terminate in a barrier-type terminal block secured to the housing. The terminal block shall have wire grips suitable for #14 AWG to #6 AWG wire sizes. All internal wiring shall be copper, 600V rated.
- The Luminaire shall be provided with a NEMA photoelectric control receptacle. The receptacle shall be a seven-prong twist lock type conforming to ANSI standard C136.41 and capable of being adjustable directionally such that any photoelectric control device may be pointed to the north.
- The nominal operating voltage shall be 120 VAC or 347 VAC +/- 10 percent, 60 Hz.
DIVISION "E" SECTION E4

DESIGN CRITERIA FOR STREET LIGHTING

- The LED driver shall be designed to operate maintenance-free for a minimum of 100,000 hours at 25 degree Celsius ambient. Provide a manufacturer’s certificate indicating that the service life of the LED luminaires is 100,000 hours of operation or greater.
- The LED driver shall have a power factor ≥ 0.90.
- The THD (current and voltage) induced into the AC supply line shall not exceed 20 percent.
- Luminaire driver electrical/electronic component devices shall comply with Industry Canada ICES Interference Causing Equipment Standards for RF emissions.
- Drivers shall be provided with 0 – 10VDC dimmable drive current operation over the 20 year expected life of the luminaires.
DIVISION "E"

SECTION E5

UTILITIES

DESIGN CRITERIA FOR MUNICIPAL PARKING LOTS LIGHTING
5.0 GENERAL REQUIREMENTS

5.0.1 Introduction

The purpose of these guidelines is to outline general design criteria and best practices for design, construction, and inspection of Municipal Parking Lot Lighting Systems within the City of Richmond Hill. The guidelines provide direction and outline expectations to the Design Engineers and Contractors and are based on existing and recommended practices for roadway lighting published by the Illuminating Engineering Society of North America (IESNA). These guidelines are not to be considered absolute and following these guidelines shall not relieve the Owner/Design Engineer of the responsibility of the design, constructing, and completing the municipal street lighting system as a finished product of competent engineering design, construction, and good engineering practices.

This document is not intended to be a complete instruction manual for the design of lighting. The Design Engineers are encouraged to refer to the referenced publications for additional information.

The City of Richmond Hill reserves the right to require different lighting levels for certain areas of the City based on intended future use.

5.0.2 References

- The following published documents have been used as the basis for establishing lighting design criteria:

  - ANSI/IES RP-20-14: Recommended Practice for Lighting for Parking Facilities.
  - ANSI/IES RP-33-14: Recommended Practice for Lighting for Exterior Environments.
  - IESNA TM-15-11: Luminaire Classification System for Outdoor Luminaires
  - IES LM-80-08: Approved Method for Measuring Lumen Maintenance of LED Light Sources.
DIVISION "E" SECTION E5

DESIGN CRITERIA FOR MUNICIPAL PARKING LOTS (OUTDOOR NON-COVERED) LIGHTING

- IES LM-82-12: Approved method for the Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature.
- IES TM-21-11: Projecting Long Term Lumen Maintenance of LED Light Sources.
- IES / IDA MLO: Model Lighting Ordinance with user’s guide.
- City of Richmond Hill Light Pollution By-law, as amended.

Contractor shall be responsible to ensure that latest version of each standard is utilized.

### 5.0.3 Professional Certification

Municipal parking lot lighting system designs shall be completed by a Professional Engineer in good standing with the Professional Engineering Society of Ontario (PEO) who is licensed to practice electrical engineering in the Province of Ontario with expertise in this field.

All drawings submitted to the City for acceptance shall be signed and sealed by a Professional Engineer of a Design Engineering Firm. The City shall be accepting the drawings as to form in reliance upon the professional skill and ability of the Design Engineering firm, as to design and specification.

### 5.1 MATERIAL SPECIFICATIONS

#### 5.1.1 Source Type

All light sources shall be of the Light Emitting Diode (LED).

#### 5.1.2 LED Luminaires

Wattages of LED luminaires will be selected based on lighting design criteria and site conditions (this to be confirmed after the implementation phase of the project). LED luminaires shall have a minimum service life of 100,000 hours (including the driver and light source life). In addition, the LED Luminaire should have the following specification:

- 0-10Volt Dimming LED Driver
- Operating voltages as a minimum 120V, 347 VAC +/- 10 percent, 60 Hz.
- Equipped with Surge protective device (SPD) in case of lightning or electrical storms. Surge protective devices shall be in compliance with the applicable ANSI standard.
DIVISION "E" SECTION E5

DESIGN CRITERIA FOR MUNICIPAL PARKING LOTS (OUTDOOR NON-COVERED) LIGHTING

- Durable finish and IP66 rated protection gasket against water and dust particles.
- Tool-less entry feature for quick and easy maintenance.
- 7-PIN NEMA twist lock photo control receptacle.
- For custom luminaires (if required), drawings shall be stamped by a Professional Engineer and approved by ESA.
- Correlated Colour Temperature (CCT): 3000K ± 200K.
- Colour Rendering Index (CRI): 70 or greater.
- Operate at an ambient temperature range of – 40 °C to + 40°C.
- Approved by an ESA-approved certified organization, such as CSA or ULC as per ESA Technical Guidelines Document.

5.1.3 Selection of LED Luminaires

BUG ratings (Backlight, Up light & Glare) must be addressed during the selection of luminaires. Ensure that up light from luminaires is zero (U=0), backlight (B) and glare light (G) shall be reviewed and selected in accordance with design criteria and site conditions.

Where parking lots and pedestrian ways are to be adjacent, the parking lot lighting and the pedestrian way lighting may be achieved by a single lighting system or multiple systems.

Ensure compliance with all City’s applicable By-Laws; especially Light Pollution By-law.

5.1.4 Manufacturers’ Product Warranty

Provide a 10 year manufactures’ warranty certificate, in the City’s name, for LED luminaires and components confirming that the luminaire housing and all of its internal components, including but not limited to LED drivers and light engines shall be covered against defective workmanship, material, and premature light source failures;

Warranty period shall begin on date of receipt of material from the supplier. The supplier/manufacturer shall provide the City with appropriate warranty certificates and shipping documents as proof of date of shipment.

Provide a manufacturer’s certificate indicating that the service life of the LED luminaires is 100,000 hours of operation or greater.
DIVISION "E" SECTION E5

DESIGN CRITERIA FOR MUNICIPAL PARKING LOTS (OUTDOOR NON-COVERED) LIGHTING

5.2 LIGHTING DESIGN

Lighting design criteria for municipal parking lots shall be as per Table 1 below. Please be advised that the requirements based on IESNA recommendations are periodically revised and updated. All lighting design criteria shall be in accordance with latest American National Standards Institute/Illuminating Engineering Society standards ANSI/IES, the latest Standard Recommended Practices (RP-20).

Table 1

<table>
<thead>
<tr>
<th>Application and task</th>
<th>Surface classification</th>
<th>Time</th>
<th>Recommended maintained Illuminance for all ages [LUX]</th>
<th>Ave:Min Ratio (Max.)</th>
<th>Max:Min Ratio (Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Time</td>
<td>Horizontal Eh (Min.) Vertical Ev (Min.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive aisles/parking areas-all activity levels</td>
<td>Asphalt</td>
<td>Pre-closing time</td>
<td>5 2.5</td>
<td>4:1 15:1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-closing time</td>
<td>2 1</td>
<td>4:1 15:1</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>Pre-closing time</td>
<td>10 5</td>
<td>4:1 15:1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post-closing time</td>
<td>2 1</td>
<td>4:1 15:1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(This table is based on IESNA RP-20-14)

Where:
- Pre-closing time: Is from dusk until ‘closing time’ (time to be determined by the City), when the area being illuminated is more likely to be in use.
- Post-closing time: Is from ‘closing time’ (time to be determined by the City) to dawn.

5.3 POLE LOCATIONS

Luminaires to be distributed to achieve the illumination design levels.

5.4 POLE NUMBERING AND TAGGING

New pole numbers will be assigned by the City. All poles to be tagged as per City of Richmond Hill Standard drawing R-11A under Division “C” Section C3.
5.5 **UNDERGROUND SERVICES**

All electrical Contractors/Subcontractors must meet Electrical Safety Authority, local electricity distribution utility company and City of Richmond Hill requirements and are subject to their approval. All wiring to be underground. All underground power cables must be placed in a minimum 50mm PVC duct. Primary and secondary power cables must be installed in separate ducts. The ducts should be sized so the power cables do not exceed forty percent (40%) of the cross-sectional area of the duct. The ducts must only be used for underground power cables.

5.5.1 **Fusing**

Fusing shall be done in accordance with the latest requirements from the Electrical Safety Authority (ESA) and/or any other applicable regulations.

5.6 **STANDARD DESIGN**

5.6.1 **Area Lighting Luminaires**

The following types of parking lot luminaire designs may be considered:

- Architectural/Decorative: A wide variety of architectural luminaires is available and because it is desirable to obscure the light source in normal applications, architectural luminaires may provide light distribution through optical systems. Efficiencies of this luminaire type can be comparable to other types.

- Post top or side mounted luminaires: They have many similarities to Architectural luminaires. Usually to be located within the parking area (away from the perimeter). Mounting heights for direct type are recommended to be 8 meters (26ft) or less. Side mounting may be used as an alternate mounting method to match the appearance of arm-mounted luminaires.

- Wall mounted (wall pack) luminaires: Narrow parking areas (that are between or adjacent to buildings) may be lighted by wall mounted luminaires. Mounting heights 8 meters (26ft) or less are recommended.

5.7 **LIGHTING CONTROLS**

Richmond Hill has converted its outdoor lighting network to LED technology and installed a smart lighting control and monitoring (SLCM) system. All new, outdoor municipal lights installed in Richmond Hill shall be equipped with Smart Control Nodes as per the requirements contained in the Street Lighting Standards section “E4” (clause 4.10) of this manual.
DIVISION "E" SECTION E5

DESIGN CRITERIA FOR MUNICIPAL PARKING LOTS (OUTDOOR NON-COVERED) LIGHTING

5.8 APPROVED LED LUMINAIRES

Table 2 lists the City approved LED luminaires that meet the City’s lighting standards, to be used for the City’s municipal parking lot lights.

TABLE 2

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Base Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE Lighting</td>
<td>EANB-0-XX-7-30-A-X-XXXX</td>
</tr>
</tbody>
</table>

5.9 SUBMISSION REQUIREMENTS

An Exterior Lighting Plan shall be provided for all parking lot lighting projects as defined in the City of Richmond Hill Light Pollution By-law. The Exterior Lighting Plan must be certified by an Electrical Engineer confirming that the design has been completed in accordance with ANSI/IESNA Recommended Practices RP-20 and Electrical Safety Authority (ESA) requirements. All exterior lighting shall be designed in accordance with and in compliance with the City of Richmond Hill Light Pollution By-law and this Standard.
DIVISION "E"

SECTION E6

UTILITIES

DESIGN CRITERIA FOR MUNICIPAL PARKS AND SPORT FACILITIES LIGHTING
DIVISION "E" SECTION E6

DESIGN CRITERIA FOR MUNICIPAL PARKS AND SPORT FACILITIES LIGHTING

6.0 GENERAL REQUIREMENTS

6.0.1 Introduction

The purpose of these guidelines is to outline general design criteria and best practices for design, construction, and inspection of Municipal Parks and Sport Facilities Lighting Systems within the City of Richmond Hill. The guidelines provide direction and outline expectations to the Design Engineers and Contractors and are based on existing and recommended practices for roadway lighting published by the Illuminating Engineering Society of North America (IESNA). These guidelines are not to be considered absolute and following these guidelines shall not relieve the Owner/Design Engineer of the responsibility of the design, constructing, and completing the municipal street lighting system as a finished product of competent engineering design, construction, and good engineering practices.

This document is not intended to be a complete instruction manual for the design of lighting. The Design Engineers are encouraged to refer to the referenced publications for additional information.

The City of Richmond Hill reserves the right to require different lighting levels for certain areas of the City based on intended future use.

6.0.2 References

The following published documents have been used as the basis for establishing lighting design criteria:

- ANSI/IES RP-08-14: Recommended Practice for Roadway Lighting.
- ANSI/IES RP-20-14: Recommended Practice for Lighting for Parking Facilities.
- ANSI/IES RP-33-14: Recommended Practice for Lighting for Exterior Environments.
- IESNA TM-15-11: Luminaire Classification System for Outdoor Luminaires
- IESNA G-1-03 (Guideline for security lighting for people, properties and public spaces).
DIVISION "E" SECTION E6

DESIGN CRITERIA FOR MUNICIPAL PARKS AND SPORT FACILITIES LIGHTING

- IES LM-80-08: Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- IES LM-82-12: Approved method for the Characterization of LED Light Engines and LED Lamps for Electrical and Photometric Properties as a Function of Temperature.
- IES TM-21-11: Projecting Long Term Lumen Maintenance of LED Light Sources.
- IES / IDA MLO: Model Lighting Ordinance with user’s guide.
- City of Richmond Hill Light Pollution By-law, as amended.

Contractor shall be responsible to ensure that latest version of each standard is utilized.

6.0.3 Professional Certification

Municipal park and sport facility lighting system designs shall be completed by a Professional Engineer in good standing with the Professional Engineering Society of Ontario (PEO) who is licensed to practice professional engineering in the Province of Ontario with expertise in this field.

All drawings submitted to the City for acceptance shall be signed and sealed by a Professional Engineer of a Design Engineering Firm. The City shall be accepting the drawings as to form in reliance upon the professional skill and ability of the Design Engineering firm, as to design and specification.

6.1 MATERIAL SPECIFICATIONS

6.1.1 Source Type

a) Parks: All light sources shall be of the Light Emitting Diode (LED).

b) Sport Facilities: Light sources could be of the Light Emitting Diode (LED), or High Pressure Sodium (HPS) to match existing.
6.1.2 LED Luminaires

- Wattages of LED luminaires will be selected based on lighting design criteria and site conditions (this to be confirmed after the implementation phase of the project). LED luminaires shall have a minimum services life of 100,000 hours (for the driver and light source life). In addition, the LED Luminaire should have the following specification:
  - 0-10 Volt Dimming LED Driver.
  - Operating voltages as a minimum 120V, 347VAC +/- 10 percent, 60 Hz.
  - Equipped with Surge protective device (SPD) in case of lightning or electrical storms. Surge protective devices shall be in compliance with the applicable ANSI standard.
  - Durable finish and IP66 rated protection gasket against water and dust particles.
  - Tool-less entry feature for quick and easy maintenance.
  - 7-PIN NEMA twist lock photo control receptacle.
  - Correlated Colour Temperature (CCT): 3000K ± 200K
  - Colour Rendering Index (CRI): 70 or greater.
  - Operate at an ambient temperature range of -40°C to +40°C.
  - Approved by an ESA-approved certified organization, such as CSA or ULC as per ESA Technical Guidelines Document.

6.1.3 Selection of Luminaires

Luminaires: LED luminaires to be selected to meet lighting design criteria.

BUG ratings (Backlight, Up light & Glare) must be addressed during the selection of luminaires. Ensure that up light from luminaires is zero (U=0), backlight (B) and glare light (G) shall be reviewed and selected in accordance with design criteria and site conditions. BUG rating system does not apply to sport facilities lighting.

Ensure compliance with all City’s applicable By-Laws; especially Light Pollution By-law.
DIVISION "E" SECTION E6

DESIGN CRITERIA FOR MUNICIPAL PARKS AND SPORT FACILITIES LIGHTING

6.1.4 Manufacturers’ Product Warranty

Provide a 10 year manufacturers’ warranty certificate, in the City’s name, for LED luminaires and components confirming that the luminaire housing and all of its internal components, including but not limited to LED drivers and light engines shall be covered against defective workmanship, material, and premature light source failures;

Warranty period shall begin on date of receipt of material from the supplier. The supplier/manufacturer shall provide the City with appropriate warranty certificates and shipping documents as proof of date of shipment.

Provide a manufacturer’s certificate indicating that the service life of the LED luminaires is 100,000 hours of operation or greater.

6.2 LIGHTING DESIGN

6.2.1 Parks Lighting

Lighting design level for Parks: Per IESNA G-1-03 (Guideline for security lighting for people, properties and public spaces)

- Locations where security concerns may exist should be illuminated to a level of at least 10 lux (1 fc) at ground level, with an average-to-minimum uniformity ratio not greater than 4:1.

- When lighting park trails and walkways, they should be illuminated to at least 6 lux (0.6 fc). The average-to-minimum uniformity ratio should be 4:1.

For parking lots lighting requirements within parks, refer to Section ‘E5’ Design Criteria for Parking Lots.

The lighting systems for parks should be reviewed and approved by the City on a case-by-case basis and in accordance with site conditions.
### 6.2.2 Sport Facilities Lighting

The table below (Table 1) illustrates the recommended horizontal and vertical maintained illuminance targets taking in considerations the visual ages of observers (based on table 35.3 from IES Handbook 10th Ed.).

<table>
<thead>
<tr>
<th>Application and Tasks</th>
<th>Notes</th>
<th>Horizontal (Eh) Targets</th>
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<td><strong>Visual Ages of Observers (years) where at least half are</strong></td>
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*Note: Average values are represented by "Avg".*
DIVISION "E" SECTION E6

DESIGN CRITERIA FOR MUNICIPAL PARKS AND SPORT FACILITIES LIGHTING

6.3 POLE LOCATIONS

Luminaires to be distributed to achieve the illumination design levels.

6.4 POLE NUMBERING AND TAGGING

New pole numbers will be assigned by the City. All poles to be tagged as per City of Richmond Hill Standard drawing R-11A under Division “C” Section C3.

6.5 UNDERGROUND SERVICES

All electrical Contractors/Subcontractors must meet Electrical Safety Authority and local electricity distribution utility company requirements, and City of Richmond Hill requirements and are subject to their approval. All underground power cables must be placed in a minimum 50mm PVC duct. Primary and secondary power cables must be installed in separate ducts. The ducts should be sized so the power cables do not exceed forty percent (40%) of the cross-sectional area of the duct. The ducts must only be used for underground power cables.

6.5.1 Fusing

Fusing shall be done in accordance with the latest requirements from the Electrical Safety Authority (ESA) and/or any other applicable regulations.

6.6 POLE DESIGN

The lighting poles will be of metal or concrete. Their design should match with the style of the project. They should be reviewed and approved by the City on a case-by-case basis.

6.7 LIGHTING CONTROLS

Richmond Hill has converted its outdoor lighting network to LED technology and installed a smart lighting control and monitoring (SLCM) system. All new, outdoor municipal lights installed in Richmond Hill shall be equipped with Smart Control Nodes as per the requirements contained in the Street Lighting Standards section “E4” (clause 4.10) of this manual.

6.8 APPROVED LED LUMINAIRES

Table 2 lists the City approved LED luminaires that meet the City’s lighting standards, to be used for the City’s park lights.

TABLE 2

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Base Part Number</th>
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<tbody>
<tr>
<td>Eaton Cooper Lighting</td>
<td>LDRV-XX-XXX-E-DIM-PER7-7030-XX</td>
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6.9 SUBMISSION REQUIREMENTS

The City requires the submission of an Exterior Lighting Plan for park lights. The Exterior Lighting Plan must be certified by an Electrical Engineer confirming that the park lights design has been completed in accordance with the requirements of this standard and the Electrical Safety Authority (ESA). All exterior lighting shall be designed in accordance with and in compliance with the City of Richmond Hill Light Pollution By-law. The Exterior Lighting Plan and associated documents will be reviewed and approved by the City on a case by-case basis.
DIVISION "F"

DEVELOPMENT
SUBMISSION
STANDARDS
# DIVISION "F"
## DEVELOPMENT SUBMISSION STANDARDS

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## DIVISION "F"
### DEVELOPMENT SUBMISSION STANDARDS

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DIVISION "F"

SECTION F1

DEVELOPMENT SUBMISSION STANDARDS

GUIDELINE FOR ENGINEERING AND SUBDIVISION AGREEMENT SUBMISSION REQUIREMENTS
DIVISION "F" SECTION F1
DEVELOPMENT SUBMISSION STANDARDS
GUIDELINE FOR ENGINEERING AND SUBDIVISION AGREEMENT
SUBMISSION REQUIREMENTS

1. GUIDELINE FOR ENGINEERING AND SUBDIVISION AGREEMENT
   SUBMISSION REQUIREMENTS

This section outlines in detail the first, second, and final submission requirements for Town review of plans and documents required to satisfy draft plan approval conditions and for preparation of the subdivision agreement. The submission requirements for execution of the subdivision agreement are also included in this document.

The submission requirements are structured to allow review of plans and documents in tandem with preparation of the subdivision agreement. The objective is to facilitate the agreement execution and availability of building permits in conjunction with preserving developments. The Town has separate pre-servicing and pre-grading requirements as outlined in Section F6.

The Town’s digital submission standards are outlined in Sections F7, F8 and F9 of this document. Prior to commencing work on any submission the applicant and/or his agent must ensure that they have a complete understanding of the requirements.

Prior to first submission, a pre-submission meeting is required with the owner and consultant and Town staff to ensure an understanding of the requirements to satisfy and allow Town clearance of draft approval conditions and conformity to Master Environmental Servicing and/or Functional Servicing Plans. Please contact the Project Coordinator to arrange the pre-submission meeting. Please contact the Manager of Stormwater and Subdivisions if uncertain of the Project Coordinator assigned to the specific development.

All submissions must be directed to the Project Coordinator. Each submission will be reviewed to ensure conformity with Town requirements and the owner will be advised if the submission is incomplete and outstanding items will be identified. Processing of submissions will be delayed until all outstanding information is received. The Coordinator will circulate the submitted plans and documents to the various departments for review and will forward comments to the owner and consultant. The Coordinator will assist in identifying any outstanding issues to be addressed in subsequent submissions.

All inquiries with respect to the status of submission review and preparation of the subdivision agreement must be directed to the Project Coordinator.
DIVISION "F" SECTION F1
DEVELOPMENT SUBMISSION STANDARDS
GUIDELINE FOR ENGINEERING AND SUBDIVISION AGREEMENT
SUBMISSION REQUIREMENTS

1. GUIDELINE FOR ENGINEERING AND SUBDIVISION AGREEMENT
SUBMISSION REQUIREMENTS (cont’d)

After receipt of a complete second submission, the Town will be in a position to prepare the subdivision agreement. If the second submission is reviewed and accepted by the Town, an agreement should be issued within approximately 10 to 12 weeks from the date of receipt of the second submission. Issuance of the agreement may be delayed if any submission items are not acceptable and require resolution with the owner and potential resubmission of plans and documents. The agreement issued should be in a form that the Town will be able to execute if reviewed and found acceptable by the owner.

Any questions regarding the above should be directed to the Project Coordinator or the Manager of Stormwater and Subdivisions.
DIVISION "F"

SECTION F2

DEVELOPMENT SUBMISSION STANDARDS

FIRST SUBMISSION REQUIREMENTS
DIVISION "F" SECTION F2
DEVELOPMENT SUBMISSION STANDARDS
FIRST SUBMISSION REQUIREMENTS

2. FIRST SUBMISSION REQUIREMENTS

• Completed Engineering and Agreement Submission Checklist (Section F9.1).

• Two (2) complete sets of prints (bound and rolled) of the following plans for engineering design review (standard digital drawing templates are available from the Design Supervisor - Design and Construction Division):
  - Title Sheet
  - General Servicing Plans
  - Standard Notes Sheet (standard drawings available from Town)
  - Sanitary Drainage Area Plan (internal and external)
  - Storm Drainage Area Plan (internal and external)
  - Foundation Drain Collector Drainage Area Plans
  - Area Grading Plans (include Park Block grading)
  - Sediment and Erosion Control Plans
  - Plan and Profile Drawings for New or Reconstructed Streets and Easements
  - Storm Water Management Facility Plans (excluding landscaping)
  - Typical Sections and Details Plans

• Two (2) copies of sanitary, storm, and Foundation Drain Collector sewer design sheets (computerized flow spreadsheets required and standard digital format is available from Design and Construction Division).

• If the proposed development includes a Storm Water Management Facility, EPA lands, Valleylands/Open Space, or Park Block, provide two (2) additional complete sets of engineering plans (bound and rolled) for review by Environmental Services and the Parks Department.

• If the proposed development includes reconstruction of an existing street, provide one (1) set of folded general servicing plans for review by the Operations Department.

• One (1) set of folded general servicing plans for Project Coordinator.

• Owner to provide contact name, address, and telephone number for agent responsible for responding to issues raised by the Project Coordinator with respect to agreement preparation and review of plans and documentation.

• Four (4) copies of Draft M-Plan. Indicate area of park, open space or SWM blocks on M-Plan.

• Four (4) copies of O.L.S. Certificate (include one signed original) as per Town standard format in Section F9.2.
DIVISION "F" SECTION F2
DEVELOPMENT SUBMISSION STANDARDS
FIRST SUBMISSION REQUIREMENTS

2. **FIRST SUBMISSION REQUIREMENTS** (cont’d)

- Four (4) copies of Certification Letter (include one signed original) from consultant stating conformity between Draft Plan and M-Plan and explanation for any discrepancies.
- Two (2) copies of Storm Water Management Report and Maintenance/Operations Report (if required).
- Five (5) copies (only 3 copies are required if no Park Block) of Soils Report and Hydrogeological Report (if required).
- Two (2) copies of Water Distribution System Analysis Report.
- Three (3) copies of Noise Report (if required).
- Two (2) copies of Tree Preservation Report and Restoration/Landscaping Plans (if required).
- Three (3) copies of Environmental Impact Statement, Environmental Management Plan and Restoration Plans (if required).
- Three (3) copies of Archeological Report (if required).
- Three (3) copies of Phase 1 Environmental Site Assessment for all lands to be conveyed to the Town.

**NOTE:** For the items noted as only to be submitted “if required”, please refer to draft plan approval conditions to verify if the item is required for submission.

At final submission stage, digital copies of all submitted reports must be provided in pdf format.
DIVISION "F"

SECTION F3

DEVELOPMENT SUBMISSION STANDARDS

SECOND SUBMISSION REQUIREMENTS
DIVISION "F" SECTION F3
DEVELOPMENT SUBMISSION STANDARDS
SECOND SUBMISSION REQUIREMENTS

3. SECOND SUBMISSION REQUIREMENTS

- Completed Engineering and Agreement Submission Checklist.
- Return First Submission Red Line Town comment set of Engineering Plans and Design Sheets.
- Plans, reports and/or other documentation required under first submission, which have been revised or updated based on comments from the Town or other agencies, shall be resubmitted for review in accordance with Section F2.
- Four (4) copies of Utility Coordination Plans.
- Three (3) copies of Landscaping Plans for SWM Facilities, Buffer Areas, Entry Features, or Traffic Islands.
- Two (2) copies of Street Lighting Design Plans and Photometric Analysis Report (as per IESNA Guidelines).
- Four (4) copies of Draft M-Plan indicating proposed Street Names (plan view and in owner’s certificate) which must be approved by the Planning Department.
- Two (2) prints of Registered Boundary R-Plan for the subject lands.
- Two (2) copies of Owner’s Deed for the subject lands.
- Two (2) copies of Parcel Register or Abstract for the subject lands.
- Three (3) prints of Draft R-Plans for internal and external easements (in accordance with provincial electronic registration requirements).
- Three (3) copies of MOE Application Forms for Approval of Municipal and Private Sewage Works and for Municipal and Private Water Works, including fees payable to the Town, three (3) complete sets of engineering plans, design sheets and applicable reports and proof of name, all in accordance with MOE guidelines.
- Cash or Check deposit in the amount of $3,000.00 for engineering and legal fees. Deposit will be credited against fee payments outlined in the subdivision agreement.
- Owner to provide contact name, address and telephone number for lawyer or firm responsible for preparation of legal documents necessary for execution of agreements and registration of M-Plan.
- List of all Lots and/or Blocks within proposed M-Plan affected by the following:
  - Engineered Fill
  - Special Foundations
  - Noise Control/Attenuation
  - Retaining Walls
3. SECOND SUBMISSION REQUIREMENTS (Cont’d)

- List of all Lots and/or Blocks within proposed M-Plan affected by the following: (cont’d)
  - Sump Pumps
  - Reduced Side Yards (in accordance with zoning by-law special provisions)

- One (1) draft copy of Schedule “D” to the subdivision agreement which is a municipal servicing (including street lighting) cost summary of works internal and external to the proposed M-Plan. Servicing costs shall be based on estimated or tendered costs if available. Schedule “D” shall be prepared using the Town standard form in Section F9.3 and supporting documentation in the form of a detailed breakdown of quantities and unit prices shall also be submitted.

- One (1) draft copy of Schedule “D-1” to the subdivision agreement which is a summary of Development Charge Credits for creditable services installed under the agreement. Schedule D-1 will not be required where creditable services are not being constructed. The Oversizing Cost identified in Schedule D-1 shall be based solely on the costs identified in the applicable Area Specific Development Charges By-law. A copy of the applicable Development Charge By-law and supporting documentation is available through the Project Coordinator. Schedule D-1 shall be prepared using the Town standard form in Section F9.4.

- The following information shall be submitted to assist the Town in preparing Schedule I to the subdivision agreement which outlines all payments and security requirements. Schedules D and D-1 must be finalized before Schedule “I” may be finalized by the Town.

  1. total length of road
  2. total length of sanitary sewer
  3. number of hydrants
  4. number of valve chambers
  5. number of tee intersections
  6. number of cross intersections
DIVISION "F"

SECTION F4

DEVELOPMENT
SUBMISSION
STANDARDS

FINAL SUBMISSION
REQUIREMENTS
DIVISION "F" SECTION F4
DEVELOPMENT SUBMISSION STANDARDS
FINAL SUBMISSION REQUIREMENTS

4. **FINAL SUBMISSION REQUIREMENTS**

- Digital copy of proposed M-Plan approved by Planning Department on diskette or via e-mail, as per Town’s specifications in Section F9.5.

- After MOE and other agency approvals have been obtained, the original engineering drawing mylars (diazo mylar 3 mil min. with surface on both sides or equivalent) shall be submitted for signature by the Commission of Engineering and Public Works. Mylars shall not be submitted for signature until so directed by the Project Coordinator.

- Digital graphic file for Engineering Plans in accordance with Section F8.4.

- Pdf files of all "final" reports and studies listed under sections F2.0 and F3.0 are to be provided on CD labeled and clearly referencing the subdivision 19T number, development name and the date submitted.
DIVISION "F"

SECTION F5

DEVELOPMENT SUBMISSION STANDARDS

AGREEMENT EXECUTION SUBMISSION REQUIREMENTS
DIVISION "F" SECTION F5
DEVELOPMENT SUBMISSION STANDARDS
AGREEMENT EXECUTION SUBMISSION REQUIREMENTS

5. AGREEMENT EXECUTION SUBMISSION REQUIREMENTS

- If the Subdivision Agreement is reviewed and accepted by the Owner and all plan mylars have been signed by the Town, the following information shall be submitted to allow the Town to prepare five (5) copies of the agreement for execution:
  1. Fifteen (15) * A-1 size prints and three (3) reduced 8.5” x 14” size prints of the following plans:
     a) Proposed M-Plan -- signed by owner(s) and surveyor
     b) General Servicing Plan(s)
     c) Area Grading Plan(s)
     d) Utility Coordination Plan(s)

* The A1 size prints shall be folded in accordance with our standard format in Section F9.6.

- After execution of the Subdivision Agreement by the Owner, the following documentation shall be provided along with the five copies of the agreement executed by the Owner:
  1. Solicitor’s Certificate
  2. Section 118 and 119 Restrictions
  3. Postponements
  4. Payments identified in Schedule I
  5. Securities identified in Schedule I in the form of a Letter of Credit
  6. Insurance Certificate

The Letter of Credit and Insurance Certificate shall be prepared using the standard form in Sections F9.7 and F9.8.
DIVISION "F"

SECTION F6

DEVELOPMENT SUBMISSION STANDARDS

PRE-GRADING AND PRE-SERVICING
DIVISION "F" SECTION F6
DEVELOPMENT SUBMISSION STANDARDS
PRE-GRADING AND PRE-SERVICING

6.1 GENERAL

✓ Prior to the start of construction, the Owner and/or his Agent, the Contractor, and the Owner’s Engineering Consultant shall meet with the Town for a pre-construction meeting.

✓ Should the Owner wish to commence construction prior to the subdivision agreement being executed, the Owner will be required to satisfy all the pre-servicing requirements in Section F6.2. All of these requirements are to be satisfied before contacting the Project Coordinator to request a pre-servicing meeting with the Town.

✓ Should the Owner only wish to commence grading activities (i.e., site cleaning, topsoil removal, area grading) before execution of the subdivision agreement, the Owner will be required to satisfy all of the pre-grading requirements in Section F6.2. All of these requirements are to be satisfied before contacting the Project Coordinator to request a pre-grading meeting with the Town. If after pre-grading, the Owner wishes to commence municipal servicing construction before agreement execution, the Owner will then be required to satisfy the pre-servicing requirements in Section F6.3.

✓ If a road closure is required to facilitate municipal servicing construction, the Consultant shall make a written request to the Project Coordinator. The request shall identify the location and duration for the closure. The Consultant shall also submit a Traffic Management Plan, in accordance with Book 7 of the Ontario Traffic Manual, for review by the Town. To facilitate the closure, a staff report will be prepared for Council to establish a by-law.

✓ A minimum of 48 hours notice must be given to the Town of Richmond Hill’s Maintenance & Operations Section for any necessary utility stakeouts (i.e. Sanitary and storm sewers, watermains and service connections). All other utility companies must be contacted directly.

6.2 REQUIREMENTS FOR PRE-SERVICING

-Site Alteration Permit
(Application form can be obtained from Engineering and Public Works Department at 225 East Beaver Creek Road, 5th Floor, Richmond Hill, Ontario)

-Letter of Credit -:
  ($20,000 (Value of Servicing Works < $250,000)
  ($50,000 (Value of Servicing Works $250,000 to $500,000)
  ($100,000 (Value of Servicing Works > $500,000)
  (Town Format for Pregrading, see Section F9.8)
DIVISION "F" SECTION F6
DEVELOPMENT SUBMISSION STANDARDS
PRE-GRADING AND PRE-SERVING

6.2 REQUIREMENTS FOR PRE-GRADING (cont’d)

- Allocation (by Council) of water and sewer servicing

- Owner’s Certificate of Insurance
  - ($10,000,000 Commercial General Liability)
  - ($5,000,000 Motor Vehicle Liability)
  (Form can be obtained from website: http://www.richmondhill.ca/documents/fin_cert_insurance_construction.pdf)

- Contractor’s Insurance Certificate
  (identify Town as additional insured)
  (Form can be obtained from website: http://www.richmondhill.ca/documents/fin_cert_insurance_construction.pdf)

- Notice of Contractor
  -(Town format, see Section F9.9)

- Archaeological Clearance

- Reviewed Tree Preservation/Restoration Plan(s) - 2 sets

- Reviewed EIS Report, Hydrogeological Report, and Phase 1 ESA

- Reviewed Area Grading Plan(s) - 2 sets

- Reviewed Erosion and Sediment Control Plan(s) - 2 sets

- Reviewed Adjacency Report

- Digital Copy of Proposed M-Plan Approved by Planning (as per Town specifications in Section F9.5)

- Pregrading Meeting with Project Coordinator

All recommendations from all the above documentation/reports must be incorporated into the applicable engineering plans prior to Pregrading. Generally, second Engineering Submission must be submitted and reviewed prior to Pregrading. Topsoil pile location and height must be identified on Erosion and Sediment Control Plans. A chemical analysis shall be submitted to the Town for any imported material to demonstrate that the material is clean fill.
6.3 REQUIREMENTS FOR PRE-SERVICING

-Site Alteration Permit
(Application form can be obtained from Engineering and Public Works Department at 225 East Beaver Creek Road, 5th Floor, Richmond Hill, Ontario)

-Letter of Credit -:
(Site Alteration) -Plan of subdivision (20% of Cost of Servicing Works)
-Site Plan (30% of Cost of Servicing Works, $20,000 min.)

-Engineering Fees:
-(4.2% of Cost of Servicing Works + GST - for Plan of Subdivision)
-(3.5% of Cost of Servicing Works + GST - for Site Plan)

-Allocation (by Council) of water and sewer servicing

-Owner’s Certificate of Insurance
-(10,000,000 Commercial General Liability)
-(5,000,000 Motor Vehicle Liability)

(Form can be obtained from website: http://www.richmondhill.ca/documents/fin_cert_insurance_construction.pdf)

-Contractor’s Insurance Certificate
(identify Town as additional insured)
(Form can be obtained from website: http://www.richmondhill.ca/documents/fin_cert_insurance_construction.pdf)

-Notice of Contractor
-(Town format, see Section F9.9)

-Archaeological Clearance

-Reviewed Tree Preservation/Restoration Plan(s) - 2 sets

-Reviewed EIS Report, Hydrogeological Report and Phase 1 ESA

-Reviewed Adjacency Report

- Engineering Plans signed by Commissioner - (4 sets - 3 bound and 1 unbound)

-MOE Approvals

-Other Agency Approvals (TRCA, MNR, MTO, Region of York, etc.)

-Digital Copy of Proposed M-Plan Approved by Planning (as per Town specifications in Section F9.5)

- Pre-servicing Meeting with Project Coordinator
6.3 REQUIREMENTS FOR PRE-SERVICING (cont’d)

If the Developer had obtained a Pregrading Site Alteration Permit with the Town of Richmond Hill, and would like to proceed with Preservicing, they must apply for a Preservicing Site Alteration Permit and provide a new or amended Letter of Credit to reflect the new permit. The Developer must also ensure that the Insurance Certificate will not expire prior to completion of Preservicing works, or issue a new Insurance Certificate. All recommendations from all the above documentation/reports must be incorporated into the applicable engineering plans prior to Pregrading. Topsoil pile location and height must be identified on Erosion and Sediment Control Plans.
DIVISION "F"

SECTION F7

DEVELOPMENT
SUBMISSION
STANDARDS

ENGINEERING DRAWINGS
DIGITAL AND HARDCOPY
SPECIFICATIONS
7.1 ENGINEERING DRAWINGS - GENERAL

- All Engineering drawings shall be prepared in AutoCad 2000 format or greater utilising the “Town of Richmond Hill Development Cad Standard Application.” See Section F8 of this document.

- The applicant is strongly advised not to begin preparation of any drawings prior to obtaining a copy of the above noted Development Submission Application Program and familiarising themselves with both the graphic and database component requirements. Strict adherence to the requirements is essential and non-conformance will ultimately result in extra work for the applicant’s consultants as a consequence of submission rejection.

- All drawings shall be neat, and must comply with the current Town of Richmond Hill Digital Standards.

- The original material used for final engineering drawings submitted for signature and for as-built record purposes shall be diazo mylar 3 mil (minimum) double matte or approved equivalent.

- Tapes and stick on labels shall not be used on drawing originals.

- Standard digital templates for engineering drawings are available from the Design Supervisor - Design and Construction Division of the Engineering and Public Works Department.

- All engineering plans submitted for approval shall be signed and sealed by a Professional Engineer licensed to practice in the Province of Ontario.

7.2 HARDCOPY ENGINEERING DRAWINGS

- Drawing size shall be A-1 (metric)

- Scale on plan and profile shall be 1:500 horizontal
  1:100 vertical

- The scale on lot grading plans and utility co-ordination plans shall be 1:500 maximum and on general servicing plans the scale shall be 1:1000 maximum

- The scale on all details shall be 1:50 minimum.
DIVISION "F" SECTION F7
DEVELOPMENT SUBMISSION STANDARDS
ENGINEERING DRAWINGS
DIGITAL AND HARDCOPY SPECIFICATIONS

7.2 HARDCOPY ENGINEERING DRAWINGS (cont’d)

- All datum shall be referred to a geodetic benchmark. All development submission plans are to be referenced to Town’s current vertical and horizontal Control Network. This information is available on the Design and Construction Division - Engineering and Public Works Department webpage through the Town’s website (www.richmondhill.ca).

- All plans and profiles shall be created, such, that each street in its entirety, including all intersections, may be separately filed. All drawing identification numbers shall ultimately be assigned by the Town.

- When streets require more than one (1) plan, match lines shall be provided.

- The lot numbering on all engineering drawings shall be the same as that on the subdivision M-Plan.

7.3 DIGITAL REQUIREMENTS

- Refer to Sections F7, F8 and F9 of this document for digital drawing and Infrastructure Management System (IMS) data requirement.

7.4 FINAL SUBMISSION

- Prior to submission for signature by the Commissioner of Engineering and Public Works, all drawings shall updated to reflect street names and lot numbering in accordance with the approved M-Plan.

- Prior to submission for signature, all drawings shall be updated to include the Town of Richmond Hill assigned drawing record number in the appropriate location reserved within the standard drawing title block.

- Upon receipt of all approvals, original mylar drawings shall be submitted to the Commissioner of Engineering and Public Works for signature.
DIVISION "F"

SECTION F8

DEVELOPMENT SUBMISSION STANDARDS

CAD STANDARD, DIGITAL SUBMISSION STANDARDS AND AS-BUILT REQUIREMENTS
DIVISION "F" SECTION F8
DEVELOPMENT SUBMISSION STANDARDS
CAD STANDARD,
DIGITAL SUBMISSION STANDARDS AND
AS-BUILT REQUIREMENTS

8.1 GENERAL

The Digital Submission requirements covered under this section are comprised of the following:

- A graphic file of the M-Plan prepared in accordance with the current CAD Standard as noted above (see Section F9.5 “Specifications for Submission of Draft Approved M-Plan).

- A graphic AutoCAD file of all the new sewer and water infrastructure that the Town will be ultimately assuming prepared in strict accordance with the current CAD Standard (see Section F8.3 “Infrastructure Management System Data Requirements”).

- An associated database populated with key fields of information about each asset that the Town will be assuming created and populated using the Town of Richmond Hill Development Submission Application (see Section F8.3 “Infrastructure Management System Data Requirements”).

The graphic and database file will be used by the Town to import into the Town’s Infrastructure Management System and property mapping cover.

8.2 DEVELOPMENT SUBMISSION CAD STANDARD

The CAD Standard has been implemented to provide standardised block and layer name conventions for drawings that are submitted to the Town of Richmond Hill. It is important to recognise that strict conformance to the CAD Standard is required. The CAD Standard was developed in conjunction with the Development Submission Application and it is important that the Consultant understands that the block and layering standard must be rigidly adhered to from the onset of each project for the Development Submission Application to work. Therefore, conformance to the standard is required or the submission will be rejected and returned for correction.
DIVISION "F" SECTION F8
DEVELOPMENT SUBMISSION STANDARDS
CAD STANDARD,
DIGITAL SUBMISSION STANDARDS AND
AS-BUILT REQUIREMENTS

8.3 INFRASTRUCTURE MANAGEMENT SYSTEM DATA REQUIREMENTS - GENERAL

The digital submission requirements are comprised of a CAD file containing all of the existing and proposed sewer and water assets and an associated database file. The Development Submission CAD Standard has been developed by the Town of Richmond Hill in order to provide Consultants with the tools necessary to satisfy the I.M.S. submission requirement.

The Town of Richmond Hill Development Submission Application runs under AutoCAD version 2000i or later and provides a graphic user interface with the tools for the Consultant to create and populate the database component that is required under this section. The current version of the Development Submission Application and CAD Standard can be obtained from the Design Supervisor at the Engineering and Public Works Department. Detailed documentation describing the installation and operation of the application can be downloaded from the Town website at www.richmondhill.ca under Town Hall>Deypartments>Engineering and Public Works>Design and Construction Section.

It is critical that the Consultant's CAD operator review the documentation in advance of starting a new project so that they have a full understanding as to the reasons for rigidly adhering to the Development Submission CAD Standard. Failure to comply with this CAD Standard will ultimately result in a considerable amount of time spent during latter stages of the project correcting block and layering errors.

The Development Submission CAD Standard is a very simple standard that applies to the sewer and water infrastructure graphic entities that currently exist and are being extended or connected to and/or the proposed sewer and water infrastructure that will be assumed by the Town as a result of the development. For everything else, the Consultant may continue to use whatever block and layering conventions they choose.

The submitted graphic file must include the existing and proposed sewer and water infrastructure blocks and layering required in accordance with the current Development Submission Application CAD Standard. The street lines and lot fabric must also be included and the layer names must conform to those specified in this Section. No additional blocks or layers shall exist within the graphic file submitted.
8.3 INFRASTRUCTURE MANAGEMENT SYSTEM DATA REQUIREMENTS - GENERAL (cont’d)

The graphic file shall encompass the entire servicing area of the Development and must contain no Xrefs (reference files). The graphic file must be tied and georeferenced to the Town’s horizontal and vertical control network. Information regarding available control monuments within the area can be obtained from the Design and Construction Section of the Town website.

8.4 INFRASTRUCTURE MANAGEMENT SYSTEM GRAPHIC & DATA REQUIREMENTS - FINAL ENGINEERING SUBMISSION

The final Engineering submission must include the graphic file prepared in accordance with Section F8.3 and the current Development Submission Application CAD Standard. The associated database file must be created using the Town’s Development Submission Application and must be partially populated. All attribute information related to pipe material, size and associated drawing number(s) must be populated (refer to the Development Submission Application Program documentation for complete details).

Upon receipt the graphic and database file will be quality assured by Town staff in order to confirm completeness and conformity with the standard. If a graphic or database component is found to be incomplete or contains errors it will be rejected and returned to the Consultant for correction and resubmission.

8.5 INFRASTRUCTURE MANAGEMENT SYSTEM - DIGITAL AS-BUILT DATA SUBMISSION

The as-built infrastructure submission must include the final as-built graphic file revised in accordance with the Development Submission Application documentation. If the difference between the proposed and as-built location of any sewer or water infrastructure exceeds the prescribed limits then the location in graphics must be revised to reflect the as-built location. (Max. deviation is 1.2m parallel to centreline alignment and 0.5m perpendicular to centreline alignment.)

The Development Submission Application database component must also be provided. ALL FIELDS MUST BE FULLY POPULATED WITH AS-BUILT DATA.

Upon receipt the graphic and database file will be quality assured by Town staff for completeness and conformity to the standard. If a graphic or database component is found to be incomplete or contains errors it will be rejected and returned to the Consultant for correction and resubmission.
8.6 ENGINEERING DRAWINGS - HARD COPY AS-BUILT SUBMISSION REQUIREMENTS

The hard copy submission requirements under this section must also be received and approved by the Town of Richmond Hill Design and Construction Section prior to proceeding through to assumption.

Two complete hardcopy sets of as-built engineering drawings and design sheets must be submitted for review with the digital files outlined in Section F8.5. The hard copy drawings must be prepared in accordance with the checklist that is available for download on the Town website. All drawings and design sheets must be signed and sealed by a Professional Engineer.

The submission must include one hard copy supporting set of engineering plans and notes used in the preparation of the as-built drawings. This set shall have been maintained by the Consultant's inspector throughout construction in order to document by means of redline comment and revision, any field changes to the original design of the municipal services as a result of construction.

The submission will be reviewed to confirm that it is complete and accurate. If the package is not complete the applicant will be advised and further review or comment will be deferred until all of the outstanding information is received.

Upon acceptance of the hard copy “as-built” engineering drawings the Project Co-ordinator will notify the consultant and request that the final as-built mylars of the entire contract drawing set be forwarded. One CD containing all the “as-built” digital files for the entire drawing set (Autodesk 2006 format) must also be provided (all X-refs must be inserted to the parent drawings and purged) and a second CD containing pdf images of all drawings.

Pdf files must be:

- plotted to scale and in proper orientation (landscape/portrait)
- generated from AutoCad through Adobe Professional (300 dots/inch)
- file size less than two megabytes
- named as per the Town assigned drawing code.

NOTE: Both the digital and hard copy submissions must be received, quality assured, and accepted by the Town prior to a development proceeding to assumption.
DIVISION "F"

SECTION F9

STANDARD DOCUMENTS

Note: Please print the attached standard documents in legal size paper.
## Section F9.1

### ENGINEERING AND AGREEMENT SUBMISSION CHECKLIST

**PROJECT NAME:** 19T -

<table>
<thead>
<tr>
<th>ITEM</th>
<th>INITIAL PHASE COPIES</th>
<th>ENCLOSED</th>
<th>SUBSEQUENT PHASE COPIES</th>
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<tr>
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<td>Parks/Environmental Services - complete set of engineering plans</td>
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<td>Water Distribution System Analysis Report</td>
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<td>Environmental Impact Statement &amp; Management Plan (if required)</td>
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<td>Archeological Report (if required)</td>
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<td>Utility Coordination Plans</td>
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<td>Landscaping Plans for SWM Facilities, Buffer Areas, Entry Features etc.</td>
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<td>Street Lighting Plans and Photometric Report</td>
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<td>Folded A-1 size General Servicing Plans</td>
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<td>Folded A-1 size Area Grading Plans</td>
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<td>Folded A-1 size Utility Plans (only if in agreement)</td>
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**NOTE:** Submission requirements for subsequent phases of development will be identified by the Project Coordinator. Please contact the Coordinator prior to the first submission for a subsequent phase of development.

h:\grp\tranwork\develop\submission checklist Rev. Mar 1/05
DATE

Town of Richmond Hill  
Engineering and Public Works Department  
P.O. Box 300  
RICHMOND HILL, ON L4C 4Y5

Dear Sirs;

Re: Project Name/Owner  
19T-Number  
Part of Lots and , Concession ,  
Town of Richmond Hill

CERTIFICATE OF AREAS AND FRONTAGES

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<th>FRONTAGE (m)</th>
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TOTALS

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TOTALS

Total Area of Residential Lots and Residential Blocks = _______________ (m²)

Total Area of Roads = _______________ (m²)

Total Area of Subdivision = _______________ (m²) = _______________ (ha)

I hereby certify that:

i) the areas and frontages of the above mentioned subdivision comply with the provisions of the applicable by-law;

ii) all existing buildings or structures on the subject lands or other lands abutting this Plan which are owned by the Owner are situated so as to comply with the applicable zoning by-laws after registration of the Plan (surveyed dimensions to be shown on M-Plan).

iii) the flankage setback requirement(s) for all proposed and future lots flanking an arterial road or for all proposed and future lots on corner lots and blocks comply with the applicable by-law.

SIGNATURE, O.L.S.
### ESTIMATED COST OF MUNICIPAL SERVICES

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<th>Service</th>
<th>Within the Plan</th>
<th>External to the Plan</th>
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<td></td>
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<tr>
<td>B  Public Highway Construction to surface course asphalt</td>
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<td>C  Sanitary Drainage</td>
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<tr>
<td>D  Storm Drainage</td>
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<td>E  Water Distribution Systems</td>
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<tr>
<td>F  Foundation Drain Collector Systems</td>
<td></td>
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<tr>
<td>G  Service Connections (if not included in C, D, E, F within the plan)</td>
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<tr>
<td>H  Stormwater Management Facilities (excluding landscaping)</td>
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<tr>
<td>I  Noise Attenuation Barrier</td>
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<td>J  Bus Shelter Pads</td>
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<td>K  Sewage Pumping Station</td>
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<td>L  Water Booster Pumping Station</td>
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<td>M  Privacy Fencing</td>
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<td>N  Emergency Access Roads</td>
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<tr>
<td>O  Street Lighting</td>
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<td>TOTAL ESTIMATED COST OF MUNICIPAL SERVICES</td>
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E. & O.E. \hspace{1cm} Date:

### ESTIMATED COST OF PARKS SERVICES

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<th>External to the Plan</th>
<th>Total</th>
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<tr>
<td>A  Chain Link Fencing</td>
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<tr>
<td>B  Landscaping for Stormwater Management</td>
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<tr>
<td>C  Restoration Planting</td>
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<tr>
<td>D  Entry Features</td>
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<td>E  Screening Planting</td>
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<td>F  Walkways</td>
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E. & O.E. \hspace{1cm} Date:
## CREDITABLE SERVICES

### Services within the Plan(s)

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<thead>
<tr>
<th>Service</th>
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<tbody>
<tr>
<td>A Collector Road - Construction</td>
<td>$</td>
</tr>
<tr>
<td>B Collector Road - Land</td>
<td>$</td>
</tr>
<tr>
<td>C Watermains</td>
<td>$</td>
</tr>
<tr>
<td>D Sanitary Sewers</td>
<td>$</td>
</tr>
<tr>
<td>E Storm Sewers</td>
<td>$</td>
</tr>
<tr>
<td>F Stormwater Management Facility (Construction and Landscaping)</td>
<td>$</td>
</tr>
<tr>
<td>G Stormwater Management Facility - Land</td>
<td>$</td>
</tr>
<tr>
<td>H Sidewalks, Landscaping, Street Lighting - Boundary Roads</td>
<td>$</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$</strong></td>
</tr>
</tbody>
</table>

### Services External to the Plan(s)

<table>
<thead>
<tr>
<th>Services</th>
<th>Oversizing Cost *</th>
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</thead>
<tbody>
<tr>
<td>A Collector Road - Construction</td>
<td>$</td>
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<td>$</td>
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<tr>
<td><strong>SUB-TOTAL</strong></td>
<td><strong>$</strong></td>
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</table>

**TOTAL OVERSIZING COST - WITHIN AND EXTERNAL** $ 

* Oversizing Cost may include engineering fees, contingencies, G.S.T. and indexing as per the applicable Area Specific Development Charge Bylaw
General

The intent of this specification is to facilitate the transfer of the digital data related to a draft approved M-Plan. The specifications have been created in an attempt to minimize any additional work required by both the proponent and the Town. We encourage suggestions on how to enhance the process and specifications.

Deliverables

The digital plan submission is comprised of two items:
• Digital plan data as per the specifications; and
• An ASCII file containing descriptive information (i.e. Metadata) related to the digital plan.

The deliverables may be provided on DVD media or may be delivered electronically by email if the files are less than 4.0 Mb. Only one digital submission will be requested and it is anticipated that it will typically be the second submission to Planning & Regulatuory Services Department, Development Engineering Division. For the digital file naming convention, the use of the 19T number (and Phase, if applicable) will facilitate referencing for all parties.

Digital Plan Specifications

The digital plan submission is preferred in AutoCAD format (dwg format). The graphic data is required to be copied from your inhouse “layering” system into the following layers/levels of data for submission to the Town:
• Layer/Level 1: Survey Lines. This layer will contain boundary linework for all subdivision units;
• Layer/Level 2: Text. This layer will contain text indicating the number of the subdivision unit and road names (if available at time of submission).

NOTE: Linework must extend from the centre of each monument/survey bar, bend or intersection to ensure a closed polygon exists for each parcel or block.

ASCII Metadata File

A comma delimited ASCII file is requested with the following metadata: Town project reference number (i.e. 19T/Phase); Company Name; Project Contact name; Contact telephone number; your project reference number; digital data file name; date of last revision for submitted digital data; software/version used to create the data; coordinate system used for data; data format; and any comments/special notes of clarification required.

Data Distribution

The digital data provided will be integrated with the overall digital property mapping database for the Town and will be used for internal purposes including the use for public information. Any external requests for this data will be redirected to the developer of the property.

Contact Information

If you have any questions, you are asked to contact the Manager, Stormwater & Subdivisions, or Supervisor, Design & Construction Services at 905-771-8830.
“FORM OF A LETTER OF CREDIT WHICH WOULD BE ACCEPTABLE TO THE TOWN OF RICHMOND HILL”

NOTE: SCHEDULE “I” BANKS ONLY ACCEPTABLE

NAME OF BANK: Date Issued:
ADDRESS:
LETTER OF CREDIT No: Amount:

Issued Subject to The Uniform Customs and Practices for Documentary Credits, 2007 revision, ICC Publication number 600, implemented July 1, 2007

TO: The Corporation of the Town of Richmond Hill
P.O. Box 300
225 East Beaver Creek Road
Richmond Hill, ON L4B 3P4

We hereby authorize you to draw on ...NAME OF BANK, BRANCH, AND ADDRESS... for account of ...NAME OF APPLICANT... up to an aggregate amount of $........................... available on Demand.

Pursuant to the request of our Customer, the said ...NAME OF APPLICANT... WE,...NAME OF BANK, BRANCH, ADDRESS... hereby establish and give you AN IRREVOCABLE LETTER OF CREDIT in your favour in the TOTAL AMOUNT OF $......CANADIAN DOLLARS which may be drawn on by you at any time and from time to time upon WRITTEN DEMAND for payment made upon us by you which demand we shall honour without enquiring whether you have a right as between yourself and our said customer to make such demand and without recognizing any claim of our said customer, or objection by it to payment by us.

Provided, however, that you are to deliver to ....NAME OF BANK, BRANCH, ADDRESS..., at such time as a WRITTEN DEMAND FOR PAYMENT is made upon us, a certificate signed by the TREASURER or the CLERK of The Corporation of the Town of Richmond Hill, confirming that monies drawn pursuant to this Letter of Credit are to guarantee obligations incurred or to be incurred in connection with an Agreement dated ..date shown on agreement... between...Name(s) shown on the agreement... and The Corporation of the Town of Richmond Hill.

The amount of the Letter of Credit may be reduced from time to time in accordance with the terms of the Agreement as advised by notice in writing given to us from time to time by you.

Subject to the condition hereinafter set forth, this Letter of Credit shall expire on ....................................*. This Letter of Credit shall be automatically extended without amendment for one year from the present or any future expiration date hereof, unless ninety (90) days prior to such date we shall notify you, in writing, by registered mail, that we elect not to consider the Letter of Credit renewed for such additional period.

For...NAME OF BANK.........

__________________________    ______________________
Countersigned       Authorized signature
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Provided, however, that you are to deliver to ....NAME OF BANK, BRANCH, ADDRESS..., at such time as a WRITTEN DEMAND FOR PAYMENT is made upon us, a certificate signed by the TREASURER or the CLERK of The Corporation of the Town of Richmond Hill, confirming that monies drawn pursuant to this Letter of Credit are to guarantee the performance of site alteration as provided for and authorized by Site Alteration Permit No. ...............and all conditions of granting such permit.

The amount of the Letter of Credit may be reduced from time to time in accordance with the terms of the Site Alteration Permit as advised by notice in writing given to us from time to time by you.

Subject to the condition hereinafter set forth, this Letter of Credit shall expire on .............................................*. This Letter of Credit shall be automatically extended without amendment for one year from the present or any future expiration date hereof, unless ninety (90) days prior to such date we shall notify you, in writing, by registered mail, that we elect not to consider the Letter of Credit renewed for such additional period.

For...NAME OF BANK....

Countersigned ............................................ Authorized signature ............................................
Date

The Corporation of the Town of Richmond Hill
P.O. Box 300
Richmond Hill, Ontario
L4C 4Y5

Attention: Mrs. Ana Bassios, Commissioner of Planning and Regulatory Services

Dear Mrs. Bassios:

Re: 19T-[file number] - [name of development] - for Plan of Subdivision only
Re: D06-[file number] - [name of development] - for Site Plan only

We hereby advise that we intend to retain the services of (name of contractor) who will act as the general contractor with respect to the installation of services within the captioned plan of subdivision or site plan.

Yours truly,


Approved in accordance with section A.8 of the subdivision agreement.
(exclude this provision for a Site Plan)

for Commissioner of Planning and Regulatory Services Date
DIVISION "G"

MISCELLANEOUS

TOWN STANDARD DRAWINGS
DIVISION "G"
MISCELLANEOUS
TOWN STANDARD DRAWINGS

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<td>HOUSE SERVICE LOCATION STANDARDS</td>
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<td>M-3A</td>
<td>CYLINDRICAL CONCRETE SURVEY MARKER</td>
</tr>
</tbody>
</table>
NOTE: IF EXISTING WATERMAIN IS CAST IRON THE PIPE SHALL BE CUT OUT AND REPLACED WITH A SECTION OF DUCTILE IRON PIPE AS DIRECTED BY THE ENGINEER.

2. WATERMAIN BEDDED IN FILL GROUND:
   IF, IN THE OPINION OF THE TOWN OF RICHMOND HILL, IT IS FEASIBLE AND IF DUCTILE IRON PIPE IS USED, CRUSHED 50mm LIMESTONE IS TO BE USED AS BEDDING FOR THE WATERMAIN PIPE ACROSS FILL GROUND. THICKNESS OF THE STONE BEDDING SHALL BE DETERMINED BY TOWN OF RICHMOND HILL.
NOTES:
1. SERVICES ARE NOT TO BE EXTENDED INSIDE PRIVATE PROPERTY.
2. SERVICES WILL NOT BE PERMITTED WITHIN DRIVEWAYS UNLESS OTHERWISE APPROVED BY THE TOWN OF RICHMOND HILL.

S.C.F.
NOTES

1. LEVELLING SHOULD BE OF 2ND ORDER AND SHOULD BE CLOSED BETWEEN TWO EXISTING PERMANENT BENCH MARKS.

2. LEVELLING AND ADJUSTMENT SHEETS ARE TO BE SUBMITTED TO THE TOWN PRIOR TO ACCEPTANCE OF BENCH MARK. ALSO SUBMIT DRAWING SHOWING LOCATION OF BENCH MARK MONUMENT WITH TIES TO PERMANENT OBJECTS.

3. NOTIFY THE ENGINEERING DEPARTMENT FOR INSPECTION PRIOR TO POURING OF CONCRETE.

4. BENCH MARK NUMBER MUST BE PUNCHED ON THE TABLET PRIOR TO INSTALLATION.
DIVISION "H"

STORMWATER MANAGEMENT
## DIVISION "H"

### STORMWATER MANAGEMENT DESIGN CRITERIA

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<td>H2.3.1</td>
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<td>H2.4.2</td>
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## DIVISION "H"

### STORMWATER MANAGEMENT DESIGN CRITERIA

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<td>ST-11A Temporary Outfall Structure</td>
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<td>Typical Detail</td>
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<td>ST-12A Outlet Structure Typical Detail</td>
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<td>ST-15A Forebay Dewatering Sump Typical Detail</td>
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DIVISION "H"

SECTION "H1"

STORMWATER MANAGEMENT DESIGN CRITERIA

DESIGN OF QUALITY AND QUANTITY CONTROL FACILITIES

DEVELOPMENTS 5 HA IN SIZE OR GREATER
DIVISION “H” - SECTION H1

STORMWATER MANAGEMENT DESIGN CRITERIA

DESIGN OF QUALITY AND QUANTITY CONTROL FACILITIES

DEVELOPMENTS  5 HA IN SIZE OR GREATER

These design criteria are considered supplemental to the latest revision of the MOE Stormwater Management Practices Planning and Design Manual. The purpose of these criteria is to provide specific direction to consultants on the conceptual and detailed design of stormwater management facilities proposed within the Town of Richmond Hill. These design criteria and the Facility Landscaping Design Criteria and Implementation Guidelines are considered to be supplementary to the MOE Manual. The type of stormwater management facility to be designed is normally determined through a Master Environmental Servicing Plan.

1. **Length/Width Ratio**

   The minimum length to width ratio is 3:1. Internal berming within the facility may be used to increase flow path to meet this criteria and will only be considered where physical constraints clearly limit the facility configuration.

2. **Sideslopes**

   **Planting Shelf**

   The planting shelf shall consist of 3m of 7:1 slope centered on the edge of the permanent pool. This width of shelf is considered a minimum requirement as a safety measure to limit the potential for public access to the permanent pool.

   **Above Planting Shelf**: 4:1 max. slope (5:1 preferred)

   **Below Planting Shelf**: 3:1 max. Slope
3. **Standard Water Depths**

Normal water level (N.W.L.) is considered the permanent pool water level within the facility.

<table>
<thead>
<tr>
<th></th>
<th>Wetpond Facility</th>
<th>Wetland Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permanent Pool:</strong></td>
<td>1.0 to 2.0 m</td>
<td>0.15 to 0.30 m (75% of surface area)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.90 m max. for deep pools</td>
</tr>
<tr>
<td><strong>Permanent Pool at Outlet</strong></td>
<td>2.5 m max.</td>
<td>2.0 m max.</td>
</tr>
<tr>
<td><strong>Extended Detention Storage (above N.W.L.)</strong></td>
<td>1.5 m max.</td>
<td>1.0 m max.</td>
</tr>
<tr>
<td><strong>Quantity Control Storage (above N.W.L.)</strong></td>
<td>2.5 m max.</td>
<td>2.0 m max.</td>
</tr>
<tr>
<td><strong>Overall Max. Depth</strong></td>
<td>5.0 m</td>
<td>4.0 m</td>
</tr>
</tbody>
</table>

Deeper permanent pool areas at outlet structures will be considered in situations where site specific conditions have been identified to warrant this design consideration. For wetlands, a localized deep pool shall be designed at the outlet structure to facilitate the use of a reverse pipe outlet as identified on Town Standard Drawing ST-12A. The use of extended detention storage for quantity control is considered acceptable to the Town.

4. **Permanent Pool and Facility Storage Requirements**

Permanent pool volume requirements shall be based on the MOE Manual or site specific requirements as recommended in Master Environmental Servicing Plans, Master Drainage Plans or Master Stormwater Management Plans.

Facility storage requirements for quality control, including extended detention, and quantity control shall be based on criteria established in Master Environmental Servicing Plans, Master Drainage Plans or Master Stormwater Management Plans. If no documentation exists to establish the level of quality and quantity control, the requirements will be as directed by the Town.
5. **Forebay**

A berm is to be provided to separate the forebay from the wetpond/wetland area. The top of berm is to be at the N.W.L. with erosion protection above the N.W.L., 1.0m in top width, with 3:1 max. sideslopes. The forebay length to width ratio shall be 2:1 or greater with length designed in accordance with MOE manual. The forebay bottom (not including sideslopes) shall be lined with 300 mm of 50mm diameter crusher run limestone (or as recommended by a geotechnical consultant) to support the use of equipment to remove sediments from the forebay. Unstable native soil conditions may warrant the use of geotextile lining under the limestone as per geotechnical recommendations. A geotechnical engineer shall certify that the forebay lining will provide adequate support for maintenance equipment. The use of maintenance equipment presumes that the forebay is dewatered prior to sediment removal. A dewatering sump shall be installed in each forebay to facilitate dewatering in accordance with Town Standard Drawing ST - 15A.

6. **Berming**

Berming around the perimeter of the facility shall be designed within a minimum top width of 2.0m (where trail or maintenance access is not located on berm) and the top of berm elevation shall be established at a minimum 0.3m above the 100 year water level or highest water level within the facility. Retaining walls within the stormwater block are not acceptable to the Town.

7. **Sediment Drying Area**

Where feasible, a sediment drying area shall be provided immediately adjacent to the maintenance access road and located as close as possible to the sediment forebay. The drying area shall have a surface area equivalent to the area of the bottom of the forebay. This area shall be graded at a 2.0 to 5.0% slope with surface drainage directed to the facility. Surface treatment of the drying area shall be consistent with the maintenance access roadway.

8. **Maintenance Access Roadway**

Maintenance access roadways shall be provided from municipal road allowances to outlet/inlet structures and to the bottom of sediment forebays. Where feasible, two access points shall be provided to each facility and access roads shall be looped to access points. Dead end access roads are not preferred, and shall be designed with a proper hammerhead turn around with a minimum hammerhead width of 17.0 m, roadway width of 5.0 m and 12.0 m centreline turning radius.

<table>
<thead>
<tr>
<th>Min. Roadway Width</th>
<th>5.0 m</th>
<th>Max. Gradient = 10%</th>
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</thead>
<tbody>
<tr>
<td>Max. Crossfall</td>
<td>2%</td>
<td>Min. Centreline Radius = 12.0m</td>
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</tbody>
</table>
Blocks between residential lots for the purpose of maintenance access shall have a minimum width of 6.0m with a 4.0m wide road surface. Blocks to be used for maintenance access and as a walkway shall have a minimum width of 8.0m with a 4.0m wide road surface.

A suitable curb cut shall be provided at the street connection and removable bollards shall be installed at the edge of the R.O.W. to prohibit public vehicular access. Permanent swing gate bollards will be required where the access road will be used as a walkway. Concrete sidewalk across the access road shall be a min. 200 mm thick with wire mesh reinforcing.

Road base is to consist of a minimum 300mm of 50mm diameter crusher run limestone, supported by appropriate geotechnical recommendations. Surface treatment to consist of limestone screenings or approved equivalent. Where the access road will also be used as part of a walkway or trail system, the surface treatment shall be 50 mm of HL3 asphalt. Access roads on blocks between residential lots shall have a 100 mm concrete surface from curb to rear of lot. The road base on the forebay ramp below the N.W.L. shall be consistent with design of forebay lining with the addition of soil reinforcement based on geotechnical recommendations.

9. **Fencing**

Fencing will be required where residential lots or blocks abut the stormwater management block. Fencing will not be required where the stormwater block abuts open space, EPA lands, restoration lands or a municipal R.O.W. Fencing to be 1.2m high, black vinyl chain link fence in accordance with OPSD. Fencing to be offset 0.05m within stormwater block with chainlink mesh on the Town side of posts.

10. **Warning Signage**

Warning signs are to be installed near pedestrian traffic routes or walkways located within or adjacent to the stormwater management block. The number of signs required will be determined by the Town on a site specific basis. Signs are to conform to the Town’s standard and shall be supplied and installed by the developer. Signs shall be ordered and purchased from the Operations Division of the Engineering and Public works Department.
11. **Inlet Structures**

Storm sewer pipe inlets into the facility are to be designed so that the invert matches the N.W.L. and headwalls are to abut the edge of the permanent pool. Headwalls and grating shall conform to OPSD. Erosion protection shall be provided between the headwall and the bottom of the forebay to prevent localized scour at the inlet. The protection shall match the width of the headwall at the inlet and shall extend 1.5m on either side of the headwall at the forebay bottom. Protection material shall consist of rip rap or river stone underlain with geotextile with size and depth of stone based on consultant recommendations. Maintenance access roadways shall extend to the top of slope/berm above inlet structures. A geodetic monument shall be established on the top of the concrete headwall to assist in future water level monitoring. The monument shall have horizontal and vertical control in accordance with Town standards.

12. **Outlet Structures**

Reverse slope pipe outlet structures shall be used for both wetland and wetpond facilities designed in accordance with Town Standard Drawing ST-10A and ST-12A. Where site grading permits, maintenance pipes shall be installed to allow the facility to drain by gravity flow. Maintenance access roadways must extend to provide access to maintenance access covers on outlet structures. For temporary stormwater facilities proposed in lieu of ultimate facilities being in place, a temporary outfall structure shall be designed as per Town Standard Drawing ST-11A.

For large facilities, a weir outfall/spillway will be considered for discharge of less frequent events in lieu of or in combination with the ditch inlet type of structure. Erosion protection for spillways shall be consistent with Section 13.0. Erosion protection for outfalls shall generally consist of a combination of rip rap or river stone and vegetation as per Town Standard Drawing ST-14A. The size and depth of stone shall be based on consultant recommendations based on flow velocity calculations. Outfalls to environmentally sensitive areas may require site specific treatment based on direction from the Town and/or as identified in Master Environmental Servicing Plans, and/or Environmental Reports.

13. **Emergency Overflow Spillway**

Each facility shall be designed to provide an emergency overflow spillway to allow storm drainage to safely exit the facility in event that the outfall structure fails to function or the occurrence storm events greater than the 100 year or highest design return period. The spillway shall be designed to convey the 100 year or highest design post development peak flow, while maintaining a 0.10m freeboard to the top of slope around the perimeter of the facility. The invert of the spillway shall be at or above the 100 year or highest water level within the facility.
The design of the spillway shall be based on flow capacity calculations provided by the consultant. Erosion protection shall be provided on the top, downslope and base of the spillway. Because of aesthetics and infrequent use of the spillway, erosion protection consist of a soil re-inforcement system with a natural vegetated surface treatment. The type of surface treatment and soil re-inforcement shall be based on consultant recommendations based on flow velocity calculations. Where access roads traverse the top of the spillway, the surface treatment and base shall be consistent with the access road design. Sideslopes at the top of the spillway shall be 3:1 maximum and shall be 10% if used as an access roadway.

14. **Major System Overland Flow Routes**

Major system overland flow routes shall be designed to safely convey the 100 year peak overland flow into the facility. The major system overland flow shall not be directed into the sediment forebay area. Channels designed to convey overland flows shall be flat bottomed with 3:1 max. sideslopes. The maximum flow depth shall be 0.3m and the channel depth shall allow for 0.1m of freeboard. Because of aesthetics and the infrequent occurrence of major system flows, erosion protection shall consist of a soil re-inforcement system with a natural vegetated surface treatment. The type of surface treatment and soil re-inforcement shall be based on consultant recommendations based on flow velocity calculations.

15. **Existing Groundwater Elevation**

As part of the geotechnical investigation for the development, at least one borehole shall be located near the centre of the stormwater block to assess the nature of existing soils and the ground water elevation. The local ground water elevation shall be compared to the proposed permanent pool water level within the facility. Where soil conditions are very permeable and the ground water elevation is below the permanent pool water level, lining of the permanent pool area with an impermeable material may be required to ensure permanent pool levels are maintained. The type and thickness of lining material shall be based on geotechnical recommendations. Where the ground water elevation is above the permanent pool water level, an appropriate investigation shall be undertaken to assess the impacts of a localized reduction in groundwater levels, potential impacts to groundwater aquifer systems and flow regimes, and to assess potential slope stability and groundwater seepage concerns within the facility. The scope of this investigation will be determined based on site specific conditions. The consultant shall consider all feasible design alternatives to limit or negate any impact to local groundwater levels to the satisfaction of the Town.
16. **Landscaping**

Facility landscaping shall be designed in accordance with the latest version of the Facility Landscaping Design Criteria and Implementation Guidelines. Information on these guidelines may be obtained from the Environmental Services Division of the Parks, Recreation and Culture Department. This document provides guidance with respect to the configuration of the facility depending on its location within the community (e.g. adjacent to environmental corridor, community parkland, or trail system etc.). This guideline outlines strategies and criteria for plantings within the stormwater block. Where pedestrian access is expected within the stormwater block, the type and location of plantings shall be designed to discourage public access to the permanent pool area.

17. **Temporary Stormwater Facility**

In situations where the ultimate downstream facilities have not been constructed and/or where trunk sewers have not been completed to convey storm drainage to the ultimate facility, interim or temporary on-site facilities will be considered by the Town. Any temporary facility must provide an equivalent level of quality and quantity control provided in the ultimate facility to the satisfaction of the Town. Any temporary facility will be required to remain in place until the ultimate facilities or trunk sewers are constructed to the satisfaction of the Town. Site plan or subdivision agreements will be structured to require the owner to be solely responsible for maintenance and operation of temporary facilities as well as any demolition, removals and restoration associated with decommissioning of the temporary facility, including disposal of any contaminated sediments in accordance with applicable Provincial guidelines and regulations. The outlet structure for temporary facilities shall be designed in accordance with Town Standard Drawing ST-11A.

The design criteria may be modified as follows for temporary facilities:

- 3:1 max. side slopes from facility bottom to top of berm
- no sediment forebay or separation berm
- no maintenance access roadway to outlet structure or emergency overflow spillway
- facility perimeter to be fenced with 1.2m black vinyl chain link on all sides with lockable access gate in accordance with OPSD.
- no maintenance pipe or valve required as part of outfall structure
- provide access for emergency vehicles
18. **As-Constructed Requirements**

An as-constructed topographic survey and engineering plans of the stormwater facility will be required along with calculations to verify the following:

- permanent pool volume
- active storage volume
- location and height of berms
- location, invert elevations and size of pipes, inlets and orifices for outfall structure

The developer’s consultant shall certify that the as-constructed facility has been built and is performing in accordance with the engineering plans and design report.

19. **Performance Monitoring During Construction and for Assumption**

In order for the Town to assume the stormwater facility, the following requirements shall be undertaken and completed to the satisfaction of the Town.

**Quality Performance Monitoring and Sediment Removal**

After grading of the facility is completed, the consultant shall complete a topographic survey of the facility to determine the elevations prior to the facility being operational. The Town requires that the survey work be completed in a dry condition. The consultant shall submit a plan showing the results of the topographic survey prior to building permit release by the Town.

After the facility has been graded and inlet/outlet structures are in place, the consultant shall monitor forebay sediment levels on a monthly basis (April 1 to November 30) and main cell sediment levels on an annual basis until assumption by the Town. Sediments shall be removed from the forebay on an annual basis, unless the consultant demonstrates that the accumulated sediment volume is less than 25% of the forebay permanent pool volume. To estimate the volume of forebay sediments, at least five uniformly distributed measurements of sediment depth shall be taken within the forebay. Sediments shall be removed from the main cell when the accumulated sediment volume is greater than 25% of the main cell permanent pool volume. The consultant shall estimate the volume of main cell sediments using at least five measurements of sediment depth along a mid section along the length of the facility. A secchi disk shall be used to estimate the sediment levels in a wet condition.
A metric staff gauge shall be installed adjacent to the storm sewer inlet headwall so that the zero reading is at the permanent pool elevation. Outlet structures shall be inspected on a monthly basis to ensure that perforated riser inlets are not blocked due to sediments or debris. The consultant shall provide monthly inspection reports to the Town along with instructions to the site contractor for any remedial work. This inspection shall be undertaken in dry weather conditions, at least 72 hours after any rainfall event. The monthly reports shall include a staff gauge reading to determine any fluctuations in the permanent pool elevation. A sample spreadsheet format for the inspection report is included in Appendix A. A digital copy of this inspection spreadsheet will be provided to the consultant prior to construction.

At the time of assumption, the facility shall be drained and all sediments shall be removed from the forebay and main cell. A second topographic survey shall be completed after all sediment removal. This topographic survey shall be submitted to the Town, along with a comparative analysis to the survey taken after substantial completion. The results should verify that all sediments have been removed from the facility.

On a yearly basis between April 1 to November 30, at least five (5) water samples shall be taken at the outfall from the facility to assess the Total Suspended Solid (TSS) concentrations in mg/l. The samples shall be taken within 24 hours after a significant rainfall event. The samples shall be submitted to an accredited laboratory for analysis. The laboratory results for the TSS concentrations shall be submitted to the Town to assess if the facility is releasing excessive sediment levels. Samples shall be taken for the period from substantial completion to assumption of the facility.

**Quantity Performance Monitoring**

Prior to assumption, performance monitoring shall be undertaken to verify that the facility is functioning in accordance with the approved engineering design. Performance monitoring shall commence after at least 50% of the dwellings have been constructed within the contributing watershed. The facility shall be monitored for a minimum of two seasons immediately prior to assumption. One season is defined as continuous water level monitoring within the facility from early May 1 to October 31.

Water levels shall be measured using a data logger and pressure transducer. The data logger shall record water levels every 15 minutes and average hourly levels. The elevation of the transducer shall be referenced to a geodetic benchmark. The monitoring equipment shall be installed immediately after substantial completion of the facility. After each season, the data shall be reviewed in conjunction with rainfall data from Richmond Hill and Buttonville gauges. The rainfall and water level data for 5 to 8 significant events shall be processed in a graphical format to display the fluctuation in water levels over time.
The resulting data shall be analyzed by the consultant to assess the following in comparison to the approved engineering design:

- permanent pool or normal water level
- fluctuation in water levels in response to rainfall events
- facility drain down time after erosion control events

The expected design water levels for the permanent pool, erosion control, 2 year and 5 year events shall be included on the graphs for comparison to the actual levels. A sample graph is included in Appendix B. The consultant shall submit the results of the analysis to the Town including any recommendations for remedial works to be undertaken on the facility to ensure proper performance with respect to erosion and quantity control. If any remedial works are undertaken after the second season of monitoring, the Town will require additional seasonal monitoring until the facility is performing to the satisfaction of the Town. The Town reserves the right to require additional monitoring until the facility is performing to the satisfaction of the Town.

20. **Stormwater Management Facility Database**

The Town maintains a digital database for stormwater management facilities. This database is used to assist in maintenance and operation of these facilities. The consultant shall provide the following summary list of information in order for the Town to update our inventory of facilities. This list shall be provided in the final design report and shall be updated by the consultant at the time of assumption.

- **Facility Type**: (wetland, wetpond or hybrid)
- **Quality Control Level**: (e.g., Level 1 - 80% removal)
- **Erosion Control Level**: (e.g., 25 mm event - 48 hr. detention)
- **Quantity Control Level**: (e.g., 2 to 100 year post to pre)
- **Pre Treatment**: (e.g., oil/grit separator)
- **Flow Splitter**: (yes or no)
- **Online**: (yes or no)
- **Off-line**: (yes or no)
- **Sediment Forebay**: (yes or no)
- **Forebay Lining Type**: (e.g., Limestone)
- **Forebay Pool Volume**: (m3)
- **Water Table Elevation**: (distance above or below permanent pool)
- **Facility Liner**: (e.g., native or clay liner)
- **Minor System Drainage Area**: (ha)
- **Major System Drainage Area**: (ha)
- **Permanent Pool Volume**: (m3)
- **Permanent Pool Elevation**: (geodetic)
- **Permanent Pool Required**: (m3)
<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
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<tr>
<td>Max. Permanent Pool Depth</td>
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<tr>
<td>Permanent Pool Surface Area</td>
<td>(m²)</td>
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<tr>
<td>Erosion Control Volume</td>
<td>(m³)</td>
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<tr>
<td>Erosion Control Elevation</td>
<td>(geodetic)</td>
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<td>Max. Erosion Control Depth</td>
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<td>5 year Ponding Depth</td>
<td>(m)</td>
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<tr>
<td>100 year or Max. Ponding Depth</td>
<td>(m)</td>
</tr>
<tr>
<td>Outlet Description</td>
<td>(detailed description of control structure including size and elevations of orifices, weirs and ditch inlets)</td>
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<tr>
<td>SWM Block Area</td>
<td>(ha)</td>
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<tr>
<td>Access Type and Width</td>
<td>(e.g., 5.0m pavement)</td>
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<td>Aquatic Plantings</td>
<td>(yes or no)</td>
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<td>Warning Signage</td>
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## APPENDIX A

**TOWN OF RICHMOND HILL**  
Engineering and Public Works Department

### SWM Facility Inspection Spreadsheet

- **Owner:**  
- **Consultant:**  
- **Location:**  
- **19T-Number:**

<table>
<thead>
<tr>
<th>Period</th>
<th>Location</th>
<th>Inspection</th>
<th>Date</th>
<th>Staff Gauge</th>
<th>Sediment Depth 1</th>
<th>Sediment Depth 2</th>
<th>Sediment Depth 3</th>
<th>Sediment Depth 4</th>
<th>Sediment Depth 5</th>
<th>Average Depth</th>
<th>Sediment Volume</th>
<th>% Perm.</th>
<th>Outlet Structure</th>
<th>Note Remedial Works Required</th>
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Facility Name
Date
Rainfall (25mm Event)

Water Elevation (masl)

Facility Elevation
PP Elevation
25mm Elevation
DIVISION "H"

SECTION "H2"

STORMWATER MANAGEMENT DESIGN CRITERIA

SITE PLAN DEVELOPMENTS

INFILL RESIDENTIAL DEVELOPMENTS (LESS THAN 5 HA IN SIZE)
DIVISION “H” - SECTION H2

STORMWATER MANAGEMENT DESIGN CRITERIA

SITE PLAN DEVELOPMENTS
INFILL RESIDENTIAL DEVELOPMENTS
(LESS THAN 5 HA IN SIZE)

1. **Stormwater Management**

Development has a direct impact to the quality and quantity of storm drainage runoff. Every applicant proposing development with the Town is responsible for the quality and quantity treatment of storm drainage runoff to mitigate the impacts of development, in accordance with the current Town of Richmond Hill Design Criteria and Provincial Stormwater Management Guidelines.

These design criteria outline a general procedure to follow to determine the level of quality and quantity control required for a specific development. In consultation with the Town and TRCA, the Consultant shall determine if a Master Environmental Servicing Plan (MESP) or Master Drainage Plan (MDP) exists which specifies the level of quality or quantity control required, other treatment measures to be implemented for the proposed development site, and existing or proposed downstream stormwater management facilities. The Consultant shall then determine which of the following scenarios applies to the proposed development:

**Scenario A**  Downstream quality and quantity control facilities are in place or proposed which service the proposed development area (proceed to Section 2)

**B**  Only downstream quantity control facilities are in place. No downstream quality control in place (proceed to Section 3)

**C**  No downstream quality or quantity treatment facilities in place or proposed to service the subject development (proceed to Section 4)

2. **Existing Downstream Quality/Quantity Control**

For this case, downstream facilities are in place to provide the required quality and quantity treatment of storm drainage for the proposed development. Additional site quantity control may be required depending on the major and minor system design as outlined in Sections 2.1 and 2.2.
2.1 **Minor System (5 Year Event)**

The Consultant shall review existing storm drainage area plans and design sheets and compare original design parameters (contributing area, runoff efficient) to proposed design parameters. If the original 5 year design flows are not exceeded by more than 5% then no additional quantity control is required for the minor system. If proposed design flows exceed the original design by more than 5% then the Consultant shall follow either option indicated in Section 2.1.1 or 2.1.2:

2.1.1 **Option 1 - Residual Capacity Analysis**

The consultant shall demonstrate that existing downstream minor system has residual capacity to accommodate additional design flows from point of connection to an existing outfall or existing trunk sewer designed for the 25 year event. The consultant shall assess the ability of the existing downstream facility to accommodate any additional storm runoff and maintain the same level of quality and/or quantity treatment.

2.1.2 **Option 2 - Additional Site Quantity Control**

Consultant shall provide on-site quantity control to reduce post development 5 year peak design flows to the original design level. Roof top storage, oversized sewer pipe storage and paved area storage will be permitted and depth of ponding within a paved parking area shall not exceed 0.3m (greater depths will be permitted in loading dock areas). Orifice control plates shall be non-removable and bolted to structures. Pipe reducers may be used instead of orifice plates to control flow. All quantity control measures shall be located on private property. The Town prefers that control measures are not located within the property line storm sewer manhole. Storage within depressed landscaping or grassed areas will be permitted and depth of ponding shall not exceed 0.9m. At-source infiltration of roof drainage is encouraged as a method of quantity control where native soils are suitable based on geotechnical recommendations.

2.1.3 **Contributing External Areas**

The proposed minor system shall be designed to accommodate contributing external drainage from adjacent built up lands or to accommodate future development of external lands as identified within a MDP or MESP. The Town will identify any requirements for drainage easements within the development.

2.2 **Major System (100 Year Event)**

The Consultant shall confirm the original design intent for direction of major system flow and outfall to an existing R.O.W. or defined overland flow route within Town easement or ownership. Generally, no exceptions to the original design intent will be permitted. The site shall be graded, to ensure positive drainage to the intended major system outlet such that the depth of ponding under 100 year event does not exceed 0.3m.
In situations where site servicing or grading constraints do not permit conveyance of the major system flows to an existing R.O.W. or overland flow route within Town easement or ownership, as per the original design intent, the Consultant shall undertake the following procedure in Section 2.2.1

2.2.1 Alternate Major System Analysis

The consultant shall investigate and determine the direction and conveyance path of existing major system flows from the site through any adjacent properties to an existing watercourse, existing R.O.W., or overland flow route within Town lands/easement. The purpose of this investigation is to determine if a suitable overland flow route exists which is acceptable to the Town. If the flow route is accepted, then on-site quantity storage may be required to limit major peak flows to pre-development levels at the discretion of the Town.

In lieu of the above investigation, or if the overland flow route is not acceptable to the Town, or the Town is aware of historical drainage issues in the area, the consultant will be required to provide on-site storage to control 100 year post development flows to the capacity of the minor system (i.e. Major system flows will be contained within the site). Roof-top storage, oversized sewer pipe storage and paved area storage will be permitted and depth of ponding within a paved parking area shall not exceed 0.3m (greater depths will be permitted in loading dock areas). Storage within depressed landscaping/grassed areas will be permitted and depth of ponding shall not exceed 0.9m.

2.3 Contributing External Areas

The proposed major system shall be designed to accommodate contributing external drainage from adjacent built up lands or to accommodate future development of external lands as identified within a MDP or MESP. The Town will identify any requirements for drainage easements within the development.

2.4 Interim or Temporary Facilities

In situations where the ultimate downstream facilities have not been constructed and/or where trunk sewers have not been completed to convey storm drainage to the ultimate facility, interim or temporary on-site facilities will be considered by the Town. Any temporary facility must provide an equivalent level of quality and quantity control provided in the ultimate facility to the satisfaction of the Town. Any temporary facility will be required to remain in place until the ultimate facilities or trunk sewers are constructed to the satisfaction of the Town. Site plan or subdivision agreements will be structured to require the owner to be solely responsible for maintenance and operation of
temporary facilities as well as any demolition, removals and restoration associated with decommissioning of the temporary facility, including disposal of any contaminated sediments in accordance with applicable Provincial guidelines and regulations. Ponding depths within any temporary facility shall be in accordance with the Town guidelines for the design of quantity and quality control facilities.

3. **Only Existing Downstream Quantity Control, No Downstream Quality Control**

3.1 **Minor and Major System Design**

Follow same procedure outlined in Section 2.1 and 2.2 to address any additional on-site quantity control relating to design of major and minor system.

3.2 **Quality Treatment**

The Consultant shall propose quality treatment of stormwater in accordance with the latest version of the MOE Stormwater Management Practices Planning and Design Manual to achieve Level 1 quality treatment. The Consultant shall review and recommend lot level controls, conveyance controls and end-of-pipe stormwater controls to provide quality treatment of stormwater. For developments where there is a potential for spill contamination (i.e. gas station, chemical storage etc.), an appropriate end-of-pipe treatment such as an oil grit separator will be considered mandatory. Determination of the potential for spill contamination shall be at the discretion of the Town.

4. **No Downstream Quality or Quantity Controls**

4.1 **Major and Minor System Design**

Where the Town and TRCA have confirmed that no downstream quantity controls are in place and no generic on-site quantity control is required, the consultant shall follow the procedure outlined in Section 2.1 and 2.2 for design of the minor and major storm drainage systems. In this case, the original design intent or parameters are replaced by existing site conditions. The Town reserves the right to request site specific quantity controls based on historical drainage issues which may be impacted by the proposed development.

4.2 **Quality Treatment**

Follow the same procedure outlined in Section 3.2 to address quality treatment requirements.
DIVISION "H"

SECTION "H3"

STORMWATER MANAGEMENT DESIGN CRITERIA

SUBMISSION REQUIREMENTS

STORMWATER MANAGEMENT REPORTS
DIVISION “H” - SECTION H3

STORMWATER MANAGEMENT DESIGN CRITERIA

SUBMISSION REQUIREMENTS

STORMWATER MANAGEMENT REPORTS

1. Submission Requirements

The following is a list of documentation which should be included within stormwater management reports submitted to the Town of Richmond Hill for review. These reports are submitted to support the final design of quality and/or quantity control facilities located within the Town of Richmond Hill. These reports shall clearly identify how applicable recommendations from Master Environmental Servicing, Functional Servicing, Geotechnical, Environmental or Hydrogeological Reports have been incorporated into the final design of the facility.

- Site Location Plan.
- Existing and proposed catchment area plan which delineates internal/external drainage areas and labels areas and catchment reference numbers.
- Engineering plans for stormwater facility which should identify the following:
  a. permanent, extended detention, highest water levels on plan view and include all ponding levels for various return periods in tabular form,
  b. section/details of major overland flow routes,
  c. section/details of maintenance access roads,
  d. section/details of erosion protection at inlet/outlet structure and on spillways,
  e. fencing limits,
  f. location of facility signage,
  g. borehole location and existing groundwater elevation,
  h. existing and proposed grading elevations and transition slopes,
  i. sediment forebay details including lining and separation berm,
  j. details of sediment drying area, where implemented
  k. section/details of inlet/outlet structures.
- Landscaping/restoration plans and details.
- Erosion and sediment control plans and details.
- Excerpts from MESP/MDP which outline requirements for quantity/quality control and any facility design requirements.
- Identify design criteria for the facility.
- Identify any deviations from the Town Stormwater Management Guidelines including an explanation based on site specific conditions.
- Pre and post development hydrologic modeling schematic (pert chart format) to illustrate all components of each model.
- Table summarizing pre and post development catchment parameters (i.e. catchment number, area, percent impervious, CN value, etc.).
- Table summarizing stage, storage and discharge characteristics of the facility.
- Table summarizing pre and post development peak flows and storage volumes based on output from hydrologic modeling or comparison to volumes and target peak flows identified in MESP.
- Table to summarize and compare required permanent pool and extended detention storage requirements to volumes provided in the facility.
- Table to compare calculated 100 year hydraulic grade line elevations (plus specified freeboard) within storm sewer system to estimated underside of basement floor slab elevations.
- Sample or supporting calculations for the following:
  a. extended detention drain downtime (hours),
  b. stage/storage/discharge characteristics of the facility,
  c. major system overland flow and velocity to confirm conveyance within R.O.W. and/or defined flow routes,
  d. 100 year hydraulic grade line to confirm basements will be protected,
  e. erosion control sizing and flow velocity at inlet/outlet structures and spillways,
  f. sediment forebay length and width in conformance with MOE manual (use settling velocity of 0.0003 m/s or use particle size removal criteria if specified),
  g. major system inlet grating sizing (assuming 50% blockage).
- Hard and digital copies of input/output files from hydrologic modeling (digital files may be provided on diskette or via e-mail).
- Identify erosion and sediment control methods to be implemented before, during, and after municipal servicing construction up to the end of servicing maintenance period, including schedule for implementation/decommissioning and maintenance requirements.
Identify long and short term facility maintenance and operation requirements, including estimates of frequency of sediment removal, labour, equipment and material costs, alternative methods of removal based on the facility design, and estimates of associated annual and capital costs. Document maintenance and operations requirements as a separate section within the stormwater management report. The Sediment Maintenance Guide, dated August 1999 or latest version, provides information on sediment removal methods and potential costs. A copy of this document may be obtained from TRCA.

Identify facility monitoring requirements based on programs identified in MESP or Draft Plan Approval Conditions. Document monitoring requirements as a separate section within the stormwater management report. The following details shall typically be provided:

- monitoring equipment and specifications,
- quality/quantity parameters to be monitored,
- duration of monitoring,
- location and installation of field equipment,
- frequency of sampling or field measurements,
- laboratory testing or analysis requirements,
- baseline monitoring requirements,
- reporting frequency and methodology,
- computer hardware/software requirements,
- estimates of annual monitoring and reporting costs.

2. **Report Format**

Report shall be bound with front/back cover. The 19T file number shall be included on the front cover. A-1 size plans included within the report shall be folded and bound into the report. Once the report has been reviewed and accepted by the Town, a digital copy of the report shall be provided in one file in an adobe acrobat (v.5.0 or lower) .pdf format.

3. **Site Plan and Infill Developments**

For site plan and smaller infill developments where conventional wetpond facilities are not feasible or recommended, the submission requirements should be modified to reflect the end-of-pipe quality treatment proposed and any on-site quantity storage utilized (i.e. parking lot, roof top etc.).
DIVISION "H"

SECTION "H4"

STORMWATER MANAGEMENT
DESIGN CRITERIA

STANDARD DRAWINGS
REMOVABLE ORIFICE PLATE
5mm THICK ALUMINUM OR EQUIVALENT

OUTLINE OF STORM SEWER

ORIFICE CUTOUT TO MATCH INVERT OF STORM SEWER (MIN. SIZE TO BE 75mm (DIA))

SUPPORT CHANNEL TO BE BOLTED TO CONTROL MANHOLE

50mm x 10mm STAINLESS STEEL ANCHOR BOLTS

DETAIL "A"

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

REMOVABLE ORIFICE PLATE
FOR MUNICIPAL FACILITY

SCALE: N.T.S.
DATE: JANUARY 2003

DRAWN: J.P.

DWG. No. ST-13A
CONCRETE HEADWALL

SURFACE TO BE SEEDED TO MATCH EXIST. VEGETATION. AREA TO BE PROTECTED WITH DEGRADABLE EROSION CONTROL BLANKETS UNTIL VEGETATION IS ESTABLISHED.

GRATING

LENGTH AND WIDTH OF EROSION PROTECTION VARIES

STORM OUTFALL PIPE

TOPSOIL TO BE PLACED WITHIN VOIDS ON SURFACE TO 200mm APPROX. DEPTH

0.8m MIN. DEPTH

RIP-RAP OR RIVERSTONE

NON-WOVEN GEOTEXTILE LINING TYPE/GRADE TO MATCH STONE SIZE.

TOWN OF RICHMOND HILL
ENGINEERING AND PUBLIC WORKS DEPT.

OUTLET EROSION PROTECTION
TYPICAL DETAIL

SCALE: N.T.S.
DATE: JANUARY 2003
DRAWN: JP.

DWG. No. ST-14A

REVISIONS
DATE
APPD
DEWATERING SUMP TO BE LOCATED ADJACENT TO FOREBAY ACCESS RAMP.

300mm TYPICAL

25mm DIA. CLEAR STONE

300mm DIA. PVC OR 35 PIPE (GREEN COLOUR)
25mm DIA. PERFORATIONS WITH 75mm SPACING.

REMOVABLE CAP 100mm ABOVE N.W.L.
DIVISION "I"

EROSION AND SEDIMENT CONTROL CRITERIA
## DIVISION “I”
### EROSION AND SEDIMENT CONTROL CRITERIA

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DIVISION "I"

SECTIONS “I1”

EROSION AND SEDIMENT CONTROL CRITERIA

GENERAL GUIDELINE
**DIVISION “I” - SECTION 11 TO 13**

**EROSION AND SEDIMENT CONTROL CRITERIA**

1.0 **General**

Erosion and Sediment Control (ESC) measures shall be implemented on all development applications, including site plans, plans of subdivision and infill applications. The ESC measures shall mitigate sediment loading from storm drainage systems during construction activity. ESC measures shall be adequate to mitigate any impacts to Town infrastructure, watercourses, wetlands, and other environmentally sensitive areas or features.

ESC plans shall be prepared by a professional consulting engineer and submitted to the Town for review in accordance with the Development Submission Standards in Division “F”. The design of ESC measures shall be completed in accordance with this Section and the most recent version of the TRCA Erosion & Sediment Control Guideline for Urban Construction. The proposed ESC measures, including design information and supporting calculations, shall be documented in the Stormwater Management Report required for the development application.
DIVISION "I"

SECTIONS “I2”

EROSION AND SEDIMENT CONTROL CRITERIA

EROSION AND SEDIMENT CONTROL MEASURES
DIVISION “I” SECTION I2
EROSION AND SEDIMENT CONTROL CRITERIA
EROSION AND SEDIMENT CONTROL MEASURES

2.0 Erosion and Sediment Control (ESC) Measures

2.1 Stockpiles

Any topsoil or earth material stockpiles to remain after area grading is completed shall not be located on any Town property or lands to be conveyed to the Town. The ESC plans shall indicate the proposed location, sideslopes and volume of material. The maximum height of any stockpile shall be 8.0 m and the maximum side slope shall be 2:1. The maximum height for a stockpile may be reduced depending on the proximity to existing residential dwellings. Stockpiles shall be located in a manner to maximize the separation distance to existing residences, municipal streets and environmental features. Temporary swales shall be utilized to direct runoff from stockpiles to appropriate ESC measures. After area grading is complete, stockpiles shall be stabilized with hydroseed to the satisfaction of the Commissioner.

2.2 Silt Fences

Silt Fences shall be installed along the limits of area grading activity where surface water drains toward adjacent property, infrastructure or environmental features. A double row of silt fence shall be constructed where area grading is adjacent a watercourse, wetland or other environmentally sensitive feature. The double row shall be separated by a minimum 5.0 m vegetated strip. Silt fence shall be constructed in accordance with OPSD 219.130. Silt fencing shall be maintained and remain in place until final lot or block grading and restoration. The ESC plans shall indicate the location of silt fencing and refer to Town standards.

2.3 Temporary Drainage Swales

Temporary drainage swales shall be used during area grading or after completion to direct surface runoff to sediment control facilities or other drainage outlets. Swales shall be sized to convey the post development, peak flow from the 5-year storm event. Swales shall have a minimum gradient of 1.0% with 3:1 sideslopes. Swales shall be maintained and remain in place until final grading and restoration. The location, gradient, direction of flow, and a typical cross-section of the drainage swale shall be provided on the ESC plans.
DIVISION “I” SECTION I2
EROSION AND SEDIMENT CONTROL CRITERIA
EROSION AND SEDIMENT CONTROL MEASURES

2.4 Rock Check Dams

Rock check dams shall be installed on all temporary drainage swales and at all concentrated flow points. At concentrated flow points, the check dams shall be installed with a sediment trap upstream of the dam as per OPSD 219.220. The maximum spacing for check dams shall be 30 metres. Rock check dams shall be constructed in accordance with OPSD 219.21 and 219.211. Rock check dams shall be maintained and remain in place until final grading and restoration. The ESC plans shall show the location of rock check dams and refer to Town standards.

2.5 Temporary Sediment Control Facilities

Temporary sediment control facilities shall be used for all area grading activities which exceed 2.0 ha in size. During area grading activities, temporary facilities shall be installed upstream of permanent stormwater management facilities. These facilities shall be sized with a permanent pool storage volume of 125 to 185 m$^3$ per hectare of contributing drainage area and an additional active storage volume of 125 m$^3$ per hectare (refer to TRCA guideline). Containment berms shall be constructed with at least 0.3 m of free board above the maximum water level, 3:1 sideslopes, 2.0m top width, and an emerging spillway. The maximum depth of flow in the spillway shall be 0.3m and the spillway shall be lined with riprap erosion protection sized for peak velocities from the 5 year storm event. The outlet pipe and the design of the facility shall conform to the typical drawings on pages C-58 and C-59 in Appendix C of the TRCA guideline. The outlet structure controls shall be sized to release the active storage volume over a minimum 48 hours period. Sediment control facilities shall be maintained and remain in place until final grading and restoration. A cross-section of the facility and outlet structure shall be indicated on the ESC plans, along with details of the flow controls and active and permanent water levels.

2.6 Restoration

Within two weeks after area grading is complete, the disturbed areas including topsoil stockpiles and temporary drainage swales shall be restored with grass vegetation using hydroseed or sodding. The only exception to this requirement will be lot or block areas which are under an active building permit application. All hydroseeding for restoration shall be completed prior to mid September or at the discretion of the Commissioner. The method of hydroseeding shall be approved by the Commissioner. The proposed seed mix shall be specified on the ESC plans. Areas which do not establish cover shall be hydroseeded again at the discretion of the Commissioner.
DIVISION “I” SECTION I2
EROSION AND SEDIMENT CONTROL CRITERIA
EROSION AND SEDIMENT CONTROL MEASURES

2.7 Storm Drain Inlet Protection

After the storm sewer system is installed, sediment control barriers shall be installed on all roadway, rear lot and ditch inlet catchbasins. Sediment barriers for inlets shall consist of a filter cover, filter barrier sox, sediment bag insert or approved equivalent. Bulkheads at storm sewer outfalls are acceptable as a sediment barrier provided the height does not exceed one third of the pipe diameter. Bulkheads must be removed prior to building occupancy. Sediment barriers for inlets shall be maintained and remain in place until contributing lot or block areas have been re-vegetated. The ESC plans shall indicate the type of inlet sediment barrier proposed, maintenance requirements and recommendations for removal or replacement during or after a winter season.

2.8 Construction Access Mud Mats

The location of temporary construction access roadways shall be shown on the ESC plans. Mud mats shall be installed on all access roadways at the point of connection to a municipal right-of-way. The mud mat shall be a minimum 6.0m in width, 30m in length and be constructed of a 0.5 m depth of 50mm diameter clear stone. The mud mats shall be maintained and stone replaced if deemed necessary by the Commissioner.

2.9 Temporary Connections to Storm Sewer

After installation of the municipal storm sewer system and road base, the lot or block areas are typically pre-graded to a lower elevation relative to the top of road. This situation may create areas of storm drainage ponding. To alleviate this situation, temporary connections to the storm sewer shall be provided to ensure all areas have a positive drainage outlet. These connections shall be sized to convey the 5-year storm event and the inlet structures shall be complete with sediment traps or facilities in accordance with the size of the contributing area. The inlet structure shall consist of an appropriately sized perforated riser pipe. The riser pipe shall be wrapped in filter fabric and surrounded with 50 mm dia. clear stone. The temporary connections shall be maintained until removal. The ESC plans shall indicate the location and details of each connection along with requirement for removal.
2.10 **Construction Dewatering**

Discharge from dewatering of excavations for construction of municipal services shall be safely directed to ESC measures. Temporary piping, swales or filter rings shall be constructed to ensure that erosion from pump hose discharge is minimized and to direct the discharge to ESC measures. Adequate erosion protection shall be provided at all concentrated discharge points and rock check dams shall be installed on all temporary swales. Sediment bags shall be used on the end of discharge hoses where the discharge from the dewatering area has a sediment load. Discharge from well point dewatering systems may be discharged directly to a storm sewer subject to approval of the Commissioner. Approval will require water quality laboratory testing and comparison to Regional and Town sewer use by-laws.
DIVISION "I"

SECTIONS “I3”

EROSION AND SEDIMENT CONTROL CRITERIA

EROSION AND SEDIMENT CONTROL PHASING
DIVISION “I” SECTION 13
EROSION AND SEDIMENT CONTROL CRITERIA
EROSION AND SEDIMENT CONTROL PHASING

3.0 ESC Phasing

ESC measures shall be designed and implemented for the phases identified in Sections 3.1 to 3.3. ESC measures for each phase shall be clearly identified on the ESC plans. A summary of the ESC measures for each phase shall be provided in chart form on the ESC plans. The summary chart shall include information on timing for installation, inspection/maintenance requirements and timing for removal of ESC measures. A sample summary chart has been included in Section 3.4. The requirements for installation, inspection, maintenance, and removal are indicated for each phase in the following sections.

3.1 Phase 1: Topsoil Stripping and Area Grading

Phase 1 shall include all ESC measures that must be in place before or during topsoil stripping or area grading activity. ESC measures that must be in place prior commencing any topsoil stripping or area grading include silt fence, mud mat, temporary drainage swales, rock check dams and temporary sediment control facilities. The developer’s consultant shall arrange an inspection with Town staff once installation of Phase 1 measures is complete and prior to any grading or stripping activity. Any deficiencies noted during this inspection shall be repaired prior to starting grading or stripping. The developer’s consultant shall undertake weekly inspections of the Phase 1 ESC measures and after each rainfall event. The developer’s consultant shall provide weekly written inspection reports to the Town Inspector noting deficiencies and repairs to ESC measures. The developer shall arrange for regular maintenance of measures to remove accumulated sediment and undertake repairs to ensure proper function.

3.2 Phase 2: Municipal Servicing Construction

Phase 2 shall include all ESC measures that will be undertaken after area grading is completed and during or after construction of municipal servicing. ESC measures that must be in place after area grading and servicing construction include restoration of graded areas and topsoil stockpiles, temporary connections to storm sewer system, and sediment traps. Phase 2 measures shall also include the removal of identified Phase 1 measures and replacement with measures such as temporary drainage swales, rock check dams or others as required on the ESC plans. The developer’s consultant shall undertake weekly inspections of the Phase 2 ESC measures and after each rainfall event. The developer’s consultant shall provide weekly written inspection reports to the Town Inspector noting deficiencies and repairs to ESC measures. The developer shall arrange for regular maintenance of measures to remove accumulated sediment and undertake repairs to ensure proper function.
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3.3 Phase 3: Building Construction

Phase 3 shall include the maintenance and repair of all Phase 1 or Phase 2 ESC measures that will remain in place until building construction is complete. Phase 3 shall also identify the removal of any ESC measures necessary to allow building construction to proceed. The timing for any such removals shall be just prior to building construction. The developer’s consultant shall arrange an inspection with the Town Inspector of all remaining measures prior to building construction. Any deficiencies noted during this inspection shall be repaired prior to building construction. The developer’s consultant shall undertake weekly inspections of the remaining measures and after each rainfall event. The developer’s consultant shall provide weekly written inspection reports to the Town Inspector noting deficiencies and repairs to ESC measures. The developer shall arrange for regular maintenance of measures to remove accumulated sediment and undertake repairs to ensure proper function.

3.4 Sample Summary Chart for ESC Phasing

<table>
<thead>
<tr>
<th>ESC Measure</th>
<th>Timing for Installation</th>
<th>Inspection/Maintenance Requirements</th>
<th>Timing for Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHASE 1 – Topsoil Stripping and Area Grading</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Silt Fence</td>
<td>Prior to topsoil</td>
<td>Consultant to arrange inspection with Town staff once installation is complete.</td>
<td>Just prior to final grading, replacement with Phase 2 measures, or construction of municipal services.</td>
</tr>
<tr>
<td>• Mud Mat</td>
<td>stripping.</td>
<td>Consultant to undertake weekly inspections and after each rainfall event, including weekly reporting. Regular maintenance to remove accumulated sediment and repair ESC measures.</td>
<td></td>
</tr>
<tr>
<td>• Drainage Swales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Check Dams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sediment Control Facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Topsoil Stockpile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Others as required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PHASE 2 - Municipal Servicing Construction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Restoration Hydroseeding</td>
<td>After area grading and installation of storm drainage system is complete.</td>
<td>Consultant to undertake weekly inspections and after each rainfall event, including weekly reporting. Regular maintenance to remove accumulated sediment and repair ESC measures.</td>
<td>Just prior to final grading or building construction.</td>
</tr>
<tr>
<td>• Sediment Traps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Drainage Swales</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Temporary Connections to Storm Sewer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Others as required</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DIVISION “I” SECTION I3
EROSION AND SEDIMENT CONTROL CRITERIA
EROSION AND SEDIMENT CONTROL PHASING

<table>
<thead>
<tr>
<th>PHASE 3 - Building Construction</th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| • Maintenance and repairs to all remaining ESC measures as per detailed inspection with Town Inspector.  
• Removal of identified Phase 1 or 2 measures | Prior to building construction, ESC measures to be repaired as per Town deficiency list.  
 | Detailed Inspection of all remaining ESC measures with Town Inspector. Consultant to undertake weekly inspections and after each rainfall event, including weekly reporting. Regular maintenance to remove accumulated sediment and repair ESC measures. | Just prior to final topsoil and sodding of lot/block areas. |
DIVISION "I"

SECTIONS “I4”

EROSION AND SEDIMENT CONTROL CRITERIA

STANDARD SPECIFICATIONS AND DRAWINGS
DIVISION “I” SECTION I4
EROSION AND SEDIMENT CONTROL CRITERIA
STANDARD SPECIFICATIONS AND DRAWINGS

4.0 Standard Specifications and Drawings

4.1 Standard Specifications

OPSS 577  Construction Specification for Temporary Erosion and Sediment Control Measures

4.2 Standard Drawings

OPSD 219.130  Heavy Duty Silt Barrier Fence

OPSD 219.210  Temporary Rock Flow Check (V-Ditch)

OPSD 219.211  Temporary Rock Flow Check (Flat Bottom Ditch or Channel)

OPSD 219.220  Excavated Sediment Trap
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Introduction

Purpose of this Document
This document provides direction for designers, owners and operators of new developments and redevelopments regarding their responsibilities for the design and operation of waste management systems. The objectives of this document are to:

- Establish design and collection requirements to ensure safe and efficient municipal waste collection.
- Ensure that residents are provided with convenient opportunities to participate in all waste management programs.
- Outline the required waste management documentation and submission drawings that must be included as part of development applications.

When to use this Document
This document must be used whenever a development application is submitted to the Town. All development applications shall adhere to all applicable requirements in this document. Residential and eligible mixed-use developments must be designed and constructed to accommodate the provision of municipal waste collection services as detailed in this document.

How to use this Document
This document consists of two sections: 1) Design Standards and 2) Collection Standards. Below is a description of each section including how and when each is to be applied:

- **Section 1- Design Standards:** Defines the design standards for new developments and redevelopments as they relate to access routes, waste storage, set out and loading areas as well as waste containers and diversion programs. The development application must include a separate waste management plan that must contain the required information outlined in the Design Standards, to demonstrate that the applicable requirements have been met. The waste management plan may require several drawings to illustrate that all of the applicable waste Design Standards have been satisfied. All drawings included in the waste management plan must be designed with and include representative scales. Standards for access routes are similar for all dwelling types and can be found in Section 1.1 Access Route Standards. Design standards for all other waste management requirements such as waste storage and collection areas, vary between dwelling types and are detailed in Section 1.2 Waste Storage and Set Out Areas. Please use Table 1 to determine the waste storage and collection method to be used for each development type and the
corresponding section(s) which contain the relevant information. Dwelling types in Table 1 have been grouped by waste storage and collection methods. Please note that for some developments containing more than one dwelling type, the owner is responsible for ensuring the development application meets the requirements for each dwelling type.

Table 1 – Waste Storage and Collection Methods by Dwelling Type

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Dwelling Type</th>
<th>Waste Storage and Collection</th>
<th>Section Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Density</td>
<td>Single detached Semi-detached Street townhouse i.e. Townhouses with individual frontage onto a street</td>
<td>Each dwelling unit has individual waste storage and setout areas for collection. Collection is with blue boxes, green bins and garbage bags.</td>
<td>1.2.1 Individual Curbside Collection</td>
</tr>
<tr>
<td>Medium Density</td>
<td>Duplex, triplex, quadruplex and apartment buildings with less than 7 dwelling units</td>
<td>Shared waste storage and setout areas for collection. Collection is with blue boxes, green bins and garbage bags.</td>
<td>1.2.2 Shared Curbside Collection</td>
</tr>
<tr>
<td>Medium Density</td>
<td>Townhouses with no individual frontage onto a street and/or no individual waste storage area (i.e. stacked townhouses)</td>
<td>Shared waste storage and setout areas for collection. Collection is with front-end containers or carts.</td>
<td>1.2.3 Shared, Bulk Collection Townhouse Developments</td>
</tr>
<tr>
<td>Medium/High Density</td>
<td>Apartment buildings with 7 or more dwelling units</td>
<td>Shared internal waste storage area and setout area(s) for collection. Collection is with front-end containers or carts.</td>
<td>1.2.4 Apartment Building Developments</td>
</tr>
<tr>
<td>Industrial Commercial and Institutional</td>
<td>N/A</td>
<td>Waste storage on private property. Private waste collection.</td>
<td>1.2.5 ICI Developments</td>
</tr>
<tr>
<td>Mixed-Use</td>
<td>Any dwelling type</td>
<td>Dependent on dwelling type.</td>
<td>1.2.6 Mixed-Use Developments</td>
</tr>
</tbody>
</table>
To ensure that all applicable Design Standards have been included in development applications prior to submission, please use the Application Checklist found in Appendix 6.

- **Section 2 - Collection Standards:** Defines the collection requirements that must be met by owners to receive and maintain municipal waste collection service. To receive municipal waste collection service, owners must complete the Town of Richmond Hill Application for Municipal Waste Collection Services found in Appendix 1 and return it to the Town.

**General Requirements**

This document shall be used in conjunction with, and not in place of, the Ontario Building Code, the Ontario Fire Code, the Environmental Protection Act, the Town’s Standards and Specifications Manual, the Town’s Waste Management By-law and all other applicable legislation, municipal standards and policies. It is the owner’s responsibility to comply with the most current version of all applicable legislation, municipal standards and policies. In case of conflict, the most stringent regulation shall apply.

Owners shall review this entire document and ensure their development application adheres to all applicable requirements. Alternative approaches to the development standards included herein will be considered by the Town of Richmond Hill during the review process, inasmuch as the alternative approach meets the intent of the requirements, and standards herein. Information concerning the development application process can be obtained from the Town of Richmond Hill Planning and Regulatory Services Department.

All residential development applications must include, at minimum, a three-stream waste collection system (garbage, organic materials and recyclable materials) as required in the Richmond Hill Waste Management By-Law.

It is the responsibility of the owner to ensure that they are using the correct version of the Waste Management Design and Collection Standards for Development, which will be posted on the Town of Richmond Hill website at [www.richmondhill.ca](http://www.richmondhill.ca). Revisions to the standards document will be made from time to time.
1.0 Design Standards

1.1 Access Route Standards
The access route standards below contain the minimum design requirements for waste collection vehicles to safely access sites to carry out municipal waste collection. All access routes located on public streets must be designed in accordance with Division C (Transportation and Road Works) of this manual. Access routes located in private developments must meet the requirements in Division C as well as those listed below. Submitted drawings must indicate that they meet the applicable standards by including the required dimensions.

1.1.1 Location of Access Route
It is the responsibility of the owner to ensure that the access route be situated in a location that minimizes the interface with pedestrian traffic and public vehicular ingress / egress to the building’s main parking area, including underground garage, drive-through and visitor parking areas. Drawings must indicate the parts of access routes with increased potential for conflict between collection vehicles and pedestrians/resident vehicular traffic. The owner shall recommend mitigation measures to minimize these potential conflicts which may include, but are not limited to, the use of proper signage, pavement markings, warning lights and mirrors to caution both pedestrians and collection vehicle operators (this includes doorways entering loading spaces etc.).

1.1.2 Access Route Details
To maintain safe and efficient waste collection, all access routes must be designed to allow a waste collection vehicle to enter the site, collect the waste and exit the site solely in a forward motion. To satisfy the requirement for continuous forward motion, it is acceptable to use a cul-de-sac designed as per Division C (Transportation and Road Works) of this manual.

In cases where the size of a site does not allow for continuous forward motion throughout the site, it is acceptable to use the Private Road - "T" Turnaround Minimum Standard design as detailed in Richmond Hill’s Standards and Specifications Manual. The waste collection vehicles shall not be permitted to make more than a three-point turn, or to reverse more than one and a half truck lengths (approximately 16.5 metres).

To maintain safe and efficient access to loading spaces for front-end waste collection, waste collection vehicles are only permitted to reverse when accessing/exiting a loading space or moving on the loading space for the purpose of loading containers.

1.1.3 Access Route Width, Radius and Vertical Clearance
Access routes must have a minimum width of 6.0 metres and a minimum inside turning radius of 9.0 metres. Access routes that are not designated as fire routes may be reduced to a width of 4.0 metres for one way traffic. The one-way access route requires
a minimum inside turning radius of 15.0 metres and a minimum outside turning radius of 14.5 metres. The minimum widths assume that parking is prohibited along the access routes and therefore “No parking” signage shall be posted throughout. If parking is allowed for any stretch of the access route, the size of the road must be increased accordingly to maintain the minimum access route width. All access routes must maintain a minimum vertical clearance of 4.4 metres.

1.1.4 Pavement Design and Grade of Access Route
The pavement structure of the access route and gradient shall be in conformance with design criteria requirements identified in Division “C” (Transportation and Road Works) of this manual. At a minimum, the pavement structure of access routes located on private property shall be designed as per the specifications for “Light Industrial, Commercial, Apartment Residential/Condominium” found in Section C1.5 of the Town of Richmond Hill’s Standards and Specifications Manual or a Town approved alternative. A geotechnical report shall confirm the required pavement structure specification to permit waste management vehicle accessibility under all climate conditions.

An access route which requires a driveway ramp to connect with an above or below grade structure shall have a maximum ramp grade of 8%.

1.1.5 Supported Structures
All portions of access routes, or loading spaces that require a collection vehicle to drive over a supported structure (such as an underground parking garage) must be capable of supporting a fully loaded collection vehicle of 35,000 kilograms and a point load of 6,000 kilograms. When applicable, a licensed Ontario Professional Engineer must certify on all submitted drawings that this requirement has been satisfied. Supported structures must also conform to all applicable legislation, including but not limited to Section 4, Structural Design of the Ontario Building Code.

1.1.6 Path of Collection Vehicle
The owner must submit a separate drawing indicating the waste collection vehicle’s footprint throughout the collection access route and at the point of ingress/egress and turnaround (if required). The owner shall include dimensions (i.e. width, turning radius, etc.) throughout the access route as well as points of ingress/egress and turnaround. The Town will, at its discretion, require the owner to submit such information using auto-turn or similar type of software. Typical dimensions of a waste collection vehicle are shown in Appendix 5: Waste Collection Vehicle Dimensions.
1.2 Waste Containers, Storage and Set Out Areas

1.2.1 Individual Curbside Collection (Single Detached, Semi-Detached and Street Townhouses)

**Waste Storage:** Each dwelling unit must have its own fully enclosed waste storage area in a non-habitable space (i.e. a garage). The waste storage area must be designed to store blue boxes, green bins, garbage bags/containers and yard waste material in between collection days. The waste storage area must not be located within the front yard. The minimum required size for the waste storage area is 2 square metres with a minimum width of 0.5 metres.

**Waste Set Out Area:** Each dwelling unit receiving individual curbside collection must have frontage onto a public or private street where waste will be set out for collection. The minimum required size for the waste set out area is 2 square metres with a minimum width of 0.5 metres. Driveways and boulevards are acceptable locations for waste set out areas however, waste set out locations must not interfere with any planned or existing infrastructure including infrastructure for pedestrians, cyclist or other public services.

1.2.2 Shared Curbside Collection (Duplex, Triplex, Quadruplex and Apartment Buildings with less than 7 Dwelling Units)

**Waste Storage:** Each building must have a fully enclosed waste storage area in non-habitable space that will be shared by all dwelling units. The waste storage area must be used to store blue boxes, green bins, garbage bags/containers and yard waste material in between collection days. The minimum required size for the waste storage area is 2.0 square metres for each dwelling unit. The layout of the waste storage area shall allow for convenient access by residents to waste containers for all streams.

**Waste Set Out Area:** Each building where dwelling units are contained must have frontage onto a public or private street where waste will be set out for collection. The minimum required size for the waste set out area is 1 square metre with a minimum width of 0.5 metres for each dwelling unit included in the building. Driveways and boulevards are acceptable locations for waste set out areas however, waste set out locations must not interfere with any planned or existing infrastructure including infrastructure for pedestrians, cyclists or other public services.

1.2.3 Shared, Bulk Collection Townhouse Developments

*Townhouse* developments where individual dwelling units do not have frontage on to a public or private street and/or individual waste storage areas, will receive shared, bulk collection with front-end containers and are required to meet the applicable waste storage and waste set out standards. The option does exist for these types of
townhouse developments that have less than 33 dwelling units to receive waste collection with carts; however this decision will be at the discretion of the Town. The standards for both front-end and cart waste collection for townhouse developments are detailed below.

**Waste Storage Rooms:** Each shared, bulk collection townhouse development is required to have at least one waste storage room that is either part of a parking structure or part of a townhouse building or an independent, fully enclosed accessory structure with a roof. The waste storage room(s) must be completely located on private property, be easily accessible to all residents and must not require any resident to walk more than 100 metres round trip to dispose of their waste. Walking paths from each dwelling unit must be demonstrated to only occur along walkways/sidewalks that have year-round maintenance. If multiple waste storage rooms are required throughout the development, the waste management plan must include how many dwelling units each waste storage room will service. If the waste storage room(s) is located underground and the development is serviced with front-end containers, it is acceptable that chutes be used by residents to dispose of waste. However, residents will still require access to the waste storage room to dispose of other material (i.e. large cardboard, bulky waste etc.) and this accessibility must be identified. The chute system must provide residents with the ability to separate the three waste streams (garbage, recycling and organics). The preferred method for this is a system with three separate chutes, one for each waste stream, however a single chute with a tri-sorter or two chutes where one has a bi-sorter are both acceptable separation methods. All chutes are required to be provided with operational washing and lock-out systems. Each chute room must also be provided with sufficient space for educational material (i.e. posters) to be attached to the wall to inform residents of proper waste sorting. All waste storage rooms must be located so that containers can be easily taken to collection/set out areas without obstructions and the waste management plan must indicate the route of the waste containers to the collection/set out areas.

The waste storage room(s) will be used by residents to dispose of waste, for the storage of waste containers and bulky waste in between collection days and will be designed to accommodate additional diversion programs which, at minimum, will include textile waste, WEEE and batteries. Please note that the space required for the storage of bulky waste, and additional diversion programs have been calculated in the minimum dimensions below. Waste storage room(s) must allow for the storage of 8 days’ worth of generated waste. Each waste storage room must have a layout that allows for convenient access by residents to waste containers for all waste streams and must have appropriate lighting and be properly ventilated as per the Ontario Building Code. In addition, all waste storage rooms must be rodent proof, have a hose bib, floor drain and include appropriate odour control measures including climate control. The required minimum vertical clearance within a waste storage room shall be 2.5 metres. Accessory structures must meet all applicable by-laws and requirements of the Ontario Building
Code and must be architecturally compatible with the development. In addition, waste storage rooms must not be forward of the main building wall as indicated in Appendix 3: Townhouse Cart Collection Pad Example.

**Waste Containers, Size of Waste Storage Room and Set Out – Front-End Collection:**

The waste containers that will be used for garbage and recyclable materials will range in size from 3 to 6 cubic yards. Waste containers for organic materials will be 2 cubic yards in size. It is assumed that the garbage for this development type will be uncompacted. If a garbage compactor is included in the waste management plan, then a reduction in the required space may be permitted at the discretion of the Town. Garbage compaction shall not exceed a ratio of 3:1. Additionally, if a garbage compactor is included in the waste management plan, public and resident access will be prohibited to any waste storage rooms equipped with a compactor, or the proper measures must be taken to ensure that the compactor is not accessible to the public and residents.

Refer to Table 2 to determine the minimum required size of each waste storage room based on the number of dwelling units that the waste storage room will service. The minimum room sizes in Table 2 are based on 3 cubic yard containers for garbage and recyclable materials. If larger containers are to be used for garbage and recyclable materials the minimum size of the waste storage room may be decreased. The Town may require an additional front-end container for each stream depending on the layout of the site and if the development is using chutes. In these circumstances, the minimum size of the waste storage room must be increased to accommodate the additional containers.

**Table 2 – Minimum Waste Storage Room Sizes for Front-End Collection from Townhouse Developments**

<table>
<thead>
<tr>
<th>Number of Dwelling Units</th>
<th>Minimum Number of Front-End Containers</th>
<th>Minimum Size of Waste Storage Room</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Garbage</td>
<td>Recyclable Material</td>
</tr>
<tr>
<td>33 to 39</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>40 to 52</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>53 to 65</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>66 to 78</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>79 to 91</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>92 to 104</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>105 to 117</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>118 to 130</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>131 to 143</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>144 to 156</td>
<td>9</td>
<td>12</td>
</tr>
</tbody>
</table>
Front-End Waste Set Out/Loading Space: The requirements for the set out area and loading space are the same as those for apartment building developments serviced with Front-End containers. For the applicable requirements, please refer to Front-End Waste Set Out/Loading Space under Section 1.2.4.

Waste Containers, Size of Waste Storage Room and Set Out - Cart Waste Collection: Shared, bulk collection townhouse developments with less than 33 dwelling units, approved by the Town to use Cart Collection, will use 95 gallon carts for garbage and recyclable materials and 65 gallon carts for organic materials. Table 3 provides the required minimum size for a waste storage room depending on the number of dwelling units that the waste storage room will service.

Table 3 – Minimum Waste Storage Room Sizes for Cart Collection from Shared, Bulk Collection Townhouse Developments

<table>
<thead>
<tr>
<th>Number of Dwelling Units</th>
<th>Minimum Number of Carts</th>
<th>Minimum Size of Waste Storage Room</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Garbage</td>
<td>Recyclable Material</td>
</tr>
<tr>
<td>7 to 8</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9 to 10</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11 to 12</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>13 to 14</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>15 to 16</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>17 to 18</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>19 to 20</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>21 to 22</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>23 to 24</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>25 to 26</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>27 to 28</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>29 to 30</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>31 to 32</td>
<td>11</td>
<td>15</td>
</tr>
</tbody>
</table>

Cart Waste Set Out Area: Each shared, bulk collection townhouse development that receives cart collection is required to have a collection pad for staging the waste containers for all 3 waste streams prior to municipal waste collection. The collection pad must be located on private property, accessible by a private street or driveway and located within 15 metres of the curb where waste collection will occur. Additionally, walkways must be provided between the waste storage room, the collection pad and the curb where waste collection will occur. The collection pad and the walkways must be constructed of concrete, asphalt or another surface approved by the Town. The collection pad must be large enough to accommodate the total number of carts based on Table 3. The minimum area to be used when designing the collection pad is 1 m² per garbage or recycling cart and for 0.5 m² per organics cart. The required minimum width of the collection pad is 1 metre. An example of an approved waste collection pad for
shared, bulk collection townhouse developments can be found in Appendix 3: Townhouse Cart Collection Pad Example.

1.2.4 Apartment Building Developments
Apartment building developments will receive front-end waste collection and are required to meet the applicable waste storage, separation and set out standards. The option does exist for developments that include apartment buildings with less than 33 dwelling units to receive waste collection with carts; however, this decision will be at the discretion of the Town. The standards for both front-end and cart waste collection for apartment building developments are detailed below.

Front-End Waste Storage: Each apartment building or tower within the development must have an internal waste storage room where waste containers and bulky waste will be stored in between collection days and where all waste chutes terminate. Waste storage rooms must have appropriate lighting and be properly ventilated as per the Ontario Building Code and be rodent proof, have a hose bib, floor drain and include appropriate odour control measures including climate control. All waste storage rooms must be located so that waste containers can be easily taken to collection/set out areas without obstructions and the waste management plan must indicate the route of the waste containers to the collection/set out areas. Waste storage rooms will include garbage compactors and as such, public and resident access will be prohibited to waste storage rooms, or the proper measures must be taken to ensure that the compactor is not accessible to the public and residents. The required minimum vertical clearance within a waste storage rooms shall be 2.5 metres.

The waste containers that will be used for garbage and recyclable materials will range in size from 3 to 6 cubic yards. Waste containers for organic materials will be 2 cubic yards in size. Waste storage room(s) must allow for the storage of 8 days' worth of generated waste.

Refer to Table 4 to determine the minimum required size of each waste storage room based on the number of dwelling units within the apartment building. The minimum room sizes in Table 4 are based on 3 cubic yard containers for garbage and recyclable materials. If a development is designed for larger containers for garbage and recyclable materials, the minimum size of the waste storage room may be decreased. Garbage compaction shall not exceed a ratio of 3:1.

Table 4 – Minimum Waste Storage Room Sizes for Front-End Collection from Apartment Building Developments

<table>
<thead>
<tr>
<th>Number of Dwelling Units</th>
<th>Minimum Number of Front-End Containers</th>
<th>Minimum Size of Waste Storage Room</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Garbage</td>
<td>Recyclable Material</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Front-End Waste Separation: Each apartment building or tower is required to have a chute system that provides residents with the ability to separate the three waste streams (garbage, recycling and organics) on each floor. To accomplish this, each apartment building or tower is required to have a minimum of three (3) separate waste chutes in total, with a dedicated chute for each of the following:

i. Garbage,

ii. Recycling; and

iii. Organics;

All chutes are required to include operational washing and lock-out systems. Chute rooms used by residents for the disposal of waste must be located on each floor of the apartment building or tower. If any dwelling units are on the same floor as the waste storage room then a waste separation method that is acceptable to the Town must be provided for those dwelling units. Each chute room must be provided with sufficient space for educational material (i.e. posters) to be attached to the wall to inform residents on proper waste sorting. The requirement for a chute system may be waived for apartment buildings with less than 5 storeys, however this decision will be at the discretion of the Town. If an apartment building development with less than 5 storeys is approved to proceed without a chute system, then all waste must be disposed of directly into the waste storage room which must be easily accessible to all residents and must be within 50 meters walking distance of all dwelling units. The dimensions of the waste storage room will be dependent on the method of waste collection (i.e. carts or front-end).

In addition to the waste storage room, each apartment building is required to have a waste drop-off area adjacent to the waste storage room that is easily accessible to residents. The waste drop-off area will be used for the disposal of items not suitable for
chutes (i.e. large pieces of cardboard) and for additional waste streams which at minimum, will include WEEE, textile waste and batteries. For apartment buildings with 100 dwelling units or less, the size of the waste drop-off area must be a minimum of 7 square metres. For apartment buildings with more than 100 dwelling units, the size of the waste drop-off area must be a minimum of 11 square metres. The waste management plan must indicate how waste will be moved from the waste drop-off area to the waste storage room or the loading space. The waste drop-off area must have appropriate lighting and be properly ventilated as per the Ontario Building Code and include appropriate odour control measures.

**Front-End Waste Set Out/Loading Space:** Each development that receives front-end waste collection is required to have a loading space for waste collection. The loading space must meet the minimum dimensions in Table 5.

<table>
<thead>
<tr>
<th>Table 5 – Minimum Loading Space Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Length</td>
</tr>
<tr>
<td>13 metres</td>
</tr>
</tbody>
</table>

The required unencumbered vertical clearance over the entire loading space is 6.5 metres for 3 or 4 cubic yard containers. If 6 cubic yard containers are used, the required vertical clearance will be increased to 7.0 metres.

The loading space is designed to accommodate one front-end container and the waste collection vehicle. Developments with more than 45 dwelling units, which will be setting out more than one front-end container per stream, require a staging pad. The staging pad is used for the temporary storing of front-end containers immediately prior to collection and must be adjacent to the area of the loading space opposite to where the collection vehicle will enter the loading space. The size of the staging pad is dependent on the number of front-end containers that will be placed out for collection on each collection day. The minimum size of the staging area will be 5 square metres for each additional container that will be set out for collection. The layout of the staging pad must allow for containers to be easily moved to the loading space during collection.

The loading space and staging pad must not exceed a grade of 2% and must be at grade with the adjacent driveway levels. The loading space and staging pad are required to be constructed of 150mm concrete with a minimum specified compressive strength of 32MPa. The loading space and staging pad must also be constructed of a base with a minimum 300mm of 20mm crusher run limestone, with an exposure class of C-2 and reinforcement mesh as required.

**Cart Waste Storage:** Each apartment building with less than 33 dwelling units, approved by the Town to use Cart Collection, will have a waste storage room where waste containers and bulky waste will be stored in between collection days. The waste storage room must be internally accessible by all residents and the layout of the waste storage room shall allow for convenient access by residents to waste containers for all
streams and provide an area for the storage of bulky waste. The waste storage room must also have appropriate lighting and be properly ventilated as per the Ontario Building Code and have a hose bib, floor drain and include appropriate odour control measures.

The waste containers that will be used for this dwelling type will be 95 gallon carts for garbage and recyclable materials and 65 gallon carts for organic materials. Table 6 provides the required minimum size of the waste storage room depending on the number of dwelling units in the apartment building.

Table 6 – Minimum Waste Storage Room Sizes for Cart Collection from Apartment Building Developments

<table>
<thead>
<tr>
<th>Number of Dwelling Units</th>
<th>Minimum Number of Carts</th>
<th>Minimum Size of Waste Storage Room</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Garbage</td>
<td>Recyclable Materials</td>
</tr>
<tr>
<td>First 7</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8 to 14</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>15 to 21</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>22 to 28</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>29 to 32</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

Cart Waste Set Out Area: Each apartment building development that receives cart waste collection is required to have a collection pad for staging the containers for all 3 waste streams to facilitate municipal waste collection. The collection pad must be located on private property, accessible by a private street or driveway and located within 15 metres of the curb where waste collection will occur. Additionally, the pad, and any necessary walkways leading to the pad, must be constructed of concrete, asphalt or another surface approved by the Town. The collection pad must be large enough to accommodate the total number of carts based on Table 6. The minimum area to be used when designing the collection pad is 1 m² per garbage or recycling cart and 0.5 m² per organics cart. The required minimum width of the collection pad is 1 metre.

1.2.5 Industrial, Commercial and Institutional Developments

ICI developments are not eligible for municipal waste collection services; however, these developments are still required to meet the following Design Standards. All ICI developments are required to have at least one waste storage room completely located on private property that is part of a parking structure, part of the ICI building or an accessory structure independent of other buildings in the development and must be fully enclosed including a roof. Accessory structures must meet all applicable by-laws and requirements of the Ontario Building Code. The waste storage room must be large enough to store all waste generated from the development between collection days as no waste is permitted to be stored outside in between collection days. ICI developments
that are restaurants or eating establishments are required to have refrigerated waste storage areas. All waste collection activities must occur completely on private property.

ICI developments on Yonge Street between Crosby Avenue/Benson Avenue in the north and Major Mackenzie Drive in the south, may be eligible to receive municipal waste collection. Development applications for ICI developments within this area will be considered on a case-by-case basis to determine the applicable standards.

1.2.6 Mixed-Use Developments
The residential and ICI components of mixed-use developments must meet the Design Standards that are outlined above for the individual development types. Separate waste storage areas are required. Each building within a mixed-use development must provide internal access from each ICI unit to the ICI waste storage room. ICI waste generated in mixed-use developments is not eligible for municipal waste collection. A shared loading space may be permitted between residential and non-residential uses where the total GFA for the non-residential component is less than 465m2 (5,000 sq. ft.), however; the non-residential components are not permitted to use the loading space on days when municipal waste collection occurs.
2.0 Collection Standards

2.1 Application for Municipal Waste Collection Services

Commencement of municipal waste collection services requires the owner of a new development or re-development to provide the Town with a completed Town of Richmond Hill Application for Municipal Waste Collection Services (Appendix 1) and a Town of Richmond Hill Acknowledgement and Release for Municipal Waste Collection Services on Private Property (Appendix 2). New developments will be eligible to receive municipal waste collection services once the development or, alternatively each building or phase, achieves 70% occupancy.

The owner is also responsible to provide the Town with a letter stamped by a licensed Ontario Professional Engineer certifying that all portions of the access routes, loading spaces and staging pads have been constructed as per the design requirements in this document. The letter must also certify that all access routes and loading spaces that require a waste collection vehicle to drive over a supported structure (such as an underground parking garage) are capable of supporting a fully loaded waste collection vehicle of 35,000 kilograms and a point load of 12,000 kilograms. Finally, the letter must confirm that the supported structures conform to all applicable legislation, including but not limited to Section 4, Structural Design of the Ontario Building Code.

The owner of the development is responsible for providing waste collection services prior to receiving municipal waste collection services.

2.2 Collection Accessibility and Safety

It is the responsibility of the owner to ensure that all access routes, loading spaces and collection pads have been constructed to meet the applicable Design Standards and that they are free of any obstructions, prior to the commencement of municipal waste collection services. Obstructions include, but are not limited to, sightline obstructions, overhanging structures, overhead wires, snow, ice, parked vehicles, debris and construction equipment. For new developments where curbside collection will occur, all boulevards must be rough graded at a minimum. It is also the responsibility of the owner to provide the required safety provisions as determined by the Town for access routes and loading spaces which may include, but are not limited to, pavement markings, warning lights, mirrors and signage. All loading spaces must include no parking signage.

In cases where more than one front-end waste container is required for collection, it is the responsibility of the owner to ensure that competent staff will be at the loading space during waste collection to maneuver front-end waste containers to and from the staging pad and loading space.
Failure to provide a well-maintained access route and loading space, or failure to provide staff to maneuver front-end waste containers, will result in the cancellation of municipal waste collection services and/or prevent the commencement of municipal waste collection services.

2.3 Waste Containers and Educational Material

Prior to commencement of municipal waste collection services, the owner is responsible for providing the development with the required minimum number of acceptable waste containers and educational material for the size and type of development. Educational material provided by the Town may include the Town’s Waste Management Calendar or the Multi-residential Waste Management Guide depending on the Development type as well as educational posters for each chute room to inform residents of proper waste sorting. The owner may be required to obtain waste containers from the Town or the owner may be required to source the waste containers themselves as detailed below.

2.3.1 Individual & Shared Curbside Developments

For Individual and Shared Curbside Developments, it is the responsibility of the owner to distribute to each dwelling unit within the development two blue boxes, one green bin and one kitchen catcher, obtained from the Town, as well as the required informational material (typically the Waste Management Calendar) prior to municipal waste collection services commencing. The owner must notify the Town at least four weeks prior to occupancy to arrange an appointment when the owner will collect the waste containers and educational material from the Town or have it delivered directly to the development.

2.3.2 Shared, Bulk Collection Townhouse and Apartment Building Developments

It is the responsibility of the owner to distribute to each dwelling unit an in-unit blue box and a kitchen catcher, obtained from the Town, as well as the required informational material prior to municipal waste collection services commencing. The educational material for each dwelling unit shall outline the waste management and separation system used in the development. The owner must notify the Town at least four weeks prior to occupancy to arrange an appointment for the containers and educational material to be delivered to the development.

It is also the responsibility of the owner to provide the development with the appropriate number and type of front-end or cart waste containers as detailed below. The Town may require that a Town provided RFID tag be secured to each front-end or cart waste collection container prior to commencing municipal waste collection services.

Front-End Containers: For shared, bulk collection townhouse Developments and apartment buildings on front-end collection, use Table 2 or Table 4 respectively, to determine the minimum required number of front-end containers for each waste stream.
based on the number of *dwelling units* within the development or *building*. Front-end *waste* containers must be purchased by the *owner* and include appropriate locking mechanisms to prevent them from rolling when set out for collection. The acceptable sizes of front-end containers for each development will be based on the design and construction of the development but will range between 3 cubic yards to 6 cubic yards for *garbage* and *recyclable material* and will be 2 cubic yards for *organic material*. Where residents dispose of material directly into front-end containers, it may be required that the containers have side openings so that residents do not have to open the lids. For Developments that utilize *garbage* compactors, it is required that compaction does not exceed a ratio of 3:1.

**Cart Collection:** For *apartment buildings* and shared, bulk collection *townhouse* developments on cart collection, use Table 3 or Table 6 respectively, to determine the minimum required number of carts for each *waste* stream based on the number of *dwelling units* within the development.

Cart *waste* containers must be purchased by the *owner*. Acceptable sizes of cart *waste* containers are 95 gallon carts for *garbage* and *recyclable materials* and 65 gallon carts for *organic material* and typical dimensions of these *waste* containers can be found in Appendix 5.

**2.4 Inspections, Waste Audits and Resident Education**

Prior to the commencement of municipal *waste* collection services, the *Town* will inspect the *owner's* property to ensure that all applicable Collection Standards have been met.

On a continuous basis, the *Town* reserves the right to carry out inspections and *waste* audits on any residential properties receiving municipal *waste* collection services to ensure compliance with this document and the Waste Management By-law and to determine the effectiveness of the *waste* management program. The *Town* also reserves the right to discontinue municipal *waste* collection services to any development that is not compliant with this document, any applicable *Town of Richmond Hill* By-laws and all other applicable legislation, municipal standards and policies.

The *Town* may, prior to the commencement of municipal *waste* collection services and/or on an on-going basis, require that the *owner* accommodate resident education events organized by *Town* staff.
Definitions

Accessory structure means a building or structure that is not used for human habitation, the use of which is customarily incidental, subordinate and exclusively devoted to a principal use or building located on the same lot and shall not include a detached garage and outdoor swimming pool.

Access route means all public and private streets or driveways providing vehicular access to or from a building, structure or waste collection set out area and designated for use by waste collection vehicles.

Apartment building means a building containing five or more dwelling units all of which have a common external access to the building by means of a common corridor system.

Apartment dwelling unit means a dwelling unit within an apartment building.

Blue box means a blue, reusable, durable, plastic container used for the collection of recyclable materials from single family residential properties.

Building means a structure occupying an area greater than 10 square metres (107.64 square feet) consisting of a wall, roof and floor, or any one or more of them, or a structural system serving the function thereof, including all works, fixtures and service systems appurtenant thereto.

Bulky waste means garbage that cannot be collected through containerized methods, i.e. furniture.

Commissioner means the Commissioner of Environment and Infrastructure Services.

Development application means Official Plan Amendments, Zoning By-law Amendments, Plans of Subdivisions and Site Plan Applications or any other applications under the Planning Act.

Driveway means a defined area providing access for motor vehicles from a street, a condominium road, or a lane to a parking space, parking area or parking lot, loading space, detached garage, building or structure.

Duplex means a building containing two dwelling units divided horizontally and having an independent entrance either directly to the outside or through a common vestibule.

Dwelling unit means a unit that:

a. Consists of one self-contained set of rooms located in a building or a structure;

b. Is used or has the capability of being used as a domicile by one of more persons as a single housekeeping unit;
c. Contains cooking, eating, living, sleeping and sanitary facilities designated for the exclusive use of its occupants; and,

d. Has a means of egress to the outside of the building, which may be a means of egress with other shared dwelling units.

*Eligible property* means one of the following:

a. A *single family residential* Property;
b. A Multi Family Residential Property;
c. Any other property that is designated by the *Commissioner* as an *eligible property* from time to time.

*Fire route* means that part of a private street, with a minimum width of 6 meters designated as a fire route for use by authorized emergency vehicles, in accordance with Chapter 1090 of the Municipal Code.

*Front yard* means a yard extending across the full width of the lot between the front lot line and the closest point of the main wall of any building or structure on the lot.

*Garbage* means any material discarded by the occupant of a dwelling unit that is not recyclable material, organic material, yard waste material, a large appliance or non-collectible waste.

*Green bin* means a green, reusable container used for the collection of organic materials from single family residential properties.

*ICI development* means industrial, commercial or institutional establishment or property.

*In-unit blue box* means a blue, reusable, durable, plastic container used for the storage of recyclable material within dwelling units that are part of a multi-family residential property.

*Kitchen catcher* means a reusable container used for the storage of organic materials within dwelling units.

*Lane* means a public or private means of vehicular access to lot or an abutting property. This may also include a parcel of land which is a common element condominium for means of vehicular access.

*Large appliances* means refrigerators, stoves, freezers washing machines, dryers, dishwashers, furnaces, hot water tanks, metal sinks and bathtubs, pool heaters, air conditioning units, metal water softeners, dehumidifiers, water heaters and barbecues and/or any other items which may be designated large appliances by the *Commissioner* from time to time.
Mixed-use development means any development that includes both residential and I.C. & I. uses.

Multi-family residential property means a residential building, including an apartment, block or townhouse complex, containing seven (7) or more dwelling units.

Non-Collectible waste means:

a. Liquid waste;
b. Concrete products, bricks or stones;
c. Tree branches exceeding ten (10) cm in diameter and root balls;
d. Carcass of any animals, or live animals or birds;
e. Material from the construction, alteration, repair or demolition of any building or structure;
f. Swill, manure, hay, straw or any other organic material not properly drained or wrapped;
g. Bandages, poultices, dressings or similar waste;
h. Discarded vehicle parts, tires and other automotive waste;
i. Stock of wholesalers' and manufacturers' waste, including wire;
j. Household hazardous waste materials such as, but not limited to, paints, solvents, batteries, propane tanks, pharmaceuticals and oil;
k. Celluloid cuttings, moving picture film, ammunition, oil or gasoline soaked materials, liquid chlorine, acid or any explosive or combustible materials;
l. Any sharp edged material such as broken glass, broken crockery, cut metal or anything of a similar nature unless such material is placed in separate, secure containers and clearly marked as to contents;
m. Needles, syringes, or any other similar device used, or capable of being used, for the injection or extraction of liquid substances, including bodily fluids;
n. Oil tanks or drums unless such items are halved or have both ends removed;
o. Grass clippings;
p. Medical waste;
q. Ashes;
r. Used deposit beverage containers;
s. Lead acid batteries;
t. Yard waste;
u. Low level radioactive waste;
v. sewage;
w. PCB’s (Polychlorinated biphenyls);
x. Asbestos; and
y. Waste Electrical and Electronic Equipment (WEEE), as defined by the Ministry of the Environment, as a *non-collectible waste*.

*Organic materials* means food waste, houseplants, soiled paper towels, tissues and wet paper, diapers and sanitary products, pet waste, litter or bedding, and/or any other material or items which may be designated *organic materials* by the Commissioner from time to time.

*Owner* means the person having right, title, interest or equity in a property as shown on the records of the land registry office, or that person’s agent authorized in writing.

*Private street* means any road, driveway, or highway as defined by the Highway Traffic Act S.1(1) with a road allowance not under the jurisdiction of the Town of Richmond Hill or public road authority.

*Public street* means a public highway as defined by the Municipal Act, 2001 S.O. 2001, c.26, as amended and shall exclude an unopened road allowance of any Street which is shown on a Registered Plan of Subdivision which has been deemed not to be a Registered Plan of Subdivision under Section 50 of the Planning Act, R.S.O. 1990, or a predecessor thereof.

*Quadruplex* means a building containing only two storeys, exclusive of a basement, divided vertically and/or horizontally into four *dwelling units*, each one of which has two walls or parts thereof in common with adjoining units and an independent entrance to either the ground or common corridor.

*Recyclable materials* means materials deemed to be recyclable under the Town’s recycling collection program as determined by the Commissioner from time to time.

*RFID* means radio frequency identification.

*Semi-Detached Dwelling* means a building that is divided vertically into two *dwelling units* sharing a common wall above the established grade and each of which has an independent entrance either directly to the outside or through a common vestibule.

*Single detached dwelling* means a completely detached *dwelling unit*.

*Single family residential property* means a *single detached dwelling*, a *semi-detached dwelling*, a *duplex*, a *townhouse* with frontage on to a *public street* or a *driveway* and an *apartment building* with a maximum of six (6) *dwelling units*. 

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Stacked townhouse dwelling, which means a building containing at least three (3) dwelling units, each dwelling unit being separated from the other vertically and horizontally and having an independent external access.

Street townhouse dwelling means a townhouse dwelling with frontage on a street.

Textile waste means any clothing or clothing related item, as determined by the Commissioner from time to time, discarded by the occupant of a dwelling unit.

Town means The Corporation of the Town of Richmond Hill.

Townhouse dwelling means a building divided vertically into three or more dwelling units, each sharing a wall above the established grade and each of which has independent entrances at grade to a front and rear yard immediately abutting the front and rear walls.

Waste means garbage, recyclable material and organic material and when applicable, yard waste.

Waste management plan means the piece of the development application that must illustrate how all of the applicable design standards detailed in Section 1.0 of the “Waste Management Design and Collection Standards for Development” document have been addressed.

WEEE means waste electrical and electronic equipment.

Yard waste means brush, leaves, hedge, or tree and garden cuttings, and Christmas trees.
## APPENDIX 1: TOWN OF RICHMOND HILL APPLICATION FOR MUNICIPAL WASTE COLLECTION SERVICES

### APPLICANT INFORMATION

<table>
<thead>
<tr>
<th>Property Address (include names of any new public or private streets):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Application:</td>
</tr>
<tr>
<td>Name of Property Owner:</td>
</tr>
<tr>
<td>Address of Property Owner:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>City:</th>
<th>Province:</th>
<th>Postal Code:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone # of Property Owner:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email Address of Property Owner:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Property Contact Person #1 (if different than Property Owner):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone # of Contact Person #1:</td>
</tr>
<tr>
<td>Email Address for Contact Person #1:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Property Contact Person #2 (Optional):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone # for Contact Person #2 (Optional):</td>
</tr>
<tr>
<td>Email Address for Contact Person #2 (Optional):</td>
</tr>
</tbody>
</table>

| Signature of Applicant: | Date: |

### PROPERTY INFORMATION

<table>
<thead>
<tr>
<th>Site Plan Application #:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Type (i.e. condo building):</td>
</tr>
<tr>
<td>Number of units on the property/building:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Has the building/property reached 70% occupancy?</th>
<th>Yes:</th>
<th>No:</th>
</tr>
</thead>
<tbody>
<tr>
<td>If not, provide a date when it is planned that 70% occupancy will be achieved:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Have all access routes for waste collection vehicles, loading spaces, staging and collection pads been constructed as per approved site plan drawings?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes:</td>
</tr>
</tbody>
</table>

Please explain deviations from the approved site plan drawings:

<table>
<thead>
<tr>
<th>Are any access routes or loading spaces part of supported structures?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes:</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Has a letter stamped by a licensed Ontario Professional Engineer been included with this application certifying that:</td>
</tr>
<tr>
<td>• All access routes, loading spaces and staging pads have been constructed as per the design standards outlined in this document; and</td>
</tr>
<tr>
<td>• All supported structures that collection vehicles will travel over are capable of supporting at least 35,000kgs and a point load of 12,000kgs</td>
</tr>
<tr>
<td>Yes:</td>
</tr>
<tr>
<td>Are all access routes for waste collection vehicles, loading spaces, staging pads and collection pads free of obstruction?</td>
</tr>
<tr>
<td>Yes:</td>
</tr>
<tr>
<td>If this application is for a property receiving curbside collection, have all boulevards been rough graded?</td>
</tr>
<tr>
<td>Yes:</td>
</tr>
<tr>
<td>If this application is for a property with a chute system, is the chute system operational including washing and lock-out systems?</td>
</tr>
<tr>
<td>Yes:</td>
</tr>
<tr>
<td>Have no parking signs been installed at the loading space?</td>
</tr>
<tr>
<td>Yes:</td>
</tr>
</tbody>
</table>

### WASTE COLLECTION INFORMATION

Please indicate the type of waste collection the property is applying for:

| Front-End: | Carts: | Curbside: |

For Front-End collection, please indicate the size of containers that will be used for garbage and recyclable materials (i.e. 3 yards):

*Note: Front-End Containers for organic material must be 2 yards*

Please indicate the number of Front-End containers provided to the building for each waste stream:

| Garbage: | Recyclables: | Organics: |

Is a Garbage compactor in use on the property?

| Yes: | No: | N/A: |

Do all front-end containers have wheels with locking mechanisms?

| Yes: | No: | N/A: |

For Cart collection, please indicate the number of carts provided to the property or building for each waste stream:

| Garbage: | Recyclables: | Organics: |

For curbside collection, have containers and educational material been delivered?

<p>| Yes: | No: | N/A: |</p>
<table>
<thead>
<tr>
<th>Yes:</th>
<th>No:</th>
<th>N/A:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FOR INTERNAL USE ONLY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date application received:</td>
<td>Date application reviewed:</td>
<td></td>
</tr>
<tr>
<td>Inspection date:</td>
<td>Inspected by:</td>
<td></td>
</tr>
<tr>
<td>Was the site constructed as per approved site plan drawings</td>
<td>Yes:</td>
<td>No:</td>
</tr>
<tr>
<td>Approved for collection</td>
<td>Yes:</td>
<td>No:</td>
</tr>
<tr>
<td>Signature of inspector:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acknowledgement and Release for Municipal Waste Collection Services on Private Property received?</td>
<td>Yes:</td>
<td>No:</td>
</tr>
<tr>
<td>Start date for municipal waste collection services:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date application and property information entered into database:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX 2: TOWN OF RICHMOND HILL ACKNOWLEDGEMENT AND RELEASE FOR PRIVATE PROPERTY WASTE COLLECTION SERVICES

1. In consideration of the Corporation of the Town of Richmond Hill (hereinafter the “Town”) providing waste collection service, ____________________________ (hereinafter the “Owner) being the registered Owner of ____________________________ (hereinafter the “Lands”) shall:
   a) Permit the Town and its employees, contractors and authorized agents, entry onto the land for purposes of providing waste collection services;
   b) Release, save harmless and indemnify the Town from all actions, causes of actions, damages, liability, fines proceedings, claims and demands arising as a result of the Town and its employees, Contractors and authorized agents utilizing the Lands, including but not limited to, the driveway, ramp, landing and parking areas of the Lands for purposes of providing waste collection services save and except any claims or damages attributable to the negligence of the Town or those for whom it is in law responsible for; and
   c) Permit the Town, its employees and authorized agents entry onto the Land for the purposes of inspecting and auditing the effectiveness of the waste management program at the Lands.

2. It is herein acknowledged by the Owner that the Town’s waste collection from the Lands is conditional on:
   a) The Owner providing free and clear access to loading spaces and collection pads determined satisfactory by the Town as provided on approved site plans and described within the site plan agreement;
   b) The Owner utilizing waste containers approved by the Town;
   c) The Owner maintaining all compaction equipment and containers in good and operable condition including regularly cleaning and sanitizing containers and replacing said equipment and containers when required;
   d) The Owner permitting any of their waste containers to have data-collecting equipment (i.e. RFID tags) affixed to them by the Town;
   e) The Owner maintaining all waste chute systems in clean and operable condition including washing and lock-out systems;
   f) All designated waste being set out for collection in approved containers no later than 7:00 a.m. on the designated collection day and being returned to waste storage rooms/areas no later than 7:00 p.m. on the day of collection once collection has occurred;
   g) The Owner or its agents moving front-end waste containers during collection if so required. The Town or its Contractor will not be responsible for emptying containers that are inaccessible to the collection vehicle;
   h) The Owner maintaining waste enclosures in a safe, clean, sanitary, odour free and tidy condition, including cleaning and sanitizing enclosures on a weekly basis or more frequently as required. Garbage, recyclable materials and organic materials are to be placed in appropriate containers. Cardboard is to be broken down and placed within appropriate recycling containers or bundled according to the Town’s Waste Management By-Law;
   i) The collection area being signed, kept clear of parked vehicles, large garbage items and large appliances to be collected loose (i.e. not within front-end containers or carts).
   j) The access routes, loading space(s) and collection pad(s) being fully cleared of snow and ice;
k) The Owner notifying and obtaining approval from the Town prior to making any changes that will affect waste collection services including but not limited to moving or making changes to waste collection loading spaces and pads and adding or changing waste containers;

l) The Owner ensuring that all tenants or unit owners in developments with shared waste storage have equally convenient access to containers for garbage, recyclable material and organic material;

m) The Owner conducting daily examination of waste containers for garbage, recyclable material and organic material to:
   i. Correct and/or prevent overflow problems.
   ii. Remove contaminants from recycling containers.
   iii. Correct and/or prevent recyclable materials from being mixed with Garbage.

m) The Owner attaching and maintaining labels and/or signs provided by the Town to waste containers;

n) The Owner placing and maintaining information posters provided/approved by the Town describing the Town's waste diversions program in common areas, including chute rooms, waste rooms, waste drop-off rooms at a minimum and as required in the lobby, mailroom and laundry room of the building or complex;

o) The Owner notifying tenants or unit Owners in writing of the current waste management program within the building or complex. Notice must be kept up to date, redistributed regularly and be provided to all new tenants or unit Owners;

p) The Owner including the requirement to separate recyclable and organic material from garbage in all tenant leases or condominium packages; and,

p) The Owner complying with all other requirements within the Town’s Waste Management By-law.

3. The Owner further acknowledges the Town’s waste collection service is limited to:
   a) Waste collection service on such days as designated by the Town;
   b) Garbage, recyclable material, organic material, yard waste (if applicable), Bulky Items and White Goods all as defined in the Town’s Waste Collection By-law;
   c) White goods as defined in the Town’s Waste Collection By-law shall be collected subject to scheduling and notice to be provided by the Owner to the Town one week prior to pick up.

4. The Owner further acknowledges that the Town shall not collect Garbage generated from building renovations, apartment fires and parking lot sweepings. All materials to be collected must be in accordance with the Town’s Waste Management By-law.

5. Owner further acknowledges that: (a) should the Owner fail to perform or comply with the conditions in this Acknowledgement and Release, the Town will cease providing waste collection services to the Owner; (b) The Town will only provide the Owner with 48 hours’ prior written notice of the cessation of such services.

6. The Owner may terminate this Agreement upon providing the Town with 60 days written notice of termination. The Owner further acknowledges that should the services no longer be required by the Owner, the Owner must provide the Town with 60 days prior written notice.

7. Any notice which the Town or the Owner is required to give pursuant to this Agreement shall be given at:

Owner: _____________________________________________________________________
APPENDIX 3: TOWNHOUSE CART COLLECTION PAD EXAMPLE

NOTES:
1. COLLECTION WILL OCCUR ON PRIVATE DRIVEWAY
2. THIS DRAWING IS ONLY A SAMPLE AND THE LOCATION OF THE COLLECTION PAD WILL DEPEND ON EACH SITE.
3. WASTE STORAGE ROOM CANNOT BE LOCATED FORWARD OF THE MAIN BUILDING WALL.
### APPENDIX 4: WASTE COLLECTION VEHICLE DIMENSIONS

<table>
<thead>
<tr>
<th></th>
<th>Front-End</th>
<th>Rear-Packer</th>
<th>Top-Loader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Width without mirrors</td>
<td>2.59m</td>
<td>2.56m</td>
<td>2.54m</td>
</tr>
<tr>
<td>Overall Width with mirrors</td>
<td>3.59m</td>
<td>3.56m</td>
<td>3.54m</td>
</tr>
<tr>
<td>Front and Rear Track Width</td>
<td>2.49m</td>
<td>2.49m</td>
<td>2.49m</td>
</tr>
<tr>
<td>Overall Length (Arms Up/No Arms - Travelling)</td>
<td>9.39m</td>
<td>10.71m</td>
<td>10.82m</td>
</tr>
<tr>
<td>Overall Length (Arms Down /Collecting)</td>
<td>11.4m</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Overall Height (Travelling)</td>
<td>4.05m</td>
<td>3.35m</td>
<td>3.35m</td>
</tr>
<tr>
<td>Overall Height (Collecting)</td>
<td>6.33m</td>
<td>N/A</td>
<td>4.86m</td>
</tr>
</tbody>
</table>
## APPENDIX 5: WASTE CONTAINER DIMENSIONS

<table>
<thead>
<tr>
<th>Container Size</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Cubic Yards</td>
<td>1.81m</td>
<td>0.92m</td>
</tr>
<tr>
<td>3 Cubic Yards</td>
<td>1.81m</td>
<td>1.05m</td>
</tr>
<tr>
<td>4 Cubic Yards</td>
<td>1.81m</td>
<td>1.32m</td>
</tr>
<tr>
<td>6 Cubic Yard</td>
<td>1.81m</td>
<td>1.81m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Container Size</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 gallon</td>
<td>0.68m</td>
<td>0.72</td>
</tr>
<tr>
<td>95 gallon</td>
<td>0.73m</td>
<td>0.86</td>
</tr>
</tbody>
</table>
APPENDIX 6: DEVELOPMENT APPLICATION CHECKLIST
All items below must be included in the Waste Management Plan

ACCESS ROUTES (RESIDENTIAL AND ICI DEVELOPMENTS)

Site Plan drawing(s) include/indicate:

☐ Travel path of the waste collection vehicle throughout the site demonstrating continuous forward motion
☐ Proper signage
☐ Pavement markings, warning lights and mirrors
☐ The waste collection vehicle does not require to make more than a 3-point turn, or reverse more than 16.5m
☐ Access routes, including points of ingress and egress, that are designed for fire routes and/or two-way traffic have a minimum width of 6m and a minimum inside turning radius of 9m
☐ Access routes designed for one-way traffic and are not fire routes have a minimum width of 4m, a minimum inside turning radius of 15m and a minimum outside turning radius of 14.5m
☐ Access routes are to maintain a minimum vertical clearance of 4.4m
☐ Access routes are to have a grade of no more than 5% on private property
☐ Access route on a driveway ramp to connect with an above or below grade structure shall have a maximum ramp grade of 8%
☐ Pavement structure of a private road shall be designed and constructed as per the specifications for “Light Industrial, Commercial, Apartment Residential/Condominium” found in Section C1.5 of the Town of Richmond Hill’s Standards and Specifications Manual or a Town approved alternative
☐ All supported structures travelled on by waste collection vehicles will be designed to support at least 35,000kgs with a point load of at least 12,000kgs

INDIVIDUAL CURBSIDE COLLECTION

Site Plan drawing(s) include/indicate examples of:

☐ Each Dwelling Unit to have its own waste storage area in non-habitable space (i.e. garage) of at least 2m² with a minimum width of 0.5m²
☐ Each Dwelling Unit to have a waste set out area of at least 2m² with a minimum width of 0.5m² (may be on the driveway or boulevard)

SHARED CURBSIDE COLLECTION

Site Plan drawing(s) include/indicate

☐ Each Dwelling Unit to have its own waste storage area in non-habitable space of at least 2m² with a minimum width of
examples of: 0.5m²
☐ Waste set out area of at least 2m² with a minimum width of 0.5m² for each Dwelling Unit

ALL SHARED, BULK COLLECTION TOWNHOUSE DEVELOPMENTS – WASTE STORAGE

Site Plan drawing(s) include/indicate:
☐ Waste storage room(s)
☐ All Dwelling Units are within 50m walking distance of a waste storage room
☐ If more than one waste storage room is planned, the number of Dwelling Units each waste storage room will service
☐ Resident accessibility to waste storage room(s)
☐ Route of waste containers from waste storage room(s) to waste collection pads or staging pads/loading spaces
☐ Minimum internal vertical clearance of all waste storage rooms to be 2.5m
☐ All waste containers in waste storage room(s) including size of waste containers
☐ Size of each waste storage room in square metres
☐ Hose bib and floor drain
☐ Waste storage rooms as being climate controlled

SHARED, BULK COLLECTION TOWNHOUSE DEVELOPMENTS, FRONT-END – WASTE STORAGE AND COLLECTION

Site Plan drawing(s) include/indicate:
☐ Size of front-end waste containers planned for garbage and recyclable material. Front-end containers for organic material indicated as being 2 cubic yards in size
☐ Garbage compactor, if planned
☐ Measures to ensure resident/public access to garbage compactor is restricted
☐ If waste chutes are planned, three separate chutes are provided (garbage, recyclable materials and organic materials)
☐ Lock out and washing systems for all waste chutes
☐ Each chute room is provided with sufficient space for displaying educational material
☐ At least one loading space with minimum length of 13m, width of 4m and with a vertical clearance of at least 6.4m
☐ Staging pad if the development has more than 45 dwelling units
☐ Size of the staging pad in square metres
☐ Planned movement of front-end containers to and from the staging area and loading space during collection
Maximum grade of loading space and staging pad no more than 2%

Construction details of loading space and staging area

SHARED, BULK COLLECTION TOWNHOUSE DEVELOPMENTS, CARTS – WASTE SET OUT

Site Plan drawing(s) include/indicate:

☐ Size of waste collection pad(s) in square metres with dimensions
☐ Construction details of collection pad(s)

ALL APARTMENT BUILDINGS – WASTE STORAGE

Site Plan drawing(s) include/indicate examples of:

☐ Internal waste storage room(s) with area in m²
☐ Route of waste containers from waste storage room(s) to waste collection/set out areas
☐ Termination of three separate chutes in waste room with waste containers under each chute and a garbage compactor under one chute
☐ Internal vertical clearance of all waste storage rooms as 2.5m
☐ Size of each waste storage room in square metres
☐ Hose bib and floor drain
☐ Waste storage room as being climate controlled

APARTMENT BUILDINGS, FRONT-END – WASTE SEPARATION AND COLLECTION

Site Plan drawing(s) include/indicate examples of:

☐ Three separate chutes (garbage, recyclable materials and organic materials)
☐ Lock out and washing systems for all waste chutes
☐ Chute rooms on each floor
☐ Waste separation method for dwelling units on the same floor as the waste room
☐ Each chute room is provided with sufficient space for displaying educational material
☐ Route of waste containers from waste storage room(s) to waste collection/set out areas
☐ Internal vertical clearance of all waste storage rooms as 2.5m
☐ Garbage compactor and all waste containers in waste storage room(s) including size of waste containers
☐ Measures to ensure resident access to garbage compactor is restricted
☐ Hose bib and floor drain
- Waste storage room as being climate controlled
- Waste drop-off room adjacent to the storage room
- Size of waste drop-off room in square metres
- At least one loading space with minimum length of 13m, width of 4m and with a vertical clearance of at least 6.4m
- Staging pad if the development has more than 45 dwelling units
- Size of the staging pad in square metres
- Planned movement of front-end containers to and from the staging area and loading space during collection
- Grade of loading space and staging pad to not exceed 2%
- Construction details of loading space and staging area

**APARTMENT BUILDINGS, CARTS – WASTE SEPARATION AND COLLECTION**

Site Plan drawing(s) include/indicate examples of:
- Size of waste collection pad(s) in square metres with dimensions
- Waste collection pads within 15m of where collection will occur
- Walkway to collection pad
- Construction details of the collection pad(s) and walkway

**INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL DEVELOPMENTS**

Site Plan drawing(s) include/indicate examples of:
- Waste storage room
- That waste collection will occur entirely on private property
- If the development includes restaurants or eating establishments that the waste storage room be refrigerated
Appendix "1"

Materials, Standards and Specifications

Executive Committee Members and Specialty Committee Chairpersons
MATERIALS, STANDARDS AND SPECIFICATIONS

EXECUTIVE COMMITTEE MEMBERS

JUNE 2015

NAME | DEPARTMENT | TITLE
--- | --- | ---
S. Fick | Environment & Infrastructure Services Department | Director, Design & Construction Division
T. Ricketts | Environment & Infrastructure Services Department | Director, Environmental Services Division
G. Taylor | Community Services Department | Director, Public Works Operations Division
D. Terzievski | Planning & Regulatory Services Department | Director, Development Engineering Division
### MATERIAlS, STANDARDS & SPECIFICATIONS

#### SPECIALTY COMMITTEES

#### FEBRUARY 2016

<table>
<thead>
<tr>
<th>DIVISION</th>
<th>SPECIALTY COMMITTEE</th>
<th>CHAIRPERSON</th>
</tr>
</thead>
<tbody>
<tr>
<td>A &amp; B</td>
<td>Sewer and Watermain</td>
<td>Diogo Oliveira, Manager, Water &amp; Wastewater Public Works Operations Division</td>
</tr>
<tr>
<td>C</td>
<td>Transportation &amp; Roadworks</td>
<td>Ahsun Lee, Manager, Transportation &amp; Site Plans Development Engineering Division</td>
</tr>
<tr>
<td>D &amp; F</td>
<td>Grading and Drainage and Development Submission</td>
<td>Jeff Walters, Manager, Stormwater Management. &amp; Subdivisions Development Engineering Division</td>
</tr>
<tr>
<td>E</td>
<td>Utilities</td>
<td>Luigi Colangelo, Manager, Roads &amp; Traffic Operations Public Works Operations Division</td>
</tr>
<tr>
<td>G</td>
<td>Miscellaneous Drawings</td>
<td>Subject matter relevant Chairperson</td>
</tr>
<tr>
<td>H &amp; I</td>
<td>Storm Water Management and Erosion &amp; Sedimentation Control</td>
<td>Jeremy Wychreschuk, Manager, Water Resources Environmental Services Division</td>
</tr>
<tr>
<td>J</td>
<td>Parks and Open Space (Under development not published)</td>
<td>Geoff Hunt, Manager, Parks &amp; Open Space Design, Design &amp; Construction Division</td>
</tr>
</tbody>
</table>

All requests for amendments or additions to the Materials, Standards and Specifications Manual are to be directed in writing to the applicable Specialty Committee Chairperson.