

TOWN OF NEWMARKET

ENGINEERING

DESIGN STANDARDS AND CRITERIA



May 2023

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This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

Record of Revisions

Revision	Date	Description
1	February 2015	General Update.
2	September 2015	Section F revised – requirement for 0.6 m wide unobstructed sideyard path increased to 1.0 m. Drawings 200.00, 202.00 and 204.00 revised. Drawings 201.00, 203.00 and 205.00 deleted.
3	September 2018	Revised Concrete Sidewalk Standard Drawings NMSD-208.00 and NMSD-209.00
4	August 2019	Section C revised to incorporate LID criteria. General updates throughout document. Revised NMSD-208.00, 209.00, 600.00 and 701.00.
5	May 2023	Document updated to reflect York Region I&I Reduction Standard for Sewers Servicing New Development, Sanitary and Stormwater Consolidated Linear Infrastructure Environmental Compliance Approval, Updated Watermain Commission Procedure, watermain clearance corrections and updated Engineering Certification wording. Revised Drawings NMSD-208.00, 210.00 and 703.00 were added.

Table of Contents

SECTION A GENERAL INFORMATION

A1.00	Introduction.....	A-1
	A1.01 Familiarization	A-1
A2.00	Miscellaneous Submission Requirements.....	A-2
	A2.01 Ministry of the Environment, Conservation and Parks.....	A-2
	A2.02 Miscellaneous Approvals	A-2
	A2.03 Original Drawings	A-2
	A2.04 Requirements Prior to Commencement of Construction	A-3
	A2.05 Subdivision Notice Signage	A-3
A3.00	Engineering Drawing Requirements.....	A-4
A4.00	General Services Plan	A-5
A5.00	Plan and Profile Drawings.....	A-7
A6.00	Lot Grading Plans.....	A-10
A7.00	Composite Utility Plans.....	A-11
A8.00	Other Drawings	A-12
	A8.01 Traffic Management Plans	A-12
	A8.02 Drainage Plans	A-12
	A8.03 Erosion and Sedimentation Control Plans, Stormwater and Tree Protection Plans	A-12
	A8.04 Detail Drawings	A-12
	A8.05 Landscaping Drawings	A-12
A9.00	Record Drawings & Asset Inventory	A-13
	A9.01 General.....	A-13
	A9.02 Record Field Survey	A-13
	A9.03 Materials.....	A-13
	A9.04 Drawing Revisions	A-14
	A9.05 Submission of Record Drawings.....	A-14
	A9.06 Asset Inventory List	A-14
A10.00	Survey Control Monuments	A-16
A11.00	Engineering Certifications	A-17

SECTION B TRANSPORTATION

B1.00	Classifications	B-1
B2.00	Supporting Traffic Studies	B-2
B3.00	Geometric Design Elements	B-3

B4.00	Design Elements	B-4
B4.01	Horizontal Curves	B-4
B4.02	Vertical Curves	B-4
B4.03	Backfall at Intersecting Streets.....	B-4
B4.04	Curb Return Radii at Intersections	B-4
B4.05	Daylighting Requirements at Intersections	B-4
B4.06	Cul-de-sacs	B-5
B4.07	Temporary Turning Circles	B-5
B4.08	Location of Utilities.....	B-5
B4.09	Community Mailbox Requirements	B-6
B5.00	Traffic Controls	B-7
B5.01	Signage	B-7
B5.02	Street Name Signs.....	B-7
B5.03	Traffic Control and Advisory Signage.....	B-8
B5.04	Pavement Markings	B-8
B6.00	Pavement Design	B-10
B7.00	Construction Requirements	B-11
B7.01	Road Sub-Drains	B-11
B7.02	Placing of Final Surface Course Asphalt.....	B-11
B7.03	Other Requirements	B-11
B8.00	Concrete Curb and Gutter	B-13
B9.00	Sidewalks	B-14
B9.01	Walkways	B-14
B10.00	Driveways	B-15
B10.01	Minimum Driveway Design	B-15
B10.02	Driveway Grades	B-15
B10.03	Driveway Depressions	B-15
B11.00	Boulevards	B-16

SECTION C STORM DRAINAGE AND STORMWATER MANAGEMENT

C1.00	Storm Drainage Policies	C-1
C1.01	Planning, Policies and Design Criteria	C-1
C1.02	Rainfall Data	C-2
C1.03	Hydrology and Hydrologic Modelling.....	C-3
C1.04	Levels of Service	C-4
C2.00	Stormwater Management	C-6
C2.01	Pond Safety Features	C-7
C2.02	Operational and Maintenance Features	C-8
C2.03	Operations and Maintenance Manual	C-8
C2.04	Perpetual Maintenance Cost for SWM Facilities	C-9

C3.00	Stormwater Conveyance	C-10
	C3.01 General.....	C-10
	C3.02 Minor Drainage System Design	C-10
	C3.03 Major Drainage System Design	C-11
	C3.04 Foundation Drain Collector Systems.....	C-14
C4.00	Storm Sewer Design	C-15
	C4.01 Rational Method	C-15
	C4.02 Runoff Coefficients	C-15
	C4.03 Time of Concentration	C-16
	C4.04 Pipe Coefficients.....	C-16
	C4.05 Flow Velocities.....	C-17
	C4.06 Minimum Sizes	C-17
	C4.07 Minimum and Maximum Grades	C-17
	C4.08 Pipe Cover.....	C-17
	C4.09 Location.....	C-17
	C4.10 Limits	C-17
	C4.11 Sewer Alignment	C-17
	C4.12 Pipe Crossings	C-18
	C4.13 Changes in Pipe Size	C-18
	C4.14 Sewer Pipe Material.....	C-18
	C4.15 Pipe Bedding and Backfill	C-18
	C4.16 Service Connections.....	C-18
C5.00	Manholes	C-20
	C5.01 Location.....	C-20
	C5.02 Maximum Spacing of Manholes	C-20
	C5.03 Manhole Types	C-20
	C5.04 Manhole Design.....	C-20
	C5.05 Grades for Manhole Frames and Covers	C-21
	C5.06 Head Losses through Manholes	C-22
	C5.07 Radius Pipe	C-22
C6.00	Catchbasins	C-23
	C6.01 Location and Spacing	C-23
	C6.02 Catchbasin Capture	C-23
	C6.03 Catchbasin Types.....	C-24
	C6.04 Catchbasin Connections.....	C-24
	C6.05 Catchbasin Frame and Covers	C-24
C7.00	Inlets, Outfalls and Special Structures.....	C-25
	C7.01 Inlets.....	C-25
	C7.02 Outlets	C-25
	C7.03 Safety Railings.....	C-25
C8.00	Testing.....	C-26

	C8.01	Deflection Testing	C-26
	C8.02	Closed-Circuit Television Inspection	C-26
C9.00		Private On-Site Stormwater Management Facilities	C-28
	C9.01	On-Site Stormwater Management Guidelines	C-29

SECTION D WATERMAINS AND APPURTENANCES

D1.00		Hydraulic Design	D-1
	D1.01	General.....	D-1
	D1.02	Fire Flow.....	D-1
	D1.03	System Pressures.....	D-1
	D1.04	Flow Design.....	D-1
	D1.05	Domestic Demand	D-2
	D1.06	Industrial, Commercial and Institutional (ICI) Water Demands	D-3
	D1.07	Locations	D-3
	D1.08	Depth of Cover	D-3
	D1.09	Horizontal Separation between Sewers and Watermains.....	D-3
	D1.10	Watermain Crossing Sewers	D-3
	D1.11	Dead-Ends	D-3
	D1.12	Location Identification	D-4
	D1.13	Joint Restraint.....	D-4
D2.00		Valve Requirements.....	D-5
	D2.01	Type	D-5
	D2.02	Size	D-5
	D2.03	Number, Location and Spacing.....	D-5
	D2.04	Valve Boxes and Chambers	D-5
D3.00		Fire Hydrant Requirements	D-7
	D3.01	Type	D-7
	D3.02	Spacing	D-7
	D3.03	Branch Valves and Boxes.....	D-7
	D3.04	Location of Hydrants.....	D-7
	D3.05	Bedding Requirements	D-7
	D3.06	Hydrant Flow Testing.....	D-8
	D3.07	Colour.....	D-8
D4.00		Service Connections	D-9
	D4.01	General.....	D-9
	D4.02	Material.....	D-9
	D4.03	Minimum Size	D-9
	D4.04	Location.....	D-9
	D4.05	Connections to Supply Main	D-9
	D4.06	Curb Stops and Control Valves.....	D-9
D5.00		Materials	D-11

	D5.01	Watermain Material.....	D-11
	D5.02	Water Meters.....	D-11
D6.00	Corrosion Protection.....		D-12
D7.00	Testing Requirements.....		D-13

SECTION E SANITARY SEWERS AND APPURTENANCES

	E1.01	GENERAL.....	E-1
E2.00	HYDRAULIC DESIGN.....		E-1
	E2.01	Confirmation of Capacity.....	E-1
	E2.02	Sanitary Drainage Plan.....	E-1
	E2.03	Domestic Sewage Flows.....	E-1
	E2.04	Commercial Sewage Flows.....	E-2
	E2.05	Industrial Sewage Flows.....	E-3
	E2.06	Institutional and School Sewage Flows.....	E-3
	E2.07	Peak Flows for Redevelopment Properties.....	E-3
E3.00	SANITARY SEWER DESIGN.....		E-4
	E3.01	Location.....	E-4
	E3.02	Pipe Capacities.....	E-4
	E3.03	Flow Velocities.....	E-4
	E3.04	Minimum Size.....	E-5
	E3.05	Minimum and Maximum Grades.....	E-5
	E3.06	Minimum and Maximum Depths.....	E-5
	E3.07	Curved Sewers.....	E-5
	E3.08	Limits.....	E-5
	E3.09	Sewer and Watermain Crossings.....	E-5
	E3.10	Head Losses.....	E-6
	E3.11	Changes in Pipe Size.....	E-6
	E3.12	Pipe Bedding.....	E-6
E4.00	MANHOLES.....		E-7
	E4.01	Location.....	E-7
	E4.02	Maximum Spacing.....	E-7
	E4.03	Manhole Design.....	E-7
E5.00	SANITARY SERVICE CONNECTION.....		E-9
	E5.01	General.....	E-9
	E5.02	Location.....	E-9
	E5.03	Size.....	E-9
E6.00	TESTING.....		E-10

SECTION F LOT GRADING

F1.00	GENERAL.....		F-1
--------------	---------------------	--	------------

	F1.01	Objectives.....	F-1
F2.00		Lot Grading Criteria.....	F-2
	F2.01	Type of Drainage Pattern.....	F-2
	F2.02	Street Townhouses.....	F-3
	F2.03	Slopes	F-3
	F2.04	Swales.....	F-4
	F2.05	Rear Lot Catchbasins	F-5
	F2.06	Sodding and Ground Cover Requirements	F-5
F3.00		Retaining Walls	F-6
F4.00		Lot Grading Certification.....	F-7
F5.00		Timing for Sodding of Lots and Certification of Grading.....	F-8
 SECTION G UTILITIES AND STREET LIGHTING			
G1.00		GENERAL.....	G-1
	G1.01	Standard Requirements.....	G-1
G2.00		COMPOSITE UTILITY DRAWINGS	G-2
G3.00		STREET LIGHTING DESIGN	G-4
	G3.01	Street Light Poles	G-5
	G3.02	Street Lighting Luminaires	G-5
	G3.03	Energization of Street Lighting System	G-6
 SECTION H EASEMENT REQUIREMENTS			
H1.00		GENERAL.....	H-1
	H1.01	Storm, Sanitary Sewer and Watermain Easements	H-1
	H1.02	Concrete Encasement	H-1
	H1.03	Pipes Constructed in Sleeves	H-2

Tables

Table B-1:	Geometric Design Elements	B-3
Table C-1:	Levels of Service for Major and Minor Systems	C-4
Table C-2:	Level of Service for Bridges and Culverts (per MTO Directive B-100)	C-5
Table C-3:	Allowable Storm Sewer Capacities and Gradients	C-11
Table C-4:	Typical Runoff Coefficients and Initial Times of Concentration	C-15
Table E-1:	Allowable Sanitary Sewer Capacities and Gradients.....	E-4

Figures

Figure C-1:	Right-of-Way Flow Carrying Capacity for Various Pavement Widths in ROW Widths.....	C-12
Figure C-2:	Walk Way Flow Carrying Capacity for Various Curb Heights at 3 m Wide.....	C-13
Figure C-3:	Inlet Energy vs Flow Rate (100 mm to 200 mm Diameter)	C-29

Appendices

Appendix 1 – General Notes for Drawings
Appendix 2 – List of Acceptable Materials
Appendix 3 – Design Storms
Appendix 4 – Storm Sewer Design Sheet
Appendix 5 – Sanitary Sewer Design Sheet
Appendix 6 – Lot Grading and Retaining Wall Certification Forms
Appendix 7 – Watermain Testing Requirements
Appendix 8 – Warrants for All Way Stop Signs (PWPOL 17)
Appendix 9 – Standard Drawings



SECTION A

General Information

Town of Newmarket Engineering Design Standards and Criteria for New Developments

May 2023

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SECTION A – GENERAL INFORMATION

SECTION A GENERAL INFORMATION

Table of Contents

A1.00	Introduction.....	A-1
	A1.01 Familiarization	A-1
A2.00	Miscellaneous Submission Requirements.....	A-2
	A2.01 Ministry of the Environment, Conservation and Parks.....	A-2
	A2.02 Miscellaneous Approvals	A-2
	A2.03 Original Drawings	A-2
	A2.04 Requirements Prior to Commencement of Construction	A-3
	A2.05 Subdivision Notice Signage	A-3
A3.00	Engineering Drawing Requirements.....	A-4
A4.00	General Services Plan	A-5
A5.00	Plan and Profile Drawings.....	A-7
A6.00	Lot Grading Plans.....	A-10
A7.00	Composite Utility Plans.....	A-11
A8.00	Other Drawings	A-12
	A8.01 Traffic Management Plans	A-12
	A8.02 Drainage Plans	A-12
	A8.03 Erosion and Sedimentation Control Plans, Stormwater and Tree Protection Plans	A-12
	A8.04 Detail Drawings	A-12
	A8.05 Landscaping Drawings	A-12
A9.00	Record Drawings & Asset Inventory	A-13
	A9.01 General.....	A-13
	A9.02 Record Field Survey	A-13
	A9.03 Materials.....	A-13
	A9.04 Drawing Revisions	A-14
	A9.05 Submission of Record Drawings	A-14
	A9.06 Asset Inventory List	A-14
A10.00	Survey Control Monuments	A-16
A11.00	Engineering Certifications	A-17

SECTION A – GENERAL INFORMATION

A1.00 Introduction

The material presented herein is intended as a guideline in the production of designs for roads and services for all land development projects within the Town of Newmarket (Town). While specific design guidelines are provided herein, the **Ontario Provincial Standard Drawings and Specifications** supply the basis for much of the construction activity and shall be adhered to at all times unless directed otherwise by these design guidelines.

The design of all municipal services in the Town is to be based upon the specifications and standards in effect at the time of submission. It is incumbent upon the Developer's Consulting Engineer to ensure the latest specifications are being utilized. All plans are to be accepted by the Town before they are used for the construction of services, however, such acceptance in no way relieves the Developer's Consulting Engineer from providing an adequate and safe design.

This document is intended to provide direction for the design of most new developments in the Town. It should be recognized that it cannot provide direction for all circumstances encountered. The Town reserves the right to apply discretion in the interpretation of these guidelines and require the use of other applicable guidelines and good engineering judgement when reviewing each project.

A1.01 Familiarization

Prior to the commencement of the engineering design, the Consultant shall obtain copies of the Town's current Engineering Design Standards and Criteria Manual and Standard Detailed Drawings to familiarize themselves with the requirements of subdivision design in the municipality. Meetings shall be held with the Town's Engineering and Planning staff to discuss areas of preliminary concern and other issues prior to commencement of the engineering design.

All design work shall adhere to the approval principles as determined through the functional reports provided and adopted during the draft plan approval stage of the process. These matters and related reports are addressed in the Planning Department document entitled "**Subdivision Approval Process: Design Submission Requirements and Final Plan Registration Guidelines**"

<https://www.newmarket.ca/LivingHere/Documents/Planning%20Department/Subdivision%20Development%20Process%20Guidelines.pdf>. Any technical servicing issues that arise within said reports must be designed and detailed within the engineering submissions, regardless of the source of the information (geotechnical, acoustic, landscaping, etc.).

SECTION A – GENERAL INFORMATION

A2.00 Miscellaneous Submission Requirements**A2.01 Ministry of the Environment, Conservation and Parks**

The Developer's Consulting Engineer will be responsible for complying with all of the requirements of the Ministry of the Environment, Conservation and Parks (MECP). All stormwater management works, storm sewers, sanitary sewers, and waterworks are to be carried out in accordance with the MECP Consolidated Linear Infrastructure program. The Town's Environmental Compliance Approval (ECA) Numbers are as follows:

Water – 124-101

Sanitary – 124-W601

Storm – 124-S701

The Developer's Engineer will be required to submit the required completed MECP forms to the Town for the works being proposed.

All works are to be designed to the more stringent requirement of this document or the most current version of the **"MECP Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval"** document .

A2.02 Miscellaneous Approvals

The Developer's Consulting Engineer is required to determine all approval requirements and make all submissions and representations necessary to obtain approvals from all other authorities affected (Region of York, Ministry of Transportation, Ministry of Natural Resources and Forestry, Fisheries Canada, Lake Simcoe Region Conservation Authority, CNR, Canada Post Corporation, Utility Companies, etc.). The Town shall be kept informed of the progress of these submissions by copies of all correspondence.

A2.03 Original Drawings

After acceptances have been received from all applicable agencies, the original drawings shall be submitted to the Director of Engineering Services or Designate for review and/or acceptance in accordance with the **"Subdivision Approval Process: Design Submission Requirements and Final Plan Registration Guidelines"**

<https://www.newmarket.ca/LivingHere/Documents/Planning%20Department/Subdivision%20Development%20Process%20Guidelines.pdf>.

If after one year from the date of the signing of the drawings by the Town, the Developer fails to enter into a Subdivision Agreement with the Town, the Town reserves the right to revoke any or all approvals related to the engineering drawings.

SECTION A – GENERAL INFORMATION

A2.04 Requirements Prior to Commencement of Construction

Prior to the commencement of construction, the Developer/Developer's Consulting Engineer shall submit the following information to the Town:

- a) Three sets of full size drawings and construction specifications along with two sets of reduced size drawings (16" x 24").
- b) The names of the proposed Contractor and any Sub-contractors.
- c) The Contractor's list of suppliers.
- d) A copy of the signed contract tender complete with prices.
- e) Securities as outlined in the Subdivision Agreement in a form acceptable to the Town's Director of Finance.
- f) Proof of public liability insurance naming the Town of Newmarket and the Town's Checking Consultant as additional insured in amounts and form satisfactory to the Town's Director of Finance.
- g) Any other information as required by the Town or as specified in the Subdivision Agreement.

A2.05 Subdivision Notice Signage

Once the roads have been constructed to base course asphalt, the Developer is to provide and erect, in a prominent location at the "entrance" to the subdivision, a Subdivision Notice Sign as per Town of Newmarket Standard Drawing NMSD-100.00.

SECTION A – GENERAL INFORMATION

A3.00 Engineering Drawing Requirements

- A3.01 A title/cover sheet is required for the drawings.
- A3.02 All drawings shall be prepared using AutoCAD 2010 (or latest version). All drawings are to be prepared in a neat and legible fashion. All plans shall be prepared on standard 600 mm x 900 mm sheets.
- A3.03 Standard title blocks shall be used indicating the name of the development and having provision for a table for revision notes within the block.
- A3.04 All elevations shown on the drawings are to be of geodetic origin and reference to the geodetic benchmark is required.
- A3.05 All existing and proposed lot and block numbers, and intended purpose for blocks (i.e., school, park, etc.) are to be included on the drawings. All easements are also to be shown on the drawings.
- A3.06 Regional floodlines are to be indicated on all plans affected.
- A3.07 A north arrow shall be referenced on all drawings. North shall generally point to the top or left on the drawings.
- A3.08 A key plan drawn to 1:10000 scale shall be shown on all Plan and Profile Drawings as well as the General Services Plan. The area covered by the drawing shall be clearly identified.
- A3.09 All engineering drawings shall be stamped by a Professional Engineer. The Engineer's stamp must be signed and dated, prior to the issuance of drawings for signature by the Town's Director of Engineering Services.

SECTION A – GENERAL INFORMATION

A4.00 General Services Plan

- A4.01 A drawing showing General Services shall be prepared for all developments at a maximum scale of 1:1000.
- A4.02 When more than one General Services Plan drawing is required for any development then the division of drawings shall reflect the limits of the Registered Plans as closely as possible. Where more than one plan is prepared, a supplementary General Services Plan at a smaller scale shall be prepared to show the entire Plan of Subdivision on one drawing.
- A4.03 The reference geodetic benchmark and the site benchmarks to be used for construction shall be identified on the General Services Plan.
- A4.04 A drawing index shall be shown on all General Services Plans to identify the Plan and Profile Drawing Number for each street or easement shown.
- A4.05 All streets shall have the approved street names indicated.
- A4.06 All existing services, utilities and abutting properties are to be shown in dashed/shaded lines. All proposed services to be constructed are to be shown on the General Services Plan in solid lines.
- A4.07 All manholes will be shown and are to be numbered in accordance with the design drawings. All catchbasins are to be shown.
- A4.08 All existing and proposed storm and sanitary sewers are to be shown including size, length, grade, direction of flow and type of the sewer. Services must be shown for all lands to be registered. Services are to be terminated at the subdivision limits.
- A4.09 All watermains, valves and hydrants are to be shown. Watermains are to be identified only by sizing.
- A4.10 All curbs and sidewalks are to be shown, including details of connections to existing sidewalk networks.
- A4.11 All fencing is to be indicated by height and type.
- A4.12 All street lighting poles and hydro transformers are to be shown.
- A4.13 If a subdivision encroaches on an existing floodplain, the approved fill and floodline restrictions must be shown, as specified by the local Conservation Authority.
- A4.14 All existing buildings and structures on the lands including ones which are to be removed are to be shown.

SECTION A – GENERAL INFORMATION

- A4.15 The location of all traffic control and information signs and line painting is to be clearly shown on separate Traffic Management Plans, not on the General Services Plan.

SECTION A – GENERAL INFORMATION

A5.00 Plan and Profile Drawings

- A5.01 All Plan and Profile Drawings shall be prepared at a scale of 1:500 horizontally and 1:100 vertically. A complete legend shall be provided on each drawing.
- A5.02 Plan and Profile Drawings are required for all roads, blocks and easements where services are proposed, for all outfalls and for all boundary roadways abutting the development.
- A5.03 All existing or future services, utilities and abutting properties shall be shown in dotted or shaded lines.
- A5.04 All services to be constructed are to be shown in solid lines.
- A5.05 All road allowances, lots, blocks, easements and reserves are to be identified. Lot and block frontages are to be dimensioned.
- A5.06 All curb, gutter and sidewalks are to be shown and dimensioned on the plan portion of the drawings.
- A5.07 All sewers and culverts shall be shown and dimensioned on the plan and shall also be plotted on the profile of the drawings to true scale size. For all sewers and culverts, the type, size, slope, length, material and direction of flow shall be shown on both the plan and profile portion of all drawings.
- A5.08 All sewers 900 mm in diameter or larger shall be shown with two lines on the plan view of drawings.
- A5.09 All manholes shall be shown on the plan and profile portion of the drawings. The manholes shall be identified by number on the plan portion and by number, size, invert elevations and applicable Ontario Provincial Standard Drawing on the profile portion of the drawing. Sanitary manholes shall include the letter “A” after the number designation. Manholes that have safety platforms or drop connections shall be noted.
- A5.10 All non-standard manholes are to be detailed on the plan portion of the drawing at a scale of 1:50 and in relation to the north arrow.
- A5.11 All catchbasins and catchbasin connections shall be shown. All grate and invert elevations for rear lot catchbasins are to be shown. Concrete encasement shall be shown on all rear lot catchbasin leads.
- A5.12 When streets are of a length that requires more than one drawing, match lines are to be used with no overlapping of information.

SECTION A – GENERAL INFORMATION

- A5.13 The reference drawing numbers for all intersecting streets and match lines shall be shown on all Plan and Profile Drawings.
- A5.14 All watermains, hydrants, valves, etc., shall be described and dimensioned on the plan portion of the drawings. The watermain is to be plotted to true scale size on the profile portion of the drawing and shall be described.
- A5.15 The location of all storm, water and sanitary service connections shall be shown and dimensioned on the plan portion of the drawings.
- A5.16 The centreline of construction with 20.0 m stations shall be noted with a small cross on the plan portion of the drawings. Chainage shall generally start on the left side of the sheet and increase from left to right on all drawings. Existing and proposed centreline elevations shall be shown at 20.0 m intervals along the bottom of the profile.
- A5.17 The original ground at centreline and the proposed centreline road grade shall be plotted on the profile. The proposed profile shall be fully described (length, grade, V.P.I. elevations, vertical curve data, etc.) with all elevations shown to three decimal places. Chainage for the centreline of construction as well as the chainages for V.P.I., B.V.C., E.V.C. shall be noted on the profile portion of the drawings.
- A5.18 Details of the gutter grades for cul-de-sacs and crescents shall be provided on the plan portion as a separate detail at a scale of 1:200.
- A5.19 Chainage for the centreline of construction, including chainages for P.I., B.C., E.C. and horizontal curve data shall be shown on the profile portion of the drawings.
- A5.20 The proposed pavement structure design and dimensions shall be noted on the plan portion of the drawings.
- A5.21 All existing utilities and services shall be shown on the plan view of the drawings. Utility locates will be required to determine the extent and location of existing utilities. It may be necessary to dig test holes to determine the actual elevations of these services to avoid conflicts with new construction. These elevations shall be shown on the profile portion of the drawings.
- A5.22 Profiles of roadways shall be produced sufficiently beyond the limits of the proposed roads to confirm the feasibility of future extensions.
- A5.23 In addition to the above, the following details shall be shown on the plan portion of the drawings:
- the curb radii at all intersections
 - the location of all luminaire poles and transformers

SECTION A – GENERAL INFORMATION

- the location and type of all street name and traffic control signage
- any special notes

SECTION A – GENERAL INFORMATION

A6.00 Lot Grading Plans

- A6.01 All Lot Grading Plans shall be prepared in accordance with the criteria outlined in Section F of this document.
- A6.02 The information indicated on Town of Newmarket Standard Drawing NMSD-600.00 should be shown as a minimum.
- A6.03 The plans shall be prepared at a scale of 1:500.
- A6.04 The plans must show overall lot fabric with lot and block numbers, street names, right-of-way limits, road curb and gutters, catchbasins, sidewalks, all aboveground street furniture and driveway locations.
- A6.05 Road grades shall be shown at 20 m intervals and at all changes in grade. Directional arrows shall be provided indicating the overland flow route.
- A6.06 Existing grades along with proposed elevations at the lot corners shall be indicated along with elevations at any break points and swales.
- A6.07 Any lots requiring more than 1.2 m of fill shall be indicated with an asterisk (*) beside the lot number to show that either engineered fill or extended footings may be required.
- A6.08 The maximum building envelope shall be shown on all lots along with the house type and specified house grade.
- A6.09 Directional arrows shall be provided on all lots indicating the direction of flow and grade of flow in percent (%) along side lot lines and rear lot lines.
- A6.10 All existing trees are to be shown. All trees are to be clearly identified with appropriate shading as “to be preserved” or “to be removed”.
- A6.11 Any existing structures shall be shown with notes clearly identifying whether they are to be retained or demolished/decommissioned.

SECTION A – GENERAL INFORMATION

A7.00 Composite Utility Plans

- A7.01 A Composite Utility Plan (or Plans) is to be prepared in accordance with the criteria outlined in Section G of this document.
- A7.02 The plans shall be prepared at a scale of 1:500.
- A7.03 The plans must show overall lot fabric with lot and block numbers, municipal addresses, street names, right-of-way limits, road curb and gutters, catchbasins, sidewalks, street trees, all aboveground street furniture and driveway locations.
- A7.04 Typical road cross-sections must be included on the plans.
- A7.05 Table G-1 indicating Public Utility Clearance Requirements must be included on all plans.
- A7.06 The location of all utilities must be clearly shown (hydro, telecommunications, gas, cable, street lighting) along with Canada Post mailbox locations.
- A7.07 The location of all utility service locations to lots must be clearly identified along with storm, sanitary and water connections.
- A7.08 Details shall be included indicating location and spacing requirements of services for the various lot types in the development.
- A7.09 A signature block shall be included for each utility to sign indicating acceptance of the layout as shown.

SECTION A – GENERAL INFORMATION

A8.00 Other Drawings**A8.01 Traffic Management Plans**

Traffic Management Plans at a scale of 1:1000 are to be prepared indicating the location and details for all traffic control and information signage and line painting.

A8.02 Drainage Plans

All drainage plans for the storm and sanitary sewer design shall be prepared in accordance with the criteria provided in Sections C and E of this document.

A8.03 Erosion and Sedimentation Control Plans, Stormwater and Tree Protection Plans

Prior to any site disturbance taking place plans will be required indicating the measures that will be put in place to protect any trees to be preserved and to prevent the migration of any silts from the site. The plans shall clearly indicate the order in which all activities are to take place and shall show the location and details for all tree protection fences, silt control fences, earth or rock check dams, sediment ponds, mud mats and any other measures necessary to protect trees and control silts. Topsoil stockpile locations shall also be indicated on the drawings.

The Town's Site Alteration Bylaw 2016-58 should be reviewed for additional erosion and sediment control and stormwater management requirements.

A8.04 Detail Drawings

The Town of Newmarket Standard Drawings shall be used whenever applicable. In the absence of a Standard Drawing the latest revision of the Ontario Provincial Standard Drawings shall be used. Individual details shall be provided by the Developer's Consulting Engineer for all special features not covered by any of the above. All details shall be reproduced or drawn on standard size sheets and shall be included as part of the engineering drawings.

A8.05 Landscaping Drawings

Drawings indicating the location and species of street trees, stormwater management pond landscaping, park design and park and open space landscaping shall be prepared in accordance with the requirements of the Town's Landscape Architect.

All landscape drawings shall be prepared on standard 600 mm x 900 mm sheets. Final landscaping drawings shall be bound and included with the final engineering drawings in one package.

SECTION A – GENERAL INFORMATION

A9.00 Record Drawings & Asset Inventory**A9.01 General**

The Record Drawings constitute the original (design) engineering drawings which were accepted by the Town and which have been amended to incorporate the construction changes and variances in order to provide accurate information on the works as installed in the development. Submission of record drawing information shall be accompanied by revised design calculation sheets which confirm the capacity of the constructed condition of the sewers. Drawings shall be submitted during the maintenance period, prior to issuance of Final Acceptance. Record Drawings shall be prepared in accordance with PEO guidelines.

A9.02 Record Field Survey

The Record Drawing revisions shall be based on a final survey of all the subdivision services and the Developer's Consulting Engineer's construction records. The final survey shall include a final check of the following items:

- location of all manholes and roadway catchbasins, including invert elevations
- distances and pipe slopes between all manholes
- location, rim and invert elevations for all rear lot catchbasins
- location of all valve boxes and chambers and any other relevant watermain appurtenances
- road centreline elevations
- site benchmarks
- location of all service connections to all lots and blocks
- closed-circuit television (CCTV) inspection of all sewer lines including video record provided on DVD and printed report

A9.03 Materials

The Record Drawings must clearly label the installed material. Information for the following installations is required as a minimum:

- mainline storm, sanitary sewers including service tees
- sanitary and storm sewer laterals
- watermain

SECTION A – GENERAL INFORMATION

A9.04 Drawing Revisions

The original drawings shall be revised to incorporate all changes and variances found during the field survey and to provide ties and additional information to readily locate all underground services.

All sewer and road grades are to be recalculated to two decimal places to reflect the as-built condition.

All house numbers are to be indicated on the Record Drawings.

All street names, lot numbering and block identification(s) shall be checked against the Registered Plan and corrected as necessary.

The Record Drawing revision note(s) shall be placed on all drawings in the revision block and dated based on the date of the surveys.

The information on the Record Drawings may be checked by the Town at any time. If any discrepancies are found, then the drawings shall be returned to the Developer's Consulting Engineer for rechecking and further revision.

The Developer's Consulting Engineer shall be required to explain in writing any major difference between the design and the "as-constructed" data and to provide verification that the alteration(s) does not adversely affect the function of the subdivision services.

Tolerances

A maximum vertical plotting tolerance of 0.2 m on the 1:50 profile portion of the drawings and maximum horizontal plotting tolerance of 1.0 m on the 1:500 scale drawing shall be considered acceptable without replotting.

A9.05 Submission of Record Drawings

The submission of the Record Drawings in paper and electronic format must be completed before "Final Acceptance" of the subdivision will be granted by the Town.

A9.06 Asset Inventory List

Prior to final acceptance of the subdivision the Developer's Consulting Engineer will be required to submit to the Town a chart in Excel format summarizing the assets which the Town will be assuming as part of the subdivision. As a minimum the following items are to be included:

- total number of manholes including manufacturer name
- total number of road catchbasins including length and size of catchbasin leads including manufacturer name

SECTION A – GENERAL INFORMATION

- lengths of sewers including description of sewer type and material
- type and manufacturer name of manholes, valve chambers and catchbasin frame and covers
- length watermain including size, material, number and size of valves, valve chambers and fire hydrants including manufacturer name for each
- number and type of traffic signs
- number of street lights
- length of roads including description of width
- length of sidewalks including description of width
- number of street trees including description of species

The materials list should be provided on a street by street basis with subtotals for each street and totals for the entire subdivision.

SECTION A – GENERAL INFORMATION

A10.00 Survey Control Monuments

Prior to the assumption of the subdivision, the Owner's Surveyor shall establish a network of second order horizontal control monuments, as set out in "Ontario Specifications for Horizontal Control Surveys (OS 79)", as well as a network of vertical control benchmarks, as set out in "Ontario Specifications for Vertical Control Surveys (OS 79)".

The same monument may be used as both a horizontal and vertical control monument/benchmark.

The horizontal control monuments, and the vertical control benchmarks, shall be established at approved locations to the satisfaction of the Director of Engineering, using the following criteria:

- Two horizontal control monuments and two vertical control benchmarks for the first 10 ha (or less) subdivided by the plan, and one additional horizontal control monument and vertical control benchmark for every additional 10 ha (or less) subdivided by the plan.
- In addition, every existing horizontal control monument and vertical control benchmark destroyed during subdivision or site plan construction must be replaced.
- The new horizontal control monuments and vertical control benchmarks (including replacements) shall be installed by an Ontario Land Surveyor. A certificate by an Ontario Land Surveyor shall be provided stating that the horizontal control monuments and vertical control benchmarks were installed as set out by the "Ontario Specifications for Horizontal Control Surveys (OS 79)" and the "Ontario Specifications for Vertical Control Surveys (OS 79)" respectively, and confirmation from the Ministry of Natural Resources and Forestry (MNRF) that the horizontal control monuments and vertical control benchmarks have been accepted into their Cosine Database.
- The horizontal control monument shall be as per Town of Newmarket Standard Drawing NMSD-800.00. The location, description and pertinent information with respect to the monuments shall be indicated on all engineering drawings.

SECTION A – GENERAL INFORMATION

A11.00 Engineering Certifications

Prior to various milestones including, but not limited to, requests to commence the maintenance period for services and infrastructure and for assumption/final acceptance of infrastructure, certifications will be required by the Developer's Consulting Engineer. The wording of the certifications shall be as follows:

"I hereby certify that the Municipal and/or Private Infrastructure including all underground and above ground services, required by the Subdivision/Site Plan Agreement have been constructed in accordance with the accepted Engineering Drawings, Town Standards and sound engineering principles. I also certify that the construction and inspections were carried out under my supervision, or a competent representative on my behalf, during the construction of the underground and above ground services and all maintenance work has been carried out over the duration of maintenance period."



SECTION B

Transportation

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

SECTION B – TRANSPORTATION

SECTION B TRANSPORTATION

Table of Contents

B1.00	Classifications	B-1
B2.00	Supporting Traffic Studies	B-2
B3.00	Geometric Design Elements	B-3
B4.00	Design Elements	B-4
	B4.01 Horizontal Curves	B-4
	B4.02 Vertical Curves	B-4
	B4.03 Backfall at Intersecting Streets.....	B-4
	B4.04 Curb Return Radii at Intersections	B-4
	B4.05 Daylighting Requirements at Intersections	B-4
	B4.06 Cul-de-sacs	B-5
	B4.07 Temporary Turning Circles	B-5
	B4.08 Location of Utilities.....	B-5
	B4.09 Community Mailbox Requirements	B-6
B5.00	Traffic Controls	B-7
	B5.01 Signage	B-7
	B5.02 Street Name Signs.....	B-7
	B5.03 Traffic Control and Advisory Signage.....	B-8
	B5.04 Pavement Markings	B-8
B6.00	Pavement Design.....	B-10
B7.00	Construction Requirements.....	B-11
	B7.01 Road Sub-Drains	B-11
	B7.02 Placing of Final Surface Course Asphalt.....	B-11
	B7.03 Other Requirements	B-11
B8.00	Concrete Curb and Gutter	B-13
B9.00	Sidewalks	B-14
	B9.01 Walkways	B-14
B10.00	Driveways.....	B-15
	B10.01 Minimum Driveway Design	B-15
	B10.02 Driveway Grades	B-15
	B10.03 Driveway Depressions	B-15
B11.00	Boulevards	B-16

SECTION B – TRANSPORTATION

B1.00 Classifications

All roadways in new developments shall be classified according to Section 15.0 of the Town's current Official Plan which includes the following:

- Freeways
- Arterial Roads
- Primary Collector Roads
- Minor Collector Roads
- Local Roads

The proposed classification of all streets planned in new development areas shall be confirmed with the Town prior to the commencement of the design. Roadways within urban areas are to be designed and constructed to urban cross-sections. Roadways supporting industrial, commercial and institutional land uses are also to be built to urban design standards.

SECTION B – TRANSPORTATION

B2.00 Supporting Traffic Studies

Prior to or at the time of draft plan approval, the Town will require the proponent to prepare and submit supporting traffic studies, for the Town's approval. The first portion of the study consists of a broad-based external transportation and traffic study, which will examine the property boundary conditions and interconnections with adjacent properties (including signalization issues), assessed under existing and future conditions. The study must recommend the phasing of traffic signals and arterial road widenings to match development. The traffic study must conform to the Region of York Traffic Impact Study Guidelines if any of the boundary roads are Regional Roads.

The second portion of the analysis consists of an internal traffic study which balances appropriate urban design guidelines with a detailed assessment of internal transportation and traffic geometric design, on-street parking restrictions, off-street or driveway parking issues, signalization warrants, stop sign warrants, roadway capacity and classification, lane configurations, boulevard requirements (i.e., snow storage and utility corridors and buy-in from utilities), transit and pedestrian requirements, vehicle decision making criteria and intersection vehicle sight lines, medians and entrance features. The internal traffic study will address, to the satisfaction of the Town, the compatibility of the roadway function and the adjacent proposed land uses. Specifically, appropriate building forms are required adjacent to and in the vicinity of collector/collector road and collector/arterial road intersections. The traffic study will also verify that sufficient on-street and off-street parking can be provided without impacting driveways, safety and road operations. These two studies are generally subject to the Town's approval prior to acceptance of the proposed draft plan.

It should be noted that any stop sign warrant analyses are to be carried out in accordance with the Town's Policy for Stop Sign Warrants PWPOL17.

SECTION B – TRANSPORTATION

B3.00 Geometric Design Elements

Table B-1: Geometric Design Elements

Geometric Detail	Local	Minor Collector	Primary Collector
Road Allowance Width	18	21	26
Design Speed (km/hr)	50	50	60
Minimum Safe Stopping Distance (m)	65	65	85
Pavement Width (m) (curb to curb)	8.0	9.0	14.0
Maximum Grade (%)	6	6	6
Minimum Horizontal Radius (m)	N/A	130	190
Minimum Visibility Curves in Sag (K Values)	6	12	12
Minimum Visibility Curves on Crests (K Values)	7	15	25
Minimum Tangent Length between Horizontal Curves (m)	50	50	80
Pavement Crossfall (%)	2	2	2
Typical AADT	< 1500	1500-5000	3000-6000
Intersection Angle (degrees) (°) <i>A deviation of 7° may be permitted at the discretion of the Town's Director of Engineering Services to assist in aligning internal subdivision streets with the Regional Road grid.</i>	90	90	90
Minimum Tangent Length between Reverse Curves (m)	30	45	45

York Region may require greater road allowance requirements for the implementation of their policies (i.e., HOV lanes, bicycle lanes, or rapid transit).

Typical Sections for Local, Minor Collector and Primary Collector Roads are included in Town of Newmarket Standard Drawings NMSD-200.00 to NMSD-205.00.

SECTION B – TRANSPORTATION

B4.00 Design Elements**B4.01 Horizontal Curves**

Horizontal alignment is to conform to the requirements as outlined in Section B3.00.

“Eyebrows / wide elbows” or flared curb and/or street line radii will not be permitted at road bends.

B4.02 Vertical Curves

All points of grade change in excess of 1% over 15.0 m shall be designed with vertical curves as outlined in the current Ministry of Transportation of Ontario publications. The minimum visibility curves to be used are outlined in the geometric details for each roadway classification. The minimum tangent length of any road grade shall be 9.0 m.

B4.03 Backfall at Intersecting Streets

At all street intersections the normal crossfall of the major street shall not be interrupted by the crown line of the minor street. A 1% or 2% backfall shall be provided on the minor street at all street intersections. This backfall shall continue to the end of the curb return radii to facilitate proper drainage of the intersection. Overland flow routing of storm drainage through the intersection must be maintained for all storm events.

B4.04 Curb Return Radii at Intersections

The curb return radii for all local streets shall be **8.0 m**. Any other street intersections shall conform to the following dimensions:

Pavement Width Street A	Pavement Width Street B	Curb Return Radii
8.0 m	9.0 m	9.0 m
9.0 m	9.0 m	9.0 m
9.0 m	14.0 m	9.0 m
14.0 m	14.0 m	17.0 m

B4.05 Daylighting Requirements at Intersections

Daylighting at all intersection quadrants shall be included in the road allowances to provide for uniform boulevard widths. Such daylighting shall be included on the proposed plan for registration (M Plan) and on all engineering drawings. Daylighting shall conform to the following requirements:

SECTION B – TRANSPORTATION**Residential**

Local to Local	5 m x 5 m (or 5 m radius)
Local to Minor Collector	5 m x 5 m
Local to Primary Collector	8 m x 8 m
Minor Collector to Minor Collector	8 m x 8 m
Minor Collector to Primary Collector	8 m x 8 m
Primary Collector to Primary Collector	12 m x 12 m

Industrial, Commercial

Local to Minor Collector	5 m x 5 m
Local to Primary Collector	12 m x 12 m
Minor Collector to Minor Collector	8 m x 8 m
Minor Collector to Primary Collector	8 m x 8 m
Primary Collector to Primary Collector	12 m x 12 m

Sight Triangles for Town/Regional Road Intersections

Intersections of Town Roads and Regional Roads	15 m x 15 m
Intersections of Regional Roads with Regional Roads	30 m x 30 m

B4.06 Cul-de-sacs

Cul-de-sacs should be avoided wherever possible. When deemed appropriate they shall be constructed with a street line radius of 19.0 m and a curb face radius of 14.0 m as per Town of Newmarket Standard Drawing NMSD-206.00. Minimum gutter grades of 0.5% shall be maintained along the flow line of the gutters around the cul-de-sac.

The maximum permissible down gradient into a cul-de-sac is 4%.

B4.07 Temporary Turning Circles

Temporary turning circles will be considered whenever a road is to be continued in the future. Signage is to be erected at the terminus of the cul-de-sac indicating that the road will be extended in the future.

B4.08 Location of Utilities

The placement of utilities within the road allowance shall be in accordance with the Town of Newmarket Standard Road Cross-Sections Drawings NMSD-200.00 to NMSD-205.00. Composite Utility Drawings shall be submitted to the Town's Director of Engineering Services or Designate for approval of the proposed utility locations.

SECTION B – TRANSPORTATION

B4.09 Community Mailbox Requirements

Community mailboxes shall be placed in locations approved by the Town and Canada Post.

Community mailboxes shall have direct sidewalk access wherever practical. Prior approval from the Town will be required for any mailboxes proposed without a direct sidewalk connection.

SECTION B – TRANSPORTATION

B5.00 Traffic Controls

The proposed location and type of all street name signs, traffic control signs, signalization and pavement markings shall be shown on the Traffic Control Plan. The plan shall be prepared by a Professional Engineer skilled in municipal traffic design. All traffic control devices (warning and regulatory signs, street signs, parking restrictions, etc.) shall conform to the Ontario Manual of Uniform Traffic Control Devices (MUTCD).

B5.01 Signage

All regulatory signs must be installed at the completion of the base course asphalt and maintained by the Developer until “Final Acceptance” by the Town. All signs indicating parking restrictions are to be installed prior to the first occupancy in residential developments.

The Developer will be responsible for installing all street signs and maintaining all signs in the subdivision until assumption of the subdivision by the Town with the exception of street name signs. Temporary street name signs are to be installed by the Developer prior to the issuance of the first building permit in the subdivision. Prior to final assumption the Town will install all permanent street name signs. The cost for these signs will be paid by the Developer through the charges identified in the Subdivision Agreement.

B5.02 Street Name Signs**Location**

Street name signs shall be placed at each intersection and shall identify each street at the intersection. The location of the street name signs are shown on the Traffic Control Plan and shall be installed on same posts as stop signs.

Type

The street name sign blades shall be extruded aluminum having a minimum thickness of 2.3 mm, a height of 150 mm and a length of 610 to 915 mm.

Lettering for the street name shall be 100 mm in height. The initial letter of each name/word is to be upper case and all others lower case. Lettering shall be white on a reflective green background.

SECTION B – TRANSPORTATION

B5.03 Traffic Control and Advisory Signage**Location**

Traffic control and advisory signs shall be located in accordance with the Manual of Uniform Traffic Control Devices for Ontario (MUTCD) as published by the Ministry of Transportation of Ontario.

All roads under the jurisdiction of the Town shall be posted with a 40 km/hr maximum speed limit (or less based on site specific conditions).

All “No Parking” and “No Stopping” zones should be clearly identified with signs in accordance with the MUTCD.

For local roads parking is generally only permitted on one side of the street. No parking zones are typically established on the side of road where the sidewalk is located.

In school zones no parking is permitted on the side of the road where the school is located and no stopping is permitted on the opposite side of the street.

Although curve warning signs are not deemed necessary by OTM Book 6, they should be considered by the Traffic Engineer in instances where they may be warranted. Although not specifically indicated on the Traffic Management Plans the Town may require such signs to be installed at the expense of the Developer after the roads are opened to traffic if deemed necessary after observing the operation of the road.

All signs shall be mounted on 50 mm round galvanized posts 3.5 m in length, and embedded 1.25 m into concrete so as to prevent rotation of the posts. Signs are to be installed on street light posts where practical to minimize clutter in boulevards.

Type

Traffic control and advisory signs shall conform to the current revised standards of the MUTCD. All signs are to be of engineering grade reflective materials.

B5.04 Pavement Markings

Pavement Markings for traffic control shall be provided and conform to the current standards of the MUTCD. All markings are to be completed with approved traffic paint in accordance with OPS specifications. Thermalplastic paint shall be used on any road which intersects an Arterial Road at the intersection and back to a distance of 100 m from the Arterial Road.

Pavement markings shall be indicated on the plans for all stop bars, pedestrian crossing, centre and lane lines, as required or directed by the Town for all subdivision streets.

SECTION B – TRANSPORTATION

Painted stop bars are required at all four-way stops and at the intersection of any road with a road classified as a Minor Collector or higher order.

Solid lines may be required on roads with 90° bends or where deemed necessary to provide traffic calming. The requirement for these lines, if necessary, will be determined by the Town during the maintenance period for the subdivision. These lines unless deemed specifically required by the Traffic Engineer should not be indicated on the Traffic Control Plans.

SECTION B – TRANSPORTATION

B6.00 Pavement Design

The minimum pavement design for all streets in new subdivisions shall be as follows:

Local Road	Collector Road
40 mm HL3	40 mm HL3
50 mm HL8	80 mm HL8
150 mm Granular "A"	150 mm Granular "A"
300 mm Granular "B"	450 mm Granular "B"

To confirm the minimum pavement design, a qualified Soils Consultant shall be engaged by the Consultant to sample, test and design a suitable pavement section.

Copies of all test results and proposed road designs shall be submitted with the engineering drawings. In no case will a pavement design be less than the minimum as shown on the Town's standard drawing for the particular road classification to be considered acceptable.

Testing and approval of all granular materials at the designated pits prior to placement and subsequent in-situ verification tests shall be performed by the Developer's Geotechnical Consultant.

Prior to the placement of asphalt pavement, the Consulting Engineer must submit the asphalt pavement mix designs to the Town's Director of Engineering Services or Designate for approval.

SECTION B – TRANSPORTATION

B7.00 Construction Requirements**B7.01 Road Sub-Drains**

100 mm diameter perforated, filter cloth wrapped plastic corrugated sub-drains will be required to run continuously along both sides of all roads with curb and gutter. The sub-drains shall be trenched, have sand bedding and shall discharge into the side wall of road catchbasins. The filter cloth around the sub-drain shall be pulled inside of the catchbasin wall (to be visible from the surface) to ensure it is continuous along the sub-drain length with no breaks. The Town reserves the right to require video inspection of sub-drains. It will be the responsibility of the Developer to justify deviation from this standard by submitting a "Soil Drainage Report" from a recognized independent Soils Consultant. Sub-drains may be omitted if it can be shown that the subgrade is sufficiently permeable to ensure adequate drainage of the road base.

B7.02 Placing of Final Surface Course Asphalt

The placement of surface course asphalt shall not commence in any area until all of the following conditions are met:

- a) A minimum period of one year has expired from the completion date for the placement of the base course asphalt.
- b) 85% of the dwellings have received Final Occupancy Permits.
- c) All undeveloped lots are rough graded in accordance with the current and accepted lot grading plans.
- d) All service connections for multiple family commercial, institutional or other blocks are installed.
- e) The approval of the Town's Director of Engineering Services or Designate is obtained in writing.
- f) All deficiencies and settlements have been repaired.
- g) Favourable weather conditions are present, as defined by OPS specifications.

B7.03 Other Requirements

Whenever it is necessary to cut through an existing Town road external to the development, the Developer's Contractor will be responsible to obtain a permit from the Town's Public Works Department. The placement and compaction of the backfill material and the restoration of the surface pavement shall be done in accordance with the standards and specifications of the

SECTION B – TRANSPORTATION

Town. All road crossings shall be completed by tunneling unless explicitly approved otherwise. Any open road cut shall be backfilled with non-shrink concrete material.

Before making detours, permission is required from the Town's Public Works Department. Where the road is not part of the Town road system, approval from the appropriate road authority will also be necessary. In all cases, the Fire and Police Departments, Ambulance Service and School Bus Companies must be notified by the Developer or his Contractor, in writing. In addition, public notice signs are to be erected and notices (if deemed necessary by the Town) advising Residents of the disruption are to be delivered. All work is to be done in accordance with ordinances and by-laws of the Town of Newmarket.

SECTION B – TRANSPORTATION

B8.00 Concrete Curb and Gutter

Concrete curb and gutter conforming to OPSD 600.040 (for single stage) or OPSD 600.070 (for two stage) shall be used on all new urban subdivision roads. Concrete is to be minimum 32 MPa C-2 concrete with 7% +/- 1.5% air entrainment.

Driveway depressions shall be formed in the curb according to the detail and location as per OPSD 351.010. A mechanical curb cutting machine is not permitted to saw cut driveway depressions (unless specifically approved by the Town).

All curb and gutter is to be protected from damage from heavy equipment and vehicles.

SECTION B – TRANSPORTATION

B9.00 Sidewalks

The location requirements for sidewalks in new subdivisions shall be confirmed with the Town prior to commencing the detailed design. In general, sidewalks are required on both sides of all arterial and collector roadways and on one side of all local streets. Sidewalks are not required on a cul-de-sac with 22 units or less unless the cul-de-sac connects to a walkway, park, school or is deemed necessary by the Town. Sidewalks may be required on both sides of roadways for roads leading to high pedestrian traffic generators such as schools and commercial uses. Where possible, sidewalks shall be constructed on the north and west sides of the streets.

Sidewalks shall be installed at locations as shown on the Typical Road Cross-Sections. The width of sidewalks for all streets shall be a minimum 1.5 m and the depth shall be a minimum thickness of 125 mm.

Sidewalk construction shall comply with Town of Newmarket Standard Drawing NMSD-208.00 and NMSD-209.00.

At street intersections the curb and the sidewalk shall be depressed to meet the roadway elevations as per OPSD 310.030, NMSD 208.00 AND NMSD 209.00.

B9.01 Walkways

Walkways are to be constructed with concrete sidewalks on a compacted base, as per the standards for sidewalks and as shown on Town of Newmarket Standard Drawing NMSD-701.00.

In special cases where the major system (i.e., overland) stormwater flows are to be conveyed through walkways, a walkway with curbs shall be used. The hydraulic capacity of the walkway as noted in Section C, Figure C-2 is not to be exceeded.

SECTION B – TRANSPORTATION

B10.00 Driveways**B10.01 Minimum Driveway Design**

The minimum consolidated depth requirements for the granular base and asphalt in driveways shall be as follows:

- a) Single Family Residential
 - Asphalt 50 mm of HL3F asphalt
 - Granular 200 mm Granular “A”

- b) Commercial, Light Industrial and Apartments
 - Asphalt 40 mm HL3 surface course
50 mm HL8 base course
 - Granular 150 mm Granular “A”
225 mm Granular “B”

- c) Heavy Industrial Driveways
 - Asphalt 40 mm HL3 surface course
75 mm HL8 base course
 - Granular 150 mm Granular “A”
300 mm Granular “B”

B10.02 Driveway Grades

The maximum permissible design grade for any driveway on private lands shall be 6% (desirable), or 8% (maximum). The minimum grade for all driveways shall be 1%.

B10.03 Driveway Depressions

The minimum width of any driveway shall be 2.5 m with the maximum width governed by the Town’s Zoning By-law. Curb depressions shall extend 0.3 m beyond each side of the driveway.

SECTION B – TRANSPORTATION

B11.00 Boulevards

All boulevard areas are to be graded according to the details shown on the Town's standard drawings and to the satisfaction of the Town. The final grade of the sod shall match the finished grade of the top of the concrete curb and sidewalk.

All debris and construction materials shall be removed from the boulevard area upon completion of the base course asphalt and shall be maintained in a clean state until the roadway section is completed.

Clean, weed free topsoil shall be placed on all boulevard areas that are to be sodded. The minimum depth of topsoil shall be 150 mm.

No. 1 Nursery Sod shall be used for all areas that are to be sodded.



SECTION C

Storm Drainage and Stormwater Management

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT**SECTION C STORM DRAINAGE AND STORMWATER MANAGEMENT****Table of Contents**

C1.00	Storm Drainage Policies.....	C-1
	C1.01 Planning, Policies and Design Criteria	C-1
	C1.02 Rainfall Data	C-2
	C1.03 Hydrology and Hydrologic Modelling.....	C-3
	C1.04 Levels of Service	C-4
C2.00	Stormwater Management	C-6
	C2.01 Pond Safety Features	C-7
	C2.02 Operational and Maintenance Features	C-8
	C2.03 Operations and Maintenance Manual	C-8
	C2.04 Perpetual Maintenance Cost for SWM Facilities	C-9
C3.00	Stormwater Conveyance	C-10
	C3.01 General.....	C-10
	C3.02 Minor Drainage System Design	C-10
	C3.03 Major Drainage System Design	C-11
	C3.04 Foundation Drain Collector Systems.....	C-14
C4.00	Storm Sewer Design	C-15
	C4.01 Rational Method	C-15
	C4.02 Runoff Coefficients	C-15
	C4.03 Time of Concentration	C-16
	C4.04 Pipe Coefficients.....	C-16
	C4.05 Flow Velocities.....	C-17
	C4.06 Minimum Sizes	C-17
	C4.07 Minimum and Maximum Grades	C-17
	C4.08 Pipe Cover.....	C-17
	C4.09 Location.....	C-17
	C4.10 Limits.....	C-17
	C4.11 Sewer Alignment	C-17
	C4.12 Pipe Crossings	C-18
	C4.13 Changes in Pipe Size	C-18
	C4.14 Sewer Pipe Material.....	C-18
	C4.15 Pipe Bedding and Backfill	C-18
	C4.16 Service Connections.....	C-18
C5.00	Manholes.....	C-20
	C5.01 Location.....	C-20
	C5.02 Maximum Spacing of Manholes	C-20
	C5.03 Manhole Types	C-20
	C5.04 Manhole Design.....	C-20

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C5.05	Grades for Manhole Frames and Covers	C-21
C5.06	Head Losses through Manholes	C-22
C5.07	Radius Pipe	C-22
C6.00	Catchbasins	C-23
C6.01	Location and Spacing	C-23
C6.02	Catchbasin Capture	C-23
C6.03	Catchbasin Types	C-24
C6.04	Catchbasin Connections	C-24
C6.05	Catchbasin Frame and Covers	C-24
C7.00	Inlets, Outfalls and Special Structures	C-25
C7.01	Inlets	C-25
C7.02	Outlets	C-25
C7.03	Safety Railings	C-25
C8.00	Testing	C-26
C8.01	Deflection Testing	C-26
C8.02	Closed-Circuit Television Inspection	C-26
C9.00	Private On-Site Stormwater Management Facilities	C-28
C9.01	On-Site Stormwater Management Guidelines	C-29

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C1.00 Storm Drainage Policies

This section outlines the policies, design criteria and applicable parameters for the design and implementation of storm drainage facilities within the Town. These policies are to be adhered to in the production of all stormwater management (SWM) facilities, and Low Impact Development (LID) practices including sewers, surface drainage, related environmental facilities and water resources components. This is a comprehensive/living document to ensure sustainable development conditions. The Town has built in flexibilities in the document. Therefore, it is recommended that the proponent consult with staff prior to conducting analysis or design.

C1.01 Planning, Policies and Design Criteria

The most current version of the following Ministry of the Environment, Conservation and Parks (MECP), Lake Simcoe Region Conservation Authority (LSRCA) and Credit Valley Conservation/Toronto and Region Conservation Authority (CVC/TRCA) guidelines, policies and standards, apply to the design of storm drainage facilities in the Town of Newmarket:

- Environmental Compliance Approval for a Municipal Stormwater Management System (ECA) 124-S701
- MECP (MOE) Stormwater Management Planning and Design Manual
- LSRCA Watershed Development Policies and Guidelines
- LSRCA Technical Guidelines for Stormwater Management Submissions – these design guidelines are to be applied throughout the Town, in regulated and non-regulated areas
- Lake Simcoe Protection Plan
- South Georgian Bay Lake Simcoe Source Protection Plan
- CVC/TRCA - Low Impact Development Stormwater Management Planning and Design Guide
- Town of Newmarket Stormwater Management and Low Impact Development Policy
- existing Watershed or Subwatershed plans within the Town

Development proponents are also required to confirm design criteria and obtain approvals from any other relevant ministries or agencies (i.e., Ministry of Transportation, Ministry of Natural Resources and Forestry, Department of Fisheries and Oceans, etc.).

The design of storm drainage facilities is to use the principles of Better Site Design, including implementation of Low Impact Development Best Management Practices as described in the Town's Stormwater Management and Low Impact Development Policy document. An LID Treatment Train Tool (LID TTT) has been developed by LSRCA, CVC and TRCA to assist with design of LID measures and is available for download on the Sustainable Technologies Evaluation Program (STEP) website:

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

<https://sustainabletechnologies.ca/low-impact-development-treatment-train-tool/>

The planning and design of SWM facilities shall be discussed with the Town's Director of Engineering Services or Designate and the LSRCA early in the planning process and shall focus on minimizing the number of pond facilities and reducing flows into town infrastructure by using a treatment train and LID approach to stormwater management. Individual on-site SWM facilities are discouraged unless for industrial and commercial usage. Water quality and quantity control in new development areas are to be provided in Town-owned municipal blocks. In the case of infilling proposals, on-site SWM concepts may be considered by the Town in conjunction with any potential off-site storm drainage improvements. Off-site storm drainage will be determined during the pre-consultation process.

Where SWM ponds are proposed, the planning and design of each pond shall also focus on opportunities to integrate the pond with the surrounding topography and land uses. Ponds are to be created as public amenity features and are to be safe, significantly visible and accessible to the general public. Opportunities for linkages through the use of trails to larger open space, floodplain areas or other SWM facilities are to be maximized.

The planning and design of SWM works is to have full regard for riparian rights of both upstream and downstream Landowners and also the potential responses of the receiving waterbody. Any change in flow rates, or water levels that would occur as a result of the development, SWM drainage areas and/or in-stream works to neighbouring private properties must be adequately addressed. Written permission from affected Landowners must be sought in cases where acknowledged impacts are proposed and any governing legislation, in this regard, must be strictly followed.

If there is conflict between this Design Standards and Criteria document and the ECA, the more stringent requirement shall prevail.

C1.02 Rainfall Data

The Town previously adopted the City of Scarborough Intensity/Duration/Frequency (IDF) curves for the 1:5 to 1:100 year storms only. The 1:100 year storm IDF was based on data taken from Pearson Airport and is still considered to be appropriate for Newmarket.

The more frequent IDF curves were based on Yarnell and have lower intensities than what is considered to be realistic for this area. The Town will continue to use the 1:5 year storm Yarnell IDF curve of $I=2464(T+16)^{-1.0}$ but only for the initial sizing of the storm sewer system. This will minimize conflicts in sewer design when new systems drain into older sewers and will provide a consistent level of convenience within the Town.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

Rainfall IDF curves to be used are defined by the following equations:

Pond Maintenance Bypass	$I = 160 (T+4)-0.800$ mm/hr
1:2 year	$I = 648 (T+4)-0.784$ mm/hr
1:5 year	$I = 930 (T+4)-0.798$ mm/hr
1:10 year	$I = 1021 (T+3)-0.787$ mm/hr
1:25 year	$I = 1100 (T+2)-0.776$ mm/hr
1:50 year	$I = 1488 (T+3)-0.803$ mm/hr
1:100 year	$I = 1770 (T+4)-0.820$ mm/hr

C1.03 Hydrology and Hydrologic Modelling

The estimation of peak design flow rates can be done using the Modified Rational Method or computer model simulation. The Modified Rational Method is typically used to design storm sewers and estimate peak flow rates from small urban areas. Its application should be limited to scenarios where the time of concentration (t_c) is less than approximately 30 minutes.

The Modified Rational Method may be used to design detention storage for small sites, generally less than 5 ha. The following method is described in the Hydrology Handbook (1996). A trapezoidal hydrograph is obtained by setting rising and receding limbs equal to t_c . The volume of required detention storage is the area between the trapezoidal inflow hydrograph and the outflow hydrograph, the latter being the allowable controlled discharge. Storage volume is then computed as:

$$V_p = Q_p D - Q_o (D+t_c)/2$$

Where: D = Duration of rainfall (minutes)

Q_p = the runoff peak for that duration (m^3/s)

Q_o = the maximum allowable discharge from the area (m^3/s)

t_c = time of concentration (minutes)

Source: Hydrology Handbook (ASCE Manuals and Reports on Engineering Practice No. 28), Second Edition pp580-582, Copyright 1996, ISBN 0-7844-0138-1

The time of concentration (t_c) shall be determined as outlined in Section C4.03.

Computer analyses are best suited to large urban areas, rural areas and designing municipal SWM facilities.

The minimum and maximum duration of design storms are 4 hours and 24 hours respectively. Hyetographs of the design storms selected by the Town (distribution based on the Toronto-Pearson data and a 10 minute discretization) are provided in Appendix 3:

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

- 24 hour SCS (i.e., SWM facility design)
- 4 hour Chicago distribution (i.e., HGL analyses)
- 24 hour Chicago distribution (where requested) (i.e., SWM facility design)

Depending on magnitude of the specific project, the Town or LSRCA may request that other design storm lengths and distributions be used.

C1.04 Levels of Service

The level of service to be provided by the storm drainage system is listed in Table C-1 unless stipulated otherwise. The planning of access routes for emergency services (i.e., police, fire, ambulance) may result in higher levels of service as determined by the Town.

Table C-1: Levels of Service for Major and Minor Systems

Item	Level of Service	Comments
Storm Sewers	1:5 year storm (Yarnell)	<ul style="list-style-type: none"> • catchbasin density such that sewers capacity largely used during 1:5 year storm
Hydraulic Grade Line	1:100 year storm	<ul style="list-style-type: none"> • no closer than 0.5 m between 1:100 year storm hydraulic grade line and finished basement floor elevations
Major System	1:100 year storm	<ul style="list-style-type: none"> • large drainage areas may require classification as a floodplain using regulatory storm criteria (LSRCA) • overland flow cannot exceed width or flow capacity of right-of-way
Culverts	Per MTO Directive B-100	<ul style="list-style-type: none"> • refer to Table C-2
Stormwater Management	1:100 year storm	<ul style="list-style-type: none"> • unless otherwise directed by Town
Critical Infrastructure	Regional Storm or Greater	<ul style="list-style-type: none"> • very special cases to be specified at the discretion of the Town

Storm sewers are to be initially sized for the 1:5 year storm as per Table C-1. The Town of Newmarket Storm Sewer Design Sheet is included in Appendix 4. Subsequent hydraulic grade line (HGL) analyses and SWM may increase sewer sizes and/or require catchbasin inlet controls to be used.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

Table C-2: Level of Service for Bridges and Culverts (per MTO Directive B-100)

Road Classification	Up to 6 m Span	Over 6 m span
Urban Arterial Road	1:50 year	1:100 year
Rural Arterial Road Urban Collector Road	1:25 year	1:50 year
Local Road	1:10 year	1:25 year
Driveways	1:5 year	1:10 year

The Town may require higher levels of service in areas deemed critical to emergency services, such as near hospitals, etc.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C2.00 Stormwater Management

Stormwater management facilities are required to meet the applicable criteria in the Town's ECA 124-S701, as well as any additional SWM prerequisites as set out by MNRF, MECP or LSRCA. Post-development peak flow rates must not exceed pre-development rates for the 1:2 to 1:100 year design storm. Volume control is to be provided for major development, as described in the LSRCA SWM Guidelines. Additional controls may be required if there is not a sufficient outlet. Watershed boundaries and drainage patterns must be maintained.

SWM facility locations, functions and design criteria shall be confirmed through consultation with the Conservation Authority and the Town. Where Stormwater Master Plans have been completed, the design criteria shall follow the approved Master Plan. LID facilities are the preferred option for stormwater management, but not for sediment control. End-of-pipe facilities are acceptable to the Town when the designs are safe, maintainable, integrated with the surrounding landscape, and aesthetically pleasing.

The Town concedes the overall design requirements to the most recent provincial direction, as is acceptable to the LSRCA. Exceptions to this are in circumstances that involve:

- matters of public safety and aesthetics
- maintenance requirements
- protecting the riparian rights of private Landowners
- protection of municipal infrastructure
- conflicts with land use
- responses of the receiving water body

In these cases, the Town may invoke additional release rate stipulations and design requirements over and above those required by other agencies.

The Town requires integration of SWM pond grading design with the surrounding landscape. The design is to consist of varied contour grading to ensure public safety, provide improved aesthetics, support of a variety of plantings and vegetation and provide passive recreational activities (i.e., walking trails, bike paths, vistas, etc.). Safety aspects must be given special consideration. This includes identifying the use of gentle slopes in areas where passive recreation takes place, an increasing density of appropriate plantings and vegetation on steeper slopes, handrails/guardrails at headwalls and placing signs which inform of the function and potential hazards of SWM ponds. Retaining walls are not permitted in stormwater management blocks.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C2.01 Pond Safety Features

The Town prefers not to unnecessarily require fencing around pond blocks, but instead to allow for casual public access. Accordingly, public safety must be kept paramount in the design of SWM facilities.

The Town may elect to require fencing at the rear of lots backing onto SWM facilities. However, fencing around the perimeter of pond blocks will only be considered by the Town when reviewing submissions where there are extenuating circumstances which prevent the above requirements from being met. Specific approval will be required from the Town for consideration of fenced facilities. Where approval for fencing SWM ponds is given by the Town, 1.8 m high black vinyl-coated fencing, posts and hardware shall be used.

All ponds must be designed to meet the following minimum standards:

- Maximum permissible side slopes shall be 4:1.
3:1 side slopes will be considered above the 1:100 year water level only in situations with extenuating circumstances as determined by the Director of Engineering Services or Designate.
- Safety shelf required with a maximum 7:1 side slope at least 3.5 m either side of normal water level (NWL).
- Maximum normal water (permanent pool) depth of 2.5 m.
- Maximum water level fluctuation of 2.0 m (NWL to HWL).
- Minimum freeboard (HWL to grade) of 0.25 m, or 20% of maximum water fluctuation, if greater.
- Emergency overflow with spill capacity of 0.1 m³/s/ha of drainage area must be provided. Where public safety or severe property damage may be at risk arising from dam failure, the Town may ask for the emergency overflow to convey more than 0.1 m³/s/ha.
- Berms are to be designed as proper dams (clay core, toe drains, etc.).
- Signage to educate and advise public of facility must be erected (refer to Town of Newmarket Standard Drawing NMSD-101.00 for Town Standard Sign and the ECA).
- Suitable landscape plantings are required to discourage access, break accidental falls, and to provide for both aesthetics and environmental enhancement. Landscaping shall be in accordance with the requirements of the Town's Parks, Recreation and Culture Department.
- Bollards or gates to discourage vehicular access to maintenance road must be installed.
- Safety grates shall be provided on all storm sewer inlet and outlet pipes and safety railings shall be provided along the top of all headwalls 600 mm in height or greater.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C2.02 Operational and Maintenance Features

The SWM pond designs are to incorporate features that allow the Town to operate and maintain the facility. It is strongly recommended that the Design Engineer arrange a pre-consultation meeting with the Town's Director of Engineering Services or Designate once a preliminary pond design has been prepared in order to discuss maintenance operations and features, specifically clean-out procedures and sediment management and removal. These features include:

- Maintenance road to access bottom of sediment forebay and to access main inlet(s) and outlet(s) having a maximum gradient of 10%, minimum width of 3.0 m and minimum inside turning radius of 10.0 m to allow for maintenance vehicle access.
- Bypass sewer between inlet and outlet (refer to section C1.02 for sizing criteria).
- Perforated pipe leading to de-watering sump (refer to Town of Newmarket Detail Drawing NMSD-402.00, unless gravity outlet is available) for both the forebay and main cell.
- All maintenance vehicle access roads shall be structurally designed to support municipal equipment.
- Flow control structures shall be located for easy access, maintenance and cleaning. These must be protected from public access where safety is an issue and must blend readily into the landscape (avoid railings, etc.).
- Minimum orifice size of 75 mm diameter.
- A valve shall be provided as part of the normal pond outlet design to enable the normal pond outlet to be closed in case of chemical spills.

Refer to the Low Impact Development Stormwater Management Planning and Design Guide for LID operation and maintenance features.

C2.03 Operations and Maintenance Manual

A SWM Facility Operations and Maintenance Manual is to be prepared for the Town by proponents of new SWM facilities. The manual is to describe how each facility operates and the maintenance requirements of the facilities with regards to the requirements outlined in the ECA. The manual shall also include estimated yearly maintenance costs for the facilities along with supporting calculations. Any collection system SWM components, such as LID practices and oil and grit separators are to be included in the manual.

A list of typical items that should be included in the manual is as follows:

- Location
- Design Drawings
- Type of SWM Facilities

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

- Facility Specifics
 - How does the facility work (describe methodology of typical events)
 - Design Values for Facility (volumes, elevations, discharges, design event, over topping, etc.)
 - Detention Time/Draw Down Time
 - Reduced Scale Plan of Facility
 - Inspection (what to check, frequency)
 - Sediment (anticipated volume, frequency of removal, disposal, testing)
 - Maintenance (grass cutting, weed control, vegetation replanting, garbage removal, sediment removal, etc.)
 - Annual Cost Estimate for all Maintenance Activities based on actual costs in current dollars
 - Inspection schedule for the proposed pond
 - Copy of MECP Environmental Compliance Approval
 - Landscape plans

Additional items as per the MECP's latest Stormwater Management Planning and Design Manual and LID SWM Planning and Design Guide should also be included as deemed appropriate for the particular facility.

C2.04 Perpetual Maintenance Cost for SWM Facilities

The Developers of any SWM facilities, including LIDs will be required to post a perpetual maintenance fund for the ongoing maintenance of the facilities by the Town prior to the Town accepting any facility. The cost will be determined based on the annual maintenance costs identified in the Operations and Maintenance Manual.

The Developer will be responsible for providing a proposed maintenance schedule for approval of the Town and for maintaining the SWM facilities during the maintenance period.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C3.00 Stormwater Conveyance**C3.01 General**

Urban stormwater conveyance systems may include open channels and swales, storm sewers, manholes and catchbasins, foundation drainage collectors, roadways and road allowances. Conveyance systems should include features to reduce phosphorus and sediment transportation, and outlets should be designed to prevent further downstream erosion and ensure no impacts on streams. The design of stormwater conveyance systems shall follow “dual drainage” principles, which consist of:

- the minor drainage system which conveys runoff from the 1:5 year return period storm
- the major drainage system which conveys runoff from storms greater than the 1:5 year return period up to the 1:100 year storm

The design of the minor drainage system shall provide un-surcharged conditions up to the 1:5 year storm. The minor system design shall include capacity for connection of foundation drains or weeping tiles and the storm sewers shall be at an appropriate depth to provide connection to foundation drains. A hydraulic grade line analysis shall be completed and submitted for review. Sufficient inlet control devices at appropriate locations shall be determined by the Design Engineer to ensure that the minor system captures not more than its nominal capacity so that un-surcharged conditions are maintained in the minor system during the 1:5 year storm. During the major storm event it must be demonstrated that the hydraulic grade line for the 1:100 year storm will be at least 0.5 m below the finished basement floor elevations of the dwellings.

The design of the major system shall be such that runoff is conveyed within the boundaries of municipal road allowances, blocks or easements. A continuous overland flow route is to be identified on the Engineering Drainage Plans.

C3.02 Minor Drainage System Design

Storm sewers should be sized to convey the peak design flow in accordance with Manning’s equation, whereby the friction slope is assumed the same as the bed slope of the pipe. The sizing of sewers at slopes greater than the critical slope is limited by inlet capacity and not friction slope. Table C-3 lists the maximum allowable flow rate for each sewer size. The table also lists the maximum pipe slopes based on a full flow velocity of 4.0 m per second. The critical slope is based upon the pipe flowing 85% full.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT**Table C-3: Allowable Storm Sewer Capacities and Gradients**

Diameter (mm)	Q Maximum (m³/s)	Slope Minimum (%)	Slope Critical (%)	Slope Maximum (1%)
300	0.12	0.5	1.34	8.4
375	0.20	0.5	1.25	6.3
450	0.32	0.5	1.17	4.9
525	0.47	0.5	1.12	4.0
600	0.66	0.5	1.07	3.4
675	0.88	0.3	1.03	2.9
750	1.1	0.3	0.99	2.5
825	1.5	0.3	0.96	2.2
900	1.8	0.3	0.93	2.0
975	2.2	0.2	0.91	1.8
1,050	2.7	0.2	0.89	1.6
1,200	3.7	0.2	0.85	1.3
1,350	5.0	0.2	0.81	1.1
1,500	6.5	0.2	0.79	0.99
1,650	8.2	0.2	0.76	0.87
1,800	10	0.2	0.74	0.77
1,950	12	0.2	0.72	0.70
2,100	14	0.2	0.70	0.63
2,250	16	0.2	0.69	0.58
2,400	19	0.2	0.67	0.53
2,700	24	0.2	0.65	0.45
3,000	29	0.2	0.62	0.39

The Town may consider flatter grades for large sewers, in special circumstances, provided a minimum velocity of 1 m/s can be attained.

C3.03 Major Drainage System Design

A continuous overland flow drainage route is to be identified on the engineering drawings and grading plans. The extent of any overland ponding at low points is also to be shown on the grading plans. Any inlet grating associated with the major drainage system is to include a 50% blockage factor in its design.

Roadway Major System

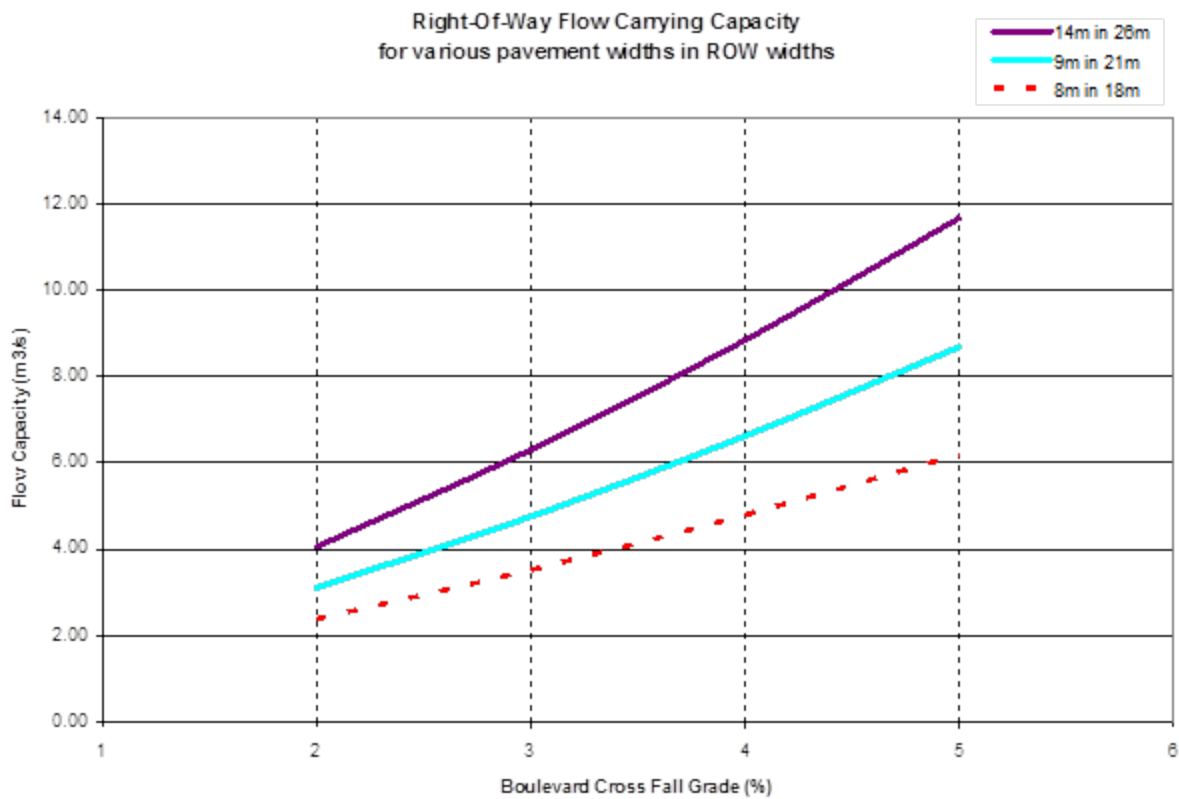
Generally, road rights-of-way vary in width from 18.0 m to 26.0 m and have a gradient in the range of 0.5% to 6%. The flow regimes at these gradients are typically supercritical, particularly at the higher flow rates. Accordingly, the flow capacity of the roadways, are dictated by the

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

energy to pass the design flow at critical depth. Critical depth is expected to occur at intersections and where the roadway changes direction. Figure C-1 provides the road allowance carrying capacity of overland flow for various pavement and road allowance widths. This figure shall be used to confirm the capacity of the overland conveyance system relative to the expected design flows.

The flow carrying capacity is predominately influenced by the boulevard cross slopes, whereby steeper boulevards provide for deeper flow. Designers should set the boulevard slopes accounting for the need to convey overland flow, but must have regard for other constraints which affect boulevard cross slopes (i.e., maximum permissible driveway grades).

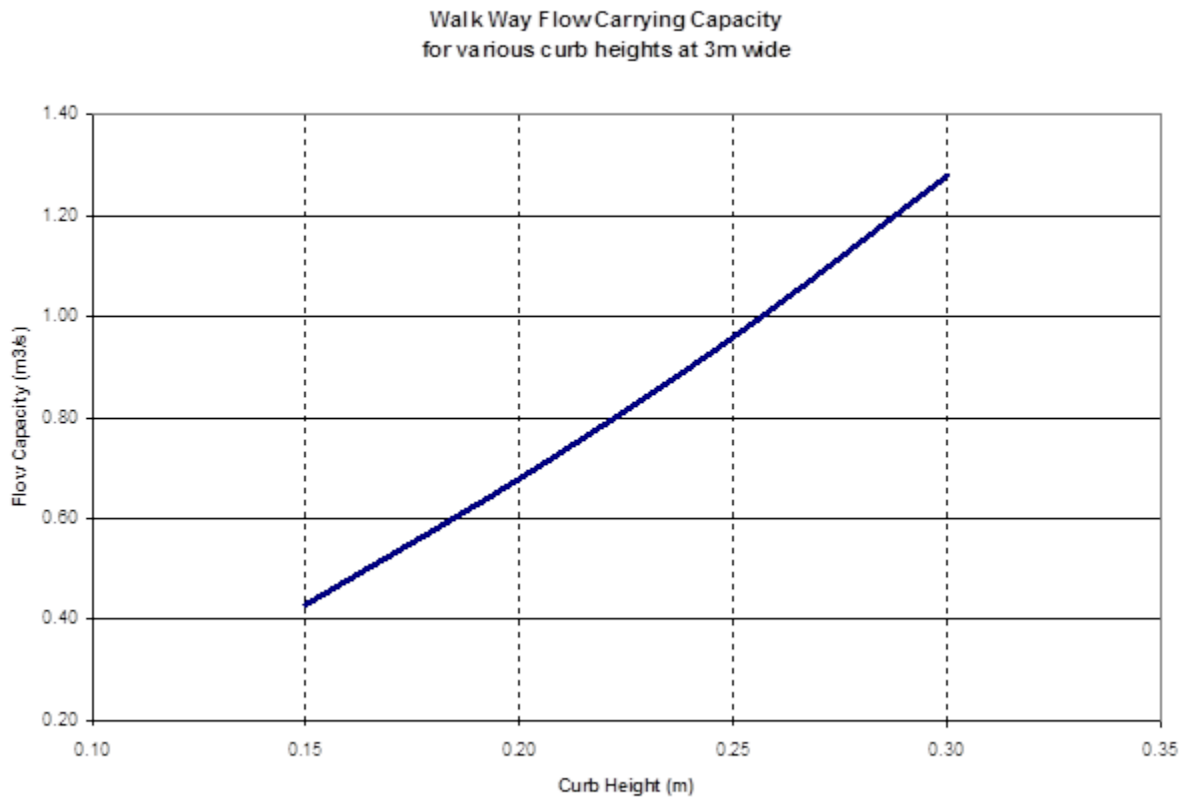
Figure C-1: Right-of-Way Flow Carrying Capacity for Various Pavement Widths in ROW Widths



Walkways are hydraulically similar to roadways, but rely on curb height instead of boulevard slope. Figure C-2 shows the flow capacity of a 3.0 m wide walkway for curb heights between 0.15 m and 0.30 m. Minimum and Maximum longitudinal walkway gradients are 0.5% and 6%, respectively.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

Figure C-2: Walk Way Flow Carrying Capacity for Various Curb Heights at 3 m Wide



Swales and Open Channels

Swales and open channels can play an important role in both the major overland flow systems and the minor systems. They are to be designed to be aesthetically pleasing, safe, resistant to erosion and easy to maintain. Critical depths and energy to determine channel capacity in the supercritical range are to be considered. Design velocities are to be calculated using Manning's equation.

The following table provides acceptable values for Manning's "n":

Grass Channel (>0.5 m deep)	0.025
Grass Swale (<0.5 m deep)	0.030
Rip-Rap Channel (>1 m deep)	0.035
Rip-Rap Channel (<1 m deep)	0.040

Generally, grassed surfaces are adequate for velocities up to 1.0 m/s to 1.5 m/s and more robust erosion protection is required for velocities beyond this range.

Fences, garden sheds and other flow impediments significantly reduce the flow carrying capacity of swales on private property. Overland flow from public property onto swales on

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

private property is not permitted. Overland flow must be limited to road rights-of-way, walkways and easements, free of fences and other impediments to flow.

Enhanced grassed swales should be implemented when feasible to provide stormwater quality improvements. Design features as noted in the MECP SWM Planning & Design Manual including wide, shallow geometry, and low flow velocities are to be utilized and supported with design calculations.

C3.04 Foundation Drain Collector Systems

In areas where it cannot be demonstrated that the hydraulic grade line for the 1:100 year storm will be at least 0.5 m below the finished basement floor elevations of the dwellings, a separate dedicated foundation drain collector sewer (FDC) will be constructed to carry flows from the weeping tile collector systems. The FDC will have a protected free outlet above the 1:100 year water elevation of the receiving water body or watercourse.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT**C4.00 Storm Sewer Design**

All storm drainage infrastructure, including sewers, manholes, catchbasins, etc., are to conform to the design standards outlined herein and MECP criteria. Should any Provincial standards (i.e., MECP) exceed the Town's standards, those standards shall dictate.

C4.01 Rational Method

The Rational Method is most appropriate when used to estimate peak flow rates from small urban areas. Its accuracy increases with imperviousness and decreases with the size of the drainage area. Its application should be limited to situations where the time of concentration is less than approximately 30 minutes.

C4.02 Runoff Coefficients

Table C-4 lists example Rational Method Runoff Coefficients as a function of the imperviousness of the catchment being considered. Composite runoff coefficients are to be calculated as a function of both total imperviousness and storm return period. The total imperviousness ratios listed in the table below are for example purposes only and Designers must calculate actual runoff coefficients on a site-specific basis for all designs.

Table C-4: Typical Runoff Coefficients and Initial Times of Concentration

	Return Period	1:5	1:25	1:100	Initial Tc (Minutes)
	C_{perv}	0.20	0.30	0.40	
	C_{imp}	0.90	0.95	1.00	
	Typical				
	Impervious	Composite "C"			
Parks	10%	0.27	0.37	0.46	14.0
Estate Res.	35%	0.45	0.53	0.61	9.5
Single Res.	55%	0.59	0.66	0.73	7.5
Semi-Det. Res.	65%	0.66	0.72	0.79	7.0
Townhouses	75%	0.73	0.79	0.85	6.5
Apartments	60%	0.62	0.69	0.76	7.0
School	60%	0.62	0.69	0.76	7.0
Church	70%	0.69	0.76	0.82	6.5
Industrial	80%	0.76	0.82	0.88	6.0
Commercial	90%	0.83	0.89	0.94	6.0

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C4.03 Time of Concentration

Times of concentration to be used with the Rational Method are to be calculated as the sum of the initial inlet time plus the on-site inlet travel time. The initial inlet time (from the most remote area of the building lot to the drainage inlet point within the lot) is listed in Table C-4. The inlet travel time (within the lot from its most upstream inlet point to where it enters the municipal system) is to be estimated as a function of the area.

The total time of concentration is calculated by adding the initial t_c listed in Table C-4 with 1 minute per each hectare of land draining to the most upstream manhole. For example, the time of concentration to the first section of municipal sewer draining 2 ha of commercial land is $6 + 2 = 8$ minutes.

Generally, the times of concentration at the most upstream end of the municipal drainage system (within municipal rights-of-way) range from approximately 7 to 10 minutes in residential areas and 4 to 10 minutes in commercial areas. Designs should not generally consider times of concentration less than 5 minutes, hence, the 5 minute rainfall intensities can be considered maximum design rates.

In situations where relatively large, undeveloped or parkland areas become tributary to a smaller urban drainage system, the lower time of concentration is to be used only where this results in higher flow rates. In these cases, only the lower portion of the undeveloped area would be contributing runoff, as a result of this shorter storm duration, proportional to the square root ratio of the two times of concentration. For example, an urban drainage system, having a time of concentration of 15 minutes, would also drain approximately 70% of a large undeveloped area, having a time of concentration of approximately 30 minutes, draining to that same point (i.e., $15/30^{1/2} = 0.7$).

C4.04 Pipe Coefficients

Manning's Formula shall be used in determining the capacity of all storm sewers, as outlined above.

The value of the roughness coefficient 'n' used in the Manning's Formula shall be as follows:

- Concrete pipe all sizes 0.013
- Concrete Box Culverts 0.015
- Corrugated Steel (culverts only) 0.024
- Polyvinyl Chloride Pipe (PVC) 0.013
- High Density Polyethylene (smooth inside wall) 0.013

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C4.05 Flow Velocities

- Minimum flow velocity = 0.8 m/sec
- Maximum full flow velocity = 4.0 m/sec

C4.06 Minimum Sizes

The minimum size for a storm sewer main shall be 300 mm in diameter.

C4.07 Minimum and Maximum Grades

The minimum and maximum grades for all storm sewers shall be in accordance with Table C-3. The minimum grade for the first upstream leg shall not be less than 1.0%.

C4.08 Pipe Cover

Typically, a minimum cover of 2.7 m (from future road grade) is required to the top outside edge of the pipe barrel for the storm sewer. However, where specifically approved by the Town, minimum frost cover may be provided on storm sewers where servicing limitations exist, or where FDCs are used.

Where sewer depths exceed 4.5 m, risers are to be utilized and brought to within 2.7 m depth. The maximum allowable depth of sewer with direct lateral connections is 6.0 m measured from centerline of road to the obvert of the sewer. Any sewer deeper than 6.0 m will be considered a trunk sewer and a separate shallower local sewer will be required for service connections. The local sewer shall be constructed directly above the trunk sewer and common manholes with drop structures shall be utilized.

C4.09 Location

All storm sewers shall be located as shown on the Standard Road Cross-Section. The standard location shall be 1.0 m offset from the centerline of the road allowance.

C4.10 Limits

All sewers shall be terminated at the subdivision limits when external drainage areas are considered in the design with suitable provision in the design of the terminal manholes to allow for the future extension of the sewer.

C4.11 Sewer Alignment

All storm sewers shall be laid in a straight line between manholes unless radial pipe has been designed. The minimum diameter for radial pipes shall be 675 mm.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C4.12 Pipe Crossings

A minimum clearance of 0.25 m shall be provided between the outside of the pipe barrel at the point of crossing for storm and sanitary sewers. A minimum outside clearance of 0.5 m shall be provided for all sewer and watermain crossings in accordance with MECP policies.

In the event the minimum clearances cannot be obtained, the designs must adhere to MECP policies. In addition, the pipes shall be concrete encased to ensure that the pipes are properly bedded.

C4.13 Changes in Pipe Size

No decrease of pipe size from a larger upstream pipe to a smaller downstream size will be allowed regardless of the increase in grade.

C4.14 Sewer Pipe Material

All sewer pipe material shall conform to the List of Acceptable Materials included in Appendix 2 of this document.

C4.15 Pipe Bedding and Backfill

The class of pipe and the type of bedding shall be selected to suit loading and proposed construction conditions. Details and types of bedding and backfill are illustrated in OPSD 802.010 and 802.030. The width of the trench at the top of the pipe must be carefully controlled to ensure that the maximum trench width is not exceeded unless a higher class of bedding or higher pipe strength pipe is used. The recommendations of a Geotechnical Engineer will be required in determining strength of pipe required and construction methods to be used.

C4.16 Service Connections

Storm service connections are to be provided to all lots for the purpose of connecting foundation drain collectors. All storm services shall be double services, where possible, with a 150 x 125 x 125 Wye connection near the common property line. Double connections are not permitted where the difference in house elevations exceeds 0.9 m.

Service pipe material shall conform to the List of Acceptable Materials included in Appendix 2 of this document.

The use of sump pumps is discouraged, but will be considered by the Town if they are deemed to be the only viable option available. (Roof leaders shall be directed overland.) The storm sewer system shall be designed such that the 1:100 year storm does not surcharge the sewers

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

or create backwater effects that could surcharge the weeper tiles within 0.5 m of the finished basement level.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C5.00 Manholes**C5.01 Location**

Manholes shall be located at each change in alignment, grade or pipe material, at all pipe junctions and at intervals along the pipe to permit entry for maintenance of the sewer.

C5.02 Maximum Spacing of Manholes

Pipe Size	Maximum Spacing
300 mm to 750 mm	150 m
825 mm to 1200 mm	150 m
1350 mm to 1800 mm	240 m
over 1800 mm	240 m

C5.03 Manhole Types

Manholes shall be constructed of pre-cast concrete. The standard manhole details as shown on the OPS Drawings shall be used for manholes. In cases where the standard drawings are not applicable, the manholes shall be individually designed and detailed.

Manhole covers shall be the “open” type per OPSD 401.010.

A reference shall be made on all Profile Drawings to the OPSD type and size of all storm manholes.

Precast manholes shall conform to ASTM Specification C478 latest revision.

C5.04 Manhole Design

- a) All manhole chamber openings shall be located on the side of the manhole parallel to the flow for straight run manholes, or on the upstream side of the manhole at all junctions.
- b) The manhole shall be centred on the sewer main.
- c) The maximum change in the direction of flow in any sewer manhole shall be no more than 90°. A change of flow direction at acute interior angles will not be permitted.
- d) Drop structures shall be used when invert levels of inlet and outlet sewers differ by 0.9 m or more. Wherever feasible, sewer systems should be designed to avoid the use of drop structures. Internal drop structures are discouraged and will only be permitted in instances with extenuating circumstances provided approval is obtained by the Director

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

of Engineering Services or Designate. Precast drop structures are permitted. All drop structures shall be constructed in accordance with OPSD 1003.020.

- e) All manholes shall be benched as detailed in the OPS Drawings.
- f) Safety gratings shall be required in all manholes greater than 5.0 m in depth. Safety gratings shall not be more than 5.0 m apart and shall be constructed in accordance with the OPSD details. Where practical, a safety grating shall be located 0.5 m below the drop structure inlet pipe.
- g) Manholes should be used at all changes in horizontal alignment in the 300 mm to 675 mm diameter range.
- h) Manholes should be used at all changes in grade.
- i) Manholes should be used at all changes in pipe sizes except for special designs in large size pipe.
- j) The use of prefabricated Wyes is recommended for junctions in storm sewers under the following conditions:
 - i) Main pipe must be 900 mm in diameter or larger. (If less than 900 mm in diameter a manhole is required for the junction.)

Diameter of Branch Pipe	Maximum Distance from Point of Junction to First Manhole Upstream on Branch Pipe
Less than 750 mm dia.	15 m
750 mm to 1350 mm dia.	120 m
Larger than 1350 mm dia.	180 m

- ii) Galvanized steel safety chains and fittings are to be provided on the downstream side of a manhole where the outlet pipe is 1200 mm diameter or greater. The chains shall be attached to the face of the manhole at the 10:00 and 2:00 positions on either side of the outlet pipe. Refer to Town of Newmarket Standard Drawing NMSD-403.00.

C5.05 Grades for Manhole Frames and Covers

All manholes located within the travelled portion of a roadway shall have the rim elevation set flush to the base course of asphalt. Prior to the placement of the surface course asphalt the manhole frame shall be adjusted to the finished grade of asphalt. Steel adjusting rings will not be permitted. The concreting and setting of the frame and cover shall be in accordance with

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

Town of Newmarket Standard Drawing NMSD-210.00. Temporary asphalt curbs shall be constructed behind all catchbasins at base course asphalt stage.

C5.06 Head Losses through Manholes

Suitable drops shall be provided across all manholes to compensate for the loss of energy due to the change in flow velocity and for the difference in the depth of flow in the sewers. Hydraulic calculations are required where the change in velocity through a manhole is 0.6 m/s or greater.

The minimum drops across manholes shall be as follows:

Change of Direction	Minimum Drop
Straight Run	0.030 m
1 to 45°	0.050 m
46 to 90°	0.080 m

C5.07 Radius Pipe

- No radial pipe will be allowed for pipe having a diameter of less than 675 mm.
- No wedge pipe will be permitted in any case.
- Minimum radii for radial pipe:

Diameter	Radius
675 mm	14 m
750 mm	14 m
825 mm	14 m
900 mm	15 m
975 mm	15 m
1050 mm	17 m
1200 mm	18 m
1350 mm	20 m
1500 mm	21 m

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C6.00 Catchbasins**C6.01 Location and Spacing**

The maximum allowable drainage path to a catchbasin is as follows:

Pavement Width	Maximum Spacing
8.5 m	90 m
9.7 m	80 m
12.8 m	65 m
15.0 m	60 m

- Where the road grade exceeds 5%, the maximum spacing is to be reduced to 75% of the above distances. The minimum catchbasin density which must be provided is to be 6 catchbasins per impervious hectare or area.
- A double catchbasin is required where drainage is received from more than one direction, as at a low point, unless overland relief is provided no more than 0.05 m above the catchbasin frame.
- All catchbasins at street intersections shall be located on the tangent section of the curb at a minimum of 0.6 m distant from the beginning or the end of the radial portion of the curb.
- Catchbasins shall not be located in driveway curb depressions.
- Leads for catchbasins located close to manholes should be connected directly to the manholes.
- Catchbasin leads shall be 250 mm diameter for single catchbasins and 300 mm diameter for double catchbasins.
- Catchbasin leads shall have a minimum grade of 1%.
- Catchbasin inlet control devices are to be PVC with “diamond” orifices and bolted to the catchbasin side as per Town of Newmarket Standard Drawing NMSD-401.00.

C6.02 Catchbasin Capture

- Calculations to estimate the catchbasin capture to the sewer system are to consider the type of grate, whether the catchbasin is in a “sag”, the catchbasin lead diameter and any inlet control device.
- Double catchbasins are required at all sags, unless there is a nearby point of relief, no greater than 0.05 m higher than the grate. Capture rates are to consider the depth of flow over the grate based on the depth of flow over the downstream point of relief.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

- Any inlet grate associated with the major drainage system is to include a 50% blockage factor in its design.

C6.03 Catchbasin Types

- Catchbasins must be of the precast type as shown on the OPSD 705.010 or 705.020.
- Special catchbasins and inlet structures shall be fully designed and detailed by the Consulting Engineer.

C6.04 Catchbasin Connections

Type	Minimum Size of Connection	Minimum Grade of Connection
Single Catchbasin	250 mm	1%
Double Catchbasin	300 mm	1%
Rear Lot Catchbasin	* 250 mm	1%

* All rear lot catchbasin leads shall be encased in concrete from the catchbasin to the street line as outlined in Section H1.03.

C6.05 Catchbasin Frame and Covers

- All catchbasin frame and covers located in roadways shall be “bike proof”.
- Rear lot catchbasin frame and covers shall be as per Town of Newmarket Standard Drawing NMSD-400.00.
- The use of riveted bar grates and heavy honeycomb grates in roadways will only be considered in special circumstances at the discretion of the Town’s Director of Engineering Services or Designate. These must be bicycle safe and able to withstand traffic loads.
- Side inlets (OPSD 400.080) and curb inlets (OPSD 400.090) may be considered where significant flow is to be captured.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C7.00 Inlets, Outfalls and Special Structures**C7.01 Inlets**

Inlet structures must be fully designed and detailed on the engineering drawings. Inlet grates shall generally consist of inclined parallel bars or rods set in a plane at approximately 18° with the top away from the flow.

Gabions, rip rap or concrete shall be provided at all inlets to protect against erosion and to channel flow to the inlet structure.

Precaution must be taken in the design of grating for structures to minimize the risk of entanglement or entrapment of a person.

C7.02 Outlets

The OPSD 804.030 standard headwall shall be used for all storm sewers less than 900 mm in diameter. The OPSD 804.040 standard headwall shall be used for all storm sewers 900 mm in diameter and larger. All headwalls shall be equipped with a grating over the outlet as per OPSD 804.050.

Gabions, rip rap, concrete or other erosion protection shall be provided at all outlets to prevent erosion of the watercourse and the area adjacent to the headwall.

C7.03 Safety Railings

Safety railings shall be provided along the top of all headwalls 1.0 m in height or greater. Railings may also be required along shorter headwalls where a risk to pedestrian safety has been identified. The site specific conditions must be reviewed in determining the requirement for safety railings and must have due regard to public health and safety.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C8.00 Testing**C8.01 Deflection Testing**

A deflection test shall be performed on all sewers constructed using PVC material. A suitably designed device as defined below shall be pulled through the sewer to demonstrate that the pipe deflection is within acceptable tolerances. The maximum deflection, measured not earlier than 30 days after completion of backfilling and installation of service connections, shall not exceed 5.5% of the internal diameter of the pipe.

The suitably designed device shall be a mandrel, cylindrical in shape, and constructed with an odd number of evenly spaced arms or prongs (minimum nine in number). The minimum diameter of the circle scribed around the outside of mandrel arms shall be equal to the allowable deflected pipe diameter – 1 mm. The contact length (L) of the mandrel shall be measured between points of contact on the mandrel arm or between sets of prongs. This length shall not be less than that shown on the following table:

Nominal Pipe Size (mm)	Contact Length (L)
150	100
200	150
250	200
300	250
375	300
450	350
525	450
600	500

The mandrel shall be checked with a go-no-go proving ring. The proving ring shall have a diameter equal to the computed deflected diameter +/- 1 mm. An acceptable mandrel shall not pass through the proving ring. The proving ring shall be fabricated from 6 mm minimum thick steel.

Any section of pipe that does not allow the mandrel to pass shall be considered to have failed the deflection test.

All sections of pipe that fail the deflection test shall be repaired and retested.

C8.02 Closed-Circuit Television Inspection

All newly constructed storm sewers and rear lot catchbasin leads shall be CCTV inspected upon satisfactory completion of all other testing. The sewers and leads must be CCTV inspected prior to the sewers being considered to be placed on maintenance and again prior to being

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

considered for Final Acceptance. CCTV inspections are to be carried out no more than 90 days prior to the request for Final Acceptance.

The Town will require written confirmation from the Developer's Consulting Engineer that they have reviewed the videos and have found the sewers to be acceptable and free of all defects. Any deficiencies should be clearly identified in the Engineer's letter and verification that all deficiencies have been rectified must be included in the letter.

A permanent record in DVD video form shall be supplied, illustrating a continuous record of the sewer installations, service connection, manholes, etc. A report identifying any unusual or substandard conditions shall also be submitted.

The CCTV inspection shall be carried out by an Operator certified by NAAPI and shall be carried out in accordance with OPSS 409.

All DVD's, reports and data provided from these inspections shall become the property of the Town.

At the discretion of the Director of Engineering Services or Designate, additional inspections and records may be required prior to "Final Acceptance".

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

C9.00 Private On-Site Stormwater Management Facilities

The Town endorses the practice of SWM on private property, but cannot accept any assurance that these practices will be properly operated and maintained by the private Landowners. This is particularly applicable to on-site stormwater detention for the purposes of peak flow reduction or water quality improvement. Under specific conditions, on-site SWM can be recognized when sizing downstream works.

For private, on-site stormwater detention, the following conditions apply:

- a) "Peak Shaving" detention using LID practices, on parking lots or within landscaped ponds:
 - i) unacceptable on residential lots
 - ii) cannot reduce downstream detention requirements
 - iii) can reduce municipal sewer sizes, but only where restricted by small diameter pipe between mainline sewer and a control manhole at property line
 - iv) must consider lot level controls and infiltration

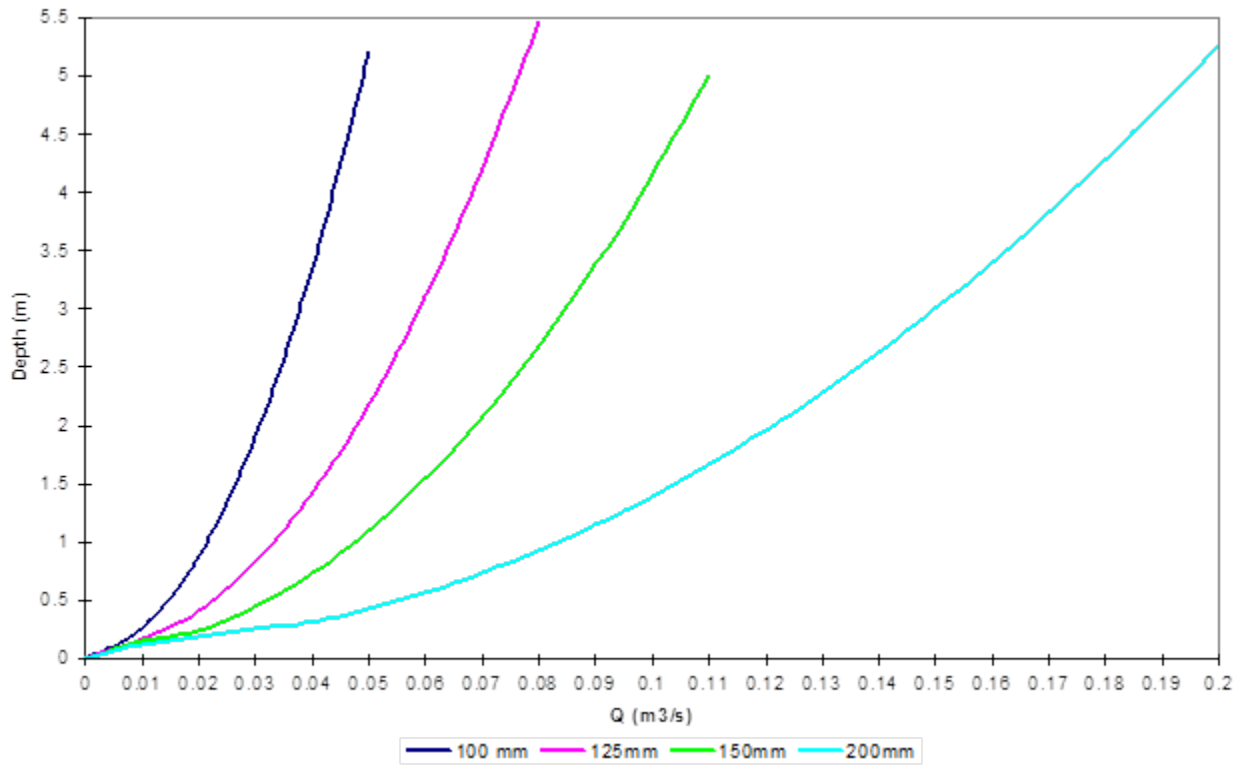
- b) "Roof Top Detention" in non-residential areas:
 - i) can reduce downstream detention requirements
 - ii) can reduce municipal sewer sizes, but only where restricted by small diameter pipe between mainline sewer and a control manhole at property line
 - iii) for hydrologic calculation purposes at master planning stage, assumed flat roof area limited to maximum 15% of gross area of subdivision

Figure C-3 shows examples of small diameter sewer versus energy under inlet control. Note the smallest acceptable restriction sewer is 100 mm diameter.

Designers should account for the hydraulic losses of the small diameter outlet sewer when sizing any other on-site control devices, such as orifices controlling parking lot detention.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

Figure C-3: Inlet Energy vs Flow Rate (100 mm to 200 mm Diameter)



C9.01 On-Site Stormwater Management Guidelines

Drainage from private property, with the exception of low/medium density residential sites, is to be self-contained (minor system) and provide the same levels of service as with municipal infrastructure.

LID facilities are to be incorporated and designed following the CVC/TRCA Low Impact Development Stormwater Management Planning and Design Guide.

Parking lot detention should have regard for frequency, depth and duration of ponding. Generally, ponding depths should not exceed 0.15 m (0.25 m in truck lanes) at the deepest point and should not occur more frequently than a few times per year. Maximum parking lot drain-down time should be 60 minutes after a 1:100 year storm. Where depths, frequency or drain-down times do not meet the above guidelines, consideration should be given to using grassed/landscaped areas for the deeper, more frequent ponding and the parking lots for only the upper registers of ponding.

Underground storage facilities should allow for proper ventilation and maintenance access. As with any buried infrastructure on private property, these facilities must meet the Plumbing Code.

SECTION C – STORM DRAINAGE AND STORMWATER MANAGEMENT

Rooftop detention release rates are typically 42 L/s/ha, on average, and Site Plan Applications should include information on number and type of roof drain restrictions in support of the Stormwater Management Report.

In the case of plans of non-residential subdivisions, the Storm Drainage Area Drawings are to show a table having the following peak design flow rates, labeled accordingly, for each block of land:

- 1:5 year storm flow (m^3/s)
- 1:100 year storm flow (m^3/s)
- permitted discharge to storm sewer (m^3/s)
- maximum allowable discharge from Block (m^3/s)



SECTION D

Watermains and Appurtenances

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

SECTION D – WATERMAINS AND APPURTENANCES

SECTION D WATERMAINS AND APPURTENANCES

Table of Contents

D1.00	Hydraulic Design	D-1
	D1.01 General.....	D-1
	D1.02 Fire Flow.....	D-1
	D1.03 System Pressures.....	D-1
	D1.04 Flow Design.....	D-1
	D1.05 Domestic Demand	D-2
	D1.06 Industrial, Commercial and Institutional (ICI) Water Demands	D-3
	D1.07 Locations	D-3
	D1.08 Depth of Cover	D-3
	D1.09 Horizontal Separation between Sewers and Watermains.....	D-3
	D1.10 Watermain Crossing Sewers	D-3
	D1.11 Dead-Ends	D-3
	D1.12 Location Identification	D-4
	D1.13 Joint Restraint.....	D-4
D2.00	Valve Requirements.....	D-5
	D2.01 Type	D-5
	D2.02 Size	D-5
	D2.03 Number, Location and Spacing.....	D-5
	D2.04 Valve Boxes and Chambers	D-5
D3.00	Fire Hydrant Requirements	D-7
	D3.01 Type	D-7
	D3.02 Spacing	D-7
	D3.03 Branch Valves and Boxes.....	D-7
	D3.04 Location of Hydrants.....	D-7
	D3.05 Bedding Requirements	D-7
	D3.06 Hydrant Flow Testing.....	D-8
	D3.07 Colour.....	D-8
D4.00	Service Connections	D-9
	D4.01 General.....	D-9
	D4.02 Material.....	D-9
	D4.03 Minimum Size	D-9
	D4.04 Location.....	D-9
	D4.05 Connections to Supply Main	D-9
	D4.06 Curb Stops and Control Valves.....	D-9
D5.00	Materials	D-11
	D5.01 Watermain Material.....	D-11
	D5.02 Water Meters.....	D-11

SECTION D – WATERMAINS AND APPURTENANCES

D6.00 Corrosion ProtectionD-12
D7.00 Testing RequirementsD-13

SECTION D – WATERMAINS AND APPURTENANCES

D1.00 Hydraulic Design**D1.01 General**

All watermains shall be sized to meet the greater of the maximum day plus fire flow or the maximum hour demand. Watermains in subdivisions shall have a minimum of two connections to the existing water network. The Town will require a computer analysis for all or any phased portion of the proposed watermain systems. Boundary conditions for modeling purposes shall be obtained from the Town or by carrying out on-site hydrant flow tests in consultation with the Town.

D1.02 Fire Flow

In general, the minimum fire flow requirement for a particular structure or area of the municipality shall be:

Detached and Semi-Detached Dwellings	7,000 L/min (117 L/sec)
Townhouses	10,000 L/min (167 L/sec)
Apartments	15,000 L/min (250 L/sec)
Industrial/Commercial	15,900 L/min (265 L/sec)

For developments not covered by the above, a calculation as outlined in “Water Supply for Fire Protection - A Guide to Recommended Practice” prepared by the Fire Underwriters Survey of the Insurance Bureau of Canada, or, per AWWA Manual M31 - Distribution System Requirements for Fire Protection, shall be provided.

D1.03 System Pressures

The maximum sustained operating pressure shall not exceed 550 kPa (80 psi). If pressure in a localized area is above this level, a pressure reducing valve shall be installed on each service downstream of the water meter within that area.

Under normal conditions of maximum hour demand, the pressure shall not drop below 350 kPa (50 psi) at any point in the water system.

Under conditions of simultaneous maximum day and fire flow demands, the pressure shall not drop below 140 kPa (20 psi) at any point in the water system.

D1.04 Flow Design

The Hazen-Williams Formula in accordance with the current MECP design criteria shall be used for the design of water distribution systems.

SECTION D – WATERMAINS AND APPURTENANCES

The Hazen-Williams equation is as follows:

$$HL = \frac{C_f L Q^{1.852}}{C^{1.852} D^{4.87}}$$

Where,

HL = headloss due to friction (m or ft)

C_f = unit conversion factor (4.73 for Imperial, 10.7 for Metric)

L = watermain length (m or ft)

D = diameter (m or ft)

Q = watermain flow (m³/s or cfs)

C = Hazen-Williams Factor

C = 100 for 150 mm watermain and smaller

C = 110 for 200 mm and 250 mm watermain

C = 120 for 300 mm watermain and bigger

D1.05 Domestic Demand

Domestic water demand shall be calculated on the basis of an average day consumption rate of 300 L/capita/day, or as directed by the Town.

Maximum Day and Peak Hour factors shall be 2.0 and 3.0 respectively, or as recommended by the MECP.

The following densities should be used for determining expected populations in residential developments:

Single Detached Dwellings	3.38 ppu
Semi-Detached Dwellings	3.04 ppu
Townhouses	2.88 ppu
Apartments	1.95 ppu

SECTION D – WATERMAINS AND APPURTENANCES

D1.06 Industrial, Commercial and Institutional (ICI) Water Demands

The following parameters should be used in estimating ICI water demands:

Commercial	Retail and Office	4 L/d/m ²
	Restaurant	60 L/d/m ²
Industrial		21 m ³ /d/ha
Institutional		18 m ³ /d/ha

D1.07 Locations

Watermains shall be located in boulevards as shown on the standard Town of Newmarket Standard Roadway Cross-Sections.

D1.08 Depth of Cover

The minimum depth of cover shall be 1.8 m.

D1.09 Horizontal Separation between Sewers and Watermains

Watermains shall be designed to have a minimum clear distance of 2.50 m from any sewer or manhole.

D1.10 Watermain Crossing Sewers

Watermains shall normally cross above sewers with sufficient vertical separation to allow for proper bedding of the watermain (minimum 0.3 m).

When it is not possible for a watermain to pass over a sewer, the watermain passing under the sewer shall have a vertical separation of 0.50 m below the sewer and the top of the watermain. The sewer must be adequately supported to prevent settling and displacement of the joints.

D1.11 Dead-Ends

Watermain distribution system shall be designed in grid patterns and looped to avoid dead-end sections. Dead-end watermains are to be avoided.

In extreme situations, as determined by the Director of Engineering Services or Designate, where it is determined that dead-end watermains are unavoidable a fire hydrant for flushing purposes shall be installed at the end of the watermain. Water service connections shall be grouped at the end of the dead-end watermain as much as possible or a 50 mm loop shall be constructed as per Town of Newmarket Standard Drawing NMSD-303.00. Calculations shall be provided to demonstrate that there is adequate water usage during low flow periods to maintain adequate chlorine residual levels at all times within the watermain.

SECTION D – WATERMAINS AND APPURTENANCES

Temporary dead-ends on watermains that are to be extended in the future shall be equipped with a 50 mm blow-off at the end of the watermain per OPSD 1104.030. At the Town's discretion, metered automatic flushers may be required with the cost of all flushed water being borne by the Developer.

D1.12 Location Identification

A tracer wire shall be provided along the top of all watermains to permit field tracing of the watermain. The wire is to be secured to the top of the watermain at every fitting and valve and at intervals not to exceed 3.0 m. All tracing wires shall be 12 gauge, stranded copper wire complete with outer plastic coating.

Tracing wire shall be brought up the outside of each valve box so that continuity of the wire shall be maintained. The tracer wire is to be taped to the valve box every 0.6 m. The end of the tracer wire is to be placed into the inside of the valve box through a slot cut in the valve box no deeper than 0.3 m from the top.

Tracer wire is to be continuous with no joints. Where joints are needed (between rolls) they are to be soldered together plus wrapped in dielectric tape over wrapped with vinyl tape.

Confirmation of the continuity of the tracer wire installation is to be provided in writing by the Owner's Consulting Engineer as part of the commissioning of the watermain system.

D1.13 Joint Restraint

Mechanical joint restraints are to be installed on bell and spigot joints for all watermains constructed in fill material and at all tees, horizontal bends, vertical bends, hydrants, end of mains and valves. Concrete thrust blocks are not permitted unless expressly approved by the Town. All mechanical restraint systems shall be installed with cathodic protection.

SECTION D – WATERMAINS AND APPURTENANCES

D2.00 Valve Requirements**D2.01 Type**

Unless specified or approved by the Town, all valves shall be Mueller resilient wedge gate valves or approved equivalent. Valves shall have a non-rising stem and a 50 mm square operating nut, opening counter-clockwise.

All valves 300 mm in diameter and larger shall be installed inside valve chambers as per Town of Newmarket Standard Drawing NMSD-304.00. These valves shall have flanged ends. A flanged to plain end spacer and a victaulic coupler shall be installed inside the chamber to permit removal of the valve, if necessary.

D2.02 Size

In all cases, the size of the line valves shall be the same size as the watermain diameter.

D2.03 Number, Location and Spacing

Two valves are required on tee intersections and three valves are required on cross intersections with the valves being placed at a point where the street line projected, intersects the watermain. Valve boxes and chambers are to be located in the boulevards and out of the pavement areas as much as possible. Under no circumstances will valve boxes or chamber lids be permitted in driveways or sidewalks.

Valve spacing along a watermain shall not exceed 300 m, or for every 40 lots, whichever is less.

The Town may, at their discretion, require additional valves to be installed beyond the requirements noted above to ensure adequate isolation during construction, to allow for future development connections or to provide adequate isolation of watermains.

D2.04 Valve Boxes and Chambers

All valves on watermains less than 300 mm in diameter shall have three piece, sliding type valve boxes.

All valves 300 mm in diameter and larger shall be installed within concrete chambers with covers set flush with the finished grade. The cover and plug shall be aligned over top of the valve operating nut. Where the valve and cover are offset (under extenuating circumstances only), the chamber is to be cored with a valve box for operation.

Any valves deeper than 2.4 m require the operating nut to have a valve stem extension.

SECTION D – WATERMAINS AND APPURTENANCES

All chambers are to have the tracer wire extend up the backside of the steps to the top rung and be securely fastened with tape.

Wherever possible, valve chambers shall be provided with a storm drain connection to the storm sewer. The diameter of the drain pipe shall be 150 mm. Where it is not possible to provide a direct connection to the storm sewer 300 mm x 300 mm x 300 mm sumps shall be provided in the base of the chamber. Valve chambers shall be as per Town of Newmarket Standard Drawing NMSD-304.00.

The requirement for drain valves and air release valves will be determined during the design review process. Fire hydrants should be located at high points in the watermain wherever possible to minimize the requirements for air release valves.

SECTION D – WATERMAINS AND APPURTENANCES

D3.00 Fire Hydrant Requirements**D3.01 Type**

Hydrants shall conform to the List of Acceptable Materials included in Appendix 2 of this document.

All hydrants shall be fitted with anti-tampering devices of a type required by the Town (one anti-tampering device per hydrant).

D3.02 Spacing

Hydrants shall be installed on all watermains with a maximum allowable spacing of 120 m in residential areas and 100 m in industrial/commercial and multi-residential areas. Coverage areas with a radius of 75 m from each hydrant shall be considered when determining hydrant locations in residential subdivisions.

D3.03 Branch Valves and Boxes

All hydrants installed on watermains up to and including 300 mm in diameter shall be controlled by a 150 mm diameter branch valve attached to the supply main with an anchor tee. Where this would place the secondary valve in the road, the valve is to be placed in the boulevard and have restraining rods back to the tee on the main.

D3.04 Location of Hydrants

Hydrants shall be located on the projection of a lot line and offset from the street line in accordance with the standard cross-section.

Hydrants shall be 1.20 m minimum distance from the edge of any driveway or house service location. Other aboveground utilities such as light standards, transformers or street signs shall not be located any closer than 3.0 m to a hydrant.

The hydrant is to be set at such a height that the distance from the finished ground around the hydrant to the bottom of the flange is between 50 mm and 150 mm.

D3.05 Bedding Requirements

All hydrants shall be installed in accordance with OPSD 1105.010, have open drainage holes and be installed with mechanically restrained joints (without thrust blocks). The hydrant base is to be installed in open-graded granular material enclosed with a geotextile fabric to ensure free draining of the boot. In areas of known high water, the hydrant drain holes shall be plugged and the Town shall be advised. This is to be reflected on the Record Drawings.

SECTION D – WATERMAINS AND APPURTENANCES

D3.06 Hydrant Flow Testing

The Developer's Consulting Engineer shall carry out a flow test in accordance with the Ontario Fire Code. Following the flow test the Developer's Consulting Engineer is to provide a written report to confirm that the minimum flows and residual pressures will be met when the subdivision is fully developed.

D3.07 Colour

Hydrants are to be painted fire engine red. The Storz cap is to be black. Steamer or pumper port threaded connections are to be painted red (same as barrel).

All paint used on hydrants is to be specifically manufactured for this purpose.

All hydrants are to be painted appropriately at commencement of maintenance and again at assumption.

Reflective rings colour coded to the hydrant flow classification will be installed on the 65 mm ports by the Town. The Developer's Consulting Engineer will be required to provide the classification for each hydrant as part of the watermain commissioning procedure. The hydrant flow classifications are as follows:

Class	Capacity	Colour
Class AA	Rated capacity 5680 L/min (1500 gpm) or greater	Light Blue
Class A	Rated capacity 3785 – 5675 L/min (1000 – 1499 gpm)	Green
Class B	Rated capacity 1900 – 3780 L/min (500 – 999 gpm)	Orange
Class C	Rated capacity less than 1900 L/min (500 gpm)	Red

SECTION D – WATERMAINS AND APPURTENANCES

D4.00 Service Connections**D4.01 General**

A single water line shall be installed to service each residential property. Services for other uses are to be adequately sized and identified on the engineering drawings. Services shall be installed according to OPSD 1104.010 and 1104.020.

D4.02 Material

All domestic water service connections shall be constructed of materials conforming to the List of Acceptable Materials included in Appendix 2 of this document.

D4.03 Minimum Size

Single water lines serving only one residence shall be a minimum of 25 mm (1”) in diameter.

D4.04 Location

Single services shall be provided for all single and semi-detached lots and on-street townhouse units. The location shall be shown on all Plan and Profile Drawings and the Composite Utility Plans.

A minimum clearance of 1.0 m shall be provided from all water services to any storm sewer or catchbasin. If this is not achievable the water service shall be insulated.

D4.05 Connections to Supply Main

The maximum size of connection that can be tapped into a 150 mm diameter watermain is 50 mm in diameter. A stainless steel saddle shall be used in all cases.

Water service connections larger than 50 mm in diameter shall be made by installing a tee on the supply main.

D4.06 Curb Stops and Control Valves

The curb stop on all water service connections 50 mm in diameter and less shall be located at the street limit and a minimum distance of 0.3 m away from the outer edge of the driveway. Curb stops to be brass (lead free) ball valves.

The control valve on water services 100 mm in diameter or larger shall be located at the supply main with the valve being secured by means of anchor tees, flanged fittings or tie rods. A second valve of equal size is also to be placed at the property line.

SECTION D – WATERMAINS AND APPURTENANCES

All non-residential services require a backflow preventer to be installed on the private side of the water meter. Domestic supply lines shall be branched from the main supply lines immediately adjacent to the boulevard on the private side with separate valve stops.

The backflow preventive device is to be designed for the appropriate use by the licensed Professional Engineer for the private development.

SECTION D – WATERMAINS AND APPURTENANCES

D5.00 Materials**D5.01 Watermain Material**

Watermain pipe material shall conform to the List of Acceptable Materials included in Appendix 2 of this document.

D5.02 Water Meters

Each dwelling serviced by water shall have a water meter installed, being a Rockwood/Sensus ECR meter (3/4" x 3/4") complete with a remote readout device located adjacent to the outside hydro meter. All meter installations and locations are to be completed to the requirements of the Operations Department.

Larger ICI (Institutional Commercial Industrial) installations will require a meter sized according to the intended use, but of the same make and type. The meter will be a minimum of one size less than the supply line. The purchase of meters is to be coordinated through the Town.

SECTION D – WATERMAINS AND APPURTENANCES

D6.00 Corrosion Protection

For any installation of water pipe systems, an investigation of the soils conditions shall be undertaken to determine the corrosivity of the native soils and to provide recommendations with regard to corrosion protection.

As a minimum, cathodic protection shall be provided in accordance with Town of Newmarket Standard Drawing NMSD-309.00.

SECTION D – WATERMAINS AND APPURTENANCES

D7.00 Testing Requirements

All watermains shall be tested in accordance with the procedures set out in the most current version of the “**Town of Newmarket Watermain Commissioning and Testing Procedure**” document.



SECTION E

Sanitary Sewers and Appurtenances

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

SECTION E – SANITARY SEWERS AND APPURTENANCES

SECTION E SANITARY SEWERS AND APPURTENANCES

Table of Contents

	E1.01	GENERAL	E-1
E2.00		HYDRAULIC DESIGN	E-1
	E2.01	Confirmation of Capacity.....	E-1
	E2.02	Sanitary Drainage Plan.....	E-1
	E2.03	Domestic Sewage Flows.....	E-1
	E2.04	Commercial Sewage Flows	E-2
	E2.05	Industrial Sewage Flows.....	E-3
	E2.06	Institutional and School Sewage Flows.....	E-3
	E2.07	Peak Flows for Redevelopment Properties	E-3
E3.00		SANITARY SEWER DESIGN.....	E-4
	E3.01	Location.....	E-4
	E3.02	Pipe Capacities.....	E-4
	E3.03	Flow Velocities.....	E-4
	E3.04	Minimum Size	E-5
	E3.05	Minimum and Maximum Grades	E-5
	E3.06	Minimum and Maximum Depths.....	E-5
	E3.07	Curved Sewers	E-5
	E3.08	Limits	E-5
	E3.09	Sewer and Watermain Crossings.....	E-5
	E3.10	Head Losses.....	E-6
	E3.11	Changes in Pipe Size	E-6
	E3.12	Pipe Bedding	E-6
E4.00		MANHOLES	E-7
	E4.01	Location.....	E-7
	E4.02	Maximum Spacing	E-7
	E4.03	Manhole Design.....	E-7
E5.00		SANITARY SERVICE CONNECTION	E-9
	E5.01	General.....	E-9
	E5.02	Location.....	E-9
	E5.03	Size	E-9
E6.00		TESTING	E-10

SECTION E – SANITARY SEWERS AND APPURTENANCES

E1.01 GENERAL

All Sanitary Sewers in shall be designed and constructed in accordance with the most recent version of the document – **“Region of York Inflow and Infiltration Reduction Standard for Servicing New Development”** with the exception of the items identified below in this Section. Any criteria noted below supersede the York Region Standard.

E2.00 HYDRAULIC DESIGN

E2.01 Confirmation of Capacity

Prior to commencement of any design for sanitary sewage works within the Town, the Developer’s Consulting Engineer shall contact the municipality to ensure that adequate external trunk sewer and treatment plant capacity is available for the proposed development.

E2.02 Sanitary Drainage Plan

The sanitary drainage plan shall be drawn to a scale suitable to show all the tributary areas that are being used to determine the design flows.

The design flow in each manhole and length of sewer shall be computed on standard sanitary design sheets. A typical Town of Newmarket Design Sheet is included in Appendix 5. For each area entered on the design sheet, the manhole numbers, size, grade and material of the sewers and the numbers consistent with the detailed plan and profile for each section of the sanitary sewer shall be shown.

Calculations for the sizing of all sewers shall be carried out on the Town of Newmarket Design Sheet which is included in the design standards.

E2.03 Domestic Sewage Flows

Peak domestic sewage flows are to be calculated using the following formula:

$$Q(d) = \frac{PqM + IA}{86,400}$$

Where,

Q(d) = peak domestic sewage flows (including extraneous flows in L/s)

P = design population

q = average daily per capita domestic flow in L/cap/day (exclusive of extraneous flows)

SECTION E – SANITARY SEWERS AND APPURTENANCES

M = peaking factor

I = unit of peak extraneous (infiltration) flows in L/ha/s

A = gross tributary area (ha)

The peaking factor shall be calculated based on the Harmon Formula:

$$M = 1 + \frac{14}{4 + P^{0.5}}$$

Where,

P = population, in thousands

M (Maximum) = 4.0

M (Minimum) = 1.5

The design population for residential developments shall be derived using the proposed Plan of Subdivision and the following densities:

Single Detached Dwellings	3.38 ppu
Semi-Detached Dwellings	3.04 ppu
Townhouses	2.88 ppu
Apartments	1.95 ppu

In the absence of a proposed Plan of Subdivision, populations should be estimated based on drainage areas and the land uses identified in the Town's Official Plan or Master Servicing Studies.

An average daily per capita flow of 350 L/cap/day shall be used to determine the capacity used in sizing the sanitary sewer system. When determining minimum cleansing velocities in critical sections of sewers the Town may require a per capital flow of 300 L/cap/day to be used.

An allowance of 0.26 L/s/ha should be used in the design for peak extraneous flows.

E2.04 Commercial Sewage Flows

Sanitary coefficients for Commercial Developments shall be based on the actual floor area as follows:

Office	4 L/day/m ²
Retail	2.5 to 5 L/day/m ²
Restaurant	60 L/day/m ²

SECTION E – SANITARY SEWERS AND APPURTENANCES

To these values is to be added an infiltration allowance of 0.26 L/sec/ha, based on the gross lot area.

Peaking factors should be calculated in accordance with MECP Light Industry Guidelines.

E2.05 Industrial Sewage Flows

Industrial sewage flows shall be determined in consultation with the Town's Director of Engineering Services or Designate. Generally, an average design of 21 m³/ha/day shall be used. A peaking factor shall also be incorporated into the design based on the gross development area as follows:

$$M_i = 6.6604 \times A^{-0.1992}$$

Where,

M_i = industrial peaking factor

A = gross lot area (ha)

E2.06 Institutional and School Sewage Flows

Institutional and School sewage flows shall be determined in consultation with the Town's Director of Engineering Services or Designate.

Generally, a peak sewage design flow shall be used for the design of all sewers as follows:

Schools	1.6 L/s/ha (based on 220 students and staff/hectare, 140 L/person/8-hr day and peak of 1.5 +an infiltration allowance of 0.30 L/s/ha
Hospitals	detailed calculations required (all hospital beds should be treated as permanent residents)
Churches	18 m ³ /ha/day

The area shall be based on the gross area of the school or institutional site.

E2.07 Peak Flows for Redevelopment Properties

For re-development properties, the proponent will be required to estimate peak flow from the existing property, based on design criteria. The estimate of existing peak flow should be included in the Functional Servicing Report submitted in support of the application.

SECTION E – SANITARY SEWERS AND APPURTENANCES**E3.00 SANITARY SEWER DESIGN****E3.01 Location**

All sanitary sewers shall be located as shown on the Standard Road Cross-Section. The standard location shall generally be 1.0 m offset from the centerline of the road allowance.

E3.02 Pipe Capacities

Table E-1 provides the allowable sanitary sewer capacities and gradients. This table shall be used to determine the maximum and minimum designs for sanitary sewers. Although the Manning's Formula is to be used as a basis for sewer design, the values listed in Table E-1 will supersede the results of Manning's calculations, where applicable. In the case of partial pipe flow, the actual velocity is to be checked against the minimum allowable velocity at the design flow rate.

Table E-1: Allowable Sanitary Sewer Capacities and Gradients

Diameter (mm)	Q Max (m³/s)	Slope Min (%)	Slope Critical (%)	Slope Max (%)
200	0.042	0.50	1.54	8.2
250	0.074	0.50	1.43	6.1
300	0.12	0.50	1.34	4.8
375	0.20	0.50	1.25	3.5
450	0.32	0.50	1.17	2.8
525	0.47	0.30	1.12	2.3
600	0.66	0.30	1.07	1.9
675	0.88	0.30	1.03	1.6
750	1.1	0.30	0.99	1.4
825	1.5	0.30	0.96	1.2
900	1.8	0.30	0.93	1.1
975	2.2	0.30	0.91	1.0
1050	2.7	0.30	0.89	0.89

Based on the following criteria:

Velocity_{min}
0.60 m/s

Velocity_{max}
3.0 m/s

Slope_{min}
0.30%

E3.03 Flow Velocities

- Minimum acceptable velocity = 0.6 m/s
- Maximum acceptable velocity = 3.0 m/s

SECTION E – SANITARY SEWERS AND APPURTENANCES

E3.04 Minimum Size

The minimum allowable size for a sanitary sewer shall be 250 mm in diameter.

E3.05 Minimum and Maximum Grades

The absolute minimum and maximum grades for sanitary sewers shall be in accordance with Table E-1 subject to achieving minimum acceptable velocity at the design flow. The minimum grade for the first upstream leg shall not be less than 1.0%.

E3.06 Minimum and Maximum Depths

The depth of the sewer shall be measured from the final centreline finished road elevation to the top of the sanitary sewer. The minimum depths of sewers for residential areas shall be 2.7 m.

The maximum depth of sewers with direct lateral connections shall be 6.0 m measured from centerline of road to the obvert of the sewer. In cases where deeper sewers are required these shall be considered trunk sewers and no direct lateral connections will be permitted. Separate local sewers constructed above the trunk sewers will be required for connection of laterals. Manholes are to be common wherever possible with drop structures.

E3.07 Curved Sewers

The use of radius pipe or deflected pipe is not permitted.

E3.08 Limits

All sewers shall be terminated at the subdivision limits when external drainage areas are being considered in the design with suitable provision in the design of the terminal manholes to allow for future extension of the sewer.

E3.09 Sewer and Watermain Crossings

A minimum clearance of 0.25 m shall be provided between the outside of the pipe barrel at the point of crossing for storm and sanitary sewers. A minimum clearance of 0.5 m shall be provided for all sewer and watermain crossings in accordance with MECP policies.

In the event the minimum clearances cannot be obtained, the designs must adhere to MECP policies. In addition, the pipes shall be concrete encased to ensure that the pipes are properly bedded.

SECTION E – SANITARY SEWERS AND APPURTENANCES

E3.10 Head Losses

The minimum drop for inverts in any manhole shall be 0.050 m for sewers turning 45° or less and 0.100 m for any sewer turning 90°. The maximum change in direction permitted for any sewer is 90°. Minimum drops in accordance with MECF policies will be considered in extreme situations where approved by the Director of Engineering Services or Designate.

In order to reduce the amount of drop required, the Designer shall, wherever possible, restrict the change in velocity between the inlet and outlet to 0.6 m/s.

Hydraulic calculations shall be submitted for all junction and transition manholes on sewers where the outlet is 1050 mm in diameter or greater. In addition, hydraulic calculations may be required for manholes where the outlet pipe is less than 1050 mm in diameter if, in the opinion of the Town, there is insufficient invert drop provided across any manhole.

Regardless of the invert drop across a manhole, as required by calculations, the obvert of the outlet pipe shall not be higher than the obvert of the inlet pipes at any manhole location.

E3.11 Changes in Pipe Size

No decrease of pipe size from a larger upstream to a smaller downstream will be allowed regardless of the increase in grade.

E3.12 Pipe Bedding

Pipe Bedding shall be in accordance with the most recent version of the document – “**Region of York Inflow and Infiltration Reduction Standard for Servicing New Development**”.

SECTION E – SANITARY SEWERS AND APPURTENANCES

E4.00 MANHOLES

Manhole designs shall be in accordance with the most recent version of the document – **“Region of York Inflow and Infiltration Reduction Standard for Servicing New Development”**, with the exceptions below:

E4.01 Location

Manholes shall be located at each change in alignment, grade or pipe material, at all pipe junctions and at intervals along the pipe to permit entry for maintenance to the sewer. The outside wall of any manhole structure shall not be located closer than 1.5 m to a curb. The manholes shall be oriented in such a way that the access cover is offset towards the centerline of the road.

E4.02 Maximum Spacing

The maximum spacing between manholes shall be as follows:

Pipe Size	Maximum Spacing
200 mm to 750 mm	90 m
825 mm to 1200 mm	125 m
1200 mm and over	155 m

E4.03 Manhole Design

- All manhole access openings shall be located on the side of the manhole parallel to the flow for straight run manholes, or on the upstream side of the manhole at all junctions.
- The manhole shall be centered on the sanitary sewer main.
- The maximum change in the direction of flow in any sanitary sewer manhole shall be no more than 90°. A change of flow direction at acute interior angles will not be permitted.

Drop structures shall be used when invert levels of inlet and outlet sewers differ by 0.9 m or more. Wherever feasible, sewer systems should be designed to avoid the use of drop structures. Internal drop structures are discouraged and will only be permitted in instances with extenuating circumstances provided approval is obtained from the Director of Engineering Services or Designate. Precast drop structures are permitted. All drop structures shall be constructed in accordance with the most recent version of the document – **“Region of York Inflow and Infiltration Reduction Standard for Servicing New Development”**.

- All manholes shall be benched as detailed in the Ontario Provincial Standard Drawings.
- Safety gratings shall be required in all manholes greater than 5.0 m in depth. Safety gratings shall not be more than 5.0 m apart and shall be constructed in accordance with

SECTION E – SANITARY SEWERS AND APPURTENANCES

the OPSD details. Where practical, a safety grating shall be located 0.5 m below the drop structure inlet pipe.

SECTION E – SANITARY SEWERS AND APPURTENANCES

E5.00 SANITARY SERVICE CONNECTION**E5.01 General**

All sanitary sewer connections for single, semi-detached and townhouse lots shall be made with single service pipes. All connections are to have a test fitting installed at the property line. The test fitting shall be 125 mm x 125 mm PVC DR 35 with a threaded plug. The threaded plug shall come with a 40 mm square nut to assist in the operation. Cast iron test fittings are not permitted for sanitary services.

The service pipe shall be extended 1.5 m into the property beyond the property line and capped with a watertight cap.

E5.02 Location

The proposed location of the sanitary sewer service shall be shown on the Plan and Profile Drawings and Composite Utility Plans.

E5.03 Size

Service connections for single family and semi-detached (or linked) units shall be 125 mm in diameter.

Service connections for multiple family blocks, commercial, institutional and industrial areas shall be sized according to the intended use.

SECTION E – SANITARY SEWERS AND APPURTENANCES

E6.00 TESTING

All testing to be carried out in accordance with the most recent version of the document – **“Region of York Inflow and Infiltration Reduction Standard for Servicing New Development”**.



SECTION F

Lot Grading

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

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SECTION F – LOT GRADING

SECTION F LOT GRADING

Table of Contents

F1.00 GENERAL F-1
 F1.01 Objectives..... F-1

F2.00 Lot Grading Criteria F-2
 F2.01 Type of Drainage Pattern..... F-2
 F2.02 Street Townhouses..... F-3
 F2.03 Slopes F-3
 F2.04 Swales..... F-4
 F2.05 Rear Lot Catchbasins F-5
 F2.06 Sodding and Ground Cover Requirements F-5

F3.00 Retaining Walls F-6

F4.00 Lot Grading Certification..... F-7

F5.00 Timing for Sodding of Lots and Certification of Grading..... F-8

SECTION F – LOT GRADING

F1.00 GENERAL

These guidelines are provided for guidance in the preparation of drainage plans. Since they are only guidelines, they cannot cover each and every situation that may be encountered in the field. Direct consultation should be made with the Town's Director of Engineering Services or Designate when the Drainage Plan Designer feels that deviation from these guidelines is warranted.

It is imperative that the overall initial Draft Plan of Subdivision be laid out with regard to the lot grading criteria outlined in this section. In particular lots requiring rear yard drainage swales may require extra depth than the adjacent lots to the rear to allow adequate space to create a rear yard amenity area as outlined in this section.

The approval of a Drainage Plan is related to drainage only. It is the responsibility of the Developer's Engineering and Planning Team to ensure that the Drainage Plan compliments the land and suits the house to be constructed.

F1.01 Objectives

- All areas shall be graded in such a way as to provide proper positive drainage, maximum use of land and ease of maintenance.
- Grading shall be performed in such a way as to preserve existing trees wherever possible.
- Drainage flows must be directed away from houses.
- Storm drainage is to be directed to approved outlets on public lands and shall not adversely affect adjacent lands.
- The use of rear lot catchbasins and retaining walls should be minimized.

SECTION F – LOT GRADING

F2.00 Lot Grading Criteria**F2.01 Type of Drainage Pattern**

- Back to front drainage is desirable in instances where drainage contributing to each side yard swale is restricted to the lots directly adjacent to the swale and no external flows or flow from the rear yards of neighboring lots is captured by the side yard swale.
- Split lot drainage with rear lot catchbasins is required where difficulties in providing side yard swales are encountered.
- Rear yards which drain through abutting lower back-to-front type lots are permitted where:
 - sufficient fall is available between the adjacent streets to achieve desired grades for swales and yards as per the criteria outlined in this section
 - the drainage from the upstream lot is limited such that a minimum of 50% of the roof area of the upstream lot drains to the front yard
- Walkout, back split and front split lots will be permitted where required due to topography constraints. In all cases the grade differential between the front and rear yard specified house grade shall be governed by the required sloping required along the side of the building envelope. Grades shall vary from a minimum 2% to a maximum 4:1 slope and shall be confined to the building side yard area. Lots with a front to rear yard grade differential exceeding 2.5 m are considered extraordinary and will require specific approval from the Town and may require advisory clauses to be inserted into Purchase and Sale Agreements of all perspective Purchasers.
- In determining maximum permissible grade differential between front and rear property line elevations compatibility of house types and impact on adjacent homes will be considered by the Town. While these standards do not set out maximum allowable grade differentials the Town will limit the grade differential on a site specific basis based on the particular circumstances unique to each subdivision.
- Front Lot Drainage – The specified house external ground grade (SHG) shall be 0.75 m minimum higher than low lot corner or 0.5 m minimum higher than high lot corner whichever is higher, both calculated at the street line. These dimensions to be increased by 30 mm for each 1.50 m of frontage over 16.0 m. SHG to be established at the rear of the house.
- Rear Lot Drainage – SHG to be 0.4 m minimum higher than high lot corner calculated at the street line. SHG to be established at the break point on the side yard.
- Reduced Setback Lots – The SHG for lots with reduced setbacks should be reviewed by the Designer to ensure lot grading meets the intent of Town Standards and sound design practices. The methods identified above for determining SHG elevations may not apply to reduced setback lots and other non-conventional lot types. The Designer will be

SECTION F – LOT GRADING

required to determine the most appropriate SHG for the lot type and may be required to supply detailed grading plans for individual lots considered by the Town to be non-conventional.

F2.02 Street Townhouses

The following criteria shall apply to on-street townhouses:

- End Houses – Specified House External Ground Grade (SHG) to be the higher of:
 - high front lot corner elevation plus 0.4 m
 - high rear lot corner (or bottom of embankment if applicable) plus 2% grade to rear house wall plus 150 mm
- Interior Houses – SHG to be highest of:
 - high front lot corner elevation plus 0.4 m
 - high rear lot corner (or bottom of embankment if applicable) plus 2% grade to rear house wall plus 150 mm
 - low front lot corner elevation plus 0.5 m
- Units with common driveways to have the same SHG based on the higher SHG calculated on the basis of the above criteria.
- Steps between SHGs to be taken up externally with 3:1 minimum embankment or approved retaining wall construction.
- Split or walk-out house types, front and back SHGs to be established using applicable criteria above.
- Number of units at same SHG shall be as per the following:
 - on road grades of under 2% – no more than four units
 - on road grades of 2% to 4% – no more than two units
 - on road grades of over 4% – each unit is considered individually
- Where difference in SHG elevations exceeds 0.5 m retaining walls must be used.

F2.03 Slopes

- Rear lots shall be graded such that a minimum of 5.0 m or 75% of the rear lot depth (whichever is greater) is to be sufficiently level (2% to 5% slope). This shall be considered to be the rear lot “useable area”.
- The grade difference in the rear lot shall be made up of the following types of slopes:
 - Slopes with a gradient between 2% and 5% which is considered “usable area”.
 - Beyond the “useable area” downward slopes shall have a gradient between 5% and 10%. No downward slopes greater than 10% will be generally be permitted except in the

SECTION F – LOT GRADING

following condition: For lots considered to have deep back yards or backing onto open space lands, the Director of Engineering Services may permit slopes greater than 10% provided a 0.5 m flat area is provided at the rear limit of the lots. (Warning clauses advising prospective purchasers of this condition may be required at the discretion of the Town's Director of Engineering Services.)

- The maximum gradient for upward slopes beyond the “useable area” shall be three parts horizontal to one part vertical (3:1). 3:1 slopes shall be permitted to a maximum height of 1.0 m. Slopes not greater than four parts horizontal to one part vertical (4:1) shall be used for heights greater than 1.0 m.
- The maximum permissible grade along rear lot line between lot corners shall not exceed 6%.
- The minimum slope on driveways shall be 2%. The maximum slope on driveways shall be 8%.
- All lots shall have a minimum 1.0 m wide unobstructed path draining at a 2% slope away from the house along at least one side of the house. This stipulation is in addition to the 150 mm apron required around buildings and is needed to permit the construction of a walkway to the rear of the house.
- A minimum separation of 150 mm shall be provided between brickline and the final ground elevation of all houses.
- An undisturbed flat area having a width of 0.5 m shall be provided at the boundary limits adjacent to other properties, in order that the existing boundary elevations shall be maintained. No filling up to or upon private lands shall be tolerated unless written permission is obtained from the adjacent Owner. Where two developments are concurrently underway, the common boundary elevations are to be established to mutually beneficial elevations, agreed to by each party.

F2.04 Swales

- Swales shall have a minimum grade of 2% and maximum side slopes of 3:1.
- Swales shall range in depth from a minimum of 150 mm to a maximum of 450 mm.
- Swales parallel to the rear lot lines shall be located at a distance based on the depth of swale but under no circumstances will the invert of the swale be permitted to be located more than 1.0 m from the rear lot line. In cases where a swale depth greater than 300 mm is required a 2:1 slope will be permitted from the swale invert to the rear lot line.
- Drainage flows which are carried around houses are to be confined in defined swales located as far from the house as possible. The depth of these swales should be kept as close as possible to the minimum of 150 mm.
- The maximum flow allowable in a side yard swale shall be that from three backyards or 750 m², whichever is less.

SECTION F – LOT GRADING

- Rear Yard Swales:
 - The maximum length of a rear yard swale shall not exceed 60 m.
 - The maximum area contributing to the rear yard swale shall be 2000 m².

F2.05 Rear Lot Catchbasins

- *The Town has recently changed its policy regarding ownership and maintenance of rear lot catchbasins (RLCBs). Easements in favour of the Town will no longer be required for RLCBs and leads. The ownership and maintenance responsibilities for RLCBs and leads on the private side of the street line shall rest with the property owner.*
- All RLCB grates are to be as per Town of Newmarket Standard Drawing NMSD-400.00. The centerline of the catchbasin top is to be 1.2 m from the rear lot line. The catchbasin frame to be set at the elevation of the invert of the lowest swale.
- RLBC leads shall be a minimum diameter of 250 mm. The leads shall be encased in concrete from the catchbasin to the street line.
- All catchbasin leads are to be located a minimum of 0.6 m from lot line; catchbasin leads to be constructed on one lot.
- RLCB leads shall be connected directly to manholes whenever possible. The layout of the storm sewer shall have consideration to this requirement to maximize the number of RLCB leads which can connect directly to manholes.
- When RLCBs are required, the Designer must consider the impacts that a plugged catchbasin will have with respect to flooding depth and area which will be impacted. The grading design must incorporate allowance for relief outlets in the event that plugging does occur.

F2.06 Sodding and Ground Cover Requirements

- Lots from the back of curb to rear property line (including drainage ditches or swales) are to be completely topsoiled and sodded with 150 mm of topsoil and No. 1 Nursery Sod.
- Clear stone (19 mm gradation) at a minimum depth of 100 mm shall be placed in side yard areas between houses with a distance less than 2.6 m instead of sod. A transition run-out area to drain the subgrade shall be provided at the clear stone/sod interface. This shall be detailed on the grading plans.

SECTION F – LOT GRADING

F3.00 Retaining Walls

The lot grading design must minimize and ideally eliminate the need for retaining walls. In carrying out the grading design the Designer should not assume that retaining walls will be permitted by the Town. Specific permission from the Town will be required for any retaining walls being proposed. All reasonable alternatives must be investigated prior to the Town being in a position to consider allowing the use of retaining walls.

Where retaining walls are required, they shall be constructed of concrete. No wood retaining walls will be permitted. All retaining walls, regardless of height, must be designed by a Professional Engineer. Certification from a Professional Engineer will be required for each wall constructed clearly stating that the wall has been designed to suit the site conditions, that construction of the wall has been inspected by the Engineer and that it has been constructed in accordance with the design.

SECTION F – LOT GRADING

F4.00 Lot Grading Certification

Prior to the maintenance period commencing for any aboveground works in the subdivision the Developer's Engineering Consultant will be required to submit a Lot Grading Certificate for every lot being placed on maintenance. If retaining walls have been constructed on any lot an additional Certificate will be required for each lot with retaining walls.

The "Template" Lot Grading Certificate and Retaining Wall Certificate included herein and in Appendix 6 shall be used and no substitutions in wording will be accepted.

SECTION F – LOT GRADING

F5.00 Timing for Sodding of Lots and Certification of Grading

Sodding shall be completed on each lot within two months of the date of the issuance of the Occupancy Permit for the lot. If the Occupancy Permit is issued later than October 15, in any year, and prior to March 31, in the subsequent year, the grading and sodding shall be completed by May 31, in the subsequent year.

Lot Grading Certification shall be completed within three months of the date of the issuance of the Occupancy Permit for the lot. If the Occupancy Permit is issued later than October 15, in any year, and prior to March 31, in the subsequent year, the lot grading certification shall be completed by June 30, in the subsequent year.

Prior to sodding any lots within a subdivision, the Developer's Consulting Engineer is encouraged to arrange a pre-sod inspection with the Town's representative.

LOT GRADING CERTIFICATION FORM

Town of Newmarket

Subdivision: _____ Municipal Address: _____

Registered Plan Number: _____ Lot Number: _____

Plot Plan Approval Date: _____

(Indicate date of Director of Engineering Services Memorandum to Chief Building Official)

I hereby certify that I (or a competent representative from this firm on my behalf) have inspected the above noted lot and that:

- the grading generally conforms with that shown on the Approved Plot Plan and Overall Grading Plan for the Subdivision
- a minimum of 150 mm of quality topsoil has been placed and the lot has been sodded in accordance with Town Standards
- curbstop is operational, adjusted to the finished ground level and located outside the limits of the driveway and walkways
- the Ontario Building Code requirements are satisfied with regard to the required finished ground level relative to the exterior foundation wall of the house
- all downspout elbows are a maximum of 100 mm above splash pads
- retaining walls (check one box)
 - no retaining walls are constructed or required on this lot
 - retaining wall certification is attached

This certification is based upon our field investigation which was carried out by

Consultant's Inspector

and _____ on
Burnside Representative

(insert date)

Seal and Signature of Developer's Consulting P.Eng.

Date: _____

This Section to be Completed by the Town's Checking Consultant

Date Received: _____

Certificate Reviewed By: _____

Date: _____

Notes: _____

(To be printed on Developer's Consulting Engineer's Letterhead)

RETAINING WALL CERTIFICATION FORM

Town of Newmarket

Subdivision: _____ Municipal Address: _____

Registered Plan Number: _____ Lot Number: _____

Plot Plan Approval Date: _____

(Indicate date of Director of Engineering Services Memorandum to Chief Building Official)

I hereby certify that the retaining wall on the above noted lot has been designed and constructed to my satisfaction in accordance with sound engineering principles and the accepted Engineering drawings as prepared by -----and dated-----and in general conformance to the Town's Standards. I also certify that the construction and inspections were carried out under my supervision, or a competent representative on my behalf, during the construction of the retaining walls. For your records, I have attached the original design, the record drawings, and the inspection reports.

Guards have been constructed (where necessary) in accordance with the requirements of the Ontario Building Code.

Seal and Signature of Developer's Consulting P.Eng.

Date: _____

This Section to be Completed by the Town's Checking Consultant

Date Received: _____

Certificate Reviewed By: _____

On-Site Inspection Carried Out By: _____

Date: _____

Notes: _____



SECTION G

Utilities and Street Lighting

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

SECTION G – UTILITIES AND STREET LIGHTING

SECTION G UTILITIES AND STREET LIGHTING

Table of Contents

G1.00 GENERALG-1
G1.01 Standard RequirementsG-1

G2.00 COMPOSITE UTILITY DRAWINGSG-2

G3.00 STREET LIGHTING DESIGNG-4
G3.01 Street Light PolesG-5
G3.02 Street Lighting LuminairesG-5
G3.03 Energization of Street Lighting SystemG-6

SECTION G – UTILITIES AND STREET LIGHTING

G1.00 GENERAL

The Town of Newmarket requires that the use of aboveground utility furniture be minimized in all new developments. The use of common “utility poles” may be required provided that a continuous visual appearance can be provided at the interface with neighboring developments. The proponent shall consult with the Town’s Director of Engineering Services or Designate prior to proceeding with the design of the street lighting and utility design for any subdivision in order to receive direction specific to the particular subdivision.

G1.01 Standard Requirements

All primary hydro, telephone, gas and cable T.V. lines shall be placed underground in locations as shown on the typical road sections listed in the Standard Drawings. Design of these utilities shall conform to the regulations of the respective authority.

SECTION G – UTILITIES AND STREET LIGHTING

G2.00 COMPOSITE UTILITY DRAWINGS

All utilities are to be shown on the Composite Utility Plan and to be submitted for the review and approval of the Town. This drawing shall be prepared at a scale of 1:500, unless otherwise approved and show all pertinent details of the utilities including street lighting poles, all above and underground services, Canada Post mailbox locations, driveways and locations of all street trees. It is the Consulting Engineer's responsibility to ensure there are no conflicts resulting from the design of the various utilities and the municipal roads and services.

All details of any entranceway features and structures within the proposed right-of-way are to be indicated on the Composite Utility Drawing, as circulated to the various utilities. Said drawings shall also indicate the presence of any pumping stations or other such facilities that may necessitate particular service requirements. The Composite Utility Plan is to be approved by all individual utility agencies presented on the drawing and Canada Post, prior to final acceptance by the Town.

- G2.01 The Composite Utility Plan is to show municipal addresses as soon as these are available, as well as lot numbers.
- G2.02 1.0 m separation is to be maintained between edge of driveway and all street furniture.
- G2.03 Standard Notes on Utility Drawings are as follows:
- a) All gas services to be installed at the opposite side of the lot from Hydro Service.
 - b) Underground hydro shall clear manholes and catchbasins by minimum of 1.0 m; otherwise, concrete encasement is required.
 - c) All hydro cables to be concrete capped over split duct at watermain and hydrant connection crossings.
 - d) Gas mains shall clear underground structures by 300 mm minimum.
 - e) Underground hydro to have 1.0 m horizontal clearance at hydrant locations. A reduction to 0.8 m will be permitted for 18.0 m wide road allowances.
 - f) The offices of Bell, Hydro, Gas, Cable T.V. and the Town's Operations Department must be contacted for precise locates before any digging can commence in the boulevard areas.
- G2.04 The typical cross-section shall be shown on the Utility Drawing.
- G2.05 A maximum of two items of street furniture will be permitted on any lot.

SECTION G – UTILITIES AND STREET LIGHTING

G2.06 Public Utility Clearance Requirements

The following represents the minimum clear separation distance for public utilities:

Condition/Utility		Gas Line	Hydro	Bell, Cable T.V.	Water/Sewer Lines
1	Minimum Vertical Distance	0.3 m	0.3 m	0.3 m	0.5 m
2	Minimum Horizontal Distance	0.9 m	0.9 m	0.3 m	1.2 m
3	Minimum Distance Below Ditch Inverts	0.6 m	0.9 m	0.3 m	1.7 m
4	Minimum Distance from Structure/Chambers	0.3 m	0.3 m	0.3 m	0.6 m
5	Minimum Distance from Hydrants	0.3 m	1.0 m	0.3 m	0.6 m

In addition, the policies for Special Protection are as follows:

Hydro Lines

- over 15 kv, install in ducts (concrete encased if under ditch)
- under 15 kv, usually direct burial except ducted under roads and concrete encased duct under ditches
- duct preferred on private property
- for all voltages, install in concrete encased duct around underground structures

Bell and Cable T.V.

- usually direct burial but may use concrete encased duct for three or more cables

SECTION G – UTILITIES AND STREET LIGHTING**G3.00 STREET LIGHTING DESIGN**

The street lighting system shall be designed by a qualified Consulting Engineer in accordance with the Illumination Engineering Society of North America (IESNA) latest edition recommendations. In addition, all street lighting systems for roadways in the Town shall meet the requirements of the Town and Newmarket Hydro.

The objective in designing street lighting is to provide a uniform distribution of lighting at a level that is adequate for the intended use of the roadway. Roadway lighting shall be designed using the values found in the IESNA Reference Guide Table 2 and abbreviated in the following table:

Road Classification (IESNA R2 & R3)	Illuminance Values	
	Average Maintained Illuminance Values (Lux)	Illuminance Uniformity Ratio (Average to Minimum)
Local Residential	7	6:1
Collector	9	4:1
Arterial	13	3:1

*All other Road Classifications not identified above will be considered on an individual basis in accordance with Town Requirements.

**Intersections shall have an illumination equal to the sum of the current design levels of the intersecting roadways.

A photometric layout will be required and must include the following information:

- a) Lighting levels extending past the property line to the nearest building (light trespass on adjacent residential properties is to be kept to a minimum utilizing full cut-off flat lens luminaires and house-side shields if required).
- b) A summary table of the illumination and uniformity values resulting from the design in accordance with parameters indicated in the above table (i.e., average, average to minimum, etc.) shall be provided. In addition to the above noted requirements, the table must show the photometric layout LLF (Light Loss Factor) used when calculating the proposed lighting levels. Lighting drawings and photometric information including statistical data shall be designed/reviewed/approved by a Professional Engineer.
- c) In the longitudinal direction, the distance between grid lines should be one-tenth (1/10) of the spacing between luminaires, or 5.0 m, whichever is smaller. At intersections the grid spacing is 2.0 m throughout the calculation area.

When establishing the spacing of street lighting within a residential subdivision, consideration must be given for the placement of a street light adjacent to the location of community mailboxes.

SECTION G – UTILITIES AND STREET LIGHTING

- d) In determining the position of a light standard, the designer shall take into consideration the location of driveways, living room windows and other aspects of a particular site. The objective is to provide a sense of security and to minimize spill and other disturbances to residential properties.
- e) The street lighting design submission package is to be submitted to the Town and shall include a cost estimate for the proposed street lighting installation works (including wiring, poles, pedestals, etc.).
- f) The Developer's Consulting Engineer shall be responsible for the review/approval of any required shop drawings submitted by the Contractor/supplier for verification or compliance to the lighting design and Town specifications.
- g) The design shall specify type of pole, conduit, luminaire, lamp wattage and size of conductor being used. Details of pole installation and luminaire(s) wiring are to be provided.
- h) Designer shall specify on the drawings the location of transformers, means of disconnects, power and control centers and other related infrastructure.
- i) Pole spacing shall be supported by detailed photometric calculations. Maximum spacing shall not exceed 50 m.
- j) The engineer shall include specification sheets on luminaires, arms, and poles to be installed as part of submission.

G3.01 Street Light Poles

Poles are to be 7.62 m (25 ft), 9.14 m (30 ft) or 12.19 m (40 ft) depending to the desired lighting level targets. Poles are to be Class B, spun reinforced concrete (octagonal) direct bury, complete with cast zinc handhole and cover, per Stresscrete E300-BPO-G_M00_S/F170. Poles are to be supplied, with scroll arm brackets.

For designs using common "utility poles", poles are to be "Alexander" telecommunications poles manufactured by Stresscrete or approved equivalent, 9.1 m overall height, c/w 1.6 m "Tenon" scroll arm and communication compartments. Finish is to be "polished eclipse black". All poles to be suitable for direct embedment installation.

G3.02 Street Lighting Luminaires

Street lighting luminaires are to be LED type 4000 to 4500 k, minimum 50,000 hours life span complete with individual long life solid state photocell sensors.

SECTION G – UTILITIES AND STREET LIGHTING

Decorative street lighting luminaires are to be Coach style complete without the polycarbonate panels per King Luminaire K601 series, Eaton/Cooper Lighting Springdale series, or Philips Lumec L40U series.

Standard street lighting luminaires are to be GE, Evolve series, Eaton/Cooper, XNV series, LED Roadway, NXT series or approved equivalent.

G3.03 Energization of Street Lighting System

The Developer's Consulting Engineer or Contractor shall arrange with Newmarket Hydro for the connection of the lighting system. The street lighting system is to be energized and functioning prior to the first occupancy in the subdivision.



SECTION H

Easement Requirements

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

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SECTION H – EASEMENT REQUIREMENTS

SECTION H EASEMENT REQUIREMENTS

Table of Contents

H1.00	GENERAL	H-1
H1.01	Storm, Sanitary Sewer and Watermain Easements	H-1
H1.02	Concrete Encasement	H-1
H1.03	Pipes Constructed in Sleeves	H-2

SECTION H – EASEMENT REQUIREMENTS

H1.00 GENERAL

Where underground services or utilities are placed outside road allowances or blocks of land under the ownership of the Town, permanent easements are required.

Any easements proposed for utilities, storm sewers, sanitary sewers and watermains shall be reviewed with the Town's Director of Engineering Services or Designate prior to the first submission.

H1.01 Storm, Sanitary Sewer and Watermain Easements

Ideally easements between adjacent lots shall be located on one side of the common lot line. Pipes shall generally be centered on the easement for easements containing one pipe. Easements straddling lots lines may be permitted if deemed appropriate by the Town's Director of Engineering Services or Designate. The minimum width of all easements shall be determined in consultation with the Town's Director of Engineering Services or Designate.

All pipes with a diameter of less than 900 mm constructed within easements between side lot lines shall be concrete encased as set out in Section H1.02. All pipes 900 mm or larger in diameter constructed between side lot lines shall be increased in strength by one class from that required based on the earth loading.

The bearing capacity of native soils must be preserved for all pipes being constructed between proposed buildings. This shall be achieved by:

- Extending the building foundations to the depth of the underside of pipe adjacent to the building.
- Placing the pipe in a sleeve constructed by tunneling.
- Installing the pipe by vertical trenching with steel sheeting left in place and cut off 0.3 m above the building foundation. The depth of the steel sheeting below the pipe invert is to be determined by a Geotechnical Engineer. Sufficient struts are to be left in place to ensure that the steel sheeting does not move during the backfilling operation.

The trench excavation and reinstatement or tunneling operation is to be monitored by a Geotechnical Engineer and certification will be required that the soils have the required bearing capacity to support the building being proposed adjacent to the pipe installation.

H1.02 Concrete Encasement

Concrete encasement shall have a square cross-section with a concrete thickness of not less than 0.150 m. The concrete shall be 15 MPa strength and vibrated in place.

SECTION H – EASEMENT REQUIREMENTS

H1.03 Pipes Constructed in Sleeves

In lieu of concrete encasement of pipes, the Town will consider allowing pipes to be constructed in steel sleeves. The specific instances where this will be permitted along with the detailed requirements must be determined in consultation with the Town's Director of Engineering Services or Designate.



APPENDIX 1

General Notes for Drawings

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

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APPENDIX 1

GENERAL NOTES – MISCELLANEOUS

The standard notes listed below along with any special notes required by the design should be listed on a separate sheet in the drawing set and referred to on the other drawings:

1. ALL DIMENSIONS ARE IN METRES (m) AND ALL PIPE SIZES ARE IN MILLIMETRES (mm), UNLESS OTHERWISE SPECIFIED.
2. THE NOTES ON THIS SHEET APPLY TO ALL WORKS UNDER THIS CONTRACT UNLESS OTHERWISE NOTED ON THE PLAN AND PROFILE DRAWINGS AND/OR SPECIFIC DETAIL DRAWINGS.
3. THE STANDARD DRAWINGS OF THE TOWN, ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS) AND THE ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) CONSTITUTE PART OF THE PLANS OF THIS PROJECT.
4. ORDER OF PRECEDENCE OF STANDARD DRAWINGS IS FIRSTLY TOWN OF NEWMARKET STANDARD DRAWINGS, AND SECONDLY ONTARIO PROVINCIAL STANDARD DRAWINGS.
5. THE STANDARD DRAWINGS INCLUDED WITH THESE PLANS ARE PROVIDED FOR CONVENIENCE ONLY AND ARE NOT TO BE CONSTRUED TO BE A COMPLETE SET FOR THE PURPOSE OF THE CONTRACT OR PROJECT.
6. ALL DIMENSIONS AND ELEVATIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION AND ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
7. ALL SITE CONTROL AND EROSION PROTECTION DEVICES ARE TO BE IN PLACE PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE AND THE GRASS HAS ESTABLISHED GROWTH, SUBJECT TO APPROVAL BY THE TOWN'S ENGINEER.
8. NATIVE MATERIAL, SUITABLE FOR BACKFILL, SHALL BE COMPACTED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY. FOR BACKFILLING WITHIN THE ROADWAY, NATIVE MATERIAL SHALL BE BACKFILLED TO 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
9. GRANULAR MATERIAL USED FOR BACKFILL SHALL BE PLACED IN LAYERS 150 mm IN DEPTH MAXIMUM AND COMPACTED TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY.
10. MATERIAL SPECIFICATION FOR ALL FRAMES, GRATES, COVERS AND GRATINGS SHALL BE AS PER OPSS 1850. FINISH ON ALL SURFACES SHALL BE PAINTED.

APPENDIX 1

GENERAL NOTES – ROADS

1. THE ROAD PAVEMENT MINIMUM STRUCTURE SHALL CONSIST OF THE FOLLOWING AND WILL BE CONFIRMED BY A SOILS CONSULTANT:

- XX mm HL3 SURFACE COURSE ASPHALT
- XX mm HL8 BASE COURSE ASPHALT
- XXX mm GRANULAR "A"
- XXX mm GRANULAR "B"

Developer's Consulting Engineer to insert appropriate depths of materials.

BOULEVARDS – 150 mm TOPSOIL AND SOD

2. NATIVE SUBGRADE SHALL HAVE A CROSS-FALL OF 3% AND THE MATERIAL SHALL BE APPROVED BY A SOILS CONSULTANT.
3. NATIVE SUBGRADE TO BE COMPACTED TO MINIMUM 95% STANDARD PROCTOR MAXIMUM DRY DENSITY AND SHALL BE PROOF ROLLED.
4. RESIDENTIAL DRIVEWAYS TO BE CONSTRUCTED WITH A MINIMUM OF 200 mm GRANULAR "A", AND 50 mm HL3F ASPHALT.
5. ROAD OCCUPANCY PERMIT IS REQUIRED FROM THE TOWN OR REGION PRIOR TO THE COMMENCEMENT OF ANY WORK IN THEIR RESPECTIVE RIGHT-OF-WAYS.
6. CONCRETE CURBS AND SIDEWALK SHALL BE 32 MPa C-2 CONCRETE WITH 7% +/- 1.5% AIR ENTRAINMENT.
7. CONCRETE CURB AND GUTTER CONSTRUCTION SHALL COMPLY WITH OPSD 600.040 OR 600.070.
8. SIDEWALK CONSTRUCTION SHALL BE AS PER NEWMARKET STANDARD DRAWINGS NMSD-208.00 AND NMSD-209.00 AND OPSD 310.030.
9. NO MANHOLE LIDS WILL BE PERMITTED TO BE CONSTRUCTED ON ANY PART OF A SIDEWALK.
10. SUB-DRAINS TO HAVE FILTER FABRIC SOCK PULLED TO INSIDE FACE OF CATCHBASIN.

APPENDIX 1

GENERAL NOTES – SANITARY SEWERS

NOTES ARE TO BE SPECIFIC FOR EACH PROJECT AND IN ACCORDANCE WITH THE MOST RECENT VERSION OF – **“Region of York Inflow and Infiltration Reduction Standard for Servicing New Development”**.

APPENDIX 1

GENERAL NOTES – SANITARY SERVICE LATERALS

1. PIPE TO BE MINIMUM 125 mm DIAMETER PVC SDR 28, RUBBER GASKET TYPE JOINTS, BEING GREEN IN COLOUR AND SHALL CONFORM TO CSA B182.1 or B182.2.
2. PVC DR 35 WATERTIGHT TEST FITTINGS SHALL BE INSTALLED ON SERVICES AT STREET LINE.
3. SERVICE LATERALS ARE TO EXTEND 1.5 m BEYOND ROAD ALLOWANCE LIMIT ONTO PRIVATE PROPERTY AND CAPPED.
4. MINIMUM DEPTH OF LATERAL AT PROPERTY LINE SHALL BE 2.6 m MEASURED FROM THE SEWER OBVERT TO FINISHED GROUND SURFACE ELEVATION, UNLESS NOTED OTHERWISE.
5. MINIMUM PIPE SLOPE TO BE 2%, MAXIMUM 8% (SEE OPSD 1006.020).
6. THE LOCATION OF THE END OF EACH LATERAL IS TO BE MARKED WITH A 50 mm x 100 mm WOOD MARKER, PAINTED GREEN EXTENDING FROM SERVICE INVERT TO 300 mm ABOVE PROPOSED FINISHED GROUND LEVEL.
7. ALL CONNECTIONS TO NEW SANITARY MAINS SHALL BE WITH PRE-MANUFACTURED, APPROVED TEES.

APPENDIX 1

GENERAL NOTES – STORM SEWERS

1. ALL STORM SEWER MAINS OVER 450 mm DIAMETER SHALL BE CONSTRUCTED WITH REINFORCED CONCRETE PIPE.
2. CATCHBASIN LEADS SHALL BE CONSTRUCTED WITH CONCRETE, PVC DR 35, OR HIGH DENSITY POLYETHYLENE (HDPE) BOSS POLY-TITE. RIBBED PVC PIPE WILL NOT BE PERMITTED.
3. CONCRETE PIPE SHALL CONFORM TO THE REQUIREMENTS OF CSA SPECIFICATION A257-M 1982 FOR THE CLASSES SHOWN BELOW:
 - a) NON-REINFORCED CONCRETE PIPE, CSA STANDARD A257.1 CLASS 1, 2 AND 3
 - b) REINFORCED CONCRETE PIPE, CSA STANDARD A257.2 STRENGTH CLASS 50-D, 65-D, 100-D AND 140-D
4. PVC PIPE SHALL CONFORM TO CSA SPECIFICATION B182.1 OR B182.2 OR LATEST REVISION THEREOF. RIBBED PVC PIPE WILL NOT BE PERMITTED.
5. HDPE PLASTIC PIPE SHALL CONFORM TO THE REQUIREMENTS OF CSA SPECIFICATION B182.6 AND SHALL HAVE A SMOOTH INSIDE WALL AND CORRUGATED OUTSIDE WALL SUCH AS HDPE BOSS POLY-TITE WITH MINIMUM STIFFNESS OF 300 kPa.
6. SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD 802.010, UNLESS APPROVED OTHERWISE BY THE TOWN. BEDDING AND COVER MATERIAL SHALL BE GRANULAR 'A'.
7. MANHOLE TOPS ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE. FRAME AND COVER TO BE PER OPSD 401.010, TYPE "A" STAMPED "STORM". ADJUSTMENTS SHALL BE AS PER NMSD 210.00.
8. SINGLE CATCHBASIN LEADS TO BE 250 mm DIAMETER MINIMUM. DOUBLE CATCHBASIN LEADS TO BE 300 mm DIAMETER MINIMUM.
9. REAR LOT CATCHBASIN LEADS SHALL BE A MINIMUM DIAMETER OF 250 mm AND SHALL BE ENCASED IN CONCRETE FROM CATCHBASIN TO STREET LINE.
10. REAR LOT CATCHBASINS TO HAVE TOPS AS PER TOWN OF NEWMARKET STANDARD DRAWING NMSD-400.00.

APPENDIX 1

11. CATCHBASIN GRATES ARE TO BE SET TO BASE COURSE ASPHALT GRADE AND THEN ADJUSTED TO FINAL GRADE. ADJUSTMENTS SHALL BE AS PER NMSD-211.00.
12. WHERE CATCHBASINS ARE CONNECTED DIRECTLY TO SEWERS, PRE-MANUFACTURED TEES SHALL BE USED.
13. SAFETY CHAINS ARE TO BE INSTALLED ON THE DOWNSTREAM SIDE OF ALL MANHOLES ON PIPES 1200 mm AND LARGER AS PER TOWN OF NEWMARKET STANDARD DRAWING NMSD-403.00.
14. STORM SERVICES SHALL BE 150 mm DIAMETER PVC DR 28, WHITE IN COLOR AND ARE TO EXTEND 1.5 m BEYOND ROAD ALLOWANCE LIMIT ONTO PRIVATE PROPERTY AND CAPPED.
15. THE LOCATION OF THE END OF EACH LATERAL IS TO BE MARKED WITH A 50 mm x 100 mm WOOD MARKER PAINTED BLACK.
16. PVC DR 35 WATERTIGHT TEST FITTINGS SHALL BE INSTALLED ON SERVICES AT STREET LINE.

APPENDIX 1

GENERAL NOTES – WATERMAINS

1. WATERMAIN MATERIAL TO BE PVC C-900, CLASS 150 (DR 18). PVC WATERMAIN SHALL INCLUDE #12 TRACER WIRE.
2. CAST IRON MECHANICAL JOINT FITTINGS MEETING AWWA SPECIFICATIONS C-907 AND CSA B138.2 SHALL BE USED ON PVC WATERMAIN 150 mm TO 300 mm IN DIAMETER.
3. ALL DOMESTIC WATER SERVICES SHALL BE 25 MM DIAMETER TYPE “K” COPPER OR POLYETHYLENE MEETING THE REQUIREMENTS OF CSA137.1.
4. A MINIMUM OF 0.5m VERTICAL CLEARANCE BETWEEN THE WATERMAIN AND ALL UTILITIES MUST BE KEPT, WHILE STILL MAINTAINING A MINIMUM DEPTH OF COVER AT ALL TIMES.
5. WATERMAIN SHALL BE INSTALLED WITH A MINIMUM COVER OF 1.8 m.
6. PVC WATERMAIN BEDDING SHALL CONSIST OF CLEAR SAND, 150 mm BELOW AND 300 mm ABOVE THE WATERMAIN (REFER TO OPSD 802.010).
7. MECHANICAL JOINT RESTRAINTS ARE TO BE INSTALLED ON BELL AND SPIGOT JOINTS FOR ALL WATERMAINS CONSTRUCTED IN FILL MATERIAL AND AT ALL TEES, HORIZONTAL BENDS, VERTICAL BENDS, HYDRANTS, END OF MAINS AND VALVES. CONCRETE THRUST BLOCKS ARE NOT PERMITTED UNLESS EXPRESSLY APPROVED BY THE TOWN.
8. HYDRANTS SHALL BE MUELLER ‘CENTURY’, AVK, CLOW MCAVITY OR APPROVED EQUIVALENT COMPRESSION TYPE COMPLETE THREE PORT HYDRANTS WITH 100 mm, ¼ TURN STORZ NOZZLE FACING THE STREET. THE SIDE PORTS SHALL BE 65 mm DIAMETER THREADED. HYDRANT TEES TO BE ANCHOR STYLE. ALL HYDRANTS TO BE EQUIPPED WITH ANTI-TAMPERING DEVICES.
9. HYDRANTS ARE TO BE PAINTED FIRE ENGINE RED. THE STORZ CAP IS TO BE BLACK. STEAMER OR PUMPER PORT THREADED CONNECTIONS ARE TO BE PAINTED RED (SAME AS BARREL)
10. REFLECTIVE RINGS COLOUR CODED TO THE HYDRANT FLOW CLASSIFICATION WILL BE INSTALLED ON THE 65 mm PORTS BY THE TOWN.
11. HYDRANT FLANGE ELEVATIONS SHALL BE SET AT A GRADE OF 50 mm TO 150 mm ABOVE THE FINISHED GROUND ELEVATION.

APPENDIX 1

12. A MINIMUM HORIZONTAL SEPARATION OF 2.5 m SHALL BE MAINTAINED BETWEEN THE WATERMAIN AND ANY SEWER.
13. UNLESS SPECIFIED OR APPROVED BY THE TOWN, ALL VALVES SHALL BE MUELLER RESILIENT WEDGE GATE VALVES OR APPROVED EQUIVALENT. VALVES SHALL HAVE A NON-RISING STEM AND A 50 mm SQUARE OPERATING NUT, OPENING COUNTER-CLOCKWISE.
14. ALL VALVES 300 mm IN DIAMETER AND LARGER SHALL BE INSTALLED INSIDE VALVE CHAMBERS. THESE VALVES SHALL HAVE FLANGED ENDS. A FLANGED TO PLAIN END SPACER AND A VICTAULIC COUPLER SHALL BE INSTALLED INSIDE THE CHAMBER TO PERMIT REMOVAL OF THE VALVE IF NECESSARY.
15. VALVES IN EXCESS OF 2.4 m IN DEPTH SHALL REQUIRE A VALVE STEM EXTENSION.
16. THE CONTRACTOR SHALL INFORM THE TOWN 48 HOURS IN ADVANCE PRIOR TO COMMENCING WORK ON ANY PART OF THE WATER SYSTEM.
17. ALL MECHANICAL FITTINGS SHALL HAVE ZINC ANODES AS PER TOWN STANDARDS.



APPENDIX 2

List of Acceptable Materials

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

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APPENDIX 2

LIST OF ACCEPTABLE MATERIALS**1. STORM SEWERS AND LEADS**

Concrete or plastic pipe will be permitted for storm sewers 450 mm in diameter and smaller. All storm sewer mains over 450 mm diameter shall be constructed with reinforced concrete pipe.

Catchbasin leads shall be constructed with Concrete, Polyvinyl Chloride SDR 35, or BOSS Poly-tite HDPE pipe.

Concrete pipe shall conform to the requirements of CSA Specification A257-M 1982 for the classes shown below:

- a) Non-reinforced Concrete Pipe, CSA Standard A257.1 Class 1, 2, and 3.
- b) Reinforced Concrete Pipe, CSA Standard A257.2 Strength Class 50-D, 65-D, 100-D and 140-D.

Polyvinyl Chloride Pipe (PVC) – Shall conform to CSA Specification B182.1 or B182.2, or latest revisions thereof. Ribbed pipe will not be permitted.

High density polyethylene (HDPE) pipe shall conform to the requirements of CSA Specification B182.6 and shall have a smooth inside wall and corrugated outside wall such as HDPE BOSS Poly-Tite with minimum stiffness of 300 kPa.

Watertight bell and spigot connections will be required for all pipe joints.

2. SANITARY SEWERS

Sanitary Sewer pipe materials to be in accordance with the most recent version of the document – “**Region of York Inflow and Infiltration Reduction Standard for Servicing New Development**”.

Laterals

Sanitary laterals shall be 125 mm PVC Pipe, green in colour conforming to CSA Specification B182.1 or B182.2, or latest versions thereof.

Storm laterals shall be 150 mm PVC Pipe, white in colour conforming to CSA Specification B182.1 or B182.2, or latest revisions thereof.

Dimension ratio (DR) of PVC lateral pipe shall not exceed 28.

APPENDIX 2

3. WATERMAIN AND APPURTENANCES

Acceptable material for watermain pipe up to and including 450 mm in diameter are as follows:

PVC Pipe – PVC manufactured in accordance with the latest edition of AWWA C900, minimum Class 150 (DR 18) shall be used.

Fittings – Shall be cast iron, cement lined and manufactured to AWWA C907. All fittings shall be supplied with mechanical joint ends.

Brass Fittings

All brass components in any fittings shall be lead free.

Service Connections

All domestic water services shall be 25 mm diameter Type “K” Copper or Polyethylene meeting the requirements of CSA 137.1.

A continuous tracer wire shall be provided along all PE services to permit field tracing of the services. In order to facilitate secure connections for the tracer wire the main stops and curb stops shall be equipped with set screws. The tracer wire shall be connected to the set screw on the main stop and curb stop and shall extend up the curb stop to be accessible from the ground surface. The wire is to be taped to each service at intervals not to exceed 1.0 m. All tracing wires shall be 12 gauge, stranded copper wire complete with outer plastic coating.

Fire Hydrants

Hydrants shall be Mueller ‘Century’, AVK, Clow McAvity or approved equivalent compression type complete three port hydrants with 100 mm, ¼ turn Storz nozzle facing the street. The side ports shall be 65 mm diameter threaded.

Hydrants are to be painted fire engine red. The Storz cap is to be black. Steamer or pumper port threaded connections are to be painted red (same as barrel).

All paint used on hydrants is to be specifically manufactured for this purpose.

Reflective rings colour coded to the hydrant flow classification will be installed on the 65 mm ports by the Town.

All hydrants shall be fitted with anti-tampering devices of a type required by the Town (one anti-tampering device per hydrant).

APPENDIX 2

Valves

All valves shall be Mueller resilient wedge gate valves or equivalent approved by the Town. They shall have a non-rising stem and a 50 mm square operating nut opening counter-clockwise.

All valves on watermains 300 mm in diameter or larger shall be installed inside valve chambers.

All valves on watermains less than 300 mm in diameter shall have three piece, sliding type valve boxes.



APPENDIX 3

Design Storms

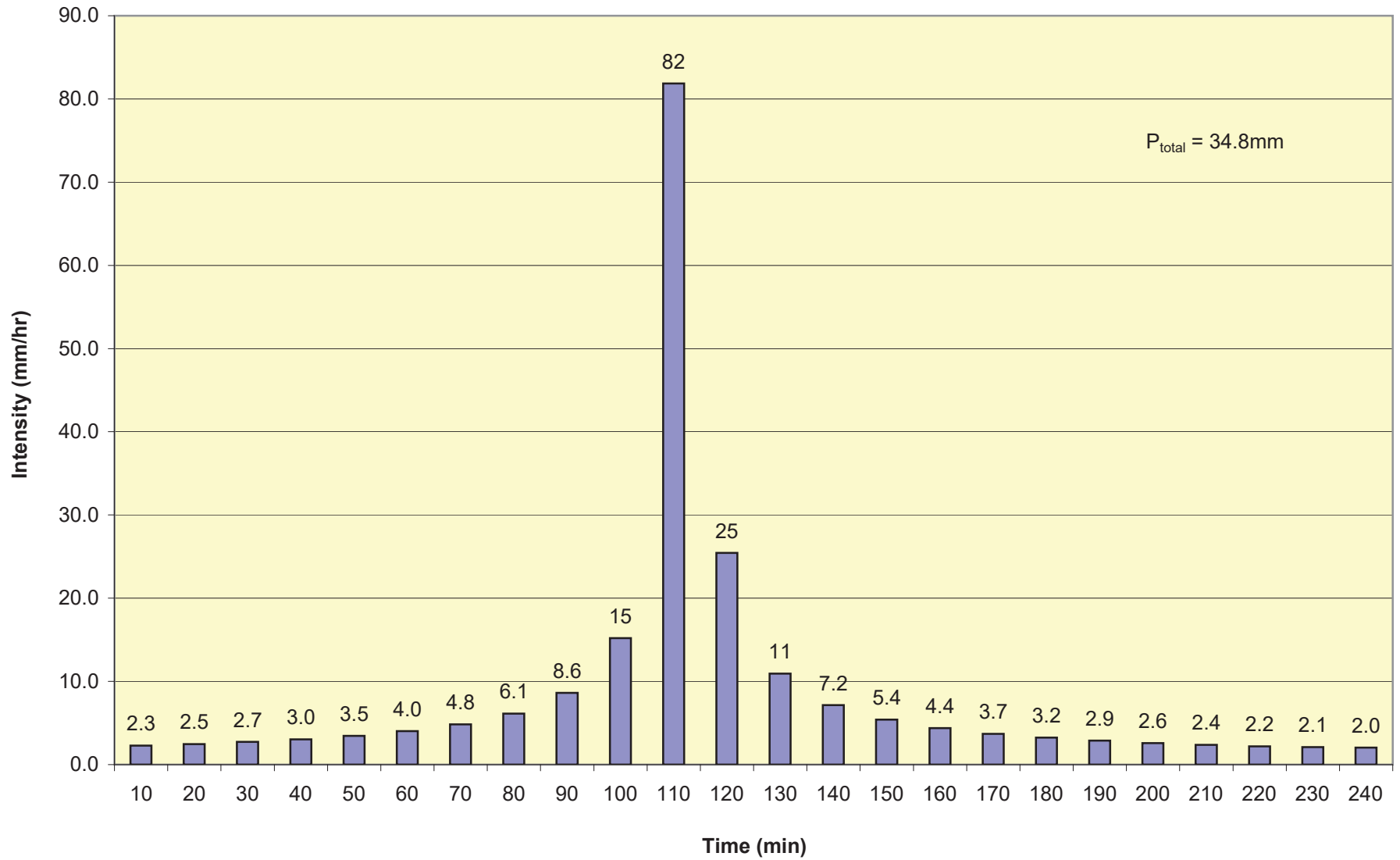
**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

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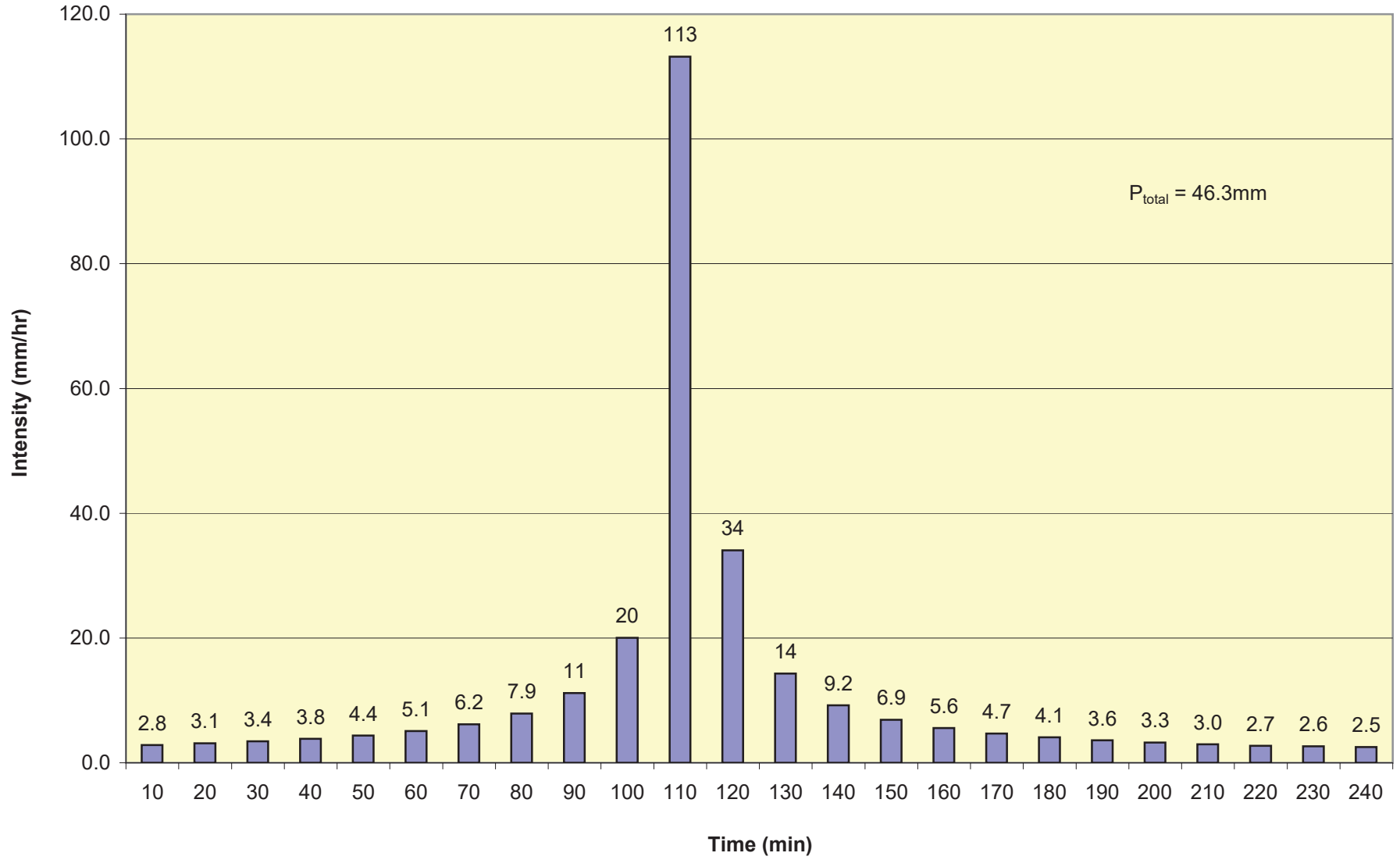
1:2 year 4 hour Design Storm

Peak Flow Analyses (i.e. HGL)



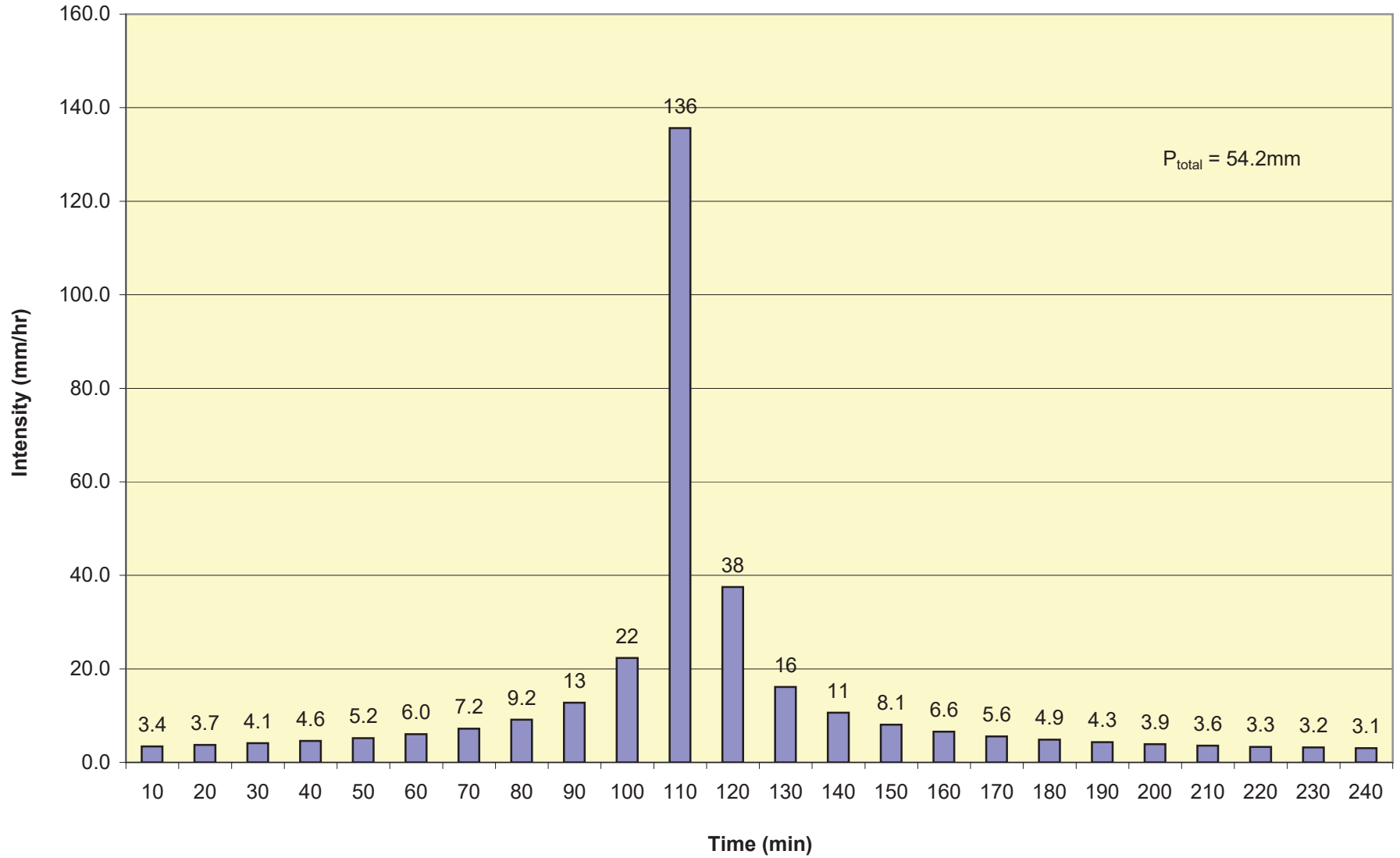
1:5 year 4 hour Design Storm

Peak Flow Analyses (i.e. HGL)



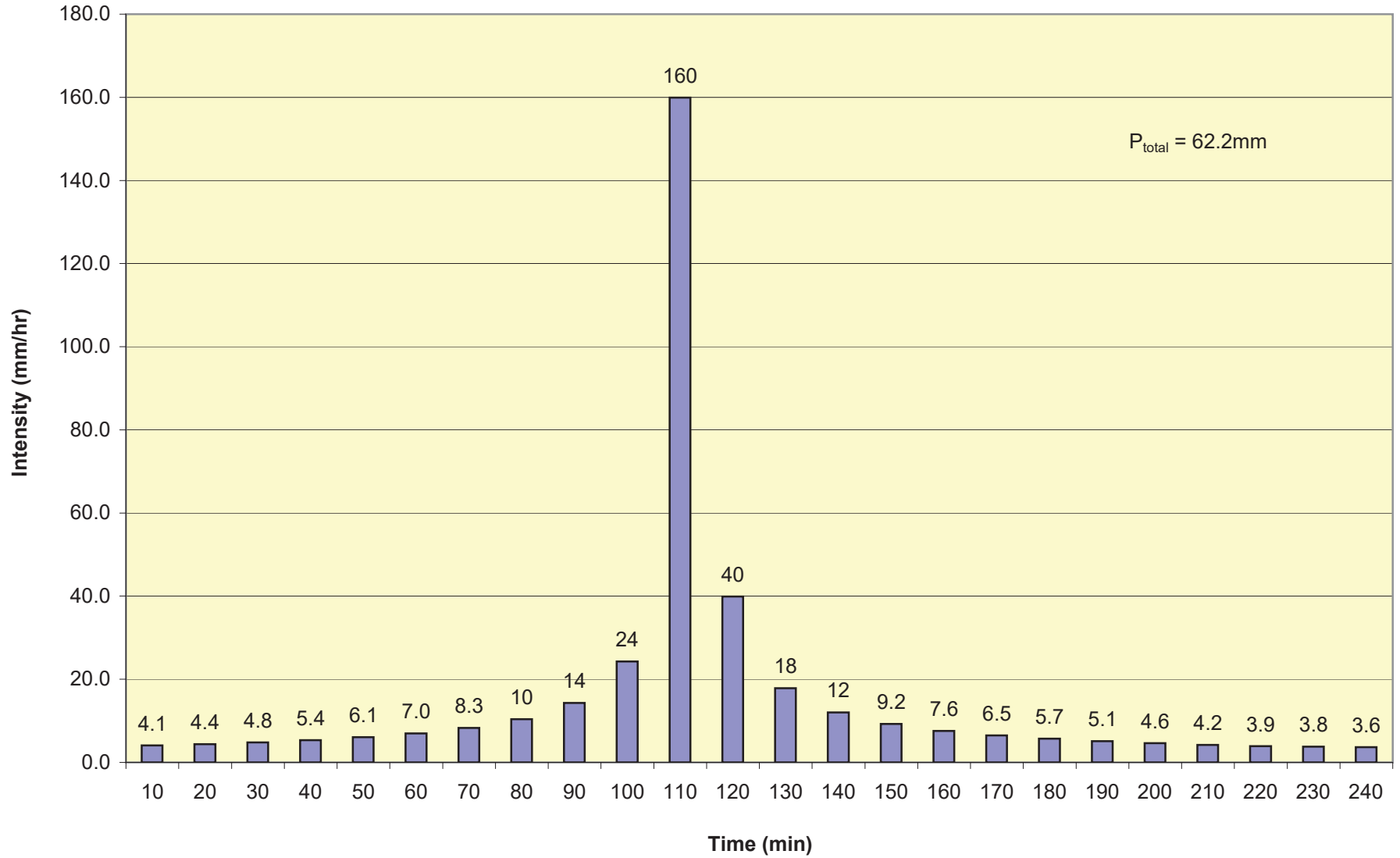
1:10 year 4 hour Design Storm

Peak Flow Analyses (i.e. HGL)



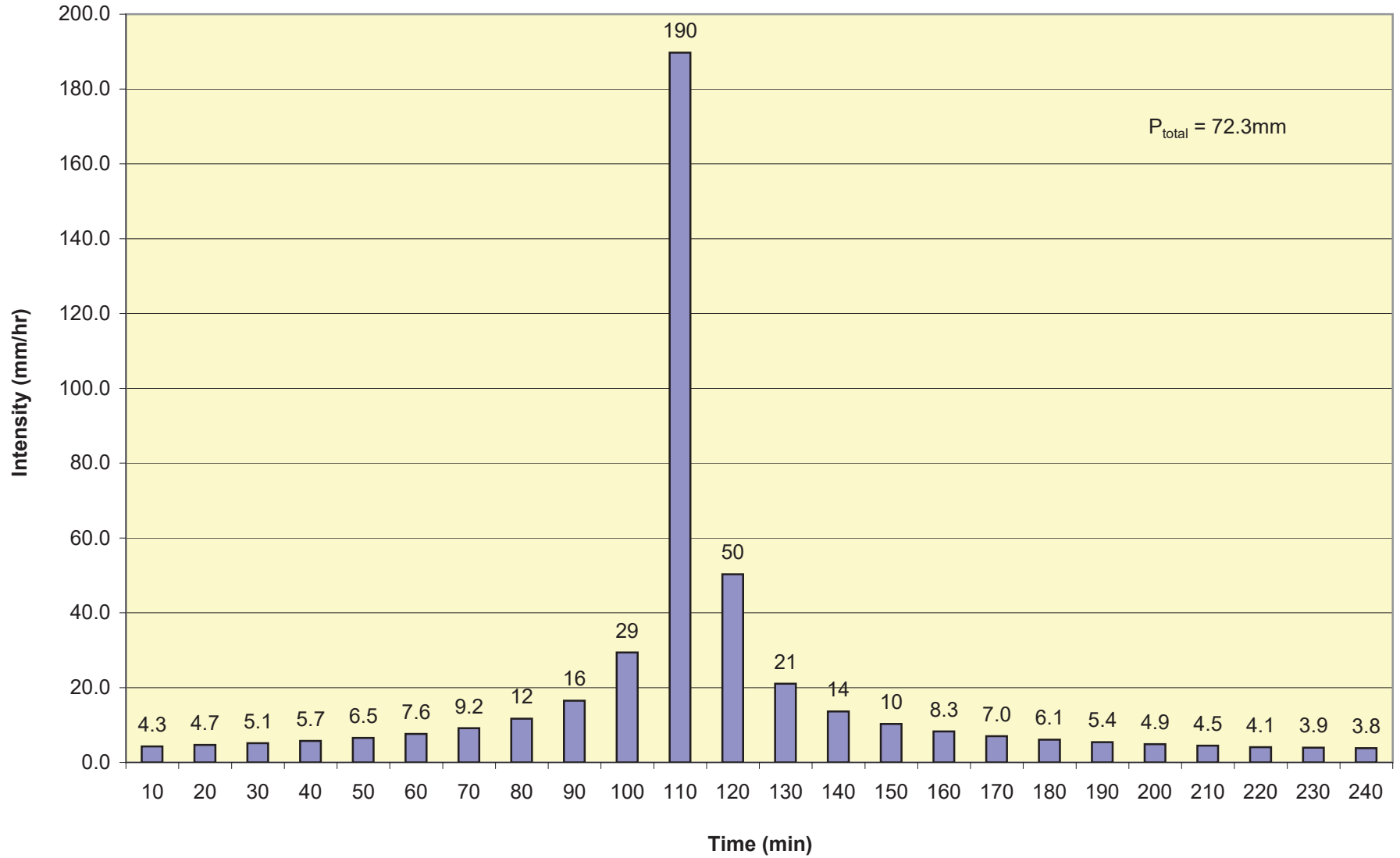
1:25 year 4 hour Design Storm

Peak Flow Analyses (i.e. HGL)



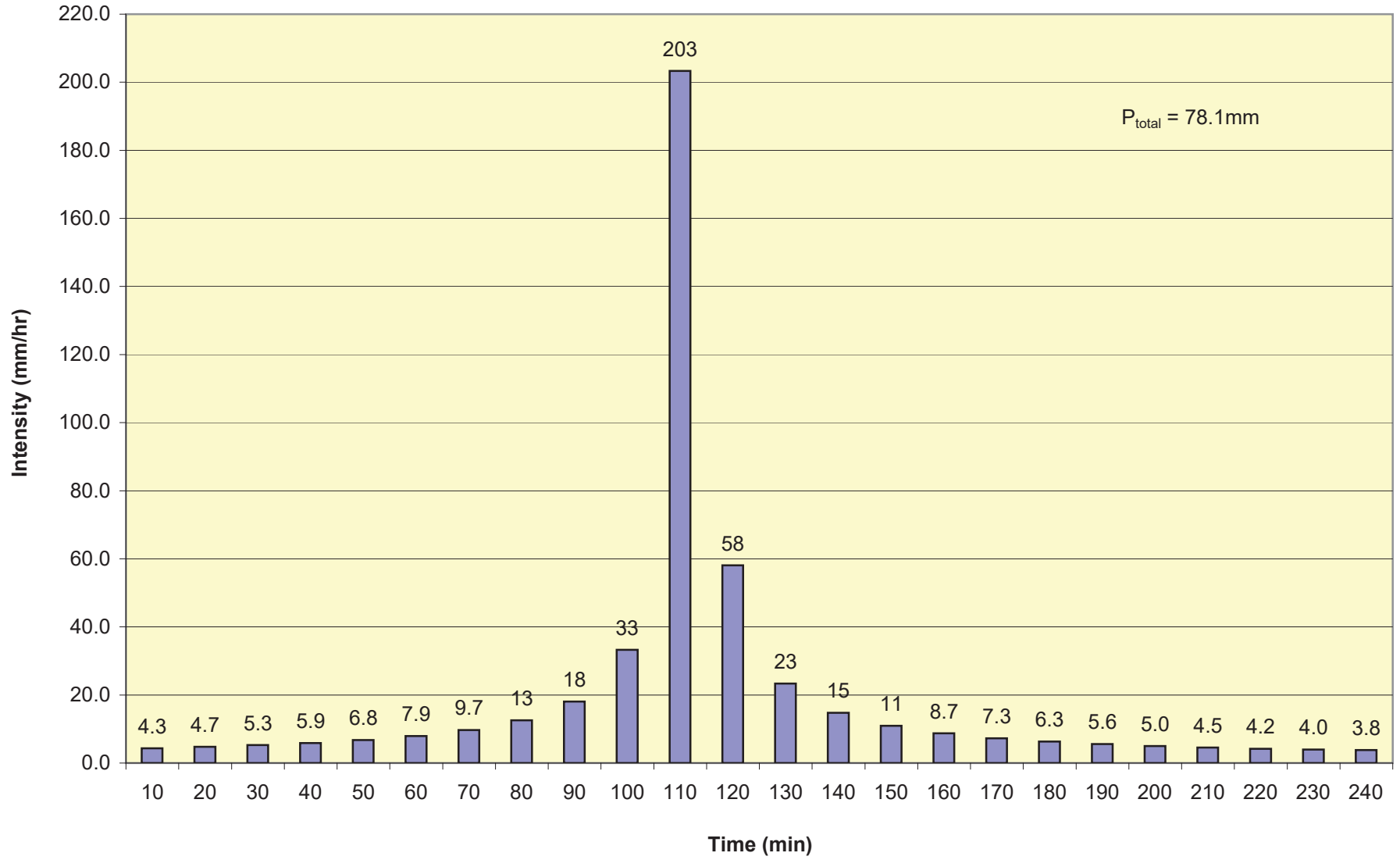
1:50 year 4 hour Design Storm

Peak Flow Analyses (i.e. HGL)



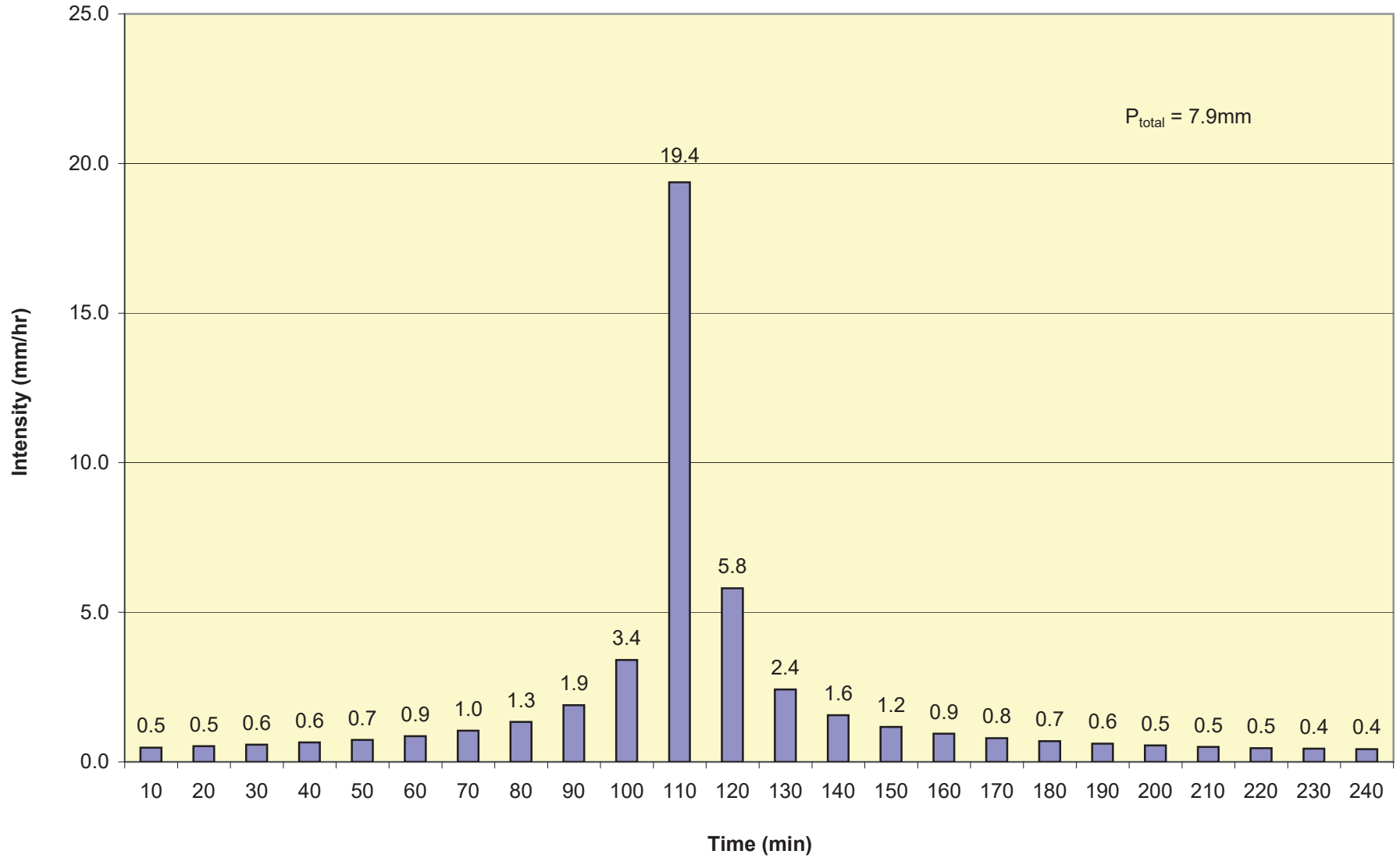
1:100 year 4 hour Design Storm

Peak Flow Analyses (i.e. HGL)



Pond Maintenance Bypass - 4 hour Design Storm

Peak Flow Analyses (i.e. pond bypass)



APPENDIX 3

1:2 Year 24 Hour SCS Design StormP_{total} – 52.12 mm

Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs	Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs
.20	.51	6.20	1.02	12.20	10.67	18.20	.76
.40	.51	6.40	1.02	12.40	6.60	18.40	.76
.60	.51	6.60	1.02	12.60	4.83	18.60	.76
.80	.51	6.80	1.02	12.80	4.57	18.80	.76
1.00	.51	7.00	1.02	13.00	3.30	19.00	.76
1.20	.51	7.20	1.02	13.20	2.79	19.20	.76
1.40	.51	7.40	1.02	13.40	2.79	19.40	.76
1.60	.51	7.60	1.02	13.60	2.79	19.60	.76
1.80	.51	7.80	1.02	13.80	2.79	19.80	.76
2.00	.51	8.00	1.02	14.00	2.79	20.00	.76
2.20	.51	8.20	1.52	14.20	1.52	20.20	.51
2.40	.51	8.40	1.52	14.40	1.52	20.40	.51
2.60	.51	8.60	1.52	14.60	1.52	20.60	.51
2.80	.51	8.80	1.52	14.80	1.52	20.80	.51
3.00	.51	9.00	1.52	15.00	1.52	21.00	.51
3.20	.51	9.20	1.52	15.20	1.52	21.20	.51
3.40	.51	9.40	1.52	15.40	1.52	21.40	.51
3.60	.51	9.60	1.52	15.60	1.52	21.60	.51
3.80	.51	9.80	1.52	15.80	1.52	21.80	.51
4.00	.51	10.00	1.52	16.00	1.52	22.00	.51
4.20	1.02	10.20	3.05	16.20	1.02	22.20	.51
4.40	1.02	10.40	3.05	16.40	1.02	22.40	.51
4.60	1.02	10.60	3.05	16.60	1.02	22.60	.51
4.80	1.02	10.80	3.05	16.80	1.02	22.80	.51
5.00	1.02	11.00	3.05	17.00	1.02	23.00	.51
5.20	1.02	11.20	4.06	17.20	1.02	23.20	.51
5.40	1.02	11.40	5.84	17.40	1.02	23.40	.51
5.60	1.02	11.60	13.21	17.60	1.02	23.60	.51
5.80	1.02	11.80	28.96	17.80	1.02	23.80	.51
6.00	1.02	12.00	60.45	18.00	1.02	24.00	.51

Use to compute stormwater detention volumes.

APPENDIX 3

1:5 Year 24 Hour SCS Design StormP_{total} – 62.43 mm

Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs	Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs
.20	.76	6.20	1.27	12.20	12.19	18.20	1.27
.40	.76	6.40	1.27	12.40	7.62	18.40	1.27
.60	.76	6.60	1.27	12.60	5.59	18.60	1.27
.80	.76	6.80	1.27	12.80	5.08	18.80	1.27
1.00	.76	7.00	1.27	13.00	3.81	19.00	1.27
1.20	.76	7.20	1.27	13.20	3.05	19.20	1.02
1.40	.76	7.40	1.27	13.40	3.05	19.40	1.02
1.60	.76	7.60	1.27	13.60	3.05	19.60	1.02
1.80	.76	7.80	1.27	13.80	3.05	19.80	1.02
2.00	.76	8.00	1.27	14.00	3.05	20.00	1.02
2.20	.76	8.20	1.78	14.20	1.78	20.20	1.02
2.40	.76	8.40	1.78	14.40	1.78	20.40	1.02
2.60	.76	8.60	1.78	14.60	1.78	20.60	1.02
2.80	.76	8.80	1.78	14.80	1.78	20.80	1.02
3.00	.76	9.00	1.78	15.00	1.78	21.00	1.02
3.20	.76	9.20	1.78	15.20	1.78	21.20	.76
3.40	.76	9.40	1.78	15.40	1.78	21.40	.76
3.60	.76	9.60	1.78	15.60	1.78	21.60	.76
3.80	.76	9.80	1.78	15.80	1.78	21.80	.76
4.00	.76	10.00	1.78	16.00	1.78	22.00	.76
4.20	1.27	10.20	3.30	16.20	1.27	22.20	.76
4.40	1.27	10.40	3.30	16.40	1.27	22.40	.76
4.60	1.27	10.60	3.30	16.60	1.27	22.60	.76
4.80	1.27	10.80	3.30	16.80	1.27	22.80	.76
5.00	1.27	11.00	3.30	17.00	1.27	23.00	.76
5.20	1.27	11.20	4.57	17.20	1.27	23.20	.76
5.40	1.27	11.40	6.60	17.40	1.27	23.40	.76
5.60	1.27	11.60	15.24	17.60	1.27	23.60	.76
5.80	1.27	11.80	33.27	17.80	1.27	23.80	.76
6.00	1.27	12.00	69.60	18.00	1.27	24.00	.76

Use to compute stormwater detention volumes.

APPENDIX 3

1:25 Year 24 Hour SCS Design StormP_{total} – 95.96 mm

Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs	Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs
.20	1.02	6.20	2.03	12.20	18.80	18.20	2.03
.40	1.02	6.40	2.03	12.40	11.68	18.40	2.03
.60	1.02	6.60	2.03	12.60	8.38	18.60	2.03
.80	1.02	6.80	2.03	12.80	8.13	18.80	2.03
1.00	1.02	7.00	2.03	13.00	5.59	19.00	2.03
1.20	1.02	7.20	2.03	13.20	4.83	19.20	1.52
1.40	1.02	7.40	2.03	13.40	4.83	19.40	1.52
1.60	1.02	7.60	2.03	13.60	4.83	19.60	1.52
1.80	1.02	7.80	2.03	13.80	4.83	19.80	1.52
2.00	1.02	8.00	2.03	14.00	4.83	20.00	1.52
2.20	1.02	8.20	2.79	14.20	2.79	20.20	1.52
2.40	1.02	8.40	2.79	14.40	2.79	20.40	1.52
2.60	1.02	8.60	2.79	14.60	2.79	20.60	1.52
2.80	1.02	8.80	2.79	14.80	2.79	20.80	1.52
3.00	1.02	9.00	2.79	15.00	2.79	21.00	1.52
3.20	1.02	9.20	2.79	15.20	2.79	21.20	1.02
3.40	1.02	9.40	2.79	15.40	2.79	21.40	1.02
3.60	1.02	9.60	2.79	15.60	2.79	21.60	1.02
3.80	1.02	9.80	2.79	15.80	2.79	21.80	1.02
4.00	1.02	10.00	2.79	16.00	2.79	22.00	1.02
4.20	2.03	10.20	5.08	16.20	2.03	22.20	1.02
4.40	2.03	10.40	5.08	16.40	2.03	22.40	1.02
4.60	2.03	10.60	5.08	16.60	2.03	22.60	1.02
4.80	2.03	10.80	5.08	16.80	2.03	22.80	1.02
5.00	2.03	11.00	5.08	17.00	2.03	23.00	1.02
5.20	2.03	11.20	7.11	17.20	2.03	23.20	1.02
5.40	2.03	11.40	10.41	17.40	2.03	23.40	1.02
5.60	2.03	11.60	23.37	17.60	2.03	23.60	1.02
5.80	2.03	11.80	51.56	17.80	2.03	23.80	1.02
6.00	2.03	12.00	107.44	18.00	2.03	24.00	1.02

Use to compute stormwater detention volumes.

APPENDIX 3

1:100 Year 24 Hour SCS Design StormP_{total} – 112.42 mm

Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs	Time hrs	Rain mm/hr	Time hrs	Rain mm/hrs
.20	1.27	6.20	2.29	12.20	21.84	18.20	2.29
.40	1.27	6.40	2.29	12.40	13.72	18.40	2.29
.60	1.27	6.60	2.29	12.60	9.91	18.60	2.29
.80	1.27	6.80	2.29	12.80	9.40	18.80	2.29
1.00	1.27	7.00	2.29	13.00	6.60	19.00	2.29
1.20	1.27	7.20	2.29	13.20	5.59	19.20	1.78
1.40	1.27	7.40	2.29	13.40	5.59	19.40	1.78
1.60	1.27	7.60	2.29	13.60	5.59	19.60	1.78
1.80	1.27	7.80	2.29	13.80	5.59	19.80	1.78
2.00	1.27	8.00	2.29	14.00	5.59	20.00	1.78
2.20	1.27	8.20	3.30	14.20	3.30	20.20	1.78
2.40	1.27	8.40	3.30	14.40	3.30	20.40	1.78
2.60	1.27	8.60	3.30	14.60	3.30	20.60	1.78
2.80	1.27	8.80	3.30	14.80	3.30	20.80	1.78
3.00	1.27	9.00	3.30	15.00	3.30	21.00	1.78
3.20	1.27	9.20	3.30	15.20	3.30	21.20	1.27
3.40	1.27	9.40	3.30	15.40	3.30	21.40	1.27
3.60	1.27	9.60	3.30	15.60	3.30	21.60	1.27
3.80	1.27	9.80	3.30	15.80	3.30	21.80	1.27
4.00	1.27	10.00	3.30	16.00	3.30	22.00	1.27
4.20	2.29	10.20	6.10	16.20	2.29	22.20	1.27
4.40	2.29	10.40	6.10	16.40	2.29	22.40	1.27
4.60	2.29	10.60	6.10	16.60	2.29	22.60	1.27
4.80	2.29	10.80	6.10	16.80	2.29	22.80	1.27
5.00	2.29	11.00	6.10	17.00	2.29	23.00	1.27
5.20	2.29	11.20	8.13	17.20	2.29	23.20	1.27
5.40	2.29	11.40	11.94	17.40	2.29	23.40	1.27
5.60	2.29	11.60	27.43	17.60	2.29	23.60	1.27
5.80	2.29	11.80	59.94	17.80	2.29	23.80	1.27
6.00	2.29	12.00	126.49	18.00	2.29	24.00	1.27

Use to compute stormwater detention volumes.



APPENDIX 4

Storm Sewer Design Sheet

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

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TOWN OF NEWMARKET STORM SEWER DESIGN SHEET

Project / Subdivision _____
 Consulting Engineer _____
 Project No. _____

Prepared by: _____
 Checked by: _____
 Last Revised: _____

Design Parameters

A = drainage area (ha)
 C = runoff coefficient
 T_c = time of concentration (to be determined in accordance with Section C4.03 of Design Standards and Criteria Manual)

Design Equations

$$I = \frac{2464}{(t + 16)} \quad Q = 2.78 \times A \times C \times I$$

NOTE: Table C-3 of the Design Standards and Criteria Manual is to be referenced for Maximum Allowable Pipe Capacity

Location			Drainage Area Characteristics				Rainfall / Runoff			Sewer Data							Remarks
Street	From	To	Area (ha)	C	AC	Accum. AC	T _c (min)	I (mm/hr)	Flow (L/s)	Diameter (mm)	Length (m)	Slope (%)	Cap. (L/s)	Vel. (m/s)	Sect. Time	Accum. Time	
	MH.	MH.															



APPENDIX 5

Sanitary Sewer Design Sheet

**Town of Newmarket
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May 2023

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TOWN OF NEWMARKET SANITARY SEWER DESIGN SHEET

Project / Subdivision _____
 Consulting Engineer _____
 Project No. _____

Prepared by: _____
 Checked by: _____
 Last Revised: _____

Design Parameters

As per Section E of Design Standards and Criteria

Design Equations

$$M(r) = \frac{1 + \frac{14}{4 + I(P)}}{4 + I(P)} \quad Q(i) = i \times j \quad A \quad Q(d) = j \quad (Q(x))$$

$$M(ind) = 6.6604 \cdot A^{-0.1992} \quad Q(r) = \frac{P \cdot q(r) \cdot M}{86400}$$

NOTE: Table E-I of the Design Standards and Criteria Manual is to be referenced for Maximum Allowable Pipe Capacity

Location				Individual Values						Cumulative Values						Flow Data						Sewer Data												
Street	From		To		Industrial Area (ha)	Commercial Area (ha)	Institutional Area (ha)	Residential Area (ha)	Residential Units #	Residential Population cap.	Industrial P.F. M(ind)	Industrial Area A(ind)	Commercial Area A(c)	Institutional Area A(ins)	Residential P.F. M(r)	Residential Area A(r)	Residential Population P	Industrial Peak Flow (L/s) Q(ind)	Commercial Peak Flow (L/s) Q(c)	Institutional Peak Flow (L/s) Q(ins)	Population Peak Flow (L/s) Q(r)	Peak Extraneous Flow (L/s) Q(i)	Total Design Flow (L/s) Q(d)	Length (m)	Pipe Size (mm)	Type of Pipe	Grade (%)	Full Flow Capacity (L/s)	Full Flow Velocity (m/s)	Actual velocity at design flow (m/s)				
	MH #	Inv	MH #	Inv																														



APPENDIX 6

Lot Grading and Retaining Wall Certification Forms

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

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LOT GRADING CERTIFICATION FORM

Town of Newmarket

Subdivision: _____ Municipal Address: _____

Registered Plan Number: _____ Lot Number: _____

Plot Plan Approval Date: _____

(Indicate date of Director of Engineering Services Memorandum to Chief Building Official)

I hereby certify that I (or a competent representative from this firm on my behalf) have inspected the above noted lot and that:

- the grading generally conforms with that shown on the Approved Plot Plan and Overall Grading Plan for the Subdivision
- a minimum of 150 mm of quality topsoil has been placed and the lot has been sodded in accordance with Town Standards
- curbstop is operational, adjusted to the finished ground level and located outside the limits of the driveway and walkways
- the Ontario Building Code requirements are satisfied with regard to the required finished ground level relative to the exterior foundation wall of the house
- all downspout elbows are a maximum of 100 mm above splash pads
- retaining walls (check one box)
 - no retaining walls are constructed or required on this lot
 - retaining wall certification is attached

This certification is based upon our field investigation which was carried out by

_____ and _____ on
Consultant's Inspector Burnside Representative

(insert date)

Seal and Signature of Developer's Consulting P.Eng.

Date: _____

This Section to be Completed by the Town's Checking Consultant

Date Received: _____

Certificate Reviewed By: _____

Date: _____

Notes: _____

(To be printed on Developer's Consulting Engineer's Letterhead)

RETAINING WALL CERTIFICATION FORM

Town of Newmarket

Subdivision: _____ Municipal Address: _____

Registered Plan Number: _____ Lot Number: _____

Plot Plan Approval Date: _____

(Indicate date of Director of Engineering Services Memorandum to Chief Building Official)

I hereby certify that the retaining wall on the above noted lot has been designed and constructed to my satisfaction in accordance with sound engineering principles and the accepted Engineering drawings as prepared by -----and dated-----and in general conformance to the Town's Standards. I also certify that the construction and inspections were carried out under my supervision, or a competent representative on my behalf, during the construction of the retaining walls. For your records, I have attached the original design, the record drawings, and the inspection reports.

Guards have been constructed (where necessary) in accordance with the requirements of the Ontario Building Code.

Seal and Signature of Developer's Consulting P.Eng.

Date: _____

This Section to be Completed by the Town's Checking Consultant

Date Received: _____

Certificate Reviewed By: _____

On-Site Inspection Carried Out By: _____

Date: _____

Notes: _____



APPENDIX 7

Watermain Commissioning and Testing Procedure

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.



Watermain Commissioning and Testing Procedure



Table of Contents

1.0. Definitions 3

2.0. Introduction 6

 2.1. Municipal Obligations 6

 2.2. Mandatory Submissions..... 6

 2.2.1. Engineering Drawings 6

 2.2.2. Commissioning Plan 7

 2.3. Scheduled Commissioning Appointments 7

 2.4. Site Meetings 7

3.0. Watermain Commissioning Procedure – New Watermain Physically Separated from the Distributions System..... 8

 3.1. Source 8

 3.1.1. Live Taps..... 8

 3.1.2. Cut in “Tee” 9

 3.1.3. Use of Existing Fire Hydrant..... 9

 3.2. Backflow Prevention Assembly..... 10

 3.2.1. Installation and Certification..... 10

 3.2.2. Removal 11

 3.2.3. Exceptions 11

 3.3. Loading and Swabbing 13

 3.4. Flushing for Turbidity and Turbidity Testing 14

 3.5. Hydrostatic Pressure Testing 15

 3.6. Chlorination 16



Watermain Commissioning and Testing Procedure

3.7. De-chlorination	17
3.8. Bacteriological Sampling.....	17
3.9. Installation of Closure Piece/Final Connection for New Watermain Physically Separated from the Distribution System.....	19
4.0. New Watermain – Connections Greater than One Pipe Length (Special Conditions).....	20
5.0. Mandatory Documentation and Submission	22
6.0. Servicing to Condominiums/Private Town homes/Industrial, Commercial, Institutional Buildings ...	22
6.1. Backflow prevention and Town Water Meter (Permanent meter for the civic address).....	23
6.1.1. Private Side Testing.....	23
7.0. New Development - Water Quality Flushing Program	24
7.1. Regulatory Obligations.....	25
7.2. Phasing out of Flushing Program	26
Appendices.....	27
Appendix A: Watermain Commissioning Checklist.....	27
Appendix D: Opening of Isolation Valves.....	35
Appendix E: Commissioning Flowchart	37
.....	37
Appendix F: Backflow Preventer Field Test Report.....	38
Appendix G: Watermain Flushing Maintenance Program - Flushing and Residual Document	41

Table of Figures

Figure 1: Backflow Preventer with Water Meter - Temporary Connection/By-pass set up.....	10
Table 1. Bypass Requirements for Swabbing and Flushing of New Watermains	15
Table 2. Bacteriological Sample Testing Parameters.....	18

1.0. Definitions

ANSI: American National Standards Institute

ANSI/NSF/CAN 60 Standard: Standard for drinking water treatment chemicals listed and approved to be used where there may be contact with potable water systems

AWWA: American Water Works Association

AWWA C651: American Water Works Association Standard for Disinfecting Watermains

Background Bacteria: General bacteria population expressed as colony counts on the total coliform membrane filter

Backflow Prevention By-Law: Town of Newmarket, Council endorsed By-Law 2019-36

Certified Operator: Refers to an MECP Certified Drinking Water Operator for the purpose of this document

CFU/mL: Colony Forming Unit per milliliter as part of microbiological sampling lab results

CFU: Colony Forming Unit

Cross Connection Control Specialist: An individual who has successfully completed an Ontario Water Works Association (OWWA) endorsed Cross Connection Course or approved equivalent

CSA B64: A series published by the Canadian Standards Association, as amended, which covers backflow performance, construction, selection, installation, maintenance, and field testing requirements for backflow preventers

Designated Workforce: Shall be a specialized Watermain Disinfection contractor whose personnel hold valid MECP licenses as water distribution Subsystem Class 1 Operator (minimum) under O.Reg. 128/04 or successors

Drinking Water: Means drinking water within the meaning of the Safe Drinking Water Act

DWWP: Drinking Water Works Permit, which provides a description of the overall drinking water system, and authority to alter the system in a specified way

Form 1: Record of watermain authorized for new drinking water system addition

Form 2: Record of minor modification or replacements to the drinking water system

Heterotrophic Plate Count (HPC): General bacteria population expressed as colony counts on a heterotrophic plate count

Live Tap: Operational task where an industry specific drilling device is used to circular cut and connect to existing potable watermain while under pressure. Can be used to connect a new watermain or new service

MDWL: Municipal Drinking Water License, containing information and rules for Owners/Operator of the System supplying drinking water to Municipalities

MECP: Ministry of the Environment, Conservation and Parks

MECP Watermain Disinfection Procedure: A supporting document for Ontario legislation and regulations related to drinking water. Shall be followed as law as it is referenced to and makes reference to other standards and regulations

mg/L: Milligrams per Liter, can be interchangeable with parts per million (ppm)

NTU: Nephelometric Turbidity Unit, used to measure particles that have the ability to hide bacteria in water

O.Reg. 170/03: Ontario Regulation for drinking water systems under the Safe Drinking Water Act, 2002

O.R.O: An operator designated as Overall Responsible Operator of a subsystem under Section 23; of O.Reg. 128/04

Potable Water (AWWA): Water that does not contain objectionable pollutants or contaminants, and is considered satisfactory for drinking or culinary purposes

ppm: Unit of measurement, known as parts per million, and is interchangeable with mg/L

Reduced Pressure Principal Backflow Preventer (RP): A backflow preventer that consists of a mechanically independent acting, hydraulically dependent relief valve located in a chamber between two independent, force-loaded check valves

Sample Set: Consists of all sample points included in a newly constructed watermain design

Sample Round: Consists of two (2) sets of sample points required to successfully commission a new watermain installation

Town Representative: Means any person assigned to a project by the Town to carry out work on their behalf



Watermain: Any system of pipes and appurtenances used for the distribution of drinking water, but does not include plumbing or a pumping facility

2.0. Introduction

2.1. Municipal Obligations

The Town of Newmarket (the Town) has adopted the Ontario Ministry of the Environment, Conservation and Parks (MECP) *Watermain Disinfection Procedure, 2020* for the commissioning of all new and temporary watermains. In addition to this procedure, the Town has obligations to adhere to the most current versions of the following:

- Municipal Drinking Water License (MDWL) (License Number: 124-101)
- Drinking Water Works Permit (DWWP) (Permit Number: 124-201)
- AWWA Standard C651 – Disinfecting Watermains
- CSA Standards B64.10 and B64.10.1
- Newmarket backflow prevention Bylaw 2019-36

This procedure applies to all watermains of any size including temporary watermains. Service pipes 100 mm in diameter and above shall be considered watermains for the purpose of this procedure.

An MECP Town of Newmarket Certified Operator is required to witness and verify the following commissioning activities:

- All watermain live taps
- Field test and certification of backflow preventers
- Physical separation commissioning process
- Disinfection and sample collection
- Industrial, Commercial, Institutional (ICI) service commissioning (Town portion)

NOTE: Private watermain commissioning is subject to the Developer acquiring an MECP licensed contractor, completing commissioning, and submitting sample results from an approved laboratory.

Appendix A: Watermain Commissioning Checklist is intended to be completed during commissioning and submitted after final connection (with all associated documentation attached) to the Town's Infrastructure Inspector or Water/Wastewater Supervisor.

2.2. Mandatory Submissions

2.2.1. Engineering Drawings

A copy of the Engineering drawings must be submitted to the Town's Infrastructure Inspector and shall include the watermain commissioning area. At a minimum, the plan must contain the necessary servicing information.



Watermain Commissioning and Testing Procedure

A hard copy must be made available for field notes by the Town Certified Operator. Electronic copies can be sent to Public Works Services for retention at publicworks@newmarket.ca.

2.2.2. Commissioning Plan

The commissioning plan must include a copy of a current MECP Certified Operator license/certificate from the Designated Workforce who will be carrying out the specific commissioning work on-site. The plan shall include a thorough breakdown of the required commissioning activities.

All chemicals used for disinfection shall meet AWWA, ANSI/NSF/CAN 60 standards.

NOTE: The review/approval process requires five (5) business days from submission. Missing information or additional document submission will prolong the review/approval process.

2.3. Scheduled Commissioning Appointments

All on-site appointment requests must be scheduled through the Town's Public Works Services Administration with Water/Wastewater Supervisor approval based on the submitted plans and documents noted in Sections 2.2.1. and 2.2.2. A minimum of three (3)-business day notice is required for all commissioning bookings. For processes taking place over the course of multiple days, the entire proposed schedule shall be submitted, reviewed and approved before work can commence.

- Public Works Administration: 905-895-5193 x2500 (Mon. - Fri., 7:30 a.m. to 4:00 p.m.)
- publicworks@newmarket.ca; attention to Water/Wastewater Supervisor and Water/Wastewater Infrastructure Inspector

2.4. Site Meetings

Mandatory site meetings are required prior to beginning commissioning. The Contractor/Developer is responsible for arranging and coordinating all appropriate parties, and should include at a minimum:

- Developer
- Contractor
- Private consultant
- Engineering department
- Public works Representative
- Water/Wastewater Supervisor



3.0. Watermain Commissioning Procedure – New Watermain Physically Separated from the Distributions System

All commissioning and disinfection of new watermains and temporary watermains is to be completed in accordance with the most recent version of the MECP *Watermain Disinfection Procedure, 2020* and AWWA Standard C651.

NOTE: A Certified Water Operator must be present to witness all steps related to disinfection.

All requests for commissioning activities must be scheduled through the Town's Public Works Services Administration, see Section 2.3. for information.

3.1. Source

By-pass installation for new watermain projects can be completed in one of three ways;

- Live-tap with valve connected to the existing water distribution system to be a minimum of 50 mm diameter using the appropriate saddle when connecting to the main (recommended).
- Cut in Tee with valve to connect to the existing water distribution system (recommended for large diameter source applications).
- Use of existing fire hydrant – it will be the responsibility of the Contractor/Developer/Designated Workforce to demonstrate that live-tap/cut in tee are not viable options. Requests will be reviewed on a case-by-case basis and shall be approved by the Water/Wastewater Supervisor.

The Contractor/Developer/Designated Workforce shall follow the MECP's *Watermain Disinfection Procedure, 2020* for cleaning/disinfection and maintaining sanitary conditions at all times.

Irrespective of which option is used, a backflow preventer will be installed and field certified. Only Certified Operators are authorized to operate the tapping sleeve valve. A Certified Operator shall be on-site to witness and receive documentation. If a Certified Operator is not present, the backflow preventer will be re-tested in the presence of the Certified Operator.

3.1.1. Live Taps

The pipe surface at the location of the live-tap shall be cleaned and disinfected using a minimum 1% sodium hypochlorite solution. All tools and appurtenances that may come in contact with the inside of the potable watermain shall be cleaned and disinfected using the same 1% sodium hypochlorite solution.



NOTE: If any tools or pipe come into contact with soil and/or water within the excavation prior to use, the disinfection procedure described shall be repeated.

The live tapping of a watermain that is part of the Drinking Water System must be performed by a Certified Operator; however, a person who is not a Certified Operator may perform wet taps provided they are being directly supervised by a Certified Operator. The name of the Certified Operator present for the wet taps must be recorded.

Service saddles shall be pressurized to 1035 kPa (150PSI) for thirty (30) minutes with no leaks. A watermain coupon (where applicable) shall be provided as proof of completion to a Certified Operator from the Town.

3.1.2. Cut in “Tee”

Where a scheduled shutdown is required, a drawing of the affected area along with a water service interruption notice shall be submitted for approval. A list of potentially affected residents/businesses shall be included and reviewed by Public Works Services. It is the responsibility of the Contractor/Developer/Designated Workforce to provide a minimum forty-eight (48)-hour notice to any affected units upon approval by the Town.

Only a Town Certified Operator is allowed to operate any valves within the potable distribution system.

Sanitary excavation practices shall be carried out and maintained for the duration of the work. Any additional sampling that may be required beyond normal commissioning procedure due to unsanitary excavation procedures or conditions where the inside or potable portion of the watermain is exposed will be done at the cost of the Contractor/Developer. All precautions shall be taken to ensure there is no contamination of the watermain after it is put into service.

The above mentioned Operator shall witness the ‘cut in tee’ process including the cleaning of the watermain surface, pipe cutting and controlled draining, and installation of any required fittings. The pipe surface, all appurtenances, additional pipe, and tools that come into contact with the drinking water shall be disinfected using the 1% sodium hypochlorite solution. If any pipe surface, appurtenances, additional pipe, and/or tools come into contact with soil and/or water within the excavation, the disinfection procedure shall be repeated.

3.1.3. Use of Existing Fire Hydrant

Request for the use of an existing fire hydrant will be reviewed on a case-by-case basis and shall be approved or rejected by the Water/Wastewater Supervisor.

If approved, the Designated Workforce shall follow site-specific disinfection and microbiological sampling requirements prior to using the hydrant as a source. The Water/Wastewater Department and

Designated Workforce shall work together to develop the site-specific disinfection and sampling procedure that is based on the latest MECP requirements.

3.2. Backflow Prevention Assembly

All potable water used for the commissioning procedure that is obtained from the Town's distribution system shall first pass through a bypass equipped with a backflow preventer.

Only Reduced Pressure Principle (RP) backflow preventers are to be used for the purpose of watermain commissioning.

All temporary watermains connected to the Town's municipal drinking water system shall have a bypass with approved backflow preventer installed in accordance with CSA B64 standard (as amended) and manufacturer specifications.

NOTE: The Owner/Contractor/Developer/Designated Workforce who creates an illegal connection shall be liable for all costs associated with any work that is undertaken by the municipality or its agents, to restore the status of the municipal drinking water system including potential charges by the MECP.

3.2.1. Installation and Certification

RP backflow preventers are not permitted to be installed within a trench or below grade structure and must strictly follow installation guidelines set out by the manufacturer and CSA Standard B64 (minimum clearance between the bottom of the backflow preventer and ground surface shall be no less than 300 mm). Town Certified Operators are required to be on-site to witness the field test and certification. Certification shall be carried out by an OWWA Cross Connection Control Specialist with a valid certificate.

NOTE: The Town reserves the right to request proof of valid Cross Connection Control Specialist Tester Certificate of the individual(s) performing the field test.

The Backflow preventer shall be tested at the following times:

- Upon initial installation
- When relocated (see exception below)
- When cleaned, repaired, or overhauled
- As required by the authority having jurisdiction

Backflow preventers shall not be removed unless notice has been given to the town of Newmarket and/or the Towns' Consultant, and must be retested once re-installed. Where possible, the backflow

preventer shall remain in place for the duration of the commissioning procedure, with the exception of being removed for the pressure test.

3.2.2. Removal

The backflow and bypass arrangement must remain in place until the closure piece/final connection installation is complete. Removal requests must be submitted and approved by the Town prior to removal. Premature removal may put the newly commissioned watermain at risk of contamination and be subject to re-commission the site.

3.2.3. Exceptions

As per the *MECP Watermain Disinfection Procedure, 2020* if a backflow preventer is relocated multiple times within the same day, testing is only required for the first installation of the day provided that the backflow preventer is relocated by a Certified Operator who will guard against damage during transit and re-installation.

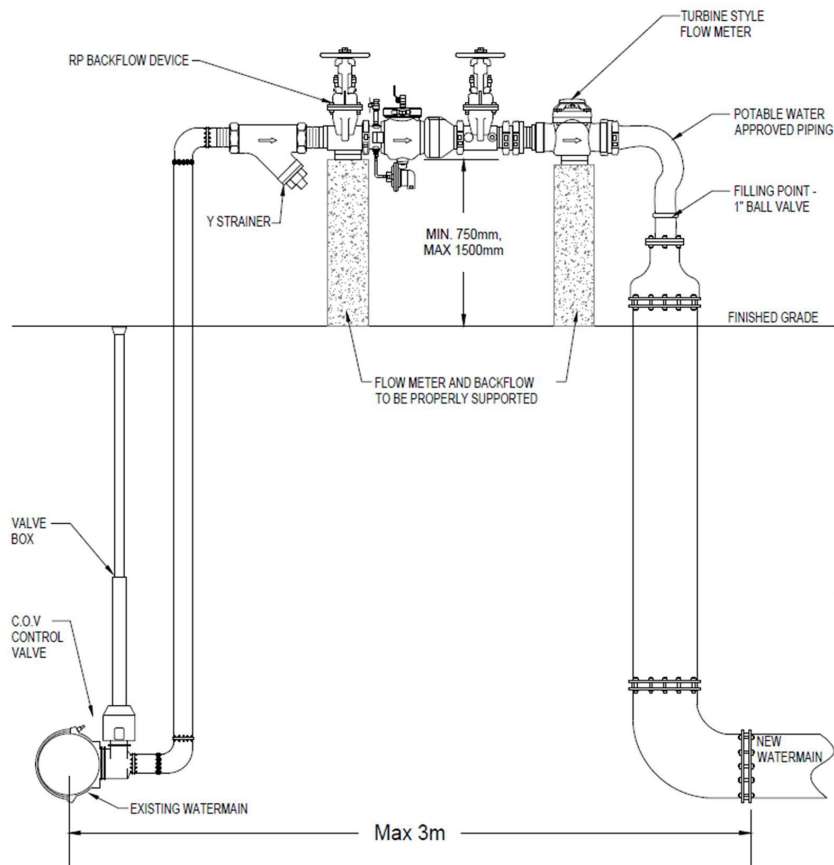
For the purpose of CSA Standard B64.10, a backflow prevention tester's license shall be an Ontario Water Works Association (OWWA) Certified Cross Connection Control Specialist certificate or a Ministry approved equivalent. In addition to the list of professionals in Table 1 of Figure E.1 of CSA Standard B64.10, a Certified Operator or a Water Quality Analyst with a backflow prevention license shall also be authorized to test, relocate, repair or replace backflow preventers used in the installation and commissioning of new watermains.

See Figure 1. Backflow Preventer with water meter - temporary connection/by-pass set up.

Complete and submit a copy of Appendix F: Backflow Preventer Field Test Report.

Watermain Commissioning and Testing Procedure

Figure 1: Backflow Preventer with Water Meter - Temporary Connection/By-pass set up



Notes:

- Backflow device must be a reduced pressure principal assembly (RP) and in conformity with CSAB64.10. Backflow to be supplied and tested by the Applicant.
- Backflow to be field tested by a cross connection control specialist with valid OWWA tester certificate. Town Certified Operator to witness all field testing of the backflow assembly. Backflow must be retested when relocated, repaired, or replaced.
- Backflow device to be removed from bypass piping during watermain pressure tests.
- All new piping and fittings to be disinfected with 1-5% sodium hypochlorite solution according to AWWA C651.
- Only Town Certified Operators to operate hydrant and municipally owned valves. The Applicant/Contractor are not permitted to turn hydrant on/off.
- The Applicant/Contractor to be responsible for any damage to Town and/or private property.
- Freezing protection must be provided and installed by the Applicant when applicable.



Watermain Commissioning and Testing Procedure

Connection Size	
Watermain Size	Minimum Bypass Size
< 150 mm	50 mm
200 mm – 400 mm	100 mm
> 150 mm	Size to be approved by Town

3.3. Loading and Swabbing

All work is to be performed by the Designated Workforce. The Consulting Engineer, Town Representative, and Designated Workforce shall maintain records of the swabs inserted and ensure that all swabs are retrieved. The swabs shall meet the following requirements:

- All swabs shall be new and clean.
- Swabs shall be one (1) size larger than the pipe diameter.
- All swabs shall be marked in the order by which they are launched.
- A minimum of two (2) swabs shall be used per section of watermain. Additional swabs may be used where, and when required.
- All swabs shall be accounted for before moving on to the next commissioning step.
- All pipes within the system, 100 mm and greater, including hydrants and hydrant leads shall be swabbed.

As per AWWA C651, where swabbing cannot be completed due to obstructions such as a butterfly valve, the watermain shall be flushed at a flushing velocity of 0.91 m/sec (3.0 ft./sec). For larger diameter pipes where 0.91 m/sec flushing velocity cannot be achieved, the pipe shall be flushed at maximum flow rate for the line for 2-3 pipe volumes.

NOTE: Flushing is not a substitute for preventative measures during construction. Certain contaminants such as caked deposits resist flushing at any feasible velocity.



3.4. Flushing for Turbidity and Turbidity Testing

All work is to be performed by the Designated Workforce. The Consulting Engineer, Town Representative, and Designated Workforce shall maintain records of flushing and turbidity testing.

Watermain shall be flushed to ensure that any air and/or other foreign material has been removed. The watermain includes all hydrants, service lines, branch connections and sample points. The watermain must be flushed until a turbidity of less than 1.0 NTU is achieved.

NOTE: All discharged water during swabbing and flushing events shall be directed towards sanitary inlets or storm inlets if water is de-chlorinated. It is up to the Contractor to take all necessary measures to prevent flooding and erosion of surrounding properties and any ice buildups during cold weather conditions.

Table 1. Bypass Requirements for Swabbing and Flushing of New Watermains

Pipe Diameter (mm)	Flow Required to Produce 0.76 m/s (approx.) Velocity in Main (L/s)	Site of Tap (mm)			Number of Open 64 mm Hydrant Outlets
		25	38	50	
		Number of Taps on Pipe			
100	6.3	One 50 mm minimum for bypass			1
150	12.6				
200	25.2	-	-	1	1
250	37.9	-	-	2	1
300	56.8	-	-	3	2
400	109.9	-	-	4	2

3.5. Hydrostatic Pressure Testing

All work is to be performed by the Designated Workforce. The Consulting Engineer, Town Representative, and Designated Workforce shall maintain hydrostatic pressure testing records.

The Town and/or Representatives reserve the right to ask for new pressure gauges if the accuracy of the existing gauges are questionable.

Prior to the start of the pressure testing, the new watermain must be fully disconnected and separated from the upstream RP backflow assembly. See 3.2. Backflow Prevention Assembly, for additional notes when backflow is removed. The watermain is to be pressurized to 1,035 kPa (150 PSI) and maintained for two (2) hours. Allowable leakage is based on the following AWWA formula:

$$Q = (L \times D \times \sqrt{P}) \div 795000$$

Where:

- Q = Allowably leakage in liters (L)
- L = Length of pipe in meters (m)
- D = Diameter of pipe in millimeters (mm)
- \sqrt{P} = Square root of the testing pressure in kilopascals (kPa)

Where multiple pipe diameters are present, a calculation shall be made for each varying pipe size and length.

If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be re-tested until a satisfactory result is obtained. All pressure test failures will result in the rescheduling of appointments which may include the retesting and flushing for turbidity (dependent on type of repairs made if required).

NOTE: For Hydrostatic testing on High Density Polyethylene (HDPE) pipe, the test shall include a three (3) to four (4) hour deformation period, maintaining 1,035 kPa for the entire duration. Once the deformation period has been satisfied, the test may begin and shall maintain 1,035 kPa for a period of two (2) hours. The entire hydrostatic test process should be completed within an eight (8)-hour period. If unsuccessful, the pipe shall be de-pressurized and be given an eight (8)-hour rest period before re-testing. Acceptable water loss for HDPE is as per the OPSS 441.07.24.02.

3.6. Chlorination

All work is to be performed by the Designated Workforce. The Consulting Engineer, Town Representative, and Designated Workforce shall maintain chlorination records. The Town requires that the following conditions be satisfied:

- Method: Continuous feed, introduced through the by-pass with backflow preventer using the water from the distribution system.
- Town preferred chlorine concentration range: 50 – 100 mg/L (ppm).
- Minimum contact time: 24 hours.
- Maximum allowable contact time: 36 hours.
- All sample points will have high count readings taken and recorded.
- No flushing shall take place during contact time.

PASS: Watermain contains at least 60% of initial chlorine dosage at all sample points after contact time has passed.



FAIL: Watermain chlorine levels drop by more than 40% of the initial chlorine concentration, to a maximum of 50 mg/L at any single sample point at which point the watermain is to be re-chlorinated. Any re-scheduling will follow Section 2.3. Scheduled Commissioning Appointments.

NOTE: Appropriate ASTM approved high-count chlorine instruments are to be used to verify concentration. Chlorine strips will not qualify as accurate measurements of high count chlorine.

3.7. De-chlorination

All work is to be done by the Designated Workforce. An approved neutralizing agent (sodium Thiosulfate) shall be used to neutralize the super-chlorinated water. The flow will be controlled as to allow for the proper neutralization through the use of dams, diffusers or collection tanks before allowing the water to enter an approved storm, sanitary or natural feature.

Water is to be flushed through all hydrants and sample points with the chlorine being checked by the Workforce until the chlorine residual matches that of the existing distribution system supply location.

NOTE: The Designated Workforce is to ensure that the chlorine residual in the neutralized water does not exceed 0.5 mg/L if disposed of into a sanitary sewer. If disposed of into a storm system or natural watercourse, the Designated Workforce shall ensure that the chlorine residual is reduced to 0.0 mg/L.

3.8. Bacteriological Sampling

All work is to be done by the Designated Workforce. All work is to be witnessed by the Consulting Engineer and/or the Town Representative and a Town Certified Operator.

Scheduling of the sampling is to be done by the Designated Workforce.

Two (2) consecutive sets (Set #1 and Set #2) of passing microbiological samples shall be taken at least sixteen (16) hours apart.

A sample set shall consist of:

- At least one (1) sample every 360 m (1,181 ft) of new watermain.
- This includes one (1) sample from the end of each watermain branch, service line (≥ 100 mm), and dead end.
- Sample points shall be brought above grade with a control valve and made of copper or other approved material. Black iron pipe and galvanized pipe are not permitted.
- All sample points will have a corresponding chlorine residual taken at the same time from the same location as the bacteriological samples.

- Samples must be tested by a licensed and accredited laboratory and tested for all of the parameters identified in Table 2.
- Sample Set #1 must be collected by the Designated Workforce with Town/Consultant/Representative present.
- Sample Set #2 must be collected by the Designated Workforce with Town/Consultant/Representative present, NO LESS than 16 hours following the collection of the last sample taken from Set #1.

PASS: All sample points from a round of sampling; Set #1 AND Set #2 pass testing requirements.

FAIL: A single sample from either Set #1 or Set #2 is positive, and above any of the parameters listed in the table below.

Table 2. Bacteriological Sample Testing Parameters

Parameter	Acceptance Value
Total Coliforms	< 1 CFU/100 ml (milliliter)
E. coli (Escherichia coli)	< 1 CFU/100 ml
Fecal Coliforms	< 1 CFU/100 ml
Background Bacteria	≤ 50 CFU/100 ml
Heterotrophic Plate Count (HPC)	≤ 100 CFU/ 1 ml

NOTE:

- **At the Town’s discretion, the acceptance value for background bacteria and HPC shall be equal to or lower than the sample result from the municipal source.**
- **Interpret < 1 as equal to “zero”.**

An acceptable disinfection concentration (0.25 mg/L of combined chlorine and 0.05 mg/L of free chlorine) must be maintained until the new watermain is placed into service. If the residual is not maintained the microbiological sampling shall be repeated.

3.9. Installation of Closure Piece/Final Connection for New Watermain Physically Separated from the Distribution System

Upon receipt of satisfactory sample results, it is the responsibility of the Contractor/Developer to circulate the lab results and begin the co-ordination of stakeholders to schedule and complete the closure piece and/or connection and remove the bypass. A minimum of three (3)-business day notice is required for the booking of staff to be on-site. Scheduling will follow Section 2.3. Scheduled Commissioning Appointments.

It is the responsibility of the Designated Workforce to ensure a minimum of forty-eight (48) hours written notice is given to any affected residence/business.

The appointment request to the Town of Newmarket shall include, at a minimum:

- A drawing of the affected area showing the affected locations impacted by the watermain shut down.
- A copy of the watermain disruption notice that will be hand delivered to those affected. The notice shall include (but is not limited to):
 - The date and time of notice creation
 - The date and time of the service interruption
 - The estimated duration of service interruption
 - On-site contact information for general inquiries
 - Steps to take when water is restored

NOTE: Connection/closure piece shall be completed as soon as reasonably possibly to ensure secondary disinfection residual remains present. If there is a delay in scheduling, watermain flushing shall occur no more than seven (7) days after the last samples have been collected. Failure to do so may require additional flushing, samples and/or re-commissioning.

Prior to the closure piece/connection, a Certified Operator shall witness the removal of the bypass and backflow preventer. Failure to comply may result in additional bacteriological samples to be taken at Contractor's expense.

A Certified Operator is required to witness the installation of the connection to ensure that sanitary construction practices are followed and proper disinfection is performed.

Closure piece/connection shall not exceed six (6) m with minimal bends and fittings.

As per the *Watermain Disinfection Procedure, 2020* and AWWA C651, all piping must be thoroughly cleaned and disinfected using a minimum 1% sodium hypochlorite solution immediately prior to installation.



Dewatering must be carried out throughout the entire process, failure to do so may result in additional samples being taken up to re-commissioning the pipe depending on the severity of contamination.

A Town Certified Operator shall be the only person authorized to operate any required valves needed to place a new watermain into service.

Once the closure piece/connection is completed, flushing through the connection shall be performed by a Certified Operator. Flushing must continue until a Certified Operator confirms that an acceptable disinfection residual is present.

Upon receipt of satisfactory chlorine residual, all necessary valves shall be opened and watermain can be placed into service.

If applicable, an approved flushing program may commence if required (to be carried out by the Designated Workforce). The Developer shall be responsible for the development and maintenance of the flushing program with monthly reports being submitted to the Town and Consultants on a regular basis.

NOTE: Watermain that is not commissioned and non-potable shall not be used for construction purposes and no service connections shall be permitted.

4.0. New Watermain – Connections Greater than One Pipe Length (Special Conditions)

Requests for connections greater than one (1) pipe length and up to forty (40) m (isolated by a valve from the new watermain to the existing water distribution system) will be reviewed on a case-by-case basis and shall be permitted only if physical separation is not a viable option. It will be the responsibility of the Developer/Contractor to demonstrate that isolation by a valve is the only available option.

This option **MUST** be brought to the attention of the Town’s Engineering Department and Consultant with the Public Works group during the development stages. The decision of the Town will be considered FINAL.

As per the *MECP Watermain disinfection procedure, 2020* this exception procedure may be used if the connection:

- Crosses a transportation corridor, the extended closure of which could result in significant community impacts (ex. traffic congestion, loss of emergency access, additional safety concerns), or;
- Cannot be constructed to within one (1) pipe length of the existing watermain due to the potential for destabilizing an existing thrust block.

If approved, a detailed commissioning plan shall be submitted by the Designated Workforce detailing the procedures in which they plan to ensure the safety and integrity of the Town's distribution system.

Commissioning Plan (as developed by the Town) should include but is not limited to:

- Contact information.
- Copies of valid MECP Certified Operator license/certificates for individuals conducting the work.
- Temporary service/by-pass size utilized for commissioning.
- Swabbing method and quantity of swabs.
- Flushing method including discharge location(s) and method(s) of control for chlorine removal.
- Pressure test detail including calculated allowable leakage.
- Method of chlorination, including de-chlorination, chlorine residual neutralization and discharge locations.
- Map or drawing highlighting flushing and swabbing runs, and sample point locations.
- Approximate timeline or schedule of events (for scheduling purposes).

Request to use the exception method shall be submitted to The Town's Engineering Department, Consultant and Water/Wastewater Supervisor for review and approval. Upon approval, the following steps shall be strictly adhered to:

- A Town Certified Operator shall be the only person authorized to operate any required valves needed to carry out this procedure.
- A Town Certified Operator will be required to witness all steps within the procedure.
- All pipe(s) and fittings shall be disinfected using a 1% sodium hypochlorite solution immediately prior to installation. If any pipe and or fitting comes into contact with soil or water from within the excavation, the disinfection shall be repeated.
- The connection shall remain isolated from the remainder of the newly installed watermain except while being flushed or sampled, until satisfactory results have been achieved.

NOTE: Only Town Certified Operators shall be permitted to operate the control valve.

- Similar steps as described above shall be carried out for the commissioning of the connection (see Sections 3.3. to 3.8. for expanded procedures).
- The watermain must be flushed until a turbidity below 1.0 NTU has been achieved.
- One (1) round, consisting of two (2) sets of passing microbiological samples shall be taken at least sixteen (16) hours apart (no flushing can occur during the sixteen (16) hour waiting period).
- Hydrostatic testing of the connection shall not be undertaken until satisfactory lab sample results and documentation have been received.
- Connection shall be tested at 1,035 kPa for a period of two (2) hours and the AWWA allowable leakage calculation will be used (see Section 3.5.).

- Upon pressure test completion, a Town Certified Operator may open the control valves and flush the watermain through the connection piece making it part of the distribution system.

NOTE: For Microbiological (bacteriological) sample failures, the Town will review case-by-case and provide guidelines that must be followed.

5.0. Mandatory Documentation and Submission

Upon project completion, all proposals/forms specified in this document as part of new watermain commissioning shall be submitted to the Town Consultant and Public Works for legislative record retention.

Documents shall include at a minimum:

- Appendix A: Watermain Commissioning Checklist
- Appendix B: Chlorine Residuals
- Appendix C: Operation of Isolation Valves
- Appendix D: Opening of Isolation Valves
- Watermain disinfection plan, including site map
- Initial Backflow preventer (RP) field test certification report
- Swabbing records
- Flushing records
- Hydrostatic testing completion and any allowable leakage volumes (in commissioning plan)
- Disinfection records; turbidity, chlorine readings (high count, drop down after contact time), in addition to Appendix B: Chlorine Residuals
- Laboratory sample results and associated chain of custody forms

6.0. Servicing to Condominiums/Private Town homes/Industrial, Commercial, Institutional Buildings

As per the MECP *Watermain Disinfection Procedure, 2020* service pipes of 100 mm and greater shall be considered as watermains for the purpose of this procedure. Commissioning steps will be similar to those used for commissioning all other watermain that make up part of the Newmarket distribution system.

Water services up to 75 mm require flushing and chlorine residual testing in the presence of a Town Certified Operator. The chlorine residual shall be representative of the local system zone it is connected to.



Watermain Commissioning and Testing Procedure

For the purpose of this procedure, it will be assumed that the watermain will be commissioned in two (2) phases:

- The Town portion first
- The private side once the Town portion has been made potable

A Town Certified Operator must be present to witness all work on the Town's portion of the service. This includes:

- Source (Section 3.1.)
- Live tap (Section 3.1.1.)
- Loading and Swabbing, see (Section 3.3.)
- Hydrostatic testing (Section 3.5.)
- Chlorination and de-chlorination (Sections 3.6. and 3.7.)
- Bacteriological Sampling (Section 3.8.)

Lots with zero setback will be reviewed on a case-by-case basis and shall only be permitted if lot line separation is not a viable option. It will be the responsibility of the Developer to demonstrate that physical separation is not possible at the property line and arrange for meetings with the Town's Engineering Department and Public Works Departments for approvals.

Failure to comply may result in the re-commissioning of any or all of the steps required.

6.1. Backflow prevention and Town Water Meter (Permanent meter for the civic address)

Once the watermain is commissioned on the Town side, a backflow preventer and meter are to be installed without delay (if premise isolation or property line metering are part of the approved servicing plan). Service plan design and layouts are provided by the Engineering Department and can be found here:

<https://www.newmarket.ca/LivingHere/PublishingImages/Pages/Planning%20and%20development/Engineering-Design-Standards/Newmarket%20Engineering%20Design%20Criteria%20Aug%202019%20SECURED.pdf>

Consult the following departments for design assistance:

- Engineering Services (design drawings and layouts)
- Public Works Services (meter purchase/delivery and account set up)

6.1.1. Private Side Testing

A Contractor who employs an MECPC Certified Operator shall complete the private side commissioning.

Commissioning must be completed with complete separation at the property line by using an approved backflow preventer (see Section 3.2. - Backflow Prevention Assembly).

All water used for the commissioning of the service must be obtained from the Newmarket distribution system and shall pass through an approved backflow preventer.

Upon receiving satisfactory sample results taken from the private side portion of the service, the closure piece/connection shall be made within seven (7) days of the sample being taken. It is the responsibility of the Developer/Designated Workforce to coordinate and schedule the work.

If this cannot be completed, the Designated Workforce shall provide service line flushing for the purpose of maintaining secondary disinfection until the closure piece/connection can be scheduled and completed. (See Section 3.9. Installation of Closure Piece/Final Connection of New Watermain Physically Separated from the Distribution System).

The bypass/backflow preventer must remain on site until a request to remove or dismantle it has been formally made to the Public Works Services Water Division.

Any Owner, Contractor or Developer who creates an illegal connection to the Town's distribution system shall be liable for all costs associated with the work undertaken by the Town or its agents, which can include complete re-commissioning of the service or to restore the status of the municipal drinking water system and any potential charges made by the MECP. This shall be determined by the Water/Wastewater Supervisor.

NOTE: If secondary disinfection is not maintained or closure piece/connection is not completed within the fifteen (15) days allotted from the date of sample collection, additional samples may be required and all associated costs will be passed on to the Developer/Contractor.

7.0. New Development - Water Quality Flushing Program

It is the sole responsibility of the Developer to ensure that the newly constructed watermain maintains the regulated secondary disinfection, chlorine residuals, set out as required per Ontario Regulation 170/03.

If it is (pre)determined that the new development will require a flushing program, it will be the responsibility of the Developer to submit a flushing program plan for approval which clearly identifies flushing points, discharge locations, sampling/residual locations (they may be the same location, but must be clearly marked and identified if being utilized for multiple activities).

A qualified MECP Certified Contractor shall submit copies of valid MECP Operator certificates specific to the employees who may operate appurtenances as part of flushing program.

If unidirectional flushing is to occur, a plan including a map must be submitted which clearly identifies valves and hydrants that will be operated to carry out the various runs.

Please refer to and use Appendix G: Watermain Flushing Maintenance Program - Flushing and Residual Document when submitting chlorine residual and flushing data.

NOTE: All valves used will be returned to their normal operating position at the end of each day.

The flushing program is to commence no later than fifteen (15) days after closure piece/connections have been completed, making the watermain part of the Newmarket municipal distribution system.

The site is now subject to adverse water quality reporting if chlorine residuals are found to be outside of the regulated allowable limits set out in O.Reg. 170/03.

If chlorine residual is found to be adverse, the approved Contractor shall follow all required reporting requirements as per O.Reg. 170/03, and shall immediately notify the Water Quality Services branch within the Public Works Water Department by calling customer service at 905-895-5193.

All flushing data shall be submitted to the Town Consultant and Water Department monthly.

Appendix G: Watermain Flushing Maintenance Program - Flushing and Residual Document shall be used to document all data deemed essential to Public Works Water Department.

7.1. Regulatory Obligations

The Town operates a chloraminated municipal drinking water system. As such, our regulatory limits with respect to chlorine residuals are as follows:

- Minimum Combined Chlorine residual shall be higher than 0.25 mg/L (total chlorine – free chlorine = combined chlorine residual).
Note – if Free Chlorine is above 0.05 mg/L, it is not considered adverse, even if the combined is less than 0.25 mg/L
- Maximum Combined Chlorine residual shall be lower than 4.0 mg/L (the Town has regulatory relief granted by the MECP).
- If an adverse residual is obtained outside of either the minimum or maximum range as described above, the Town shall be notified immediately by contacting customer service 905-895-5193, someone from the Water Department must be spoken to directly and followed up with an email to publicworks@newmarket.ca as soon as possible. **Flushing must continue until an acceptable residual is obtained and is found to be satisfactory with respect to adverse residual limits.**



NOTE: If the combined chlorine is less than 0.25 mg/L and the Free Chlorine is equal to or greater than 0.05 mg/L, the result is NOT adverse and does not need to be reported.

7.2. Phasing out of Flushing Program

The reduction and/or phasing out of a flushing program will be determined on a case-by-case basis. Consideration will be determined based on factors including but not limited to occupancy, build out, and the presence of any dead end watermain (either as part of design, or built for future development), and water turnover rate.

Submitted flushing data will be reviewed in support of the water turn over factor as listed above in assisting in determining if the program can be reduced or ended.



Appendices

Appendix A: Watermain Commissioning Checklist

Project Name:

Date:

Town File No.:

Contractor/ Workforce:

Consulting Engineer:

Item	Procedure	Responsible Designate	Completion Date	Witness (Initial)	Attached
2.2.1.	Engineering Drawings	Consulting Engineer/Developer			<input type="checkbox"/> Yes <input type="checkbox"/> No
2.2.2.	Commissioning Plan	Consulting Engineer/Developer			<input type="checkbox"/> Yes <input type="checkbox"/> No
3.2.	Backflow Prevention Assembly (field test certificate)	Consulting Engineer Workforce Town			<input type="checkbox"/> Yes <input type="checkbox"/> No
3.3.	Loading and Swabbing	Consulting Engineer Workforce Town			<input type="checkbox"/> Yes <input type="checkbox"/> No

Watermain Commissioning and Testing Procedure

Item	Procedure	Responsible Designate	Completion Date	Witness (Initial)	Attached
3.4.	Flushing for Turbidity and Turbidity Testing	Consulting Engineer Workforce Town			<input type="checkbox"/> Yes <input type="checkbox"/> No
3.5.	Hydrostatic Pressure Testing	Consulting Engineer Workforce Town			<input type="checkbox"/> Yes <input type="checkbox"/> No
3.6.	Chlorination	Consulting Engineer Workforce Town			<input type="checkbox"/> Yes <input type="checkbox"/> No
3.7.	De-chlorination	Consulting Engineer Workforce Town			<input type="checkbox"/> Yes <input type="checkbox"/> No
3.8.	Bacteriological Sampling	Consulting Engineer Workforce Town			<input type="checkbox"/> Yes <input type="checkbox"/> No
3.9.	Installation of Closure Piece/Final Connection	Overall Responsible Operator Town			N/A



Consulting Engineer's Certification

We hereby certify that the Workforce carrying out the above noted works is licensed, by the MECP as an Operator, and that these works have been completed in accordance with the Town of Newmarket Procedures for New Watermains.

Consulting Engineer and/or Representative's Signature

cc: Town Municipal or Plumbing Inspector and Town



Appendix B: Chlorine Residual

Project Name:

Date:

Town File No.:

Contractor/ Workforce:

Consulting Engineer:

Watermain Supply:

Method of Disinfection:

Time disinfection started:

Time disinfection ended:

NOTE: Chlorine residuals are to be confirmed with an approved high count testing device, litmus paper is not acceptable.

NOTE: If the difference between the high count and 24-hour count is greater than 50 mg/L or 40% depending on high count amount, it will be considered a fail Low Count refers to the normal chlorine residual in the area.

Location or Sample Number	Turbidity Count, NTU's	High Count, mg/L	24-hr Count, mg/L	Low Count, mg/L	Decrease (%)	Sampler name



Watermain Commissioning and Testing Procedure

Location or Sample Number	Turbidity Count, NTU's	High Count, mg/L	24-hr Count, mg/L	Low Count, mg/L	Decrease (%)	Sampler name



Watermain Commissioning and Testing Procedure

Location or Sample Number	Turbidity Count, NTU's	High Count, mg/L	24-hr Count, mg/L	Low Count, mg/L	Decrease (%)	Sampler name

Consulting Engineer and/or Representative's Signature



Appendix C: Operation of Isolation Valves

Date: _____ Town File No.: _____

Memo To: Water/Wastewater Supervisor
Maintenance and Operations Section and Town

From: Consulting Engineer or his/her Representative

Subject: OPERATION OF ISOLATION VALVES

Project Name: _____

Name of Designated Workforce: _____

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, Date Requested: _____

Removal of Super chlorinated Water, Date Requested: _____

Please, confirm the date requested for the opening of the isolation valves by Certified Maintenance and Operations staff.

The Consulting Engineer or his/her representative and Town will be on-site to verify the isolation valves to be operated.

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



Watermain Commissioning and Testing Procedure

Consulting Engineer and/or Representative's Signature

Confirmation by Town Inspection Staff

Municipal or Plumbing Inspector Signature



Appendix D: Opening of Isolation Valves

Date: _____ **Town File No.:** _____

Water/Wastewater Supervisor

Memo To: Maintenance and Operations Section and Town

From: Municipal Inspector or Plumbing Inspector and Town

Subject: OPERATION OF ISOLATION VALVES

Project Name: _____

This is to notify the Maintenance and 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 & Checklist" have been completed.

Appendix A: Watermain Commissioning Checklist Received (date): _____

Date Requested For Opening Isolation Valves: _____

Location of Isolation Valves:

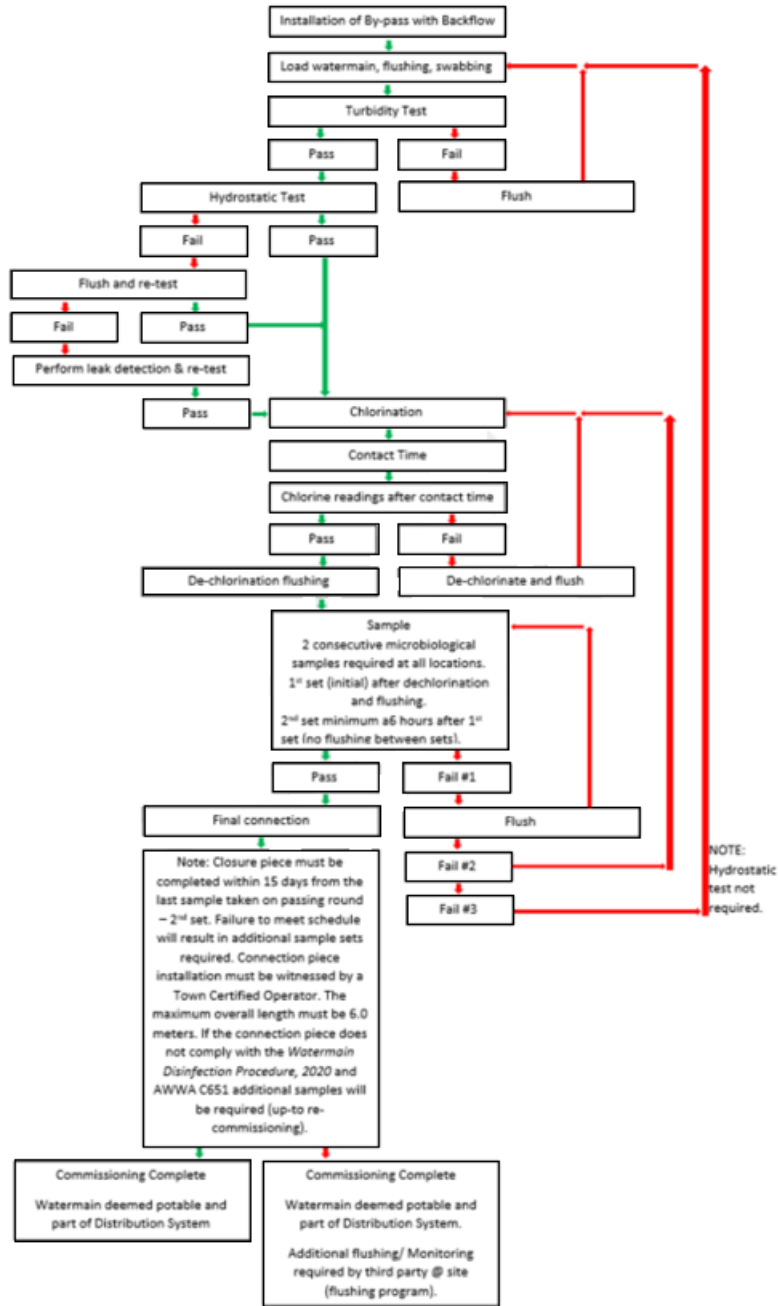


Watermain Commissioning and Testing Procedure

(Plan highlighting the location of valves to open and section of watermain or water service to be put on line is attached.)

Signature of Municipal Inspector or Plumbing Inspector

Appendix E: Commissioning Flowchart





Appendix F: Backflow Preventer Field Test Report

Contact Information			
<u>Project/Development Name:</u>	<u>Developer:</u>	<u>Project Number:</u>	
<u>Qualified Person Name:</u>		<u>OWWA Cert #:</u>	
<u>Test Kit Make:</u>	<u>Test Kit Model #:</u>	<u>Test Kit Serial #:</u>	<u>Date of last Calibration:</u> yyyy / mm / dd
<u>Business Name:</u>	<u>Business Address:</u>	<u>Postal Code:</u>	<u>Phone Number:</u>
Backflow Prevention Device information			
<u>Device Make:</u>	<u>Device Model:</u>	<u>Device Serial #:</u>	
<u>Device Size:</u>	<u>Device Orientation:</u> Horizontal <input type="radio"/> Vertical <input type="radio"/>	<u>Install Date:</u> yyyy / mm / dd	
<u>Location of backflow preventer on-site:</u>			
<u>Reason for Test:</u> Initial Set Up <input type="radio"/> Removed/Depressurized <input type="radio"/> Repaired <input type="radio"/>		<u>Type of Device:</u> RP <input type="radio"/> DCVA <input type="radio"/>	
NOTE: For watermain commissioning, RP backflow preventer is the ONLY style permitted.			



Watermain Commissioning and Testing Procedure

Test		
RP Model		
Differential Pressure Relief Valve	Check Valve 1	Check Valve 2
Failed to open <input type="radio"/> Opened <input type="radio"/> Opened @ _____ PSI/kPa	Leaked <input type="radio"/> Closed tight <input type="radio"/> Pressure differential across Check Valve 1 PSI/kPa _____	Leaked <input type="radio"/> Closed tight <input type="radio"/> Pressure differential across Check Valve 2 PSI/kPa _____
DCVA Model		
Check Valve 1	Check Valve 2	
Leaked <input type="radio"/> Closed tight <input type="radio"/> Pressure drop across Check Valve 1 PSI/kPa _____	Leaked <input type="radio"/> Closed tight <input type="radio"/> Pressure drop across Check Valve 2 PSI/kPa _____	
<u>Static Inlet line pressure at time of test (PSI/kPa):</u>	<u>Test Result:</u> PASS <input type="radio"/> FAIL <input type="radio"/>	<u>Test Date:</u> yyyy / mm / dd
<u>Signature of Qualified Person/Tester:</u>		<u>Date:</u> yyyy / mm / dd
<u>Signature of Inspector:</u>		<u>Date:</u> yyyy / mm / dd



Watermain Commissioning and Testing Procedure

Comments:



Appendix G: Watermain Flushing Maintenance Program - Flushing and Residual Document

Development Name		Flushing Contractor Contact Information	
Development Location		Name	
Flushing Contractor		Phone Number	

Date mm/dd/yyyy	Flushing/Residual Location	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Combined Chlorine (mg/L)	Volume Flushed (m³)	Operator Name (please print)



Watermain Commissioning and Testing Procedure

Date mm/dd/yyyy	Flushing/Residual Location	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Combined Chlorine (mg/L)	Volume Flushed (m ³)	Operator Name (please print)
Comments:						



APPENDIX 8

Warrants for All Way Stop Signs (PWPOL17)

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

**POLICY FOR STOP SIGN & OTHER TRAFFIC CONTROL MEASURE
REQUESTS BY RESIDENTS**

PURPOSE:

TO CLEARLY SET OUT THE PROCEDURES TO BE FOLLOWED FOR CONSIDERING REQUESTS FROM RESIDENTS FOR STOP SIGNS OR OTHER TRAFFIC CONTROL MEASURES.

PROCEDURES:

STAFF WILL REVIEW REQUESTS FROM RESIDENTS FOR STOP SIGNS OR OTHER TRAFFIC CONTROL MEASURES AND PROCEED AS FOLLOWS:

1. PETITIONS:

IF A REQUEST FOR STOP SIGNS OR OTHER TRAFFIC CONTROL MEASURES IS IN THE FORM OF A PETITION, A STAFF REPORT AND RECOMMENDATIONS WILL BE SUBMITTED TO COMMITTEE.

2. INDIVIDUAL REQUEST:

IF A STOP SIGN OR OTHER TRAFFIC CONTROL MEASURE IS REQUESTED BY A RESIDENT, SAID REQUEST WILL BE DEALT WITH BY STAFF AND ONLY REPORTED TO COMMITTEE IF A BYLAW IS BEING RECOMMENDED. OTHERWISE, STAFF WILL TAKE THE APPROPRIATE ACTION AND ADVISE THE RESIDENT OF SAID ACTION.

3. STOP SIGN WARRANTS:

THE TOWN OF NEWMARKET WARRANTS FOR STOP SIGNS (ATTACHED) WILL BE USED FOR THE REVIEW OF STOP SIGN REQUESTS.

4. OTHER TRAFFIC CONTROL MEASURES:

OTHER TRAFFIC CONTROL MEASURES SUCH AS PARKING AND STOPPING RESTRICTIONS WILL BE REVIEWED AND ANALYZED BASED ON TOWN PARKING GUIDELINES (ATTACHED), OTHER MANUALS OF PRACTICE, AND SOUND ENGINEERING PRACTICE.

Attachment

FILENAME	DATE	REVISIONS
OPPOL17	1998 09 14	OPERATIONS & FIRE COMMITTEE MEETING JUNE 24, 1998/COUNCIL JULY 13, 1998
	1998 10 05	FOR CLARIFICATION
	2001 03 07	HOUSEKEEPING
PWPOL17	2004 09 15	HOUSEKEEPING

TOWN OF NEWMARKET
WARRANTS FOR ALL WAY STOPS

NOTE: These warrants to be used in conjunction with the M.T.O. **Guidelines and Warrants for Stop Signs.**

WARRANT #1

Where traffic signals are warranted and urgently needed - the ALL WAY STOP control is an interim measure that can be installed to control traffic while arrangements are being made to have the signals installed.

WARRANT #2

An accident problem - as indicated by three or more REPORTED accidents during a 12 month period - of types susceptible to correction by an ALL WAY STOP installation will warrant the approval of that control. (Such reported accidents shall include right and left turn collisions as well as right angle collisions.)

WARRANT #3

(Minimum traffic volumes - the lowest percentage of 3(a) and 3(b) governs this warrant - must be minimum of 100% for all-way to be warranted)

When either of the roads is an ARTERIAL road - an ALL WAY STOP is not recommended because of the high traffic volumes involved. In such cases a study will be conducted to determine the need for automatic traffic signals.

3(a) ALL APPROACH VOLUME -

When either of the roads is a COLLECTOR road - the total vehicular volume* entering the intersection must average not less than 500 vehicles per hour during the hours from 7:00 a.m. to 9:00 a.m. and 3:30 p.m. to 5:30 p.m.

When both of the roads are RESIDENTIAL - (LOCAL) - the total vehicular volume* entering the intersection must average not less than 250 vehicles per hour during the hours from 7:00 a.m. to 9:00 a.m. and 3:30 p.m. to 5:30 p.m.

* If there is a SCHOOL within 100 meters of the intersection - the pedestrian volume crossing the major street shall be combined with the vehicular volumes and the two highest consecutive hours between 3:00 p.m. and 6:00 p.m. will be considered the p.m. peak for the purpose of the study.

3 (b) MINOR ROAD VOLUME -

When either of the roads is a COLLECTOR road - the combined vehicular and pedestrian volume entering the major street at the intersection shall average not less than 200 units during the same hours used in 3(a).

When both roads involved are local residential - the combined vehicular and pedestrian volume entering the major street at the intersection shall average not less than 100 units per hour for the same four hours used in connection with 3(a).



APPENDIX 9

Standard Drawings

**Town of Newmarket
Engineering Design Standards and Criteria**

May 2023

This document is current as of the date noted above. Periodic updates will be available on the Town of Newmarket website at www.newmarket.ca. It is the user's responsibility to check for updates prior to using this document. Any updates will form part of the current Design Standards and Criteria.

APPENDIX 9

<u>NMSD</u>	<u>Typical Section Name</u>
100.00	Subdivision Notice Sign
101.00	Stormwater Management Facility Warning Sign
200.00	Typical Section – Local Road – 18m R.O.W.
201.00	Typical Section – Local Road – 18m R.O.W. (with “Polefab” Streetlighting Poles) DELETED
202.00	Typical Section – Minor Collector Road – 21m R.O.W.
203.00	Typical Section – Minor Collector Road – 21m R.O.W. (with “Polefab” Streetlighting Poles) DELETED
204.00	Typical Section – Primary Collector Road – 26m R.O.W.
205.00	Typical Section – Primary Collector Road – 26m R.O.W. (with “Polefab” Streetlighting Poles) DELETED
206.00	Typical Cul-de-sac
207.00	Breakaway Dead End Sign and Barricade Detail DELETED
208.00	Concrete Sidewalk (with boulevard and sidewalk ramps)
209.00	Concrete Sidewalk (adjacent to curb and curb ramps)
210.00	Typical Adjustment for Precast Concrete Maintenance Holes (for storm only)
211.00	Typical Adjustment for Precast Concrete Catchbasins
300.00	Total Isolation of Existing and New Systems DELETED – SEE WATERMAIN COMMISSIONING AND TESTING PROCEDURE DOCUMENT
301.00	Typical Water Connection Schematic DELETED – SEE WATERMAIN COMMISSIONING AND TESTING PROCEDURE DOCUMENT
302.00	Commissioning New Watermains Physically Isolated from System DELETED – SEE WATERMAIN COMMISSIONING AND TESTING PROCEDURE DOCUMENT
303.00	Watermain Configuration for Dead End Cul-de-sacs
304.00	Circular Precast Valve Chamber (300mm – 450mm watermain)
305.00	100mm to 400mm Gate Valve, Valve Box and Tracer Wire Arrangement for PVC or CPP Watermains
306.00	Hydrant Assembly with Mechanically Restrained Joints
307.00	19mm and 25mm Copper Water Service
308.00	50mm Blowoff
309.00	Cathodic Protection Requirements
310.00	Water Sampling Station
311.00	Tracer Wire Installation
400.00	Beehive Catchbasin Frame and Cover for Rear Lot Catchbasins
401.00	Catchbasin Inlet Control Device (Sliding Type)
402.00	Dewatering Sump
403.00	Safety Chain Detail
500.00	Sediment Trap Detail for Road Catchbasin
501.00	Sediment Trap Detail for Rear Lot Catchbasin
502.00	Standard Siltation Control Fence

APPENDIX 9

<u>NMSD</u>	<u>Typical Section Name</u>
503.00	Tree Protection / Heavy Duty Siltation Control Fence
600.00	Lot Grading Plan (Typical Requirements)
700.00	Chain Link Fence Detail
701.00	Pedestrian Walkway with Fencing
702.00	Swing Gate Detail
703.00	Bollard
800.00	Horizontal Control Monument

NOTICE

THE ROADS AND OTHER MUNICIPAL SERVICES WITHIN THIS SUBDIVISION HAVE NOT YET BEEN ACCEPTED OR ASSUMED BY THE TOWN OF NEWMARKET. USE AT OWN RISK.

INQUIRIES, COMPLAINTS AND/OR EMERGENCY CALLS SHOULD BE DIRECTED TO:

(IDENTIFY DEVELOPER OR DEVELOPER'S CONSULTING ENGINEER)

IN ESTABLISHING YOUR DATE OF OCCUPANCY WITH THE BUILDER, YOU MUST KEEP IN MIND THAT THE MUNICIPALITY WILL NOT PERMIT OCCUPANCY UNTIL YOUR WATER, SEWER, AND HYDRO CONNECTIONS ARE IN AND INSPECTED AND CAPABLE OF FUNCTIONING AND CURBS AND BASE COURSE ASPHALT ON THE ROADS HAVE BEEN INSTALLED. OCCUPANCY MAY ALSO BE DELAYED IF ANY REQUIRED SIDEWALKS AND STREET LIGHTING HAVE NOT BEEN COMPLETED.

ARRANGEMENTS REGARDING THE PROVISION OF TELEPHONE, CABLE TV AND NATURAL GAS FOR YOUR DATE OF OCCUPANCY MUST BE MADE BY YOU WITH YOUR BUILDER.

TOWN OF NEWMARKET


100mm TEXT

38mm BOLD TEXT

38mm TEXT

75mm TEXT

SIGN DIMENSIONS 1.2m X 2.4m
ALL LETTERS TO BE BLACK ON WHITE BACKGROUND

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	11/08	REV	1
SUBDIVISION NOTICE SIGN			
			NMS - 100.00

CIRCLE AND STRIKETHROUGH LINE TO BE RED



WARNING
HAZARDOUS CONDITIONS

THIS STORMWATER
MANAGEMENT FACILITY
POND CONTAINS FEATURES
WHICH MAY BECOME
HAZARDOUS UNDER
CERTAIN CONDITIONS.
HAZARDS CAN INCLUDE
FLUCTUATING WATER
LEVELS AND THIN ICE.
PLEASE EXERCISE EXTREME
CAUTION IN THIS AREA

TOWN OF NEWMARKET
905-895-5193

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

11/08

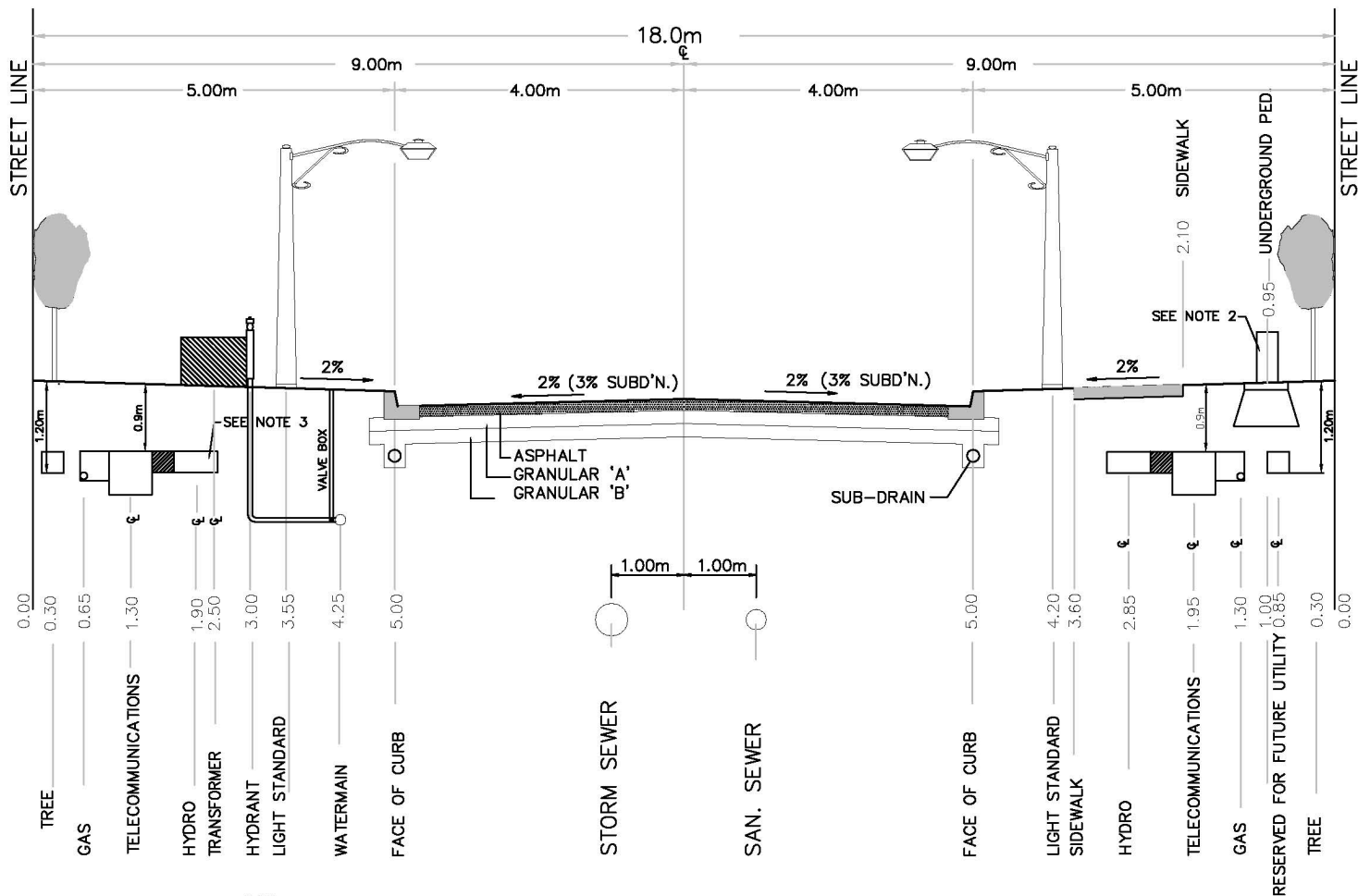
REV

1

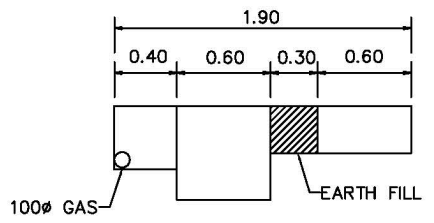
STORMWATER
MANAGEMENT FACILITY
WARNING SIGN

NMS - 101.00




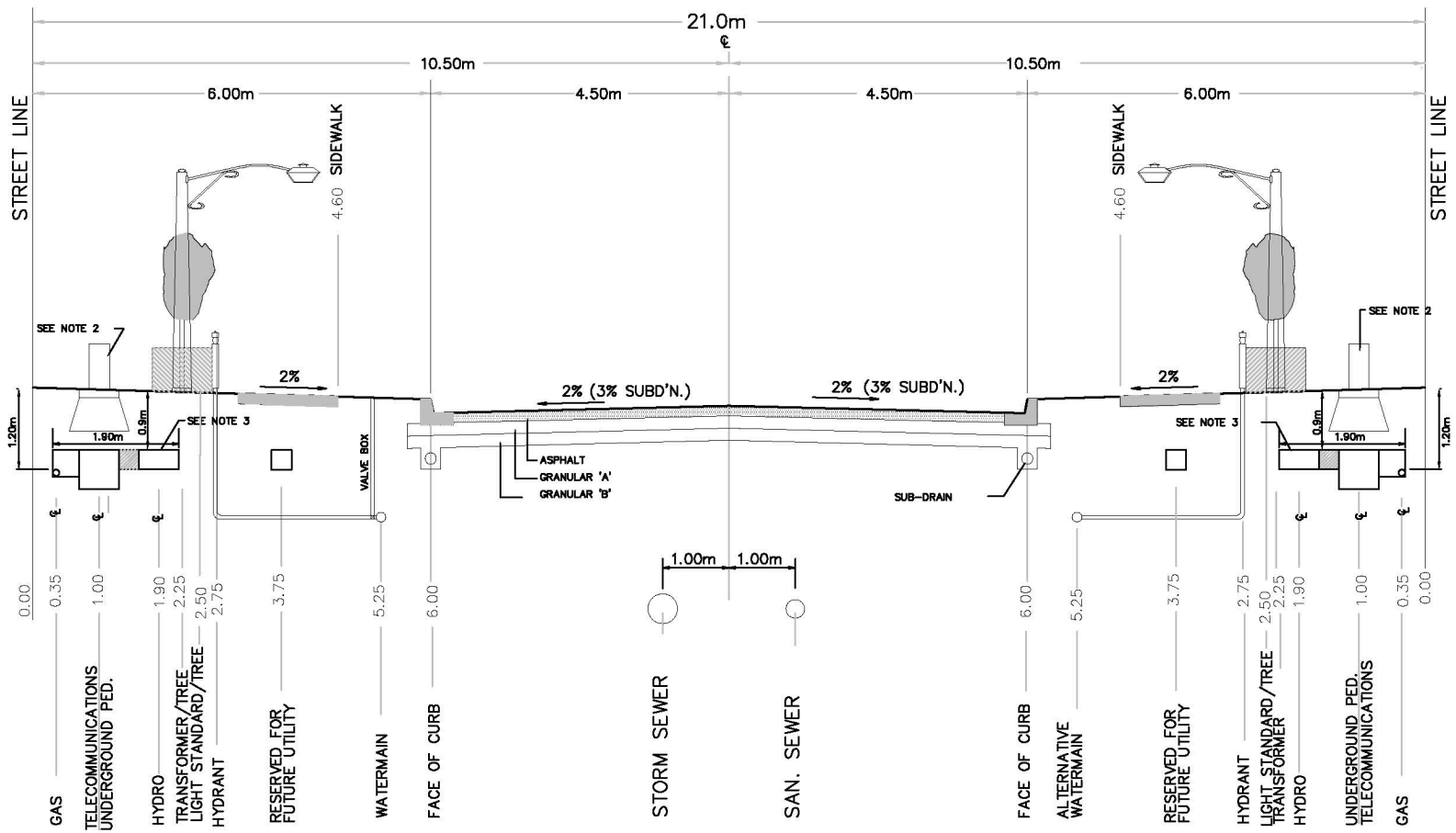


- NOTES:
1. ABOVE GROUND PEDESTAL TO BE APPROVED BY THE TOWN ENGINEER FOR SPECIAL CASES ONLY.
 2. HYDRO DUCTS/CABLES TO BE CAPPED WITH CONCRETE AT HYDRANT.
 3. TYPICAL DETAILS SHOWN FOR HYDRO TRENCH TO BE MODIFIED IF VOLTAGE EXCEEDS 15KV. IF VOLTAGE EXCEEDS 22KV (BELL STANDARD) THEN MORE SPACE MAY BE REQUIRED.
 4. TREES ON SIDEWALK SIDE TO BE HAND-DUG.
 5. CATV ENVIRONMENTAL PEDESTAL TO BE LOCATED ON LOT FLANKAGE ONLY AND WITH LONG DIMENSION PARALLEL TO THE CURB.
 6. HYDRO PME UNIT TO BE LOCATED ONLY ON LOT FLANKAGE.
 7. TELEPHONE OPT UNIT TO BE LOCATED ON LOT FLANKAGE ONLY.
 8. SPECIFIC DESIGN DETAILS RELATED TO THE ABOVE CATV, HYDRO AND TELEPHONE SPECIAL UNITS TO BE APPROVED BY THE TOWN ENGINEER AS PART OF SUBDIVISION DESIGN APPROVAL PROCESS.
 9. BOULEVARD SODDED BETWEEN STREETLINE AND CURB.
 10. ALL GARAGES ON THE SIDEWALK SIDE REQUIRE SEGMENTAL ROLL-UP GARAGE DOORS.

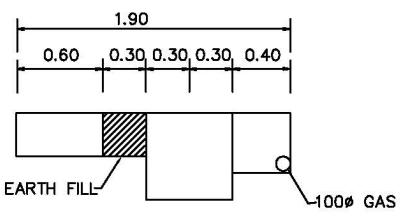


TYPICAL TRENCH DETAIL


TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	JAN/15	REV	2
<h2>TYPICAL SECTION LOCAL ROAD - 18m R.O.W.</h2>			 NMS - 200.00

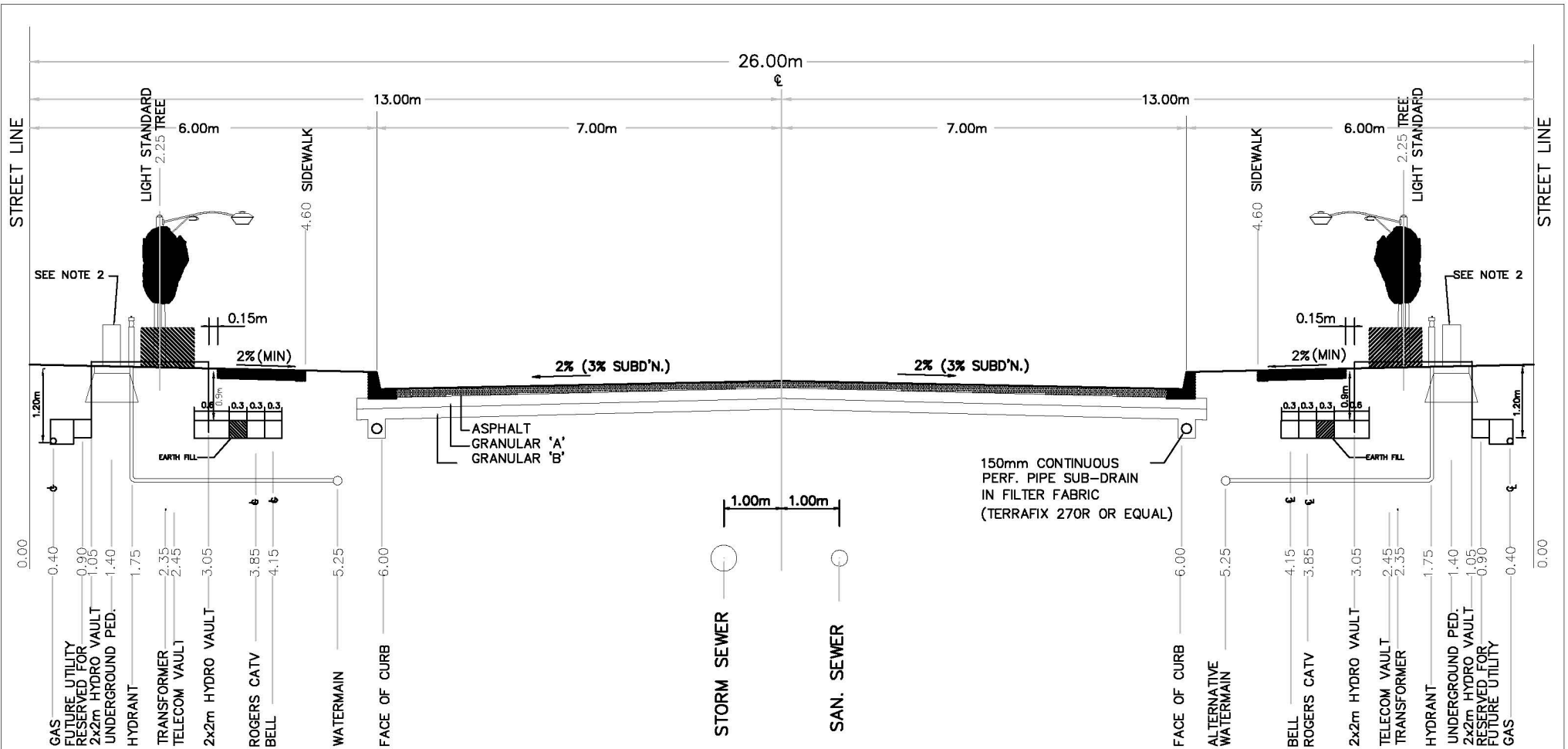


- NOTES:
1. ABOVE GROUND PEDESTAL TO BE APPROVED BY THE TOWN ENGINEER FOR SPECIAL CASES ONLY.
 2. HYDRO DUCTS/CABLES TO BE CAPPED WITH CONCRETE AT HYDRANT.
 3. TYPICAL DETAILS SHOWN FOR HYDRO TRENCH TO BE MODIFIED IF VOLTAGE EXCEEDS 15KV. IF VOLTAGE EXCEEDS 22KV (BELL STANDARD) THEN MORE SPACE MAY BE REQUIRED.
 4. TREES TO BE HAND-DUG.
 5. BOULEVARD SODDED BETWEEN STREETLINE AND CURB ALL GARAGES REQUIRE SEGMENTAL ROLL-UP GARAGE DOORS.
 6. CATV ENVIRONMENTAL PEDESTAL TO BE LOCATED ONLOT FLANKAGE ONLY WITH LONG DIMENSION PARALLEL TO CURB.
 7. HYDRO PME UNIT TO BE LOCATED ON LOT FLANKAGE ONLY.
 8. TELEPHONE OPI UNIT LOCATION TO BE DETAILED AT SUBDIVISION DESIGN TIME TO THE APPROVAL OF THE TOWN ENGINEER.
 9. DESIGN DETAILS OF ALL OF THE ABOVE SPECIAL UTILITY UNITS TO BE APPROVED BY THE TOWN ENGINEER AT SUBDIVISION DETAILED DESIGN STAGE.



TYPICAL TRENCH DETAIL

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING		DATE	REV	1
<h1>TYPICAL SECTION</h1> <h2>MINOR COLLECTOR ROAD - 21m R.O.W.</h2>				
		<h3>NMS-202.00</h3>		



NOTES:

- ABOVE GROUND PEDESTAL TO BE APPROVED BY THE TOWN ENGINEER FOR SPECIAL CASES ONLY.
- HYDRO DUCTS/CABLES TO BE CAPPED WITH CONCRETE AT HYDRANT.
- TYPICAL DETAILS SHOWN FOR HYDRO TRENCH TO BE MODIFIED IF VOLTAGE EXCEEDS 15KV. IF VOLTAGE EXCEEDS 22KV (BELL STANDARD) THEN MORE SPACE MAY BE REQUIRED.
- TREES TO BE HAND-DUG.
- BOULEVARD SODDED BETWEEN STREETLINE AND CURB ALL GARAGES REQUIRE SEGMENTAL ROLL-UP GARAGE DOORS.
- CATV ENVIRONMENTAL PEDESTAL TO BE LOCATED ONLOT FLANKAGE ONLY WITH LONG DIMENSION PARALLEL TO CURB.
- HYDRO PME UNIT TO BE LOCATED ON LOT FLANKAGE ONLY.
- TELEPHONE OPI UNIT LOCATION TO BE DETAILED AT SUBDIVISION DESIGN TIME TO THE APPROVAL OF THE TOWN ENGINEER.
- DESIGN DETAILS OF ALL OF THE ABOVE SPECIAL UTILITY UNITS TO BE APPROVED BY THE TOWN ENGINEER AT SUBDIVISION DETAILED DESIGN STAGE.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

06/08

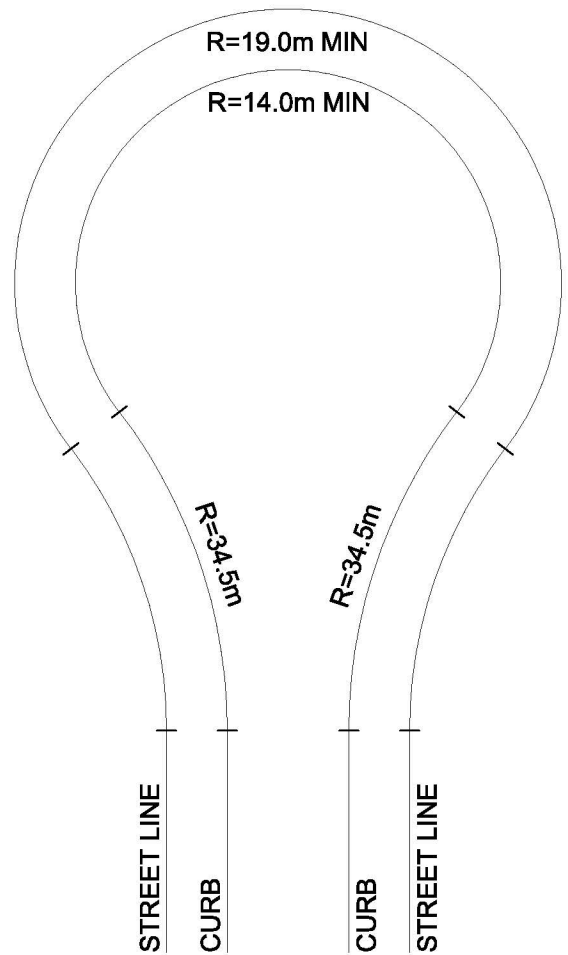
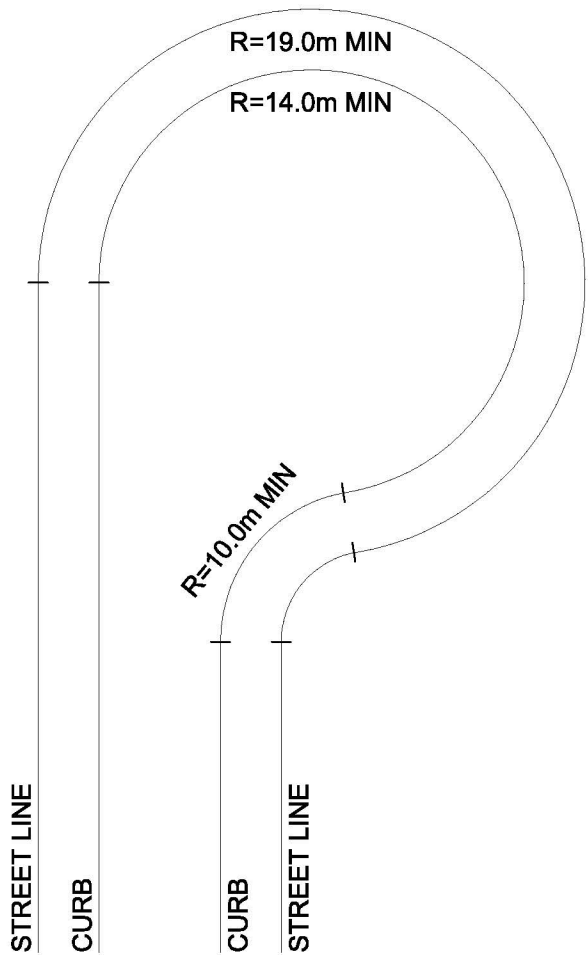
REV

2

TYPICAL SECTION
Primary Collector Road - 26m R.O.W.



NMS - 204.00



TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

05/08

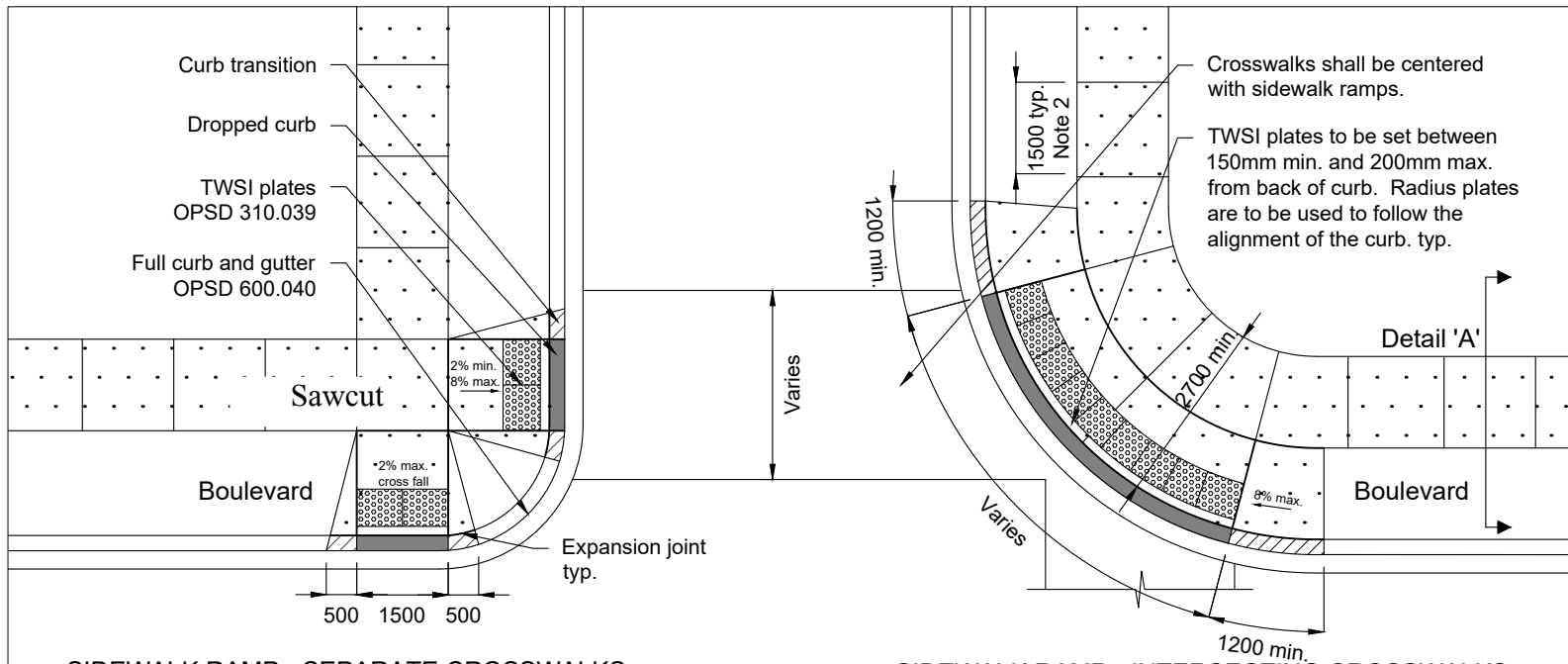
REV

1

TYPICAL CUL-DE-SAC

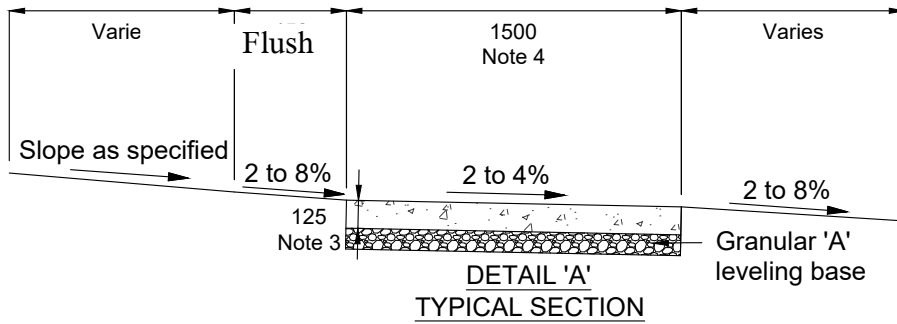
NMS - 206.00



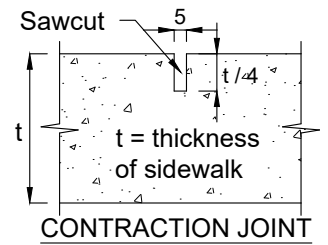


SIDEWALK RAMP - SEPARATE CROSSWALKS

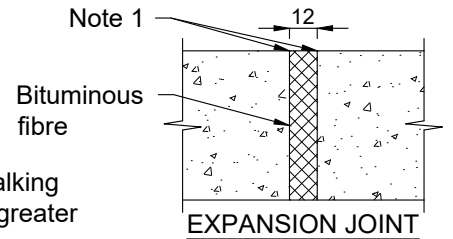
SIDEWALK RAMP - INTERSECTING CROSSWALKS



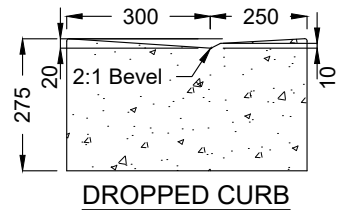
DETAIL 'A' TYPICAL SECTION



CONTRACTION JOINT




EXPANSION JOINT

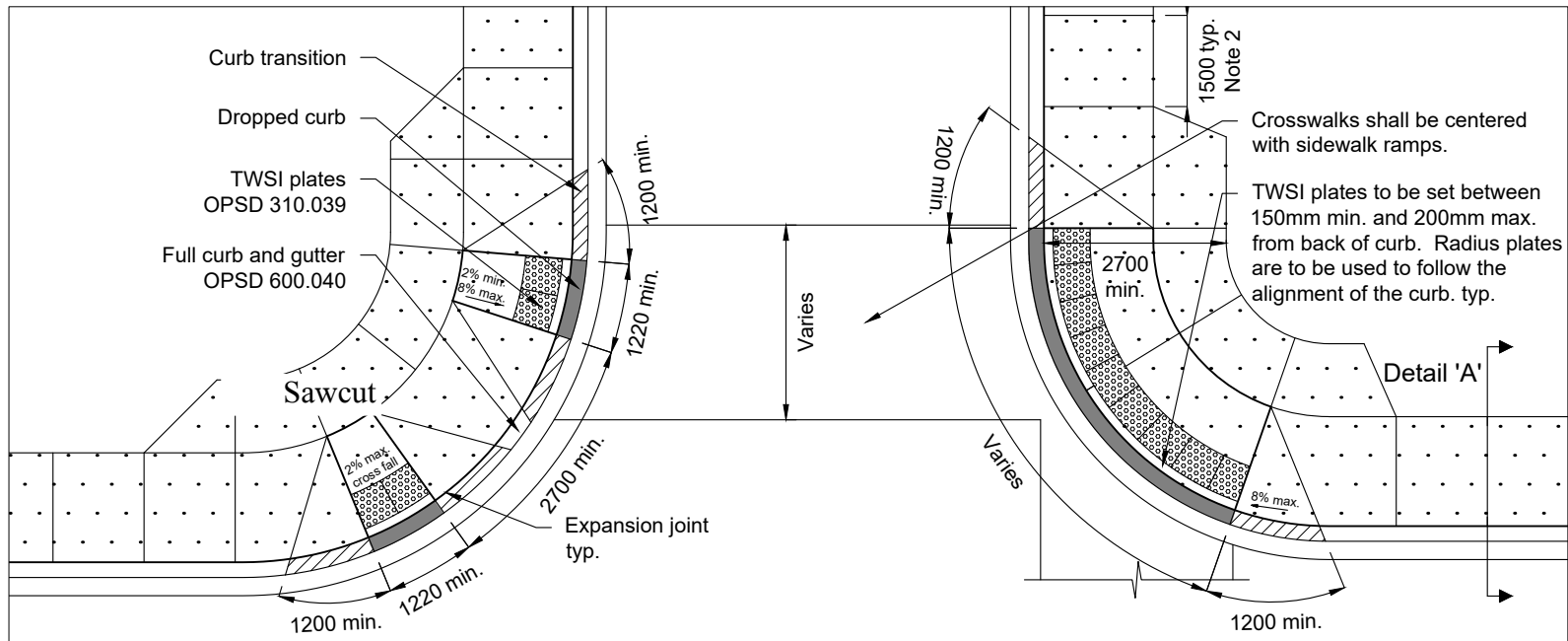


DROPPED CURB

NOTES:

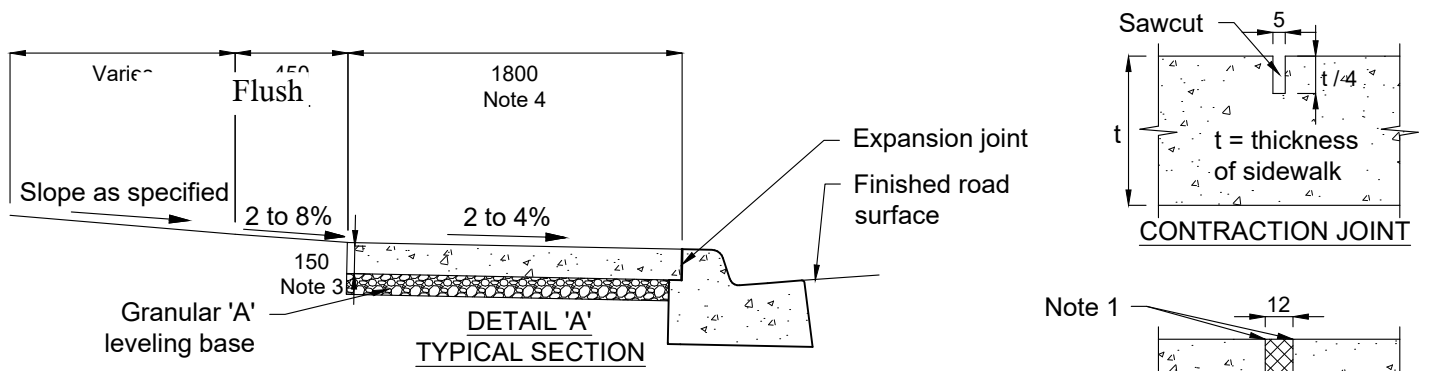
1. Expansion joints shall be finished in a manner to maintain a uniform and flush walking surface, and shall be placed every 3rd sidewalk bay or 4.5m. Where spacing is greater than 4.5m but less than 9.0m, an expansion joint shall be placed at the midpoint.
2. Contraction joints shall be sawcut every 1.5m.
3. Sidewalk thickness at residential driveways shall be 150mm. Sidewalk thickness at ICI driveways and sidewalk ramps adjacent to curb shall be 200mm.
4. Width of sidewalk shall be 1.8m where feasible, 2.4m at schools, bus stops and other high volume pedestrian areas.
5. Concrete strength shall be minimum 32MPa at 28 days with 7% ± 1.5 air entrainment.
6. Concrete class shall be C-2
 - a) All dimensions are in millimeters unless otherwise shown.
 - b) This NMSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and OPSS 351.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	MAR/21	REV	4
CONCRETE SIDEWALK WITH BOULEVARD AND SIDEWALK RAMPS	SEPT/18		
	NMSD - 208.00		




SIDEWALK RAMP - SEPARATE CROSSWALKS

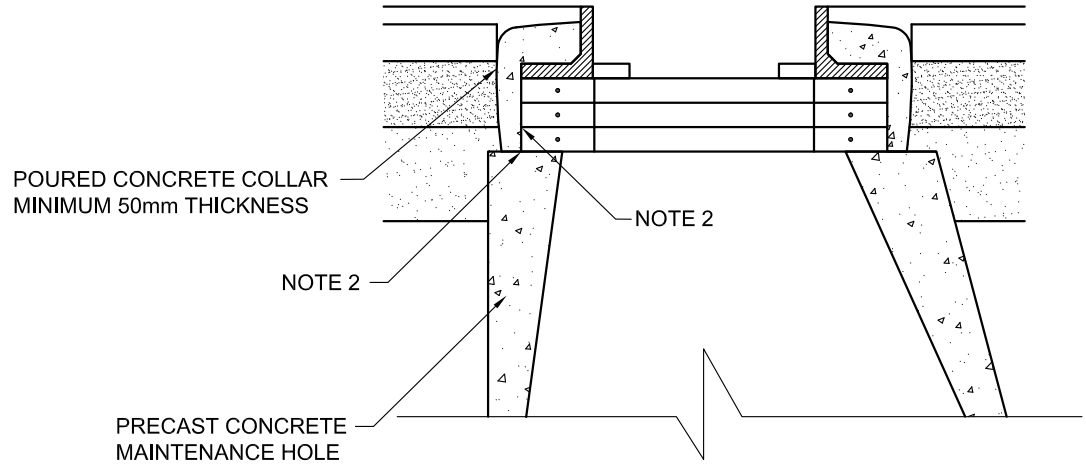
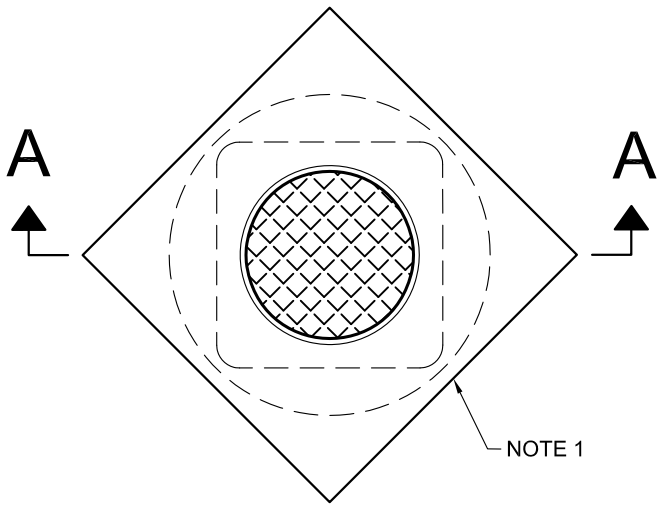
SIDEWALK RAMP - INTERSECTING CROSSWALKS



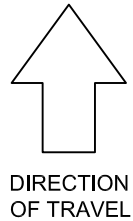
NOTES:

1. Expansion joints shall be finished in a manner to maintain a uniform and flush walking surface, and shall be placed every 3rd sidewalk bay or 4.5m. Where spacing is greater than 4.5m but less than 9.0m, an expansion joint shall be placed at the midpoint.
 2. Contraction joints shall be sawcut every 1.5m.
 3. Sidewalk thickness at ICI driveways and sidewalk ramps adjacent to curb shall be 200mm.
 4. Width of sidewalk shall be 2.4m at schools, bus stops and other high volume pedestrian areas.
 5. Concrete strength shall be minimum 32MPa at 28 days with 7% ± 1.5 air entrainment.
 6. Concrete class shall be C-2
- a) All dimensions are in millimeters unless otherwise shown.
 b) This NMSD shall be read in conjunction with OPSD 310.030, 310.031, 310.032, 310.033 and OPSS 351.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	AUG/19	REV	3
CONCRETE SIDEWALK ADJACENT TO CURB AND CURB RAMPS	SEPT/18	2	
	NMSD - 209.00		




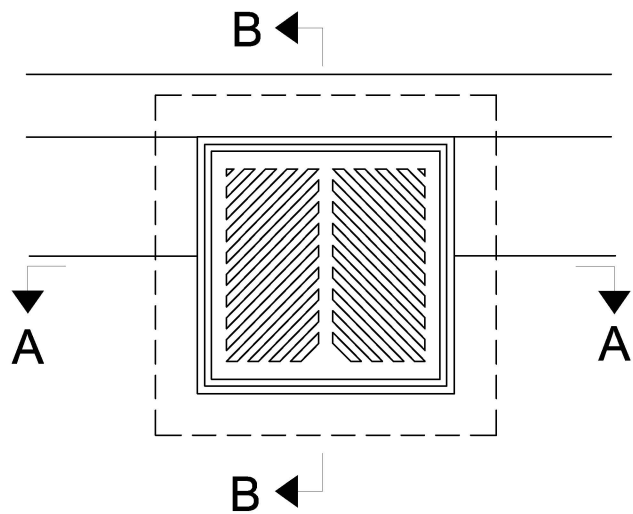
SECTION A-A



NOTES:

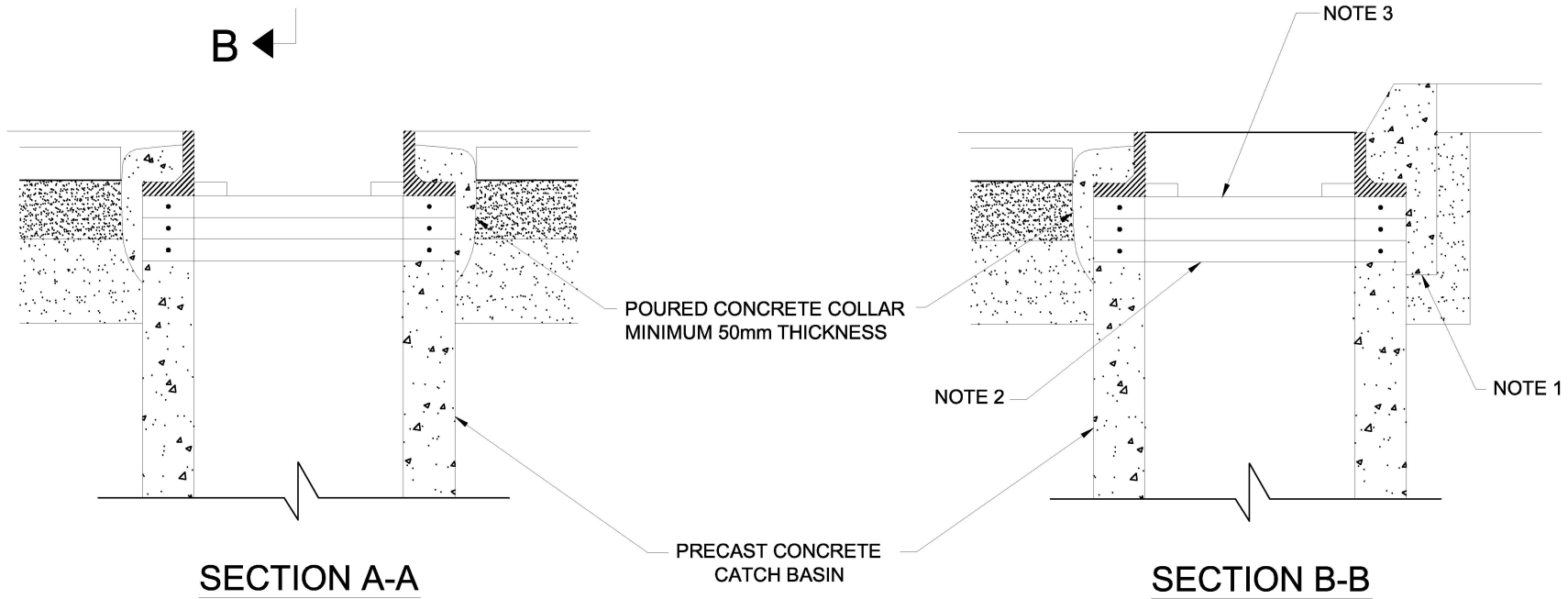
1. THE EXISTING ASPHALT SHALL BE CUT DIAGONAL TO THE DIRECTION OF TRAVEL.
2. THE FIRST ADJUSTMENT UNIT SHALL BE SET IN A FULL MORTAR BED.
3. RISER UNITS SHALL BE USED TO A MAXIMUM ADJUSTMENT HEIGHT OF 275mm.
CATCH BASINS TO BE ADJUSTED OVER 300mm SHALL USE A 300mm HIGH PRECAST RISER UNIT.


TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING		APR/23	REV	2
TYPICAL ADJUSTMENT FOR PRECAST CONCRETE STORM MAINTENANCE HOLES		 Newmarket		
				NMSD - 210.00

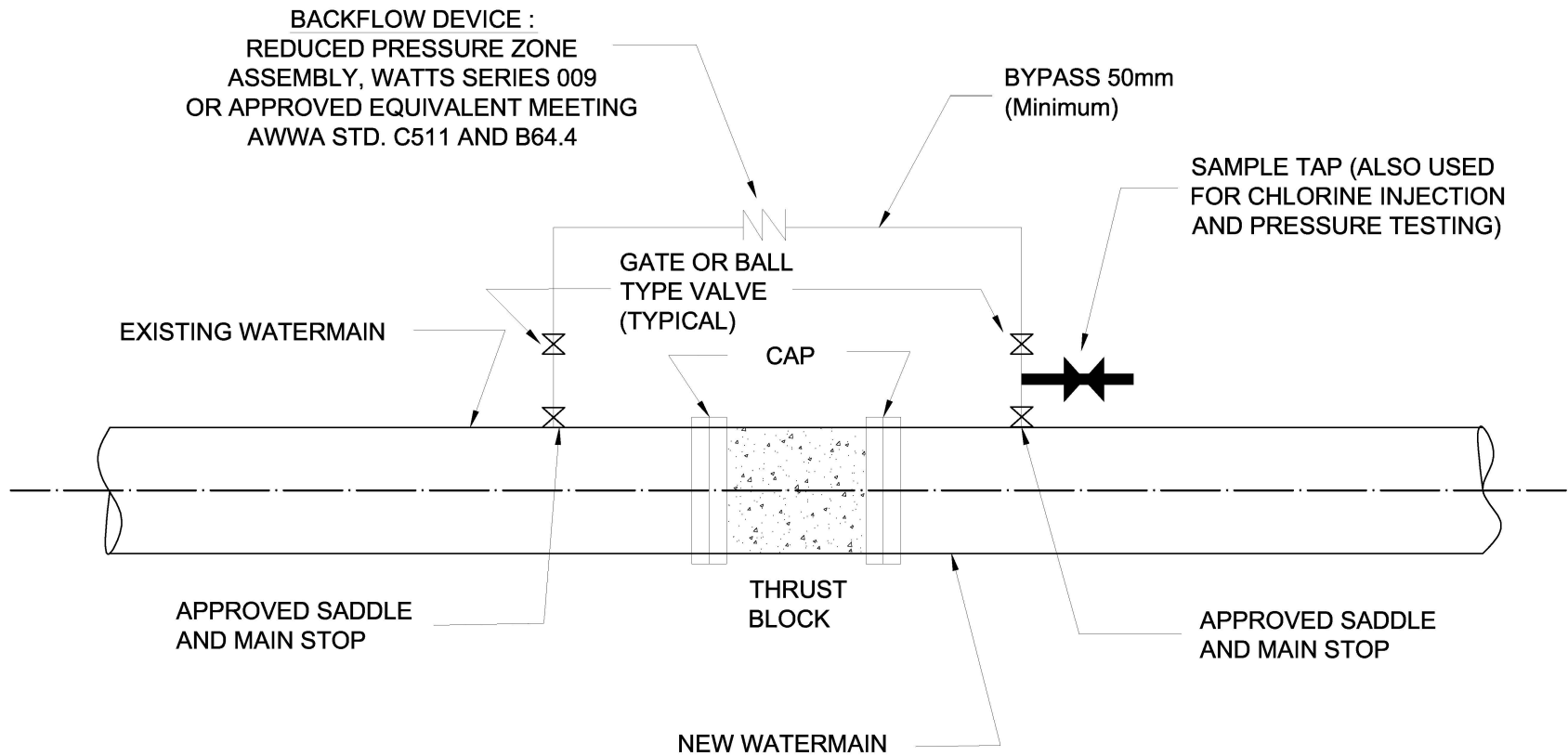



NOTES:

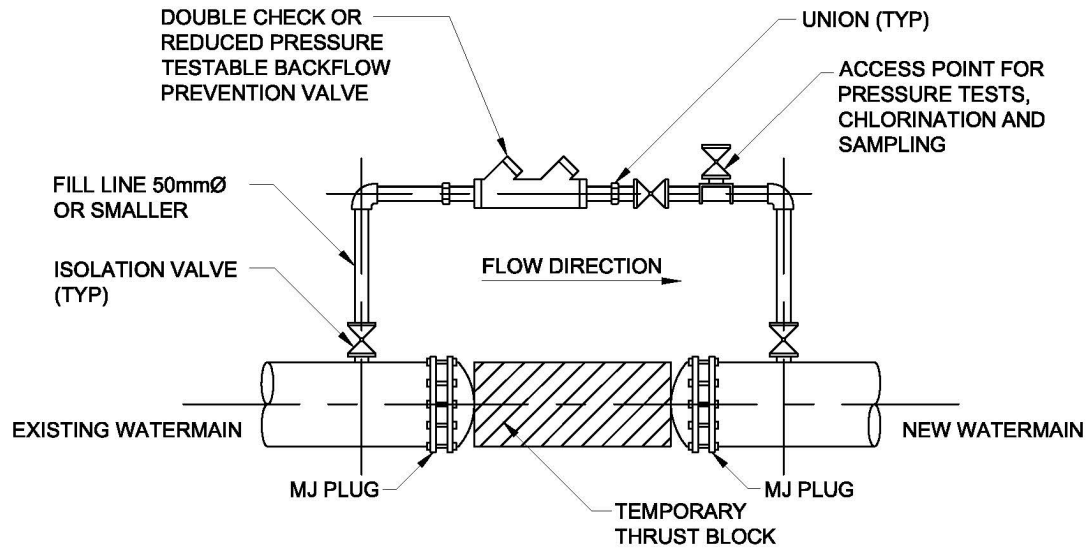
1. EXTEND BOTTOM OF CURB TO MINIMUM OF 50mm BELOW THE TOP OF PRECAST CONCRETE CATCH BASIN UNIT.
2. FIRST ADJUSTMENT UNIT TO BE SET IN A FULL MORTAR BED.
3. RISER UNITS SHALL BE USED TO A MAXIMUM ADJUSTMENT HEIGHT OF 275mm. CATCH BASIN TO BE ADJUSTED OVER 300mm SHALL USE A 300mm HIGH PRECAST RISER UNIT.



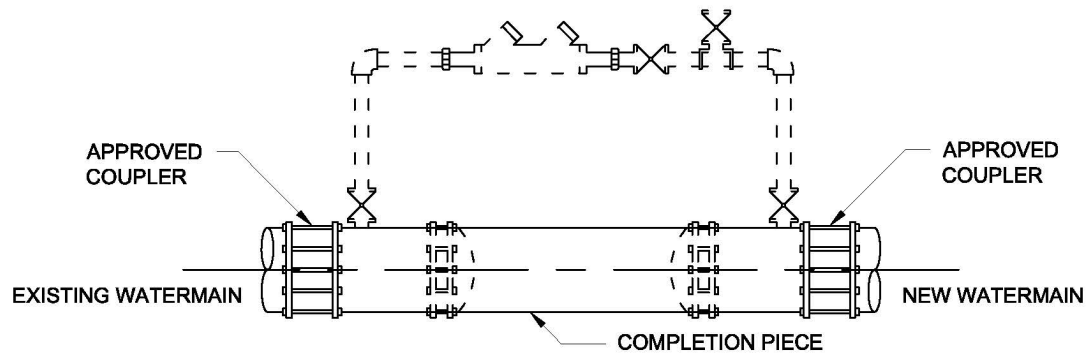
TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	JAN/15	REV	1
TYPICAL ADJUSTMENT FOR PRECAST CONCRETE CATCH BASINS	 Newmarket		
NMSD - 211.00			



TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	06/08	REV	1
TOTAL ISOLATION OF EXISTING AND NEW SYSTEMS	 Newmarket		
			NMS - 300.00



BACKFLOW PREVENTION VALVE ASSEMBLY



WATERMAIN COMPLETED ASSEMBLY

NOTES:

1. THE BACKFLOW PREVENTION VALVE ASSEMBLY SHALL BE REMOVED DURING WATERMAIN PRESSURE TESTS.
2. THE FINAL CONNECTION OF THE WATERMAIN SHALL BE COMPLETED ONLY AFTER AUTHORIZATION BY THE MUNICIPALITY.
3. THE WATERMAIN SHALL BE DRAINED BY CONTROLLED MEANS. SUFFICIENT TRENCH DEWATERING CAPACITY SHALL BE USED WHEN THE EXISTING AND NEW WATERMAINS ARE DRAINED PRIOR TO THE FINAL CONNECTION TO ENSURE NO BACKFLOW INTO EITHER WATERMAIN.
4. THE WATERMAIN SHALL BE CUT BACK TO REMOVE THE TAPPING POINTS OF THE BACKFLOW PREVENTION VALVE ASSEMBLY.
5. ALL NEW PIPING AND APPURTENANCES PLACED IN THE CONNECTION SHALL BE THOROUGHLY DISINFECTED WITH 1% SOLUTION OF SODIUM HYPOCHLORITE OR EQUIVALENT.
6. ON NON-METALLIC WATERMAINS, THE TRACING WIRE SHALL BE CONNECTED TO THE COUPLER ONLY IF THE COUPLER IS NOT IN CONTACT WITH A METALLIC WATERMAIN OTHERWISE TERMINATE TRACER WIRE WITH AN ANODE.
7. A PHYSICAL SEPARATION MUST BE MAINTAINED AT ALL CONNECTION POINTS OF NEW WATERMAINS TO THE EXISTING SYSTEMS UNTIL BACTERIOLOGICAL TESTS HAVE PASSED. A SAMPLING TAP MUST BE PROVIDED AT THE END OF EACH BRANCH OR STUB.
8. ONLY THE MUNICIPAL STAFF SHALL OPERATE MUNICIPALITY OWNED VALVES.
9. THIS DETAIL IS FOR SCHEMATIC INFORMATION ONLY. THE ACTUAL CONFIGURATION USED MUST SATISFY THE INTENT OF THIS DRAWING.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

05/08

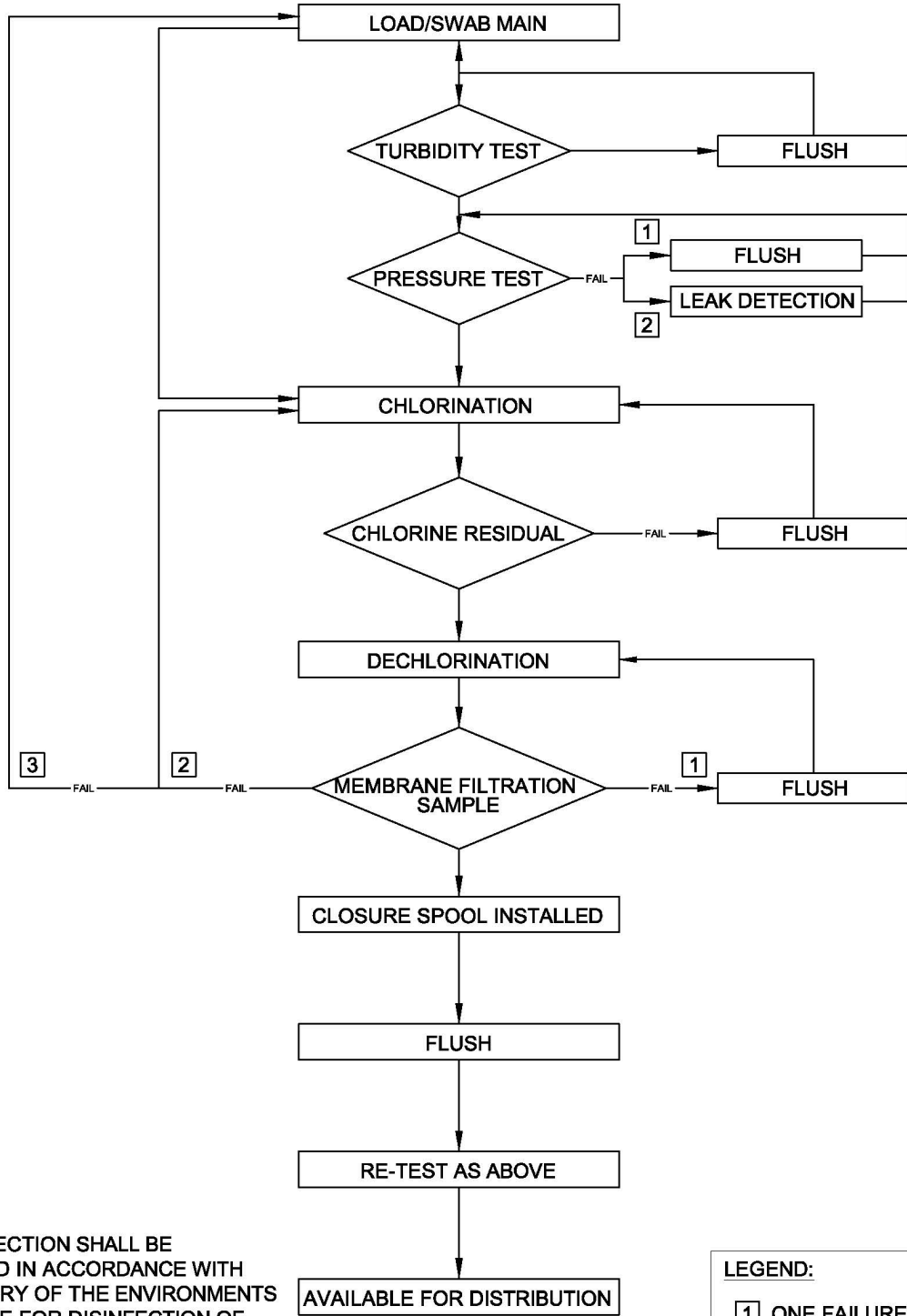
REV

1

**TYPICAL WATER
CONNECTION
SCHEMATIC**

NMS - 301.00





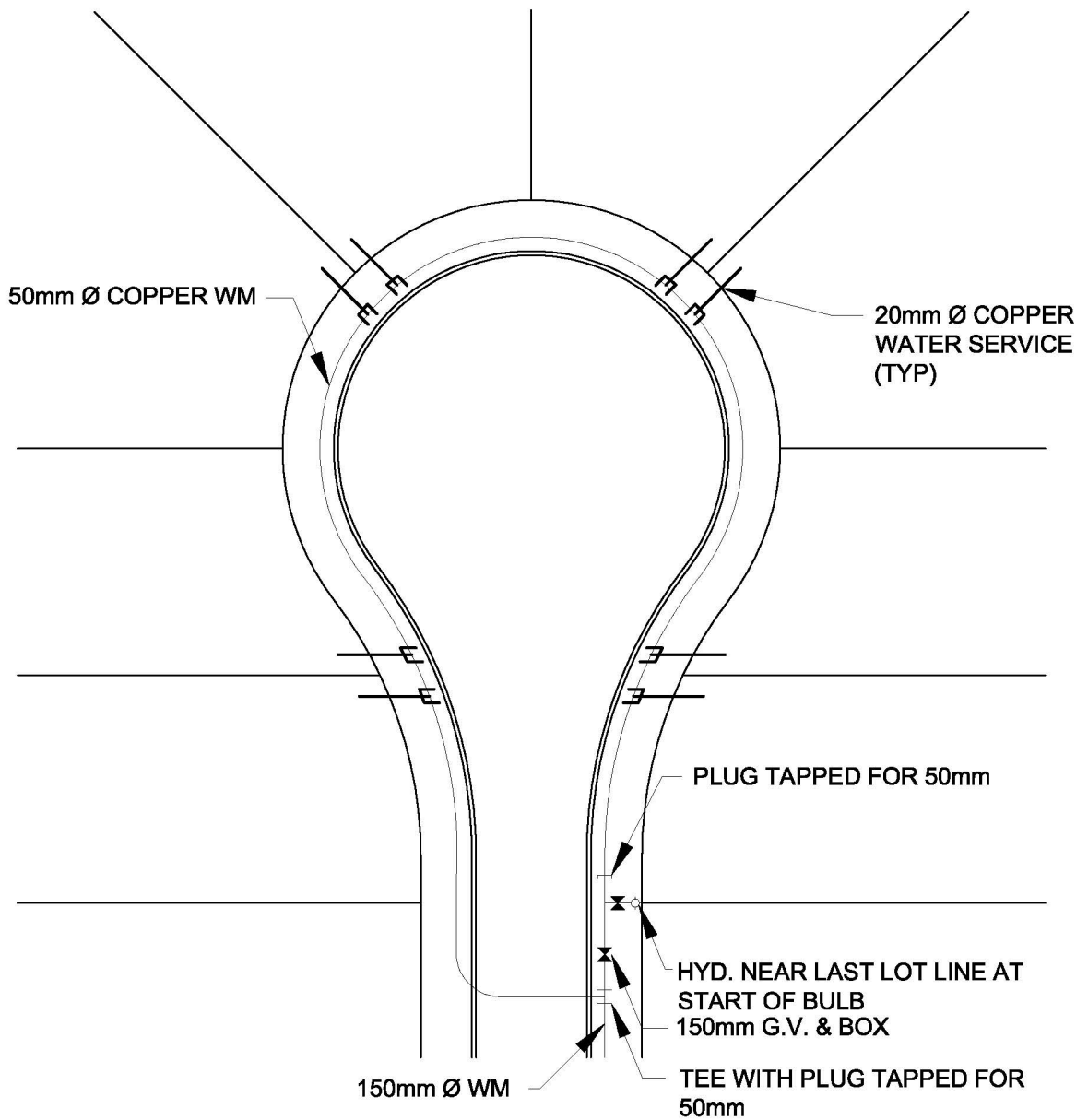
NOTE:

ALL DISINFECTION SHALL BE COMPLETED IN ACCORDANCE WITH THE MINISTRY OF THE ENVIRONMENTS PROCEDURE FOR DISINFECTION OF DRINKING WATER IN ONTARIO AND AWWA STANDARD FOR DISINFECTING WATERMAINS (C651-99)

LEGEND:

- 1 ONE FAILURE
- 2 MORE THEN ONE FAILURE
- 3 MULTIPLE FAILURES

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	05/08	REV	1
COMMISSIONING NEW WATERMAINS PHYSICALLY ISOLATED FROM SYSTEM	NMS - 302.00		



TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

05/08

REV

1

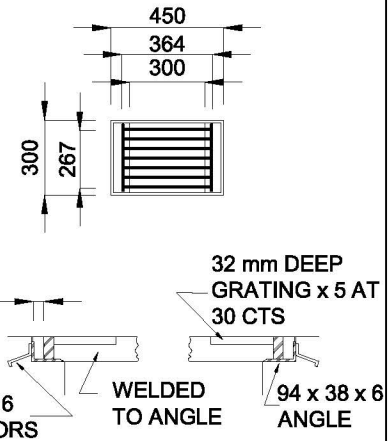
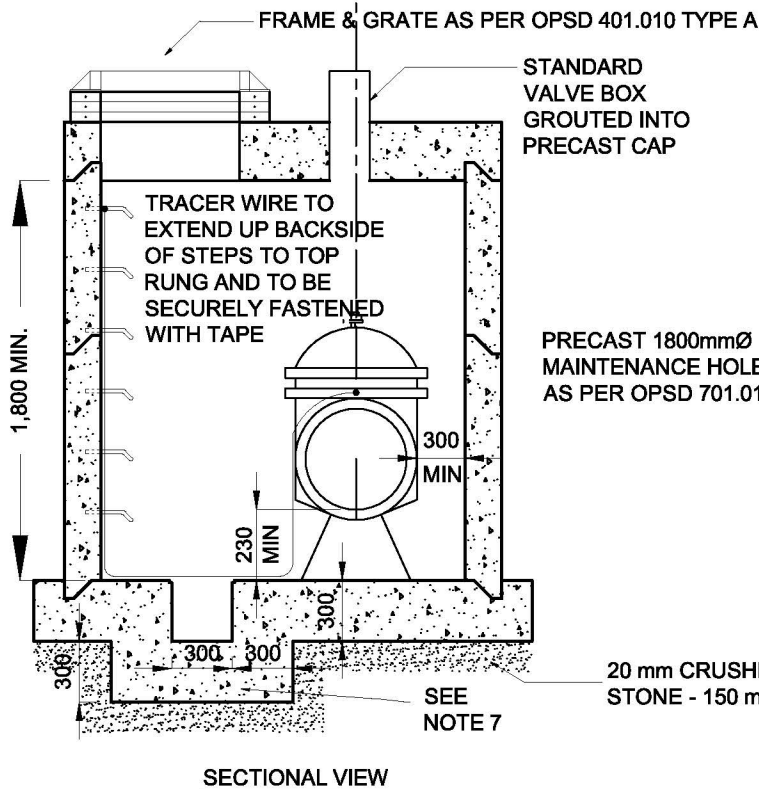
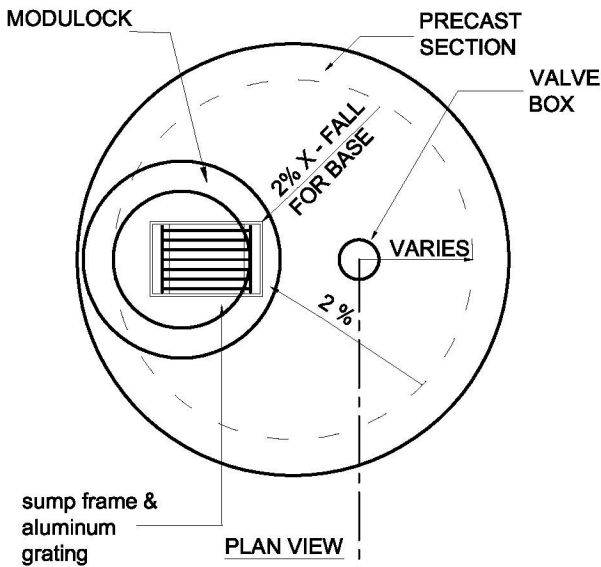
**WATERMAIN
CONFIGURATION FOR DEAD
END CUL-DE-SACS**

NMS - 303.00

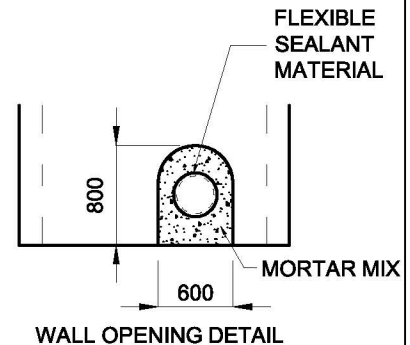


NOTES:

1. PRECAST SECTIONS TO BE MANUFACTURED TO OPS SPECIFICATIONS
2. CONCRETE FOR BASE AND VALVE SUPPORT SHALL BE 20 mpa
3. ALL MORTAR MIX TO BE 3:1
4. ALL LIFT HOLES TO BE FILLED WITH MORTAR MIX BEFORE BACKFILLING
5. POLYETHYLENE BOND BREAKER TO BE USED BETWEEN CONCRETE AND FITTINGS
6. ALL MODULOC SECTIONS TO BE PARGED ON THE EXTERIOR FACE - 15mm MINIMUM
7. INSTALL 150mmØ PVC DRAIN TO STORM SEWER WHERE SEWER IS WITHIN 10m OF VALVE CHAMBER. WHERE THE DISTANCE EXCEEDS 10m INSTALL SUMP AS SHOWN. CONCRETE BASE TO SUMP NOT REQUIRED WHERE WATER TABLE IS BELOW CHAMBER FORMATION LEVEL. USE PRECAST BASE.
8. FLANGED VALVE TO BE USED WITH UNFLANGED ADAPTER FLANGES ON DUCTILE IRON PIPEWORK.



FRAME & GRATING DETAILS FOR SUMP



WALL OPENING DETAIL

DIMENSIONS SHOWN IN mm

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

05/08

REV

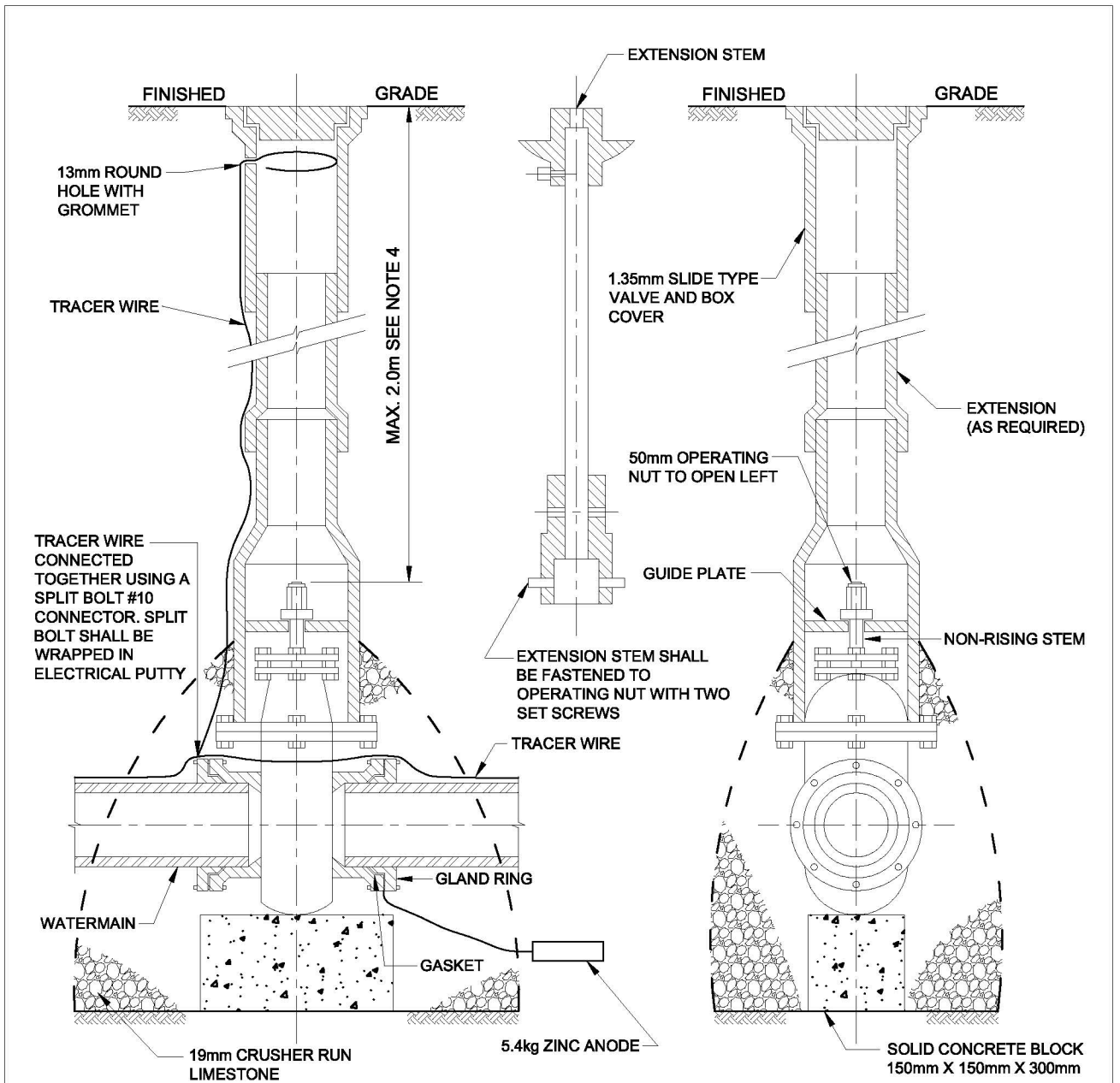
1

CIRCULAR PRECAST VALVE CHAMBER

300mm - 450mm WATERMAIN

NMS - 304.00

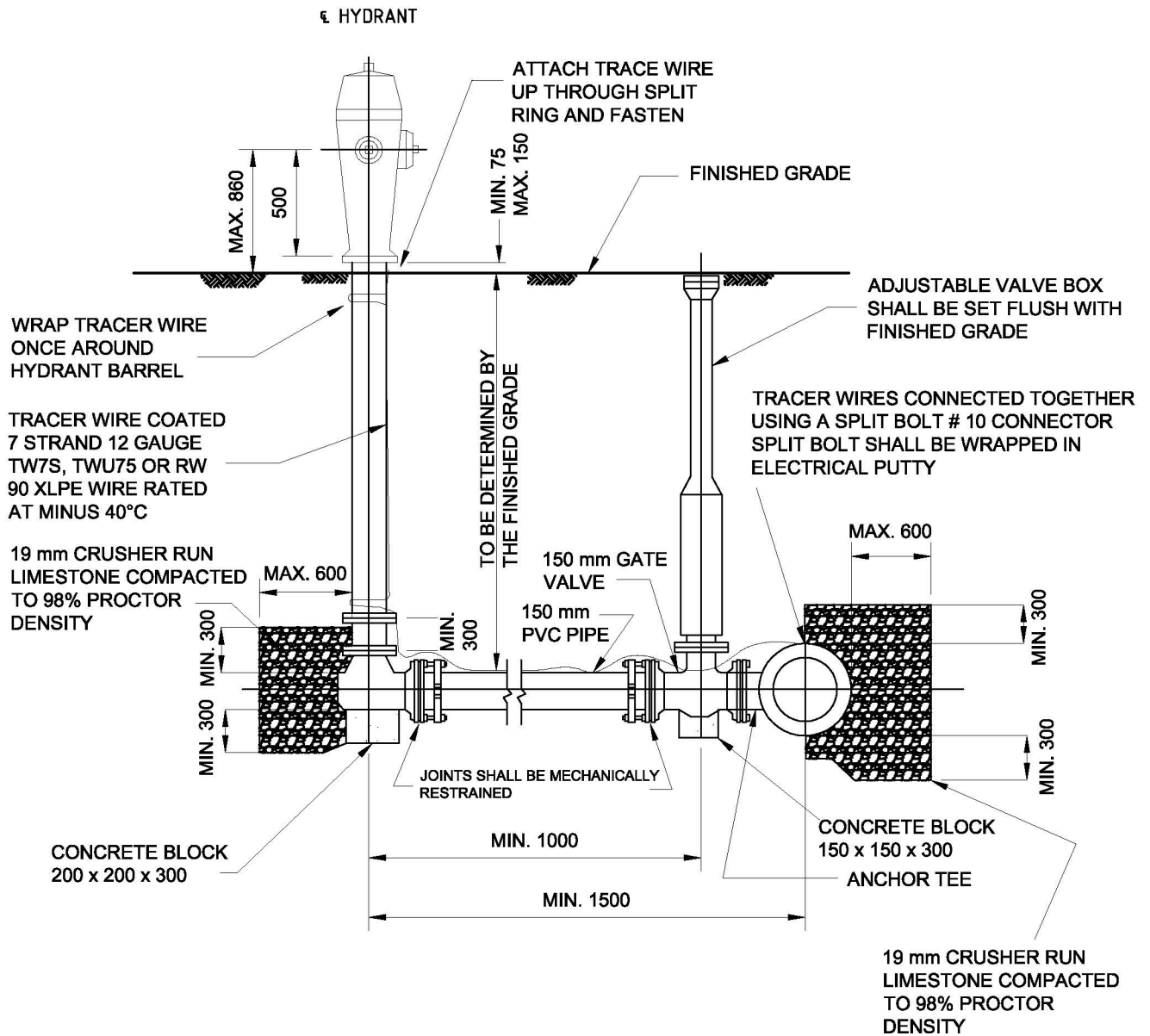




NOTES:

1. VALVE BOX SHALL BE ADEQUATELY BRACED WHILE BACKFILLING AND MUST REMAIN PLUMB
2. VALVE BOX EXTENSION SHALL BE USED ONLY IF REQUIRED
3. VALVE SHALL BE COMPLETELY BACKFILLED WITH 19mm CRUSHER RUN LIMESTONE
4. AN EXTENSION STEM SHALL BE USED WHEN THE DEPTH OF THE OPERATING NUT EXCEEDS 2.0m BELOW FINISHED GRADE
5. ALL INLINE VALVES INSTALLED ON PVC WATERMAINS SHALL BE RESTRAINED UNLESS OTHERWISE NOTED
6. A 1.0m X 1.0m X 50mm ASPHALT COLLAR SHALL BE INSTALLED IF VALVE BOX IS LOCATED IN GRAVEL
7. TRACER WIRE SHALL BE COATED, 7 STRAND, 12 GAUGE TW75 TWU75 OR RW90XLPE WIRE RATED AT MINUS 40° C
8. TRACER WIRE SHALL BE INSTALLED ON THE OUTSIDE OF THE VALVE BOX AND SHALL BE BROUGHT INTO THE UPPER SECTION THROUGH A 13mm Ø ROUND HOLE AND LOOPED AT THE TOP. THE LOOP SHALL BE A MINIMUM 450mm IN LENGTH
9. TRACER WIRE SHALL BE INSTALLED IN ALL PVC AND CPP MAIN LINE VALVE BOXES
10. CATHODIC PROTECTION, BONDING CABLE AND TRACER WIRE SHALL BE INSTALLED AS PER NMSD 309.00

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	MARCH 2008	REV	1
100mm TO 400mm GATE VALVE, VALVE BOX AND TRACER WIRE ARRANGEMENT FOR PVC OR CPP WATERMAINS		NMSD 305.00	
			

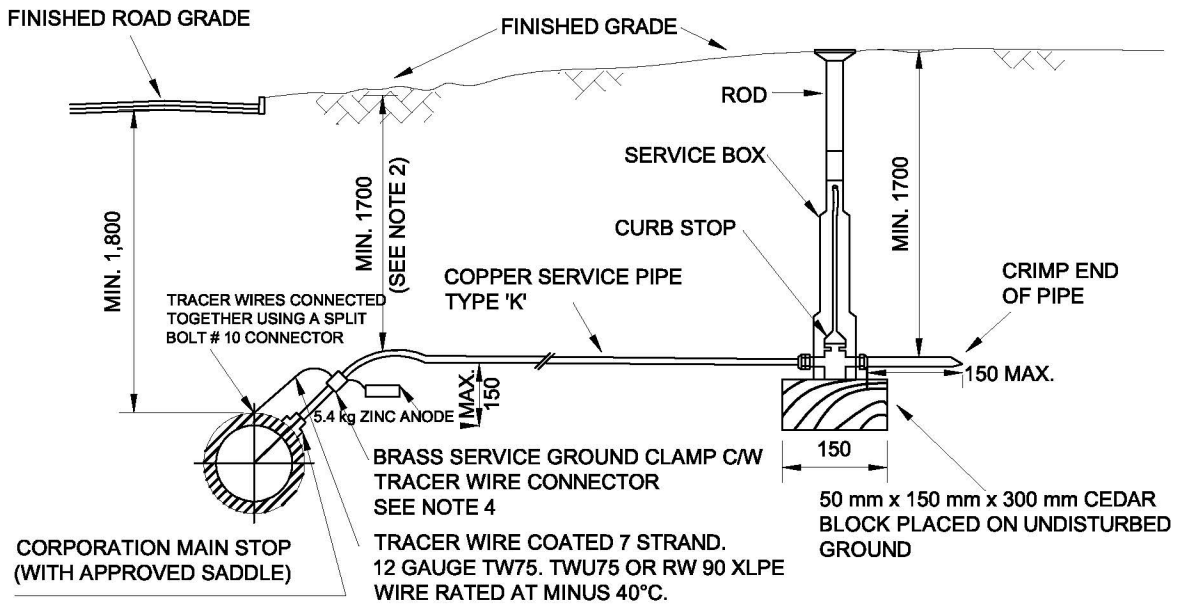


NOTES

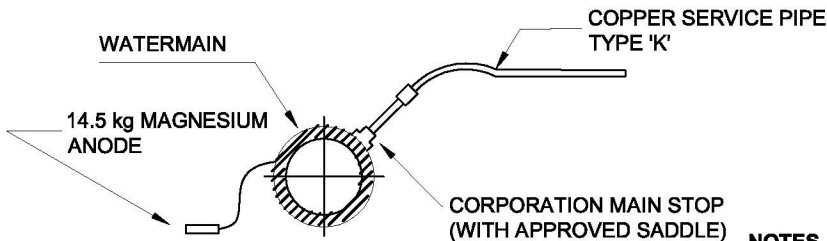
1. JOINTS SHALL BE MECHANICALLY RESTRAINED.
2. HYDRANT EXTENSIONS SHALL BE INSTALLED AT BOTTOM OF BARREL.
3. ANCHOR TEE, VALVE & HYDRANT SHALL BE COMPLETELY BACKFILLED WITH 19mm CRUSHER RUN LIMESTONE.
4. TRACER WIRE COATED, 7 STRAND, 12 GAUGE TW75, TWU75 OR RW 90 XLPE WIRE RATED AT MINUS 40°C.
5. TRACER WIRE SHALL BE INSTALLED AT ALL HYDRANT LOCATIONS.
6. CATHODIC PROTECTION, BONDING CABLE AND TRACER WIRE SHALL BE AS PER NMSD - 309.00

ALL DIMENSIONS IN MILLIMETERS EXCEPT WHERE NOTED.

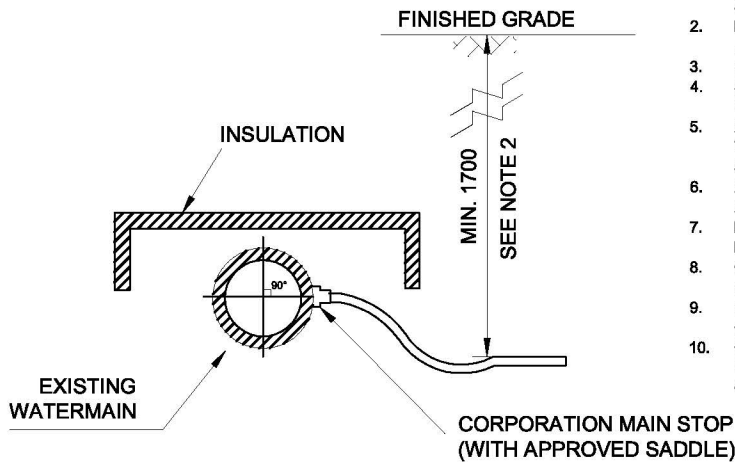
TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	08/08	REV	1
HYDRANT ASSEMBLY WITH MECHANICALLY RESTRAINED JOINTS	NMS - 306.00		



NON - FERROUS WM



FERROUS WM



LOWERING WATER SERVICES

NOTES

1. THE WATER CONNECTION SHALL BE LAID FROM THE MAIN TO 150 mm BEYOND THE PROPERTY LINE, IN NEW SUBDIVISIONS ONLY.
2. HORIZONTAL GOOSE NECK SHALL BE USED WHEN COVER LESS THAN 1700 mm.
3. WATERMAIN SHALL BE TAPPED UNDER PREASURE.
4. SERVICE GROUND CLAMPS AND SPLIT BOLT SHALL BE WRAPPED WITH ELECTRICAL PUTTY.
5. ANODE SHALL BE PLACED AT LEAST 1.0 m AWAY FROM THE SERVICE AND AS DEEP AS THE BOTTOM OF THE SERVICE.
6. ANODE SHALL BE LOCATED BETWEEN THE MAIN STOP AND THE CURB STOP.
7. PLUMBING CONTRACTOR TO REMOVE TAIL PIECE AND HOOK UP TO CURB STOP.
8. CATHODIC PROTECTION BONDING CABLE AND TRACER WIRE SHALL BE AS PER NMSD - 309.00.
9. MINIMUM SEPARATION DISTANCE BETWEEN TAPPED COUPLINGS SHALL BE 1.0 m.
10. COUPLINGS SHALL NOT BE PERMITTED BETWEEN THE MAIN STOP AND THE CURB STOP WITHOUT PERMISSION OF THE TOWN OF NEWMARKET.

ALL DIMENSIONS IN MILLIMETERS EXCEPT WHERE NOTED.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

07/08

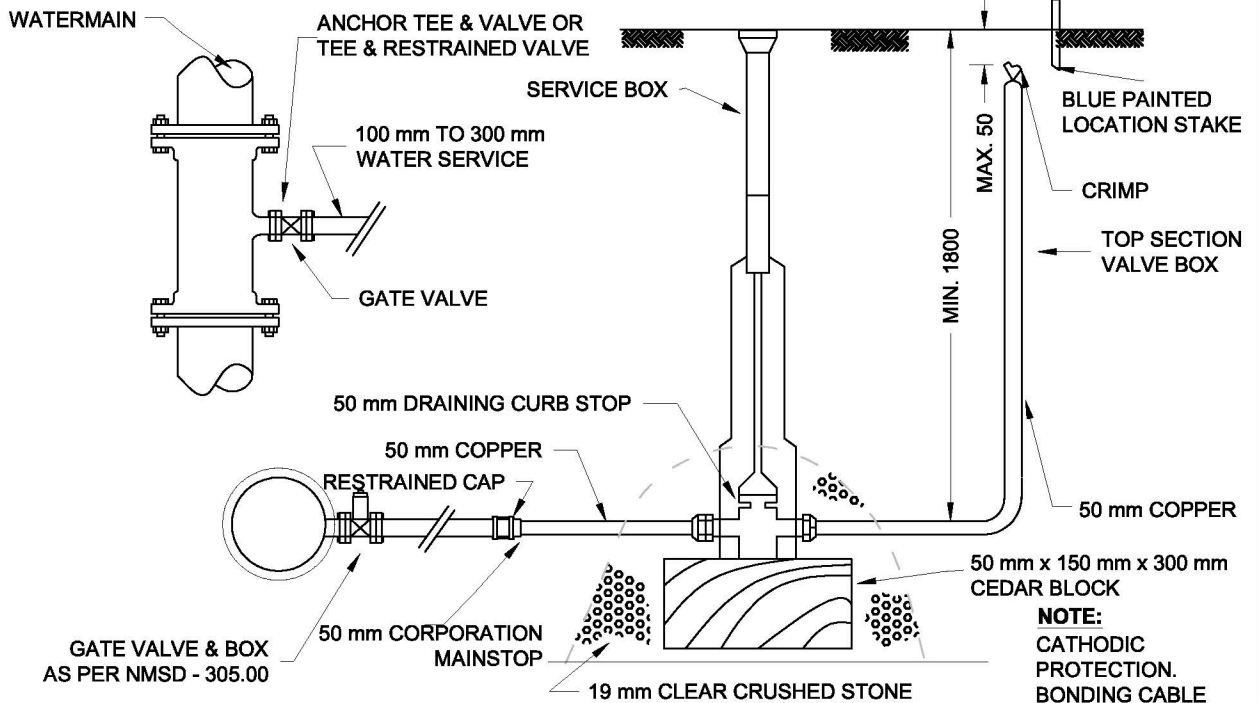
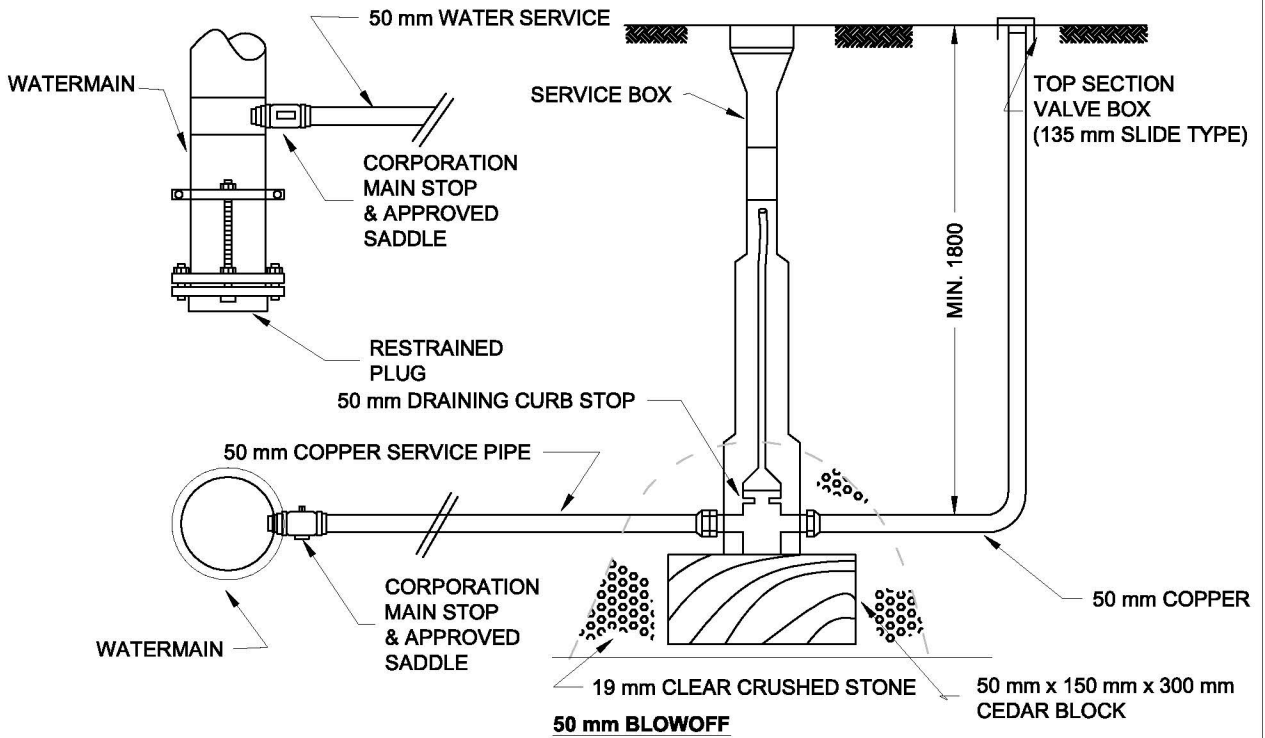
REV

1

19 mm AND 25 mm COPPER WATER SERVICE

NMS - 307.00





50 mm BLOWOFF FOR 100 mm TO 300 mm WATER SERVICE STUBS

ALL DIMENSIONS IN MILLIMETERS EXCEPT WHERE NOTED.

NOTE:
CATHODIC PROTECTION BONDING CABLE AND TRACER WIRE SHALL BE AS PER NMSD - 309.00

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

07/08

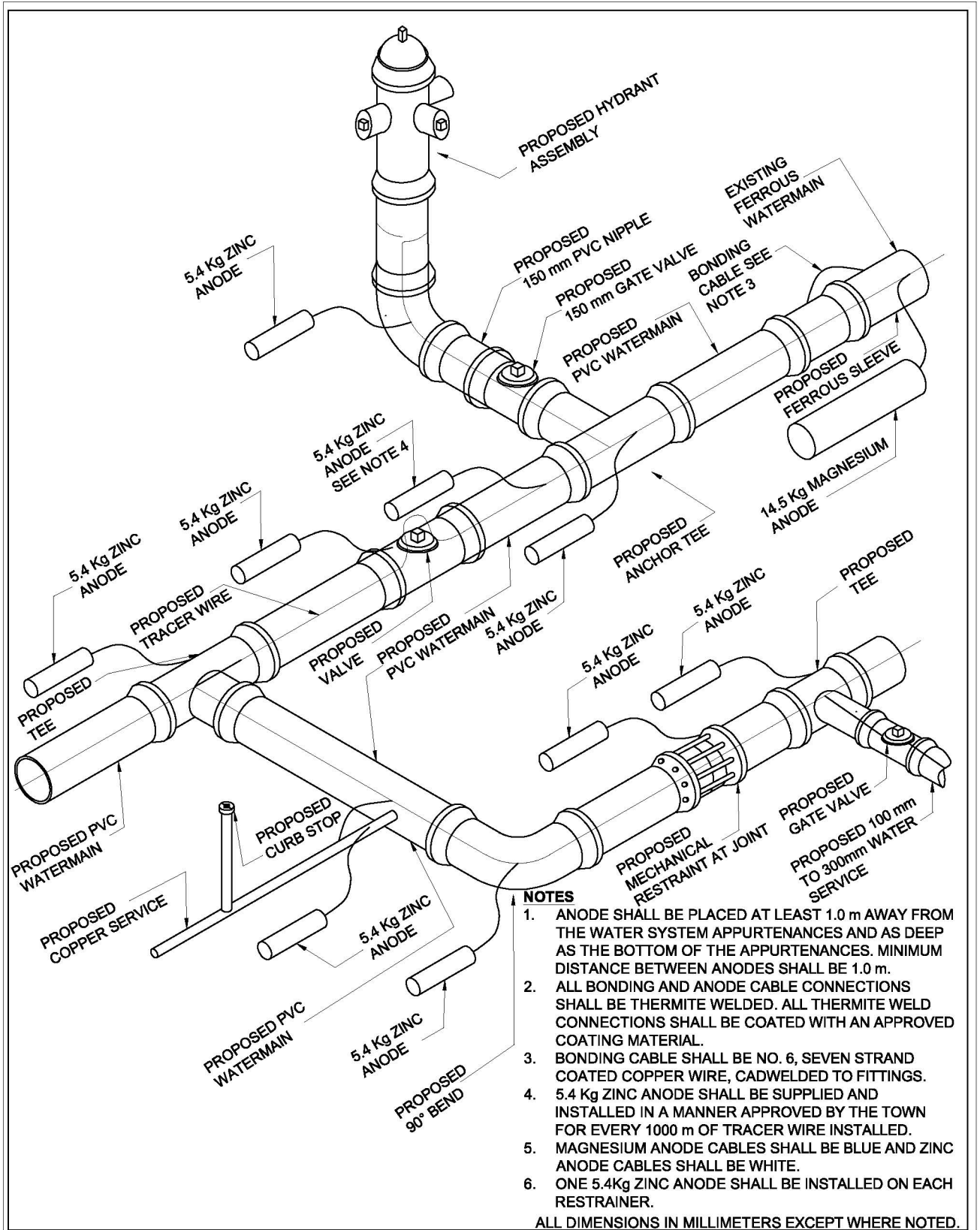
REV

1

50 mm BLOWOFF

NMS - 308.00





TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

08/08

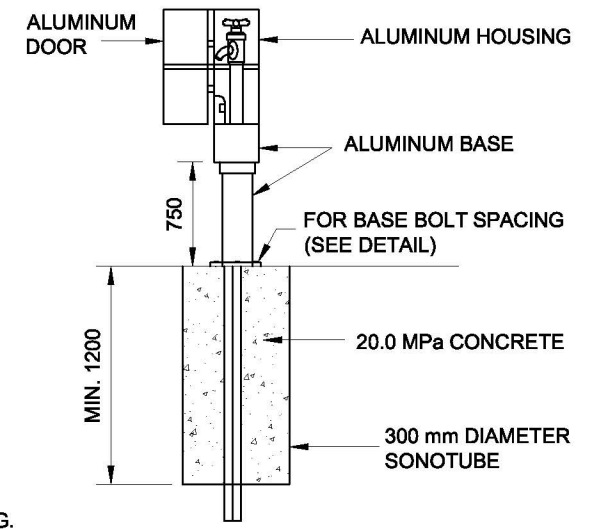
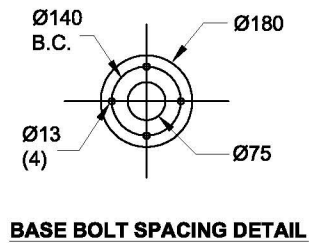
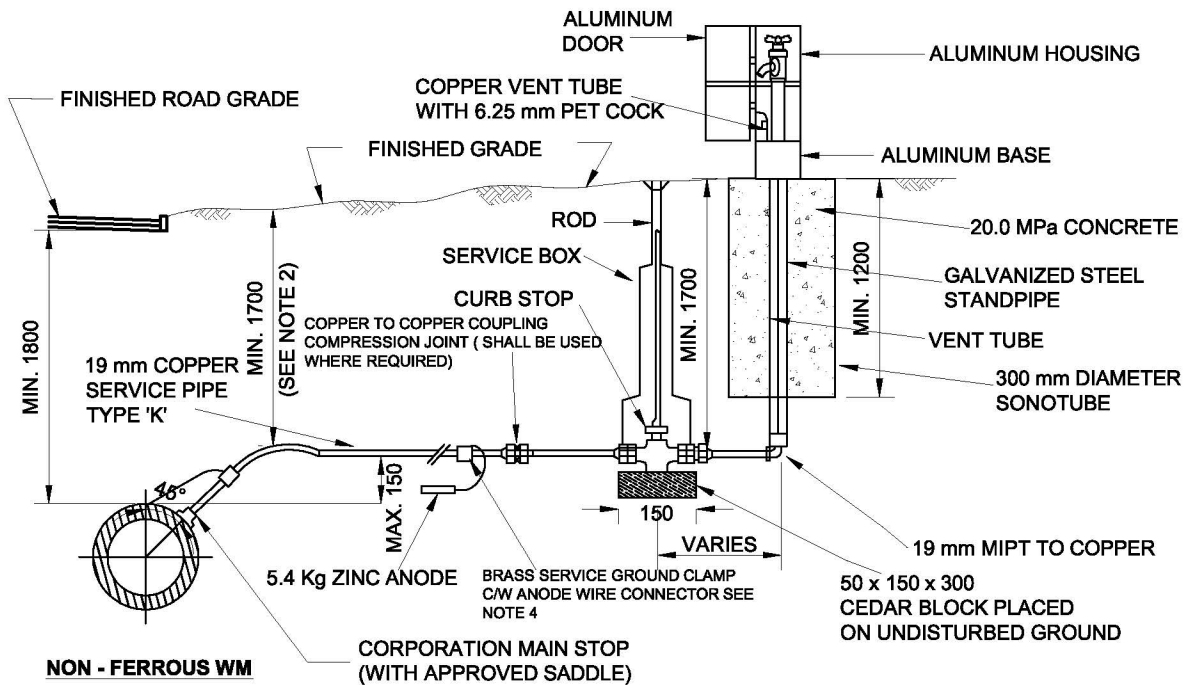
REV

1

CATHODIC PROTECTION REQUIREMENTS


NMSD - 309.00

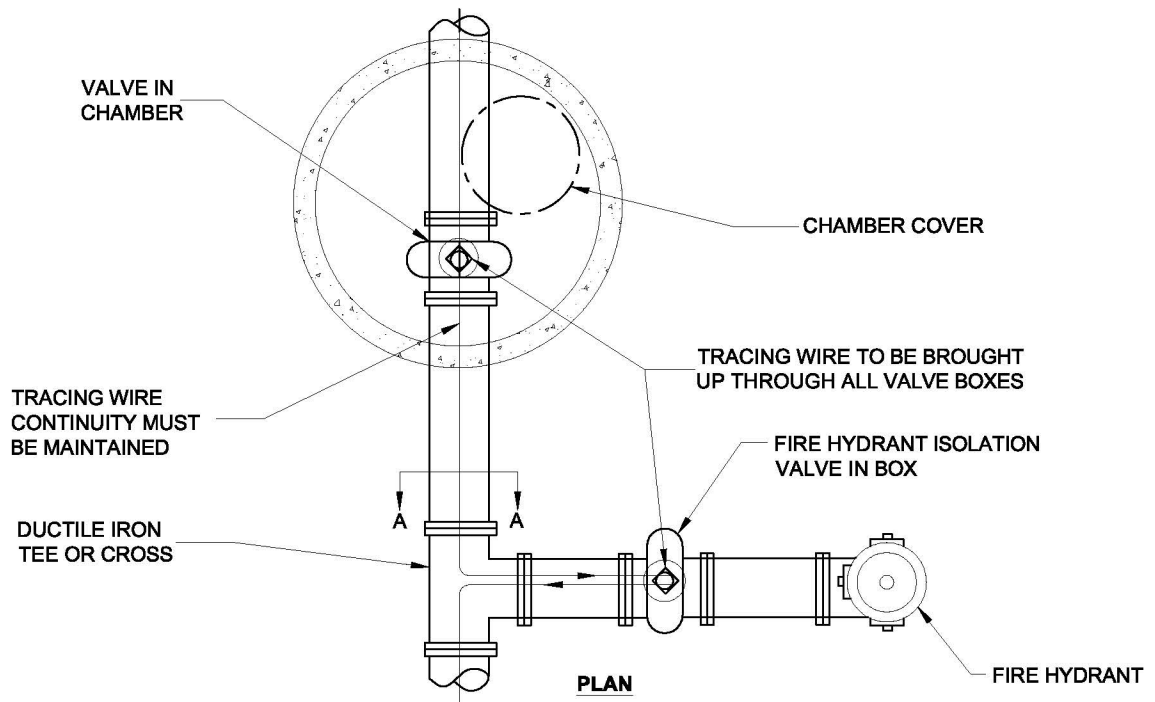




- NOTES**
1. WATERMAIN SHALL BE TAPPED UNDER PRESSURE.
 2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE NON REMOVABLE, ALUMINUM - CAST HOUSING.
 3. ALL WORKING PARTS SHALL BE BRASS AND REMOVABLE FROM ABOVE GROUND WITH NO DIGGING.
 4. FOR CONNECTION DETAILS TO FERROUS WATERMAIN REFER TO NMSD - 307.00
 5. LOCATION OF SAMPLING STATION AND CURB STOP SHALL BE DETERMINED BY THE TOWN OF NEWMARKET.
 6. A DECAL PROVIDED BY THE TOWN OF NEWMARKET SHALL BE AFFIXED TO THE FRONT OF THE SAMPLING DOOR.

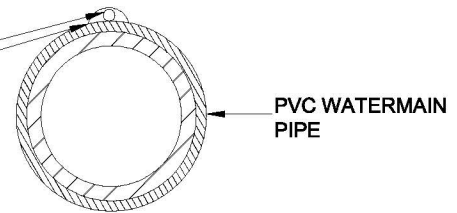
ALL DIMENSIONS IN MILLIMETERS EXCEPT WHERE NOTED.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	08/08	REV	1
WATER SAMPLING STATION		NMSD - 310.00	
			



12 GAUGE STRANDED PLASTIC COATED TRACER WIRE, T.W.U. 75C. 600V. OR APPROVED EQUAL.

TRACER WIRE TO BE SECURED TO PIPE AT EVERY FITTING, VALVE, AND AT INTERVALS NOT EXCEEDING 1m, BY THE USE OF FIBERGLASS TAPE OR PLASTIC WRAP. (TRACER WIRE IS NOT TO BE LOOPED AROUND WATER MAIN)




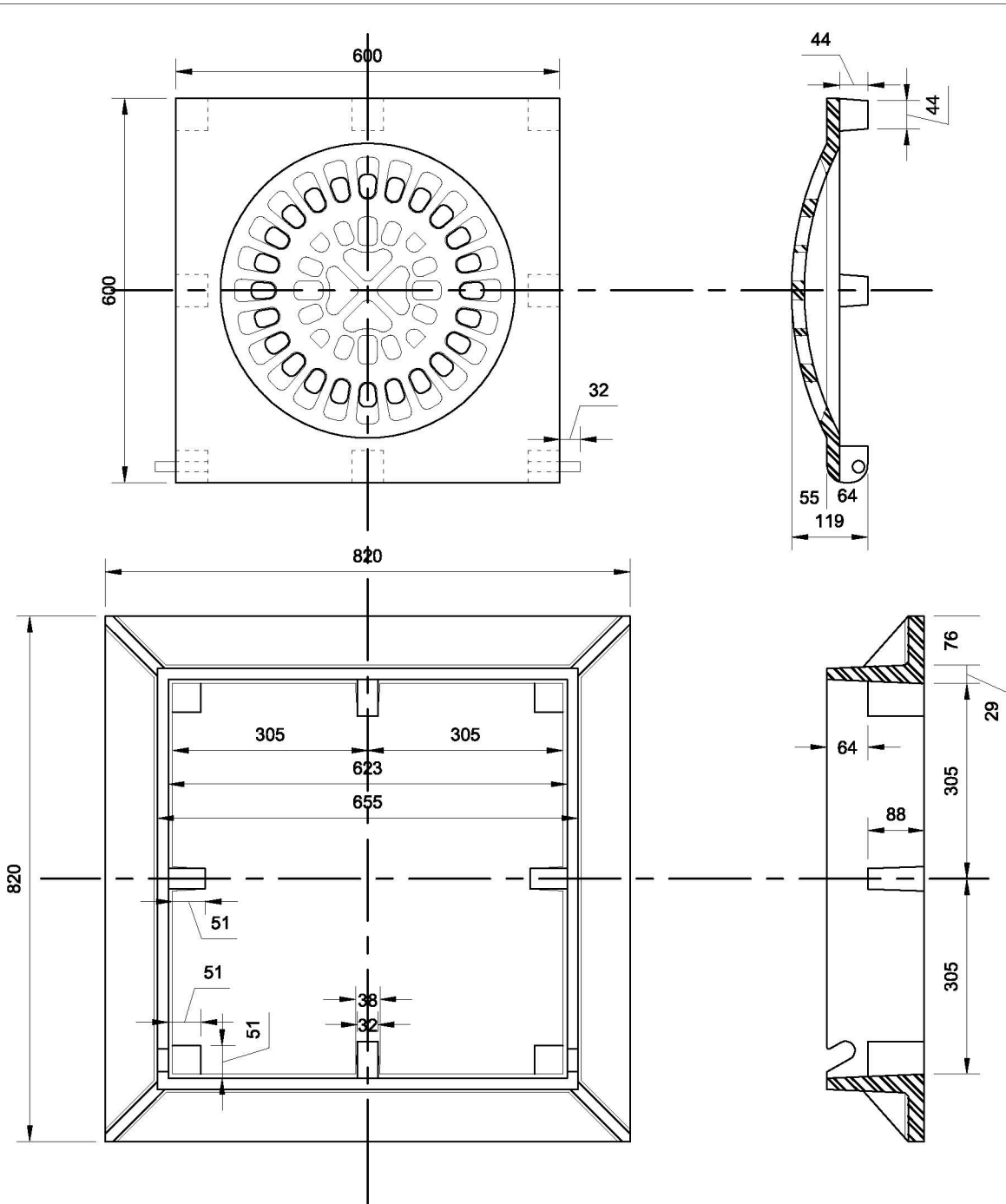
SECTION A - A

NOTES

1. SPLICING OF TRACER WIRE IS NOT PERMITTED UNLESS SPECIFIED OR APPROVED BY THE ENGINEER WHEN PERMITTED, THE WIRE SHALL BE SOLDERED.
2. IF SPLICING IS REQUIRED, ELECTRICAL CONNECTORS APPROVED FOR UNDERGROUND INSTALLATION SHALL BE USED.
3. TRACER WIRE CONTINUITY OF CURRENT MUST BE TESTED AND VERIFIED BY THE TOWN OF NEWMARKET WATERWORKS REPRESENTATIVE.


ALL DIMENSIONS ARE EXPRESSED IN mm UNLESS OTHERWISE NOTED.

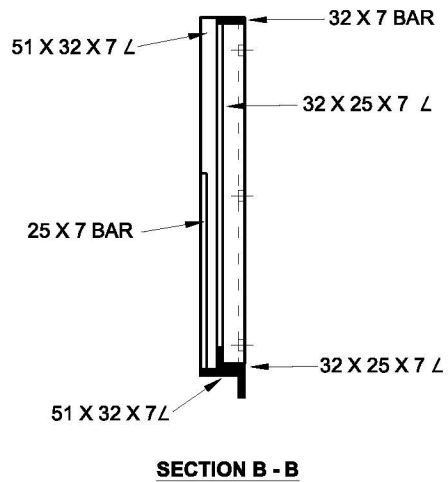
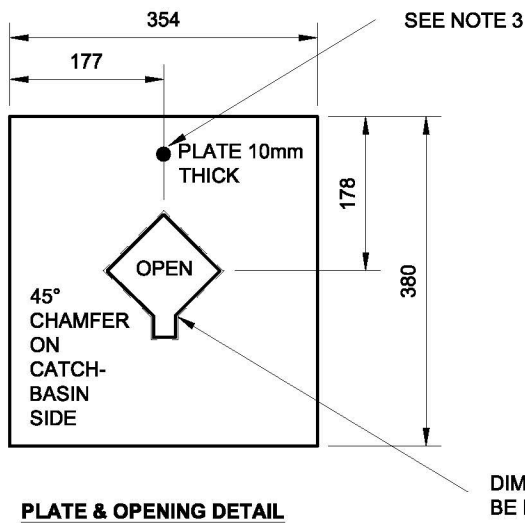
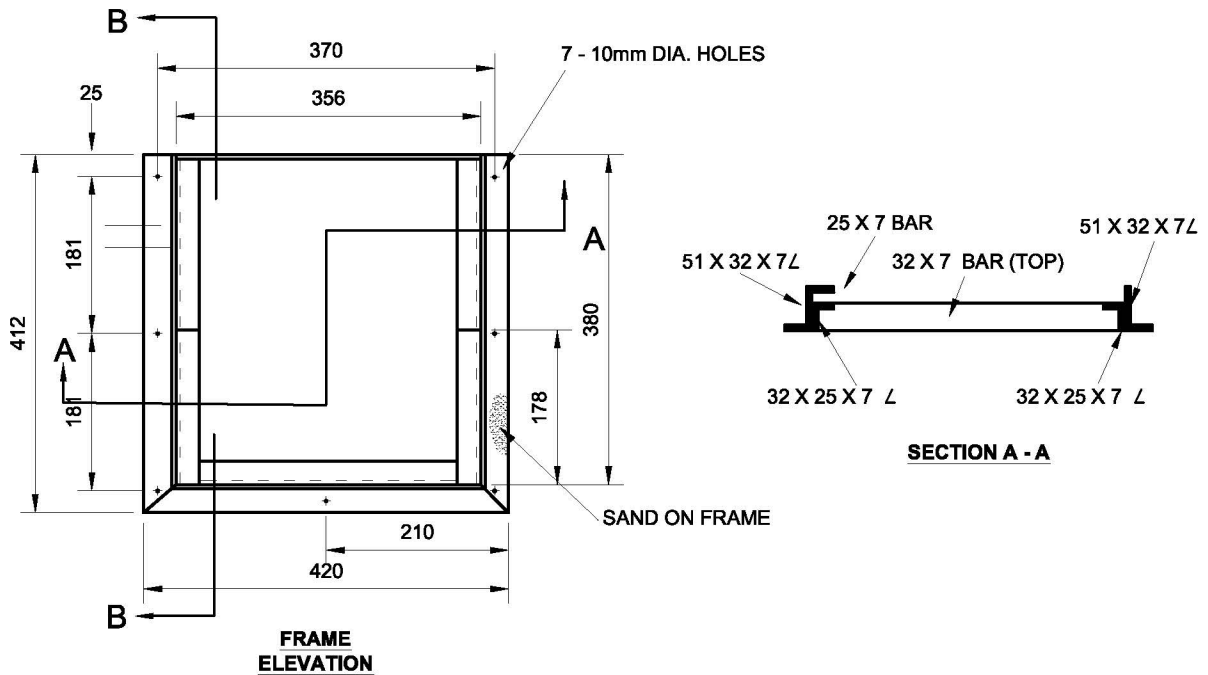
TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	08/08	REV	1
TRACER WIRE INSTALLATION	NMSD - 311.00		



NOTES:

- ALL DIMENSIONS ARE SUBJECT TO THE MANUFACTURES TOLERANCES
- TO BE USED ON ALL REAR LOT CATCHBASINS OR AS SPECIFIED BY THE TOWN'S DIRECTOR OF PUBLIC WORKS AND ENVIRONMENTAL SERVICES


TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	05/08	REV	1
BEEHIVE CATCHBASIN FRAME AND COVER FOR REAR LOT CATCHBASINS	NMS - 400.00		

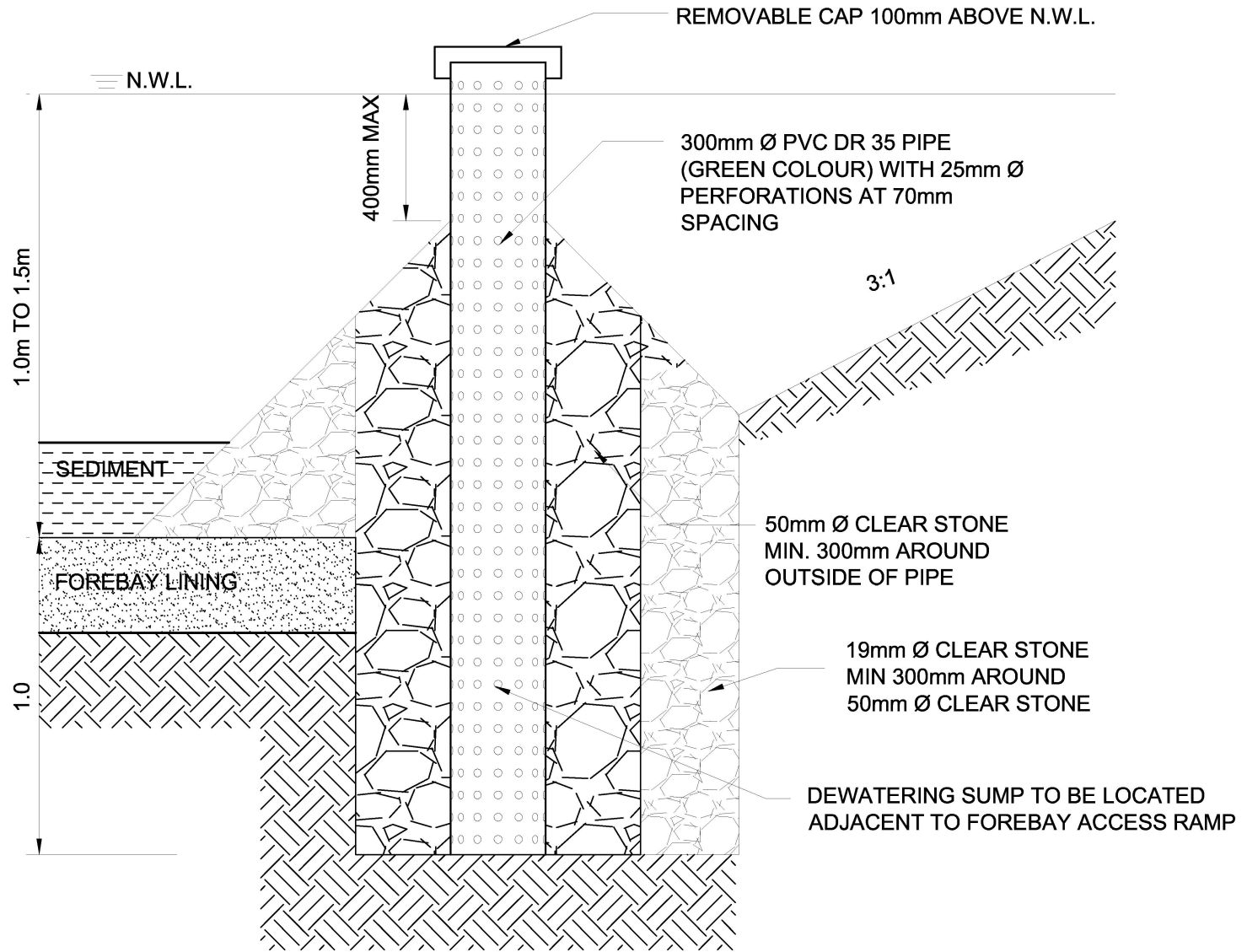


DIMENSION OF OPENING (TYPE A THROUGH F) TO BE IDENTIFIED ON PLAN & PROFILE DRAWINGS

NOTES:

1. ALL ANGLES, BARS & PLATE TO BE PVC MATERIAL.
2. SECURE FRAME TO CATCHBASIN WITH 7 - 10 M 50mm LONG HOT DIP GALVANIZED LAG BOLTS AND WASHERS WITH CINCH ANCHORS.
3. SECURE PLATE TO CATCH BASIN WALL WITH 12mm Ø 75mm LONG HOT DIP GALVANIZED LAG BOUT WITH WASHER AND CINCH ANCHOR.
4. ALL SURFACES TO BE SOLVENT WELDED, TO BE TREATED WITH PVC PRIMER PRIOR TO APPLICATION OF PVC SOLVENT WELDING CEMENT.
5. LOCATE IN CATCHBASIN WITH CENTRE OF OPENING AT CENTRE OF OUTLET PIPE.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	06/08	REV	1
CATCHBASIN INLET CONTROL DEVICE (Sliding Type)	NMS - 401.00		



TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

06/08

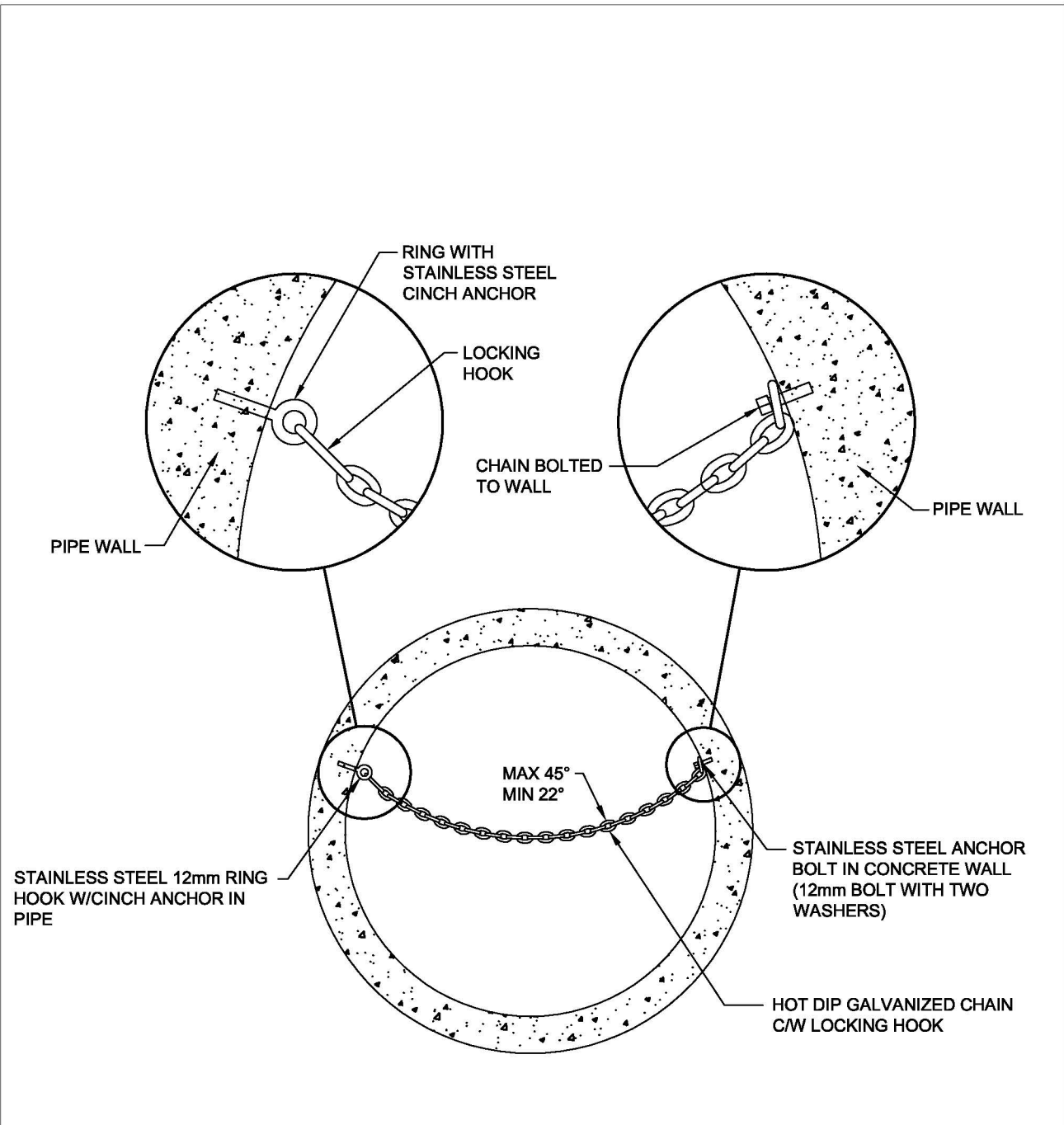
REV

2

DEWATERING SUMP



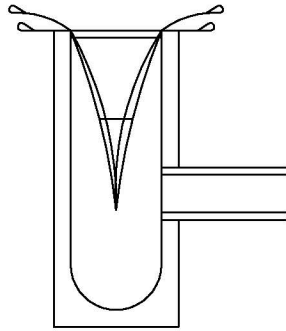
NMS - 402.00



NOTES:

1. TO BE INSTALLED IN OUTLET PIPE.
2. MINIMUM PIPE SIZE - 1,200mm Ø
3. CHAIN TO BE LOCATED 150mm DOWNSTREAM OF DOWNSTREAM FACE OF MANHOLE WALL
4. CHAIN TO BE GALVANIZED STEEL, 9.5mm EXACT SIZE OR TRADE SIZE. PROOF COIL WITH 34.5mm INTERNAL LINK LENGTH, 15.7mm INTERNAL LINK WIDTH AND TO HAVE A SAFE WORKING LOAD OF 1 TONNE

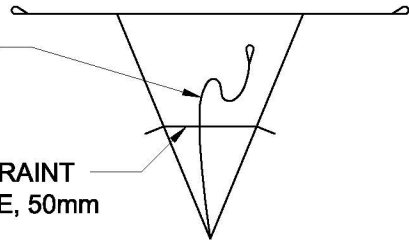
TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	05/08	REV	1
SAFETY CHAIN DETAIL		 Newmarket	
	NMS - 403.00		



INSTALLATION DETAIL

DUMP STRAPS (2)

EXPANSION RESTRAINT
(6mm NYLON ROPE, 50mm
FLAT WASHERS)

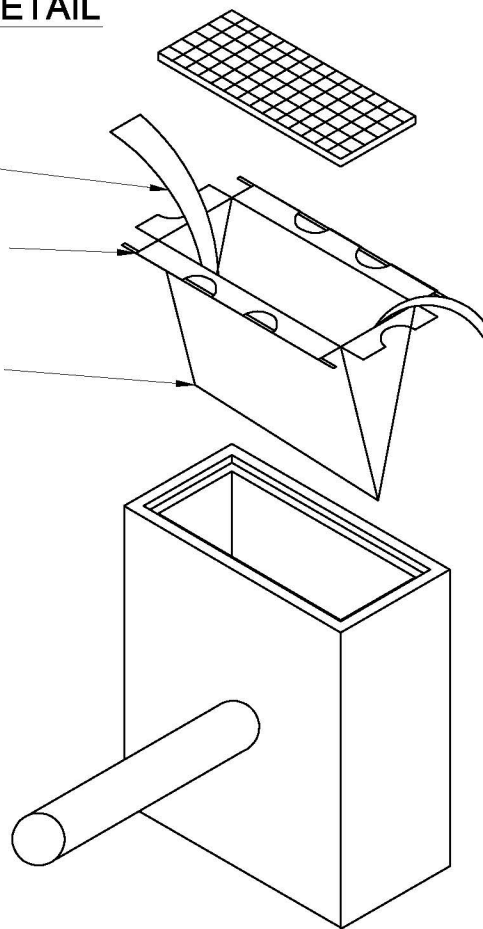


BAG DETAIL

DUMP STRAP

25mm REBAR FOR BAG
REMOVAL FROM INLET

SILT SACK



NOTES:

- INSPECT AFTER EVERY MAJOR RAIN EVENT
- INSPECT EVERY THREE WEEKS MINIMUM
- SILTSACK SHOULD NEVER BE OVER HALF FULL

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

05/08

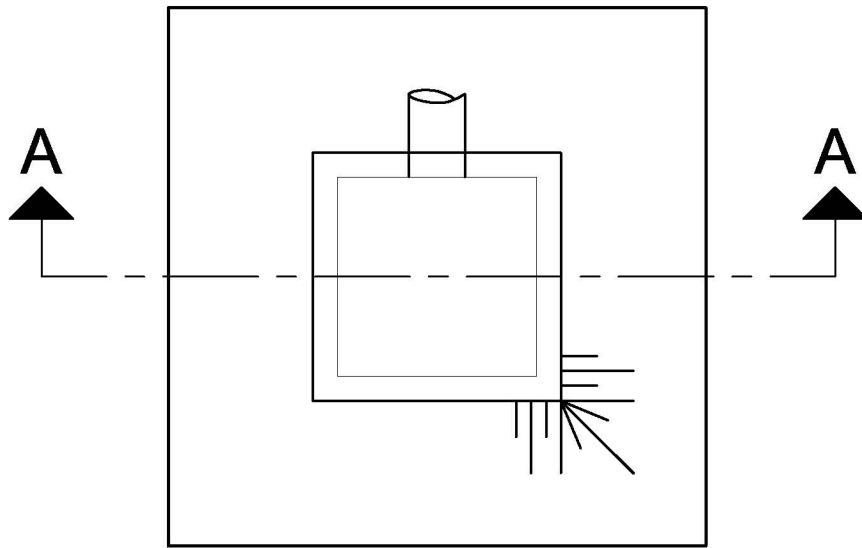
REV

1

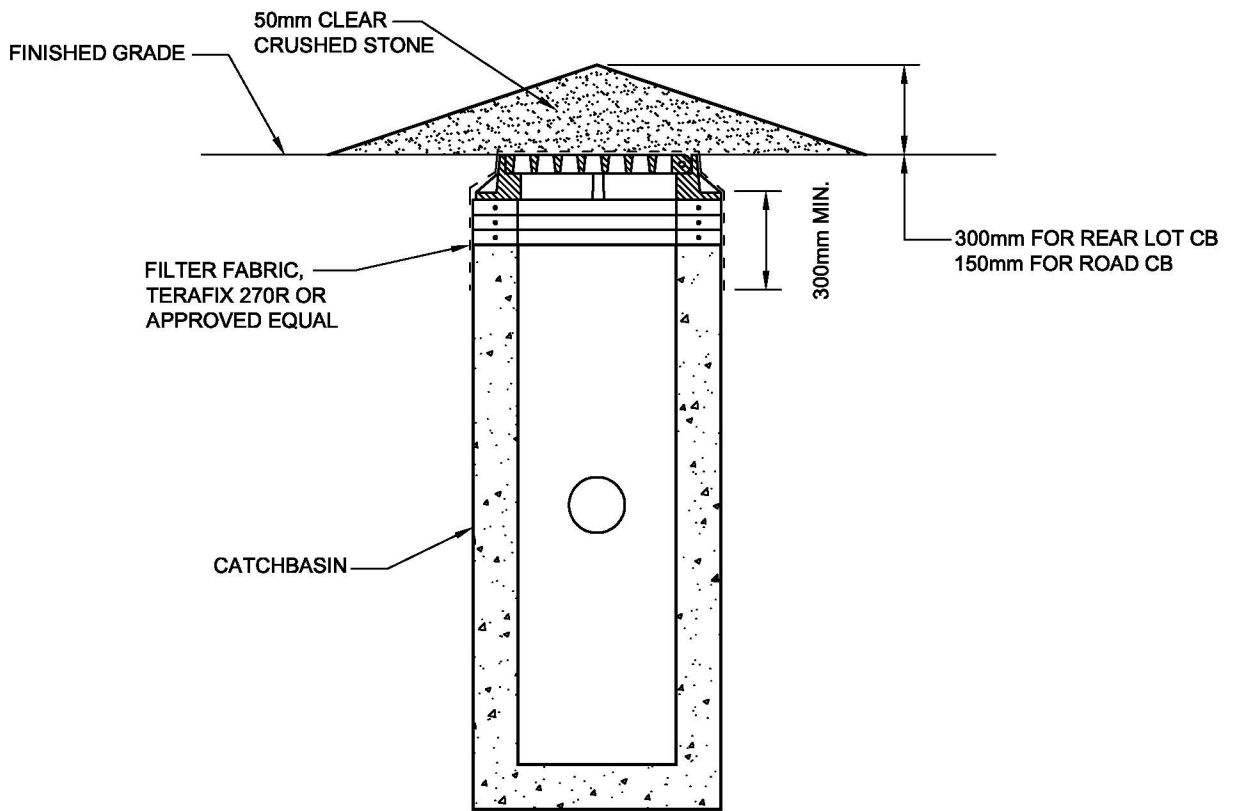
**SEDIMENT TRAP DETAIL FOR
ROAD CATCHBASIN**

NMS - 500.00





PLAN



SECTION A-A

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

05/08

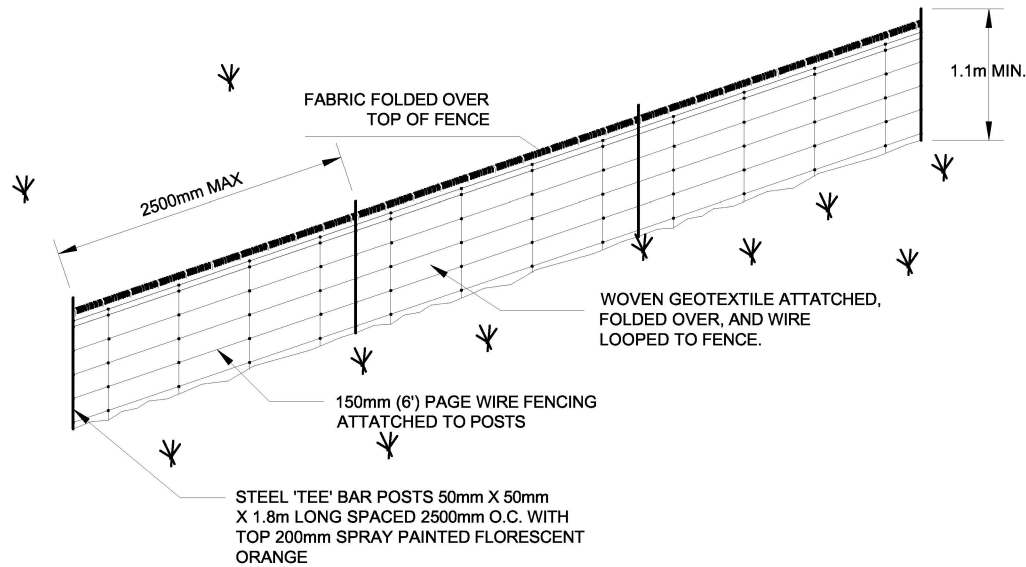
REV

1

**SEDIMENT TRAP FOR REAR
LOT CATCHBASINS**

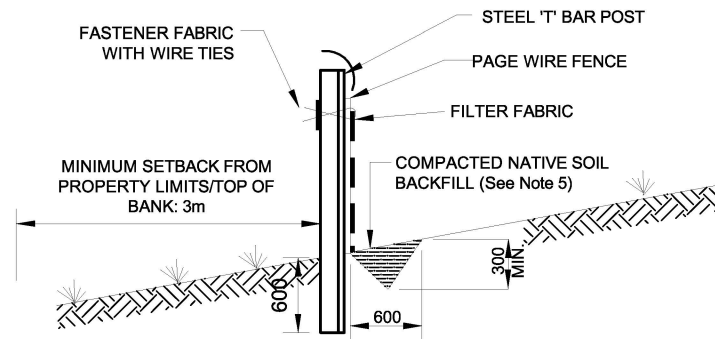
NMS - 501.00





NOTES:

1. SILT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SILT/SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 'CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT.'
3. SILT /SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TOED INTO THE SOIL A MIN OF 300mm BY EITHER STATIC SLICING OR TRENCH METHOD WITH COMPACTION OF TRENCH MATERIAL MEETING 95% STANDARD PROCTOR DENSITY.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED MAX. 2500mm ON CENTER.
5. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
6. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
7. GEOTEXTILE FABRIC TO BE COMPRISED OF WOVEN OR NON WOVEN U.V. STABILIZED MATERIAL. FABRIC TO BE FOLDED OVER TOP OF FENCE MIN. 300mm AND WIRE FASTENED.



TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

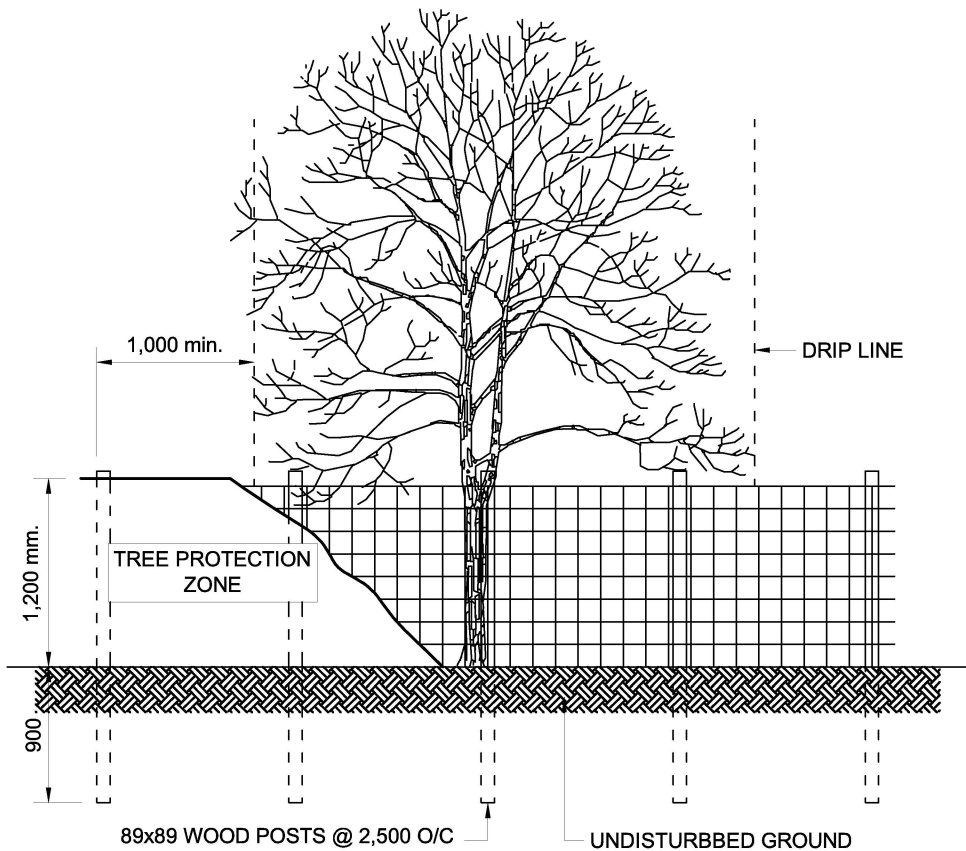
06/08

REV 1

STANDARD SILTATION CONTROL FENCE



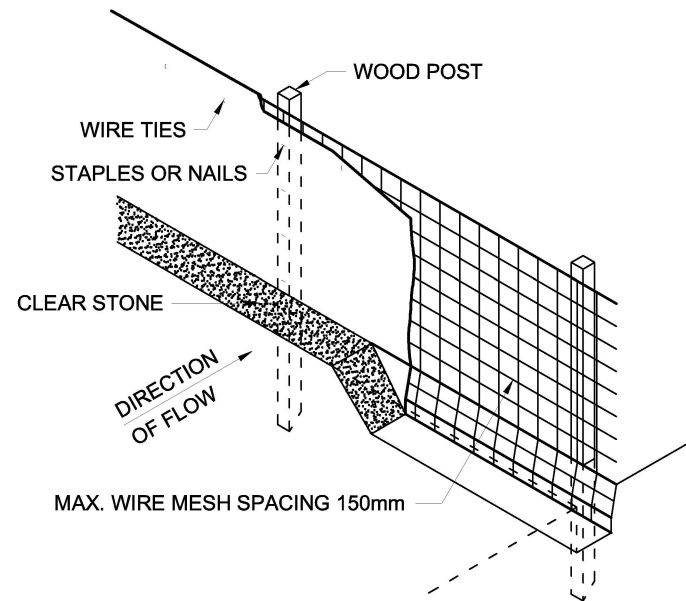
NMS - 502.00



ELEVATION

NOTES:

1. ALL DIMENSIONS IN MILIMETERS
2. INSTALLATION: 2,100mm MIN. LENGTH WOOD POSTS, SPACED 2,500mm O.C. MAX. AND WIRED OR STAPLED TO STANDARD HIGHWAY FENCE AT MIN. 3 LOCATIONS PER POST WITH #10 WIRE OR GALVANIZED STAPLES.
3. ATTACH FILTER FABRIC (TERRAFIX 270R OR APPROVED EQUAL) SECURLY TO UPSTREAM SIDE OF POSTS BY HEAVY DUTY STAPLES.
4. ENSURE FENCE IS LOCATED 1.0m MIN. BEYOND THE DRIP LINE OF TREES TO BE PRESERVED.
5. FENCING TO BE INSTALLED PRIOR TO CONSTRUCTION.
6. TREE PROTECTION ZONE SIGNAGE (min dimensions 300mm x 450mm) TO BE ATTACHED TO FENCE IN HIGHLY VISIBLE LOCATIONS



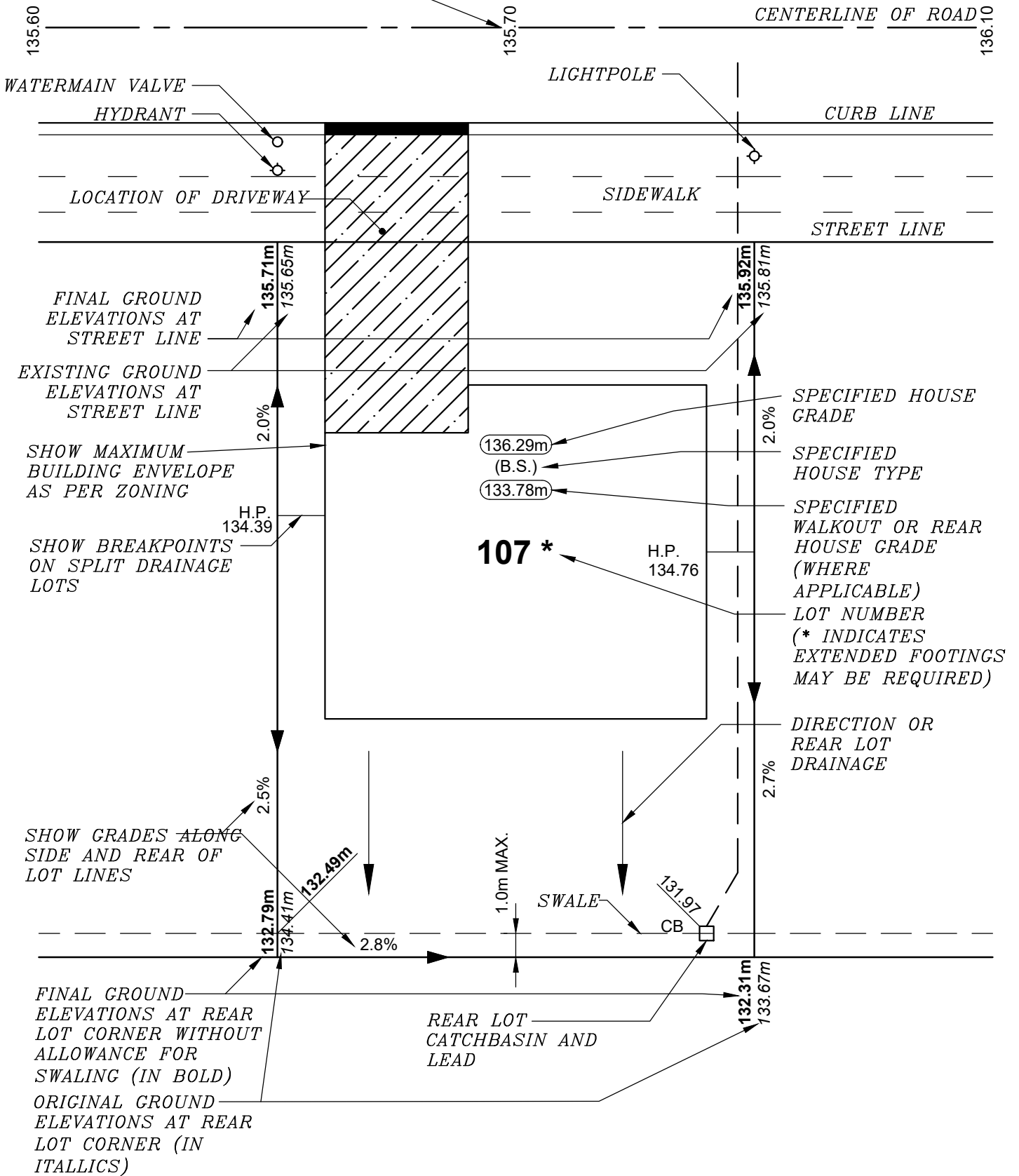
SECTION

FROZEN CONDITION

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	05/08	REV	1
TREE PROTECTION / HEAVY DUTY SILTATION CONTROL FENCE		 Newmarket	
		NMS - 503.00	

STREET NAME

SHOW CENTERLINE ROAD GRADES AT 20m INTERVALS



TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

08/19

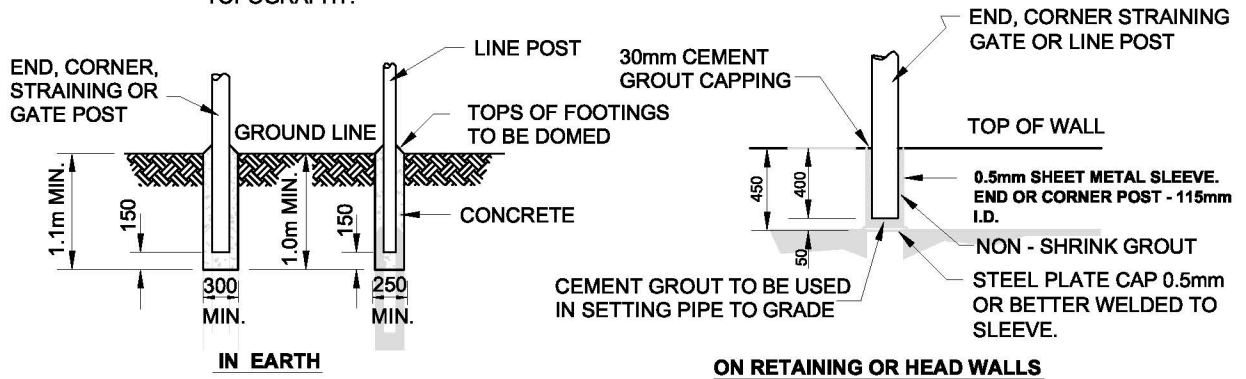
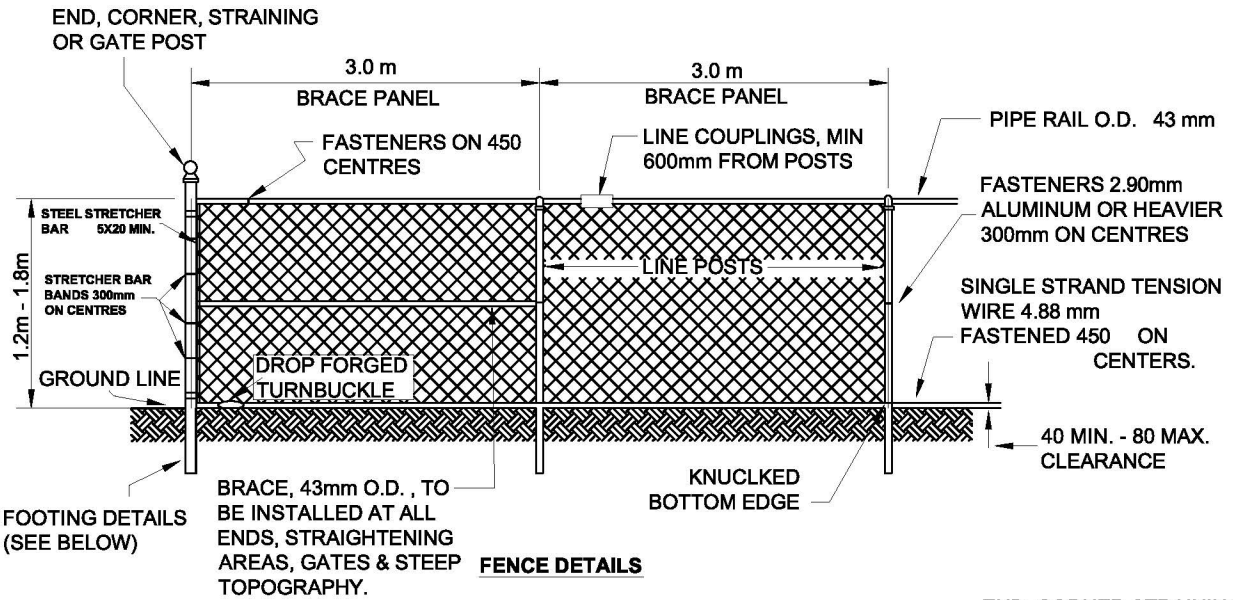
REV

2

LOT GRADING PLAN (Typical Requirements)

NMS - 600.00





POST DETAILS							
DESCRIPTION	O.D	LENGTH					
		FABRIC WIDTH 1.8m		FABRIC WIDTH 1.5m		FABRIC WIDTH 1.2m	
		IN EARTH	RETAINING WALLS	IN EARTH	RETAINING WALLS	IN EARTH	RETAINING WALLS
LINE POST	60	2670	2170	2360	1870	2060	1560
END, CORNER, STRAINING AND GATE POST WITH OPENINGS MAX.	90	2900	2400	2590	2100	2290	1790
RAIL, TOP & BRACE	43	RANDOM					

NOTES

- CHAIN LINK FABRIC TO BE BLACK VINYL COATED, 38 WOVEN MESH 9 GAUGE O. D. OF 11 GAUGE GALVANIZED STEEL CORE FASTENED TO TOP RAIL, BRACE RAIL, LINE POST, STRETCHER BAR AND BOTTOM RAIL WITH 9 GAUGE GALVANIZED WIRE 475 O.C.
- FINISH TO BE BLACK GLOSS ENAMEL BY POWDER COAT APPLICATION. PRIOR TO COATING, ALL SURFACES TO BE CHEMICALLY CLEANED AND TREATED WITH PARKER BONDERITE AND CHLOROPRENE SOLVENT OR APPROVED EQUALS. POWDER COATING MUST BE A POLVESTOR 2000 SERIES APPLIED IN A THICKNESS OF 4-5 MILS BY ELECTROSTATIC COAT AND OVEN CURED TO A SMOOTH AND EVEN SURFACE.
- ALL FENCE POSTS AND RAILS TO BE GALVANIZED SCHEDULE "40" PIPE.
- NO PLASTIC FITTINGS OR COMPONENTS ARE TO BE USED.
- BOTTOM RAIL MAY NOT BE REQUIRED IN SOME APPLICATIONS SUBJECT TO APPROVAL OF ENGINEERING SERVICES DEPARTMENT.
- INSTALL MESH ON PUBLIC SIDE OF FENCE.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

05/08

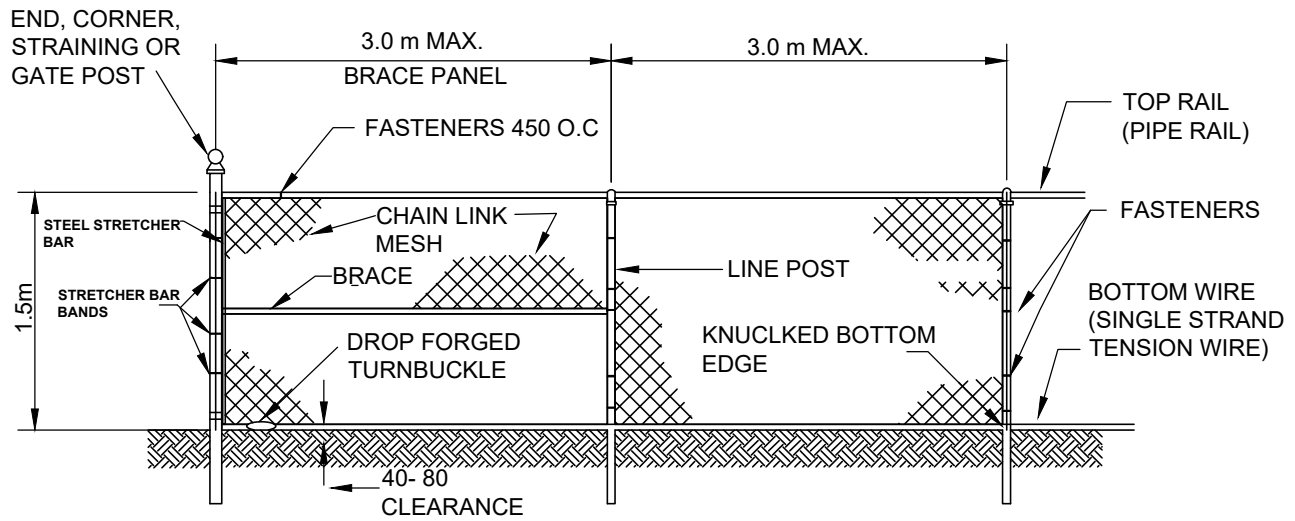
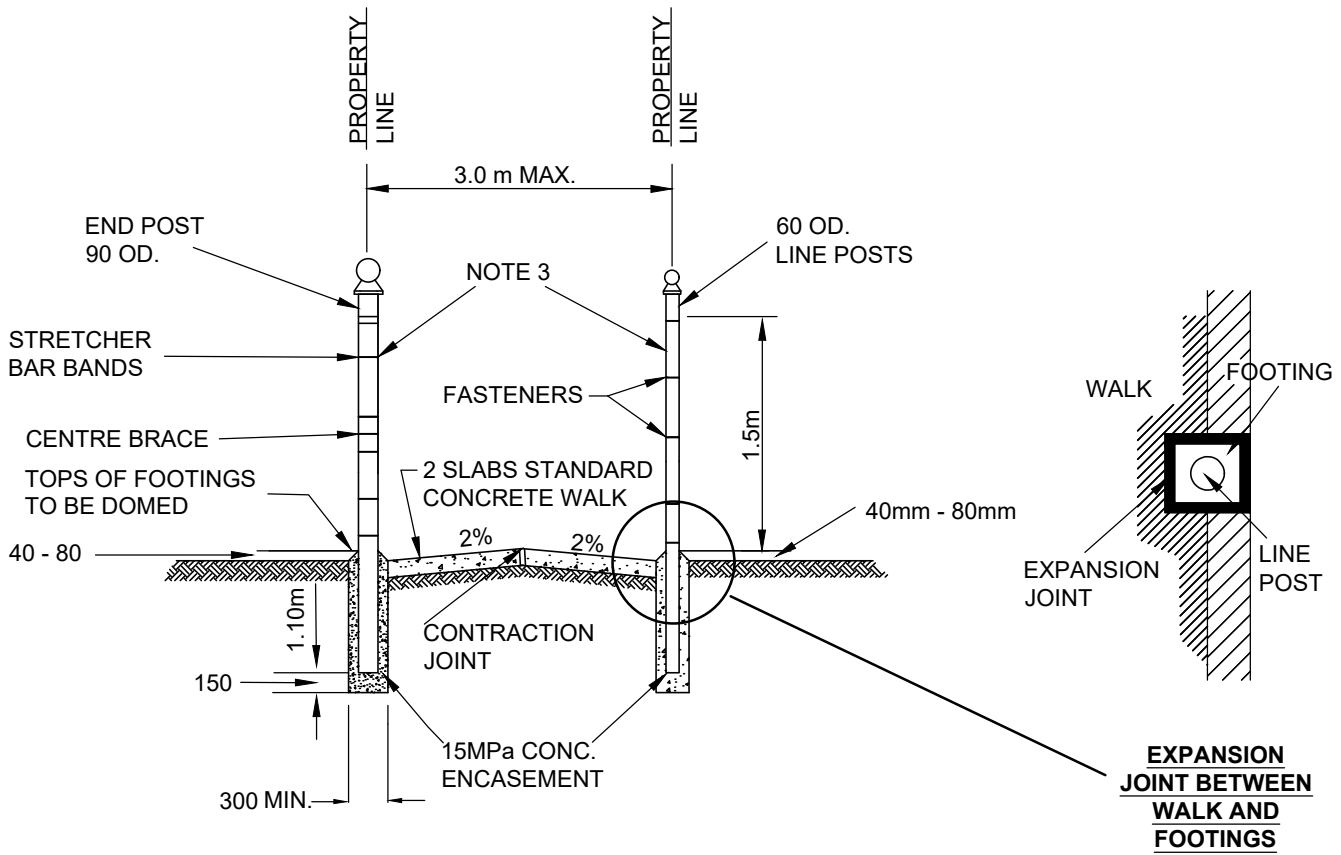
REV

1

CHAIN LINK FENCE DETAIL

NMS - 700.00





NOTES:

1. HEIGHT SHALL BE STEPPED DOWN TO 0.9m FROM BUILDING LINE TO STREET LINE FOR FRONT YARDS.
2. WALKS EXCEEDING 3m WIDTH REQUIRE STRUCTURAL DESIGN.
3. CHAIN LINK MESH TO BE INSTALLED INSIDE OF WALKWAY.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

08/19

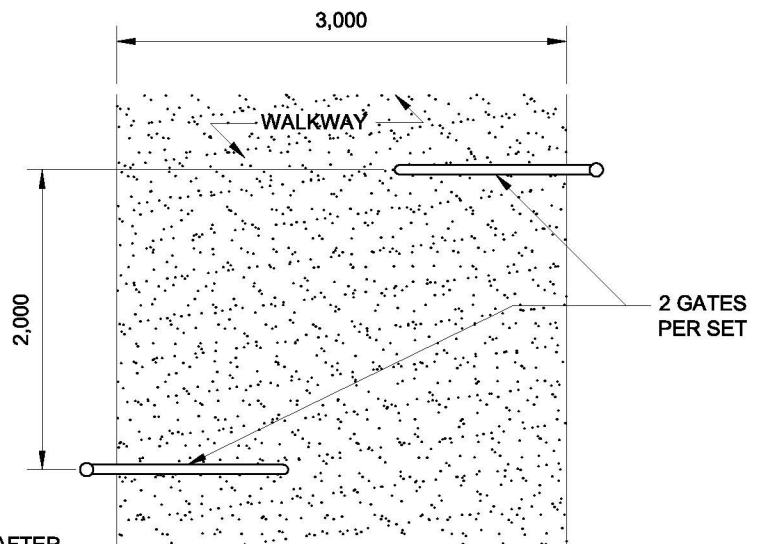
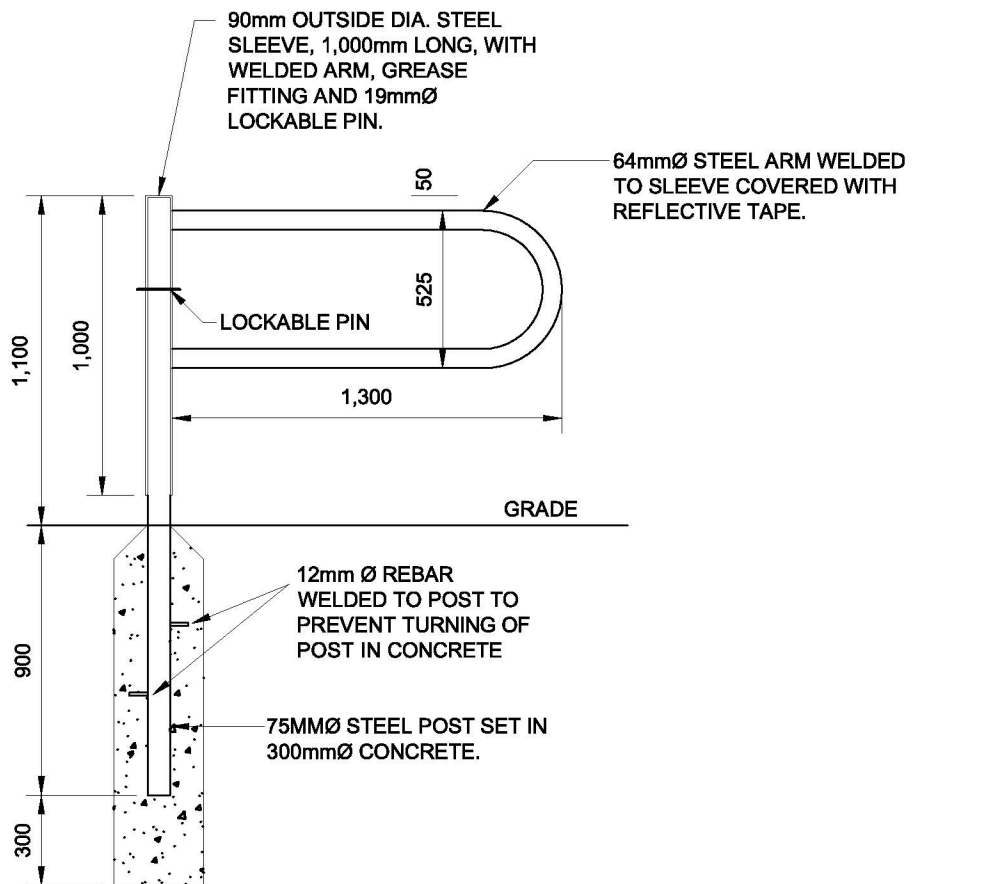
REV

2

**PEDESTRIAN WALKWAY
WITH FENCING**

NMSD - 701.00





PLAN

NOTES:

- 1 ALL DIMENSIONS ARE IN MILLIMETERS.
- 2 GATE TO BE HOT DIPPED GALVANIZED AFTER WELDING
- 3 STEEL TO BE PRIMED AND PAINTED WITH TWO COATS OF BLACK PAINT

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

DATE

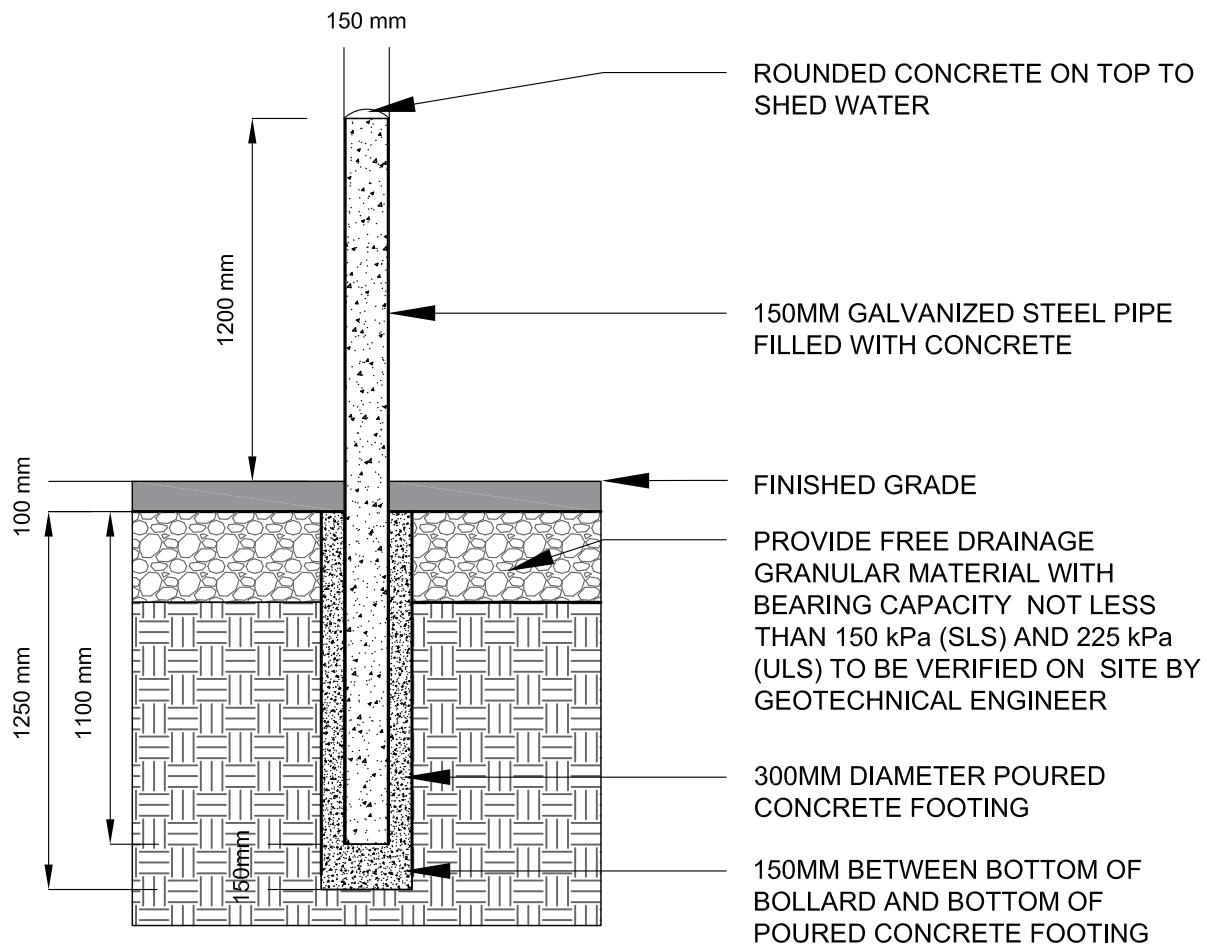
REV

1

SWING GATE DETAIL

NMSD - 702.00





NOTES :

1. Concrete strength to be minimum 30 mpa at 28 days with 7% 1.5 air entrainment.
2. Provide 1.0m min clearance where bollards are placed in front of hydrants.
3. Bollards are to be finished with primer and two coats of semi - gloss yellow enamel paint or black enamel paint.
4. 76.2 mm wide reflective tape shall be affixed around the bollard if painted black.
5. All dimensions are in millimeters unless otherwise shown.

TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING

APR/2023

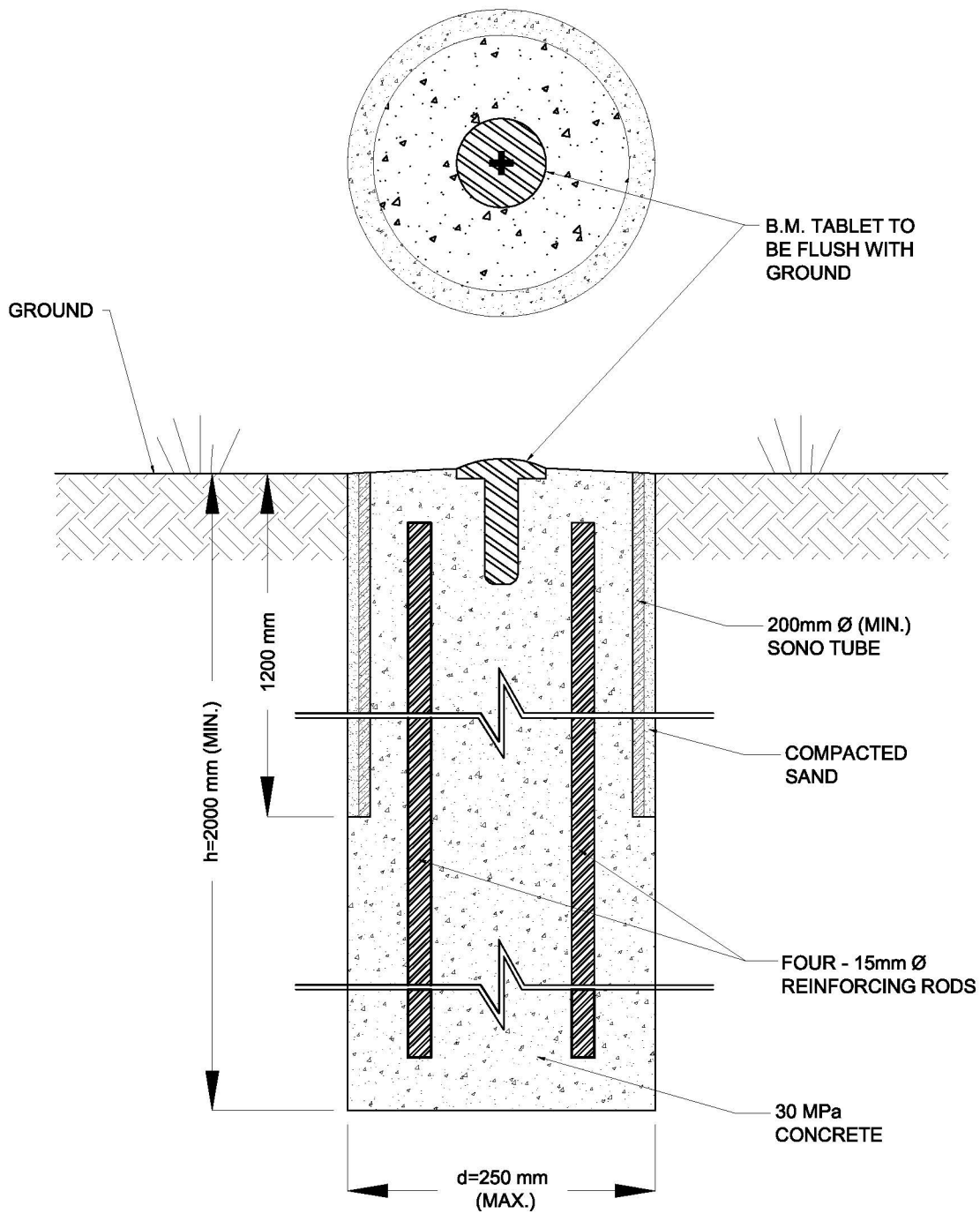
REV

1

BOLLARD

NMSD - 703.00





TOWN OF NEWMARKET MUNICIPAL STANDARD DRAWING	JAN/15	REV	1
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HORIZONTAL CONTROL MONUMENT

NMSD - 800.00

