




The Corporation of the
Town of Whitby
Engineering Services

Design Criteria and Engineering Standards

Revision June 2025

Approved By	Signature
Peter Angelo, P.Eng. Director, Engineering	



The Corporation of the
Town of Whitby
Engineering Services

Design Criteria

Major Revisions on Design Criteria:

1. A2.01 General requirements have been revised.
2. A2.02 Drawing requirements have been revised.
3. A3.02 First Submission requirements have been revised.
4. A3.03 Second Submission requirements have been revised.
5. A3.06 Site Alteration has been added.
6. A3.07 Underground Servicing Approval has been added
7. A4.02 Drawing Requirements-note “e” has been removed.
8. A5.00 Submissions and Approvals – Municipal Projects -chapter number has been revised to A4.03 Submissions and Approvals. Rest of the chapter numbers have been updated.
9. A5.06 Approved Materials has been revised.
10. A5.07 Erosion and Sediment Control Plan has been revised.
11. A6.00 Record Drawings, the first paragraph has been revised, note a has been revised.
12. A7.00 Development with Private Services, chapter title has been revised.
13. A7.04 Lot Grading has been revised.
14. B2.00 Watershed Planning/Storm Water Management has been revised.
15. B2.01 Lot Level Controls, note “c”, “e” and “f” has been revised.
16. B2.02 Conveyance Controls, note “d” and “e” has been revised.
17. B2.03 End-Pipe Storm Water Management Facilities, note “c” and “d” has been revised.
18. B2.04 Storm Water Quality Treatment Facility Requirements, note “a”, “r” and “s” has been revised.
19. B2.06 Non-conventional Stormwater Management Facilities has been added.
20. B2.07 Industrial, Commercial and Institutional (ICI) Developments has been added.

21. B3.04 Pipe Capacity, note “e” has been revised.
22. B3.09 Maintenance Holes, note “d”, “l” and “s” has been revised.
23. B13.1 General, note “e” has been revised.
24. Table C3.01 pavement width has been revised to include local road.
25. Table C3.01 General, boulevard width and bike lane requirements and note “12” has been revised.
26. C3.01.1 Minimum Visibility Triangle requirements have been revised.
27. C5.02 Locations of Community Mail Boxes requirements have been revised.
28. C6.01.1 Residential Driveways, note “c” has been revised.
29. C6.03.1 Curb Standard – New Developments, note “d” has been revised.
30. C7.00 Traffic Calming, speed humps detail has been referenced.
31. C10.05 Detailed Design and Submission Requirements, note “c” has been revised.
32. C11 Public Laneways, note “a”, “b” and “e” has been revised.
33. D2.01 Lot Grading Design, note “c” has been revised.
34. D5.00 Lot Grading Requirements for Infill Development has been revised.
35. D5.03 Lot Grading Criteria for Infill Housing, notes have been revised.
36. D5.04 Lot Grading and Stormwater Management Criteria for Infill Housing, note “l” and “m” has been revised.
37. D7.00 Foundation Control and Lot Grading Certification has been revised.
38. F5.00 Fencing, note “c” has been removed.
39. G1.00 General, second paragraph has been removed.
40. The whole Chapter “J” has been renumbered to “I”
41. J3.03.1 (renumbered to I3.03.1) Internal Works has been revised.
42. J3.04 (renumbered to I3.04) Building Section Requirements has been removed.
43. J4.05 (renumbered to I4.05) Urban Standard for Private Internal Street, sub-section Road Width has been revised from 6.5m to 6m (face of curb to face of

curb)

44. J4.05 (renumbered to I4.05) Urban Standard for Private Internal Street, subsection Cul-De-Sac, third point –“or a cul-de-sac” has been removed.
45. J4.08 (renumbered to I4.08) Groundwater Pumping, Drawdown and Foundation Drainage, a new chapter has been added.
46. Appendix A Digital Information Submission requirements have been revised.
47. Appendix B Engineering Drawings requirements have been revised.
48. Appendix F New appendix has been added.

Major Revisions on Standard Drawings:

1. Town of Whitby Standard Drawing #208.30 – Sidewalk Curb Depression – new standard has been added.
2. Town of Whitby Standard Drawing #214 – Multi-Use Path – notes have been revised.
3. Town of Whitby Standard Drawing #214.10 – Typical Rest Area along MUP and Sidewalk – Standard has been revised.
4. Town of Whitby Standard Drawing #214.20/#214.30 – MUP signs and Pavement Markings – standard has been revised.
5. Town of Whitby Standard Drawing #216 – Speed Hump – standard has been revised.
6. Town of Whitby Standard Drawing #402 – Collector/Arterial B Roadway 36.0m ROW – notes have been revised.
7. Town of Whitby Standard Drawing #402.10 – Arterial B Roadway 36.0m ROW – notes have been revised.
8. Town of Whitby Standard Drawing #406.20 - Typical 90 Degree Bend, Laneway - 8.5m R.O.W. – new standard has been added.
9. Town of Whitby Standard Drawing #408.10 – Hammerhead Detail – new standard has been added.
10. Town of Whitby Standard Drawing #410– Non-Residential and Multi-family Entrance Detail– standard has been revised.
11. Town of Whitby Standard Drawing #413 – Accessibility Parking – standard has

been revised.

12. Town of Whitby Standard Drawing #413.10 – Parking Meter Standard – new standard has been added.
13. Town of Whitby Standard Drawing #413.20 – EV Pad Detail - new standard has been added.
14. Town of Whitby Standard Drawing #413.30 – EV Pad Installation Details – new standard has been added.
15. Town of Whitby Standard Drawing #413.40 – SLM60 Metered Pedestal Detail– new standard has been added.
16. Town of Whitby Standard Drawing #500 – Street Sign Location – standard has been revised.
17. Town of Whitby Standard Drawing #501 – Street Name Sign – notes have been revised.
18. Town of Whitby Standard Drawing #501.20 – Stormwater Management Pond Sign Detail – standard has been revised.
19. Town of Whitby Standard Drawing #501.30 – Mud Mat Detail – new standard has been added.
20. Town of Whitby Standard Drawing #509 – Drawing Title Block for New Subdivision – standard has been revised.
21. Town of Whitby Standard Drawing #515 – Ditch Infill – Typical Details – standard has been added.
22. Town of Whitby Standard Drawing #515.10 – Ditch Infill Notes – standard has been added.

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Section A - General Information

A1.00 Introduction

The following engineering design criteria and requirements provide guidance to consulting engineers on design issues under the jurisdiction of the Town of Whitby. This includes storm drainage, Town of Whitby roads, lot grading, fencing, and street lighting. Separate design criteria and guidelines which may apply to a particular project are available from: Regional Municipality of Durham (Sanitary Sewer, Watermains and Regional Roads), Elexicon (Electrical Distribution), Town of Whitby Planning Department, Region of Durham Planning Department, CLOCA/MNR (Watercourses and Environmentally Sensitive Areas), MTO (Provincial Highways), Railroads and other authorities when required.

These design criteria refer to the Town of Whitby Standard Drawings found in Part 2 of this manual. They provide details on certain areas to clarify the design intent and are indexed as follows:

Section 100 - Storm Sewers
Section 200 - Curbs/Sidewalks
Section 300 - Grading
Section 400 – Geometrics
Section 500 – Miscellaneous

Note:

The Town of Whitby reserves its right to apply discretion in the interpretation of this Design Criteria and Engineering Standards documents and require the use of other relevant design guidelines/standards when reviewing each project.

A2.00 Engineering Drawings

A2.01 General

Colour Tables, Line Tables, Sample Drawings, Symbols, Tables and Template Drawings is available upon request for the creations of all engineering drawing sets for subdivisions, also see Appendices A and B of this manual. Engineering drawing requirements for site plans are described in Section J and individual house siting plan requirements are described in Section D.

Typical Subdivision drawing set will normally include the following drawings:

- Cover Sheet with Key Plan and Index of Drawings
- General Notes
- General Plan of Services (1:1000)
- Plan and Profile Drawings of all proposed roads and sewers on easements (H 1:500, V 1:50)
- Grading Plan(s) (1:500)
- Minor and Major System Storm Drainage Plan(s) with Detailed Overland Flow Routing (1:1000)
- Sanitary Drainage Plan(s) (for submission to the Region of Durham) (1:1000)
- Storm Water Management Facilities Plan(s) (if applicable) (1:500)
- Utility Coordination Plan(s) (1:500)
- Photometric Plan (s) of new lighting levels in rights of way (1:500)
- Erosion and Sedimentation Control Plans (1:500)
- Construction Management Plan(s)
- Subdivision Phasing Plan (as required) (1:1000)
- Signage and Pavement Marking Plan(s) (1:1000)
- Detail Drawing(s) (Min. 1:50)
- Storm Sewer Design Sheets (minor system)(in 12 pt text) (N.T.S.)
- Hydraulic Grade Line Calculations (in 12 pt text)

Drawings to be Submitted Separately

- Traffic Calming Plan (as required)
- Roundabout Design Checks Package (if applicable)

A2.02 Drawing Requirements

- (a) Drawings shall be ARCH "D" size (604 mm x 914 mm). The title block for all drawings shall conform to Town of Whitby Standard Drawing No. 508 and/or 509. All plans shall have a "North" arrow and key plan.
- (b) All data shall be referred to the closest Town of Whitby geodetic benchmark which shall be noted on the plans. Site benchmarks shall be established and described and detailed on plans. The drawings shall incorporate horizontal control grid lines based on the Universal Transverse Mercator (UTM) NAD 83,

Zone 17N coordinate system. Any new benchmarks or horizontal control monuments established within the limits of the project (by the developer as required in the subdivision agreement or by other means) shall be added to the drawings prior to submission of as-built drawings.

- (c) All plans and profiles shall be drawn such that each street may be separately filed.
- (d) When streets require more than one plan, match lines shall be provided with no overlapping information.
- (e) Lot and block numbers on all engineering drawings shall be the same as on the Registered Plan.
- (f) All drawings shall be neat and legible, and shall be created in a current version of AutoCAD being used by the Town of Whitby. Refer to Appendix A for digital file submission requirements. Minimum text size of 3mm.
- (g) Stamps, tapes and stick-on labels shall not be used except for the Professional Engineer's stamp, which must be signed and dated prior to the final submission.
- (h) The Town of Whitby will provide maintenance hole, identification numbers by marking up the second submission drawings. Subsequent submissions shall have the Town of Whitby numbers on all drawings and on the sewer design sheets.
- (i) Signage and Pavement Marking Plans shall include, but not limited to, the following: locations of streetlights, potential street trees, hydrants, and all proposed signage with Ontario Traffic Manual code and a colour graphic representation of the sign and all proposed pavement markings.
- (j) Utility Coordination Plans shall show all proposed above ground and below grade utility infrastructure as well as potential street tree locations as per the Town's Landscape Plan Guidelines for Site Plan and Subdivision Development 2023 as amended and available online.

Typical structure size will be shown in the drawing legend. Any deviations from the typical size for larger structures (e.g., switchgears, OPI cabinets) shall be shown graphically and dimensioned on the drawings. Temporary and permanent community mailboxes will also be shown.

A3.00 Submissions and Approvals - New Development

A3.01 General

All submissions material (drawings, reports, calculations, etc) shall be stamped with the submission number (i.e.: 1st submission), and the submission date. Please note that drawing sets are **not** to be stamped as "FINAL Submission", only numeric references are to be used. The Town may ask for additional submission material as deemed appropriate for the development application.

A3.02 First Submission

One hard copy and electronic copies of each of the following plans and documents shall be submitted to Engineering Services:

- (a) Plan Proposed for Registration.
- (b) General Plan(s) of Services which shows all services to be constructed.
- (c) Lot Grading Plan(s).
- (d) Plan and Profile Drawing(s) of all streets and easements.
- (e) Storm Drainage Plan(s) with detailed Overland Flow Routing (See Section B).
- (f) Detail Drawing(s).
- (g) Storm Water Management (SWM) Facilities Plans (if applicable).
- (h) SWM report, dual drainage computer modelling files, O&M Manual.
- (i) Erosion and Sedimentation Control Plan(s).
- (j) Storm sewer design sheet(s) (5 and 100-year) and 100-year Hydraulic Grade Line (HGL) calculation.
- (k) A geotechnical report including the design of the road pavement structure, underground service bedding design, construction recommendations and house foundation recommendations including any engineered fill requirements.
- (l) Slope stability assessment (if applicable). Contact Engineering Services for guidelines and requirements.
- (m) A letter, stamped and signed from the consulting engineer stating that they have been engaged for the design, contract administration and resident supervision of the subdivision in accordance with the subdivision agreement requirements.
- (n) Engineering review fee deposit as per the Town's General Fees and Charges By-law (as amended).

A3.03 Second and Subsequent Submissions

The following plans and documents shall be submitted to Engineering Services:

- (a) One hard copy and electronic copy of all the plans and documents listed under "First Submission" which have been revised to include comments by Engineering Services and the other approving authorities.
- (b) One (1) loose copy of the General Plan(s) of Services (second submission only).
- (c) A formal submission letter and/or a response matrix including the Town's previous written comments and a point-by-point response by the Consultant.
- (d) Previous submission drawings and storm sewer design sheets as marked up by the Town of Whitby staff.
- (e) Applicable Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) forms and attachments.

- (f) Streetlight Layout and Photometric Design Plan(s), including base plan information.
- (g) Utility Coordination Plan.
- (h) Construction Management Report/Plan(s)
- (i) Subdivision Phasing Plan (If applicable)
- (j) Signage and Pavement Marking Plan(s)
- (k) Traffic Calming Plan
- (l) Engineer's Cost Estimate using the template available upon request from Development Engineering.

A3.04 Final Submission for Town Approval

Once all comments by the Town of Whitby, the Region of Durham, and applicable agencies and utilities have been satisfactorily addressed, the consultant will be requested to submit the original drawings, sealed by a P.Eng., to Engineering Services for signature.

Plan and profile drawings will **not** be signed or approved by the Town of Whitby prior to receiving an acceptable Utility Coordination Plan.

A3.05 Issued for Construction Submission

After the original drawings have been approved and signed by Engineering Services and returned to the Consulting Engineer, the following shall be forwarded to Engineering Services prior to construction commencement.

- (a) Two full-sized and three reduced format (half scale) complete sets of the approved engineering drawings signed by the Town and the Region of Durham, including a fully coordinated Utility Coordination Plan.
- (b) Vector-based .PDF files of all Town-signed "Issued for Construction" drawings with the Town signature information typed in, and "Issued for Construction" indicated within the title block.
- (c) Digital format of the approved engineering drawings, including streetlight drawings, in AutoCAD.
 - i.) AutoCAD generated drawings shall include all layers and object data that are identified in Appendix A "Layering Structure and Object Data requirements" and shall provide details outlined in Appendix A "Digital Information Submission".
 - ii.) In isolated cases, at the discretion of Engineering Services, the required object data information may be accepted in Excel format in lieu of AutoCAD file with object data. An Excel file "TOW AutoCAD Object Data Template" is available electronically upon request.
- (d) One (1) hard copy and one (1) scalable, vector based .PDF files of all final revised reports (e.g., Stormwater Management Report and O&M Manuals).

A3.06 Site Alteration

In accordance with Town of Whitby's Site Alteration By-law #7425-18 (as amended), a site alteration permit (i.e., fill permit) will be required for any alteration to the grade (topography) of land and the use of municipal highways through the movement, removal

or placement of topsoil, soil or fill, prior to engineering approval or execution of a development agreement. Further details are available on-line at <https://www.whitby.ca/en/town-hall/site-alteration.aspx>.

A3.07 Underground Servicing Approval

When a subdivision engineering design has advanced to a stage where it is generally acceptable, the subdivider may apply for Underground Servicing Approval (USA) to allow for construction of underground sewers prior to full engineering approval and execution of the subdivision agreement.

The following are the criteria that will make the subdivision eligible:

- (a) Design of stormwater management (SWM) facilities and underground services are finalized;
- (b) Grading and other design aspects are generally acceptable subject to minor revisions that will not affect SWM facility and underground services;
- (c) Utility Coordination Plan has been started;
- (d) Acceptable Cost Estimate has been provided before or with the USA request;
- (e) Approved Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA) forms have been provided before or with the USA request.

To obtain Underground Servicing Approval, the following conditions must be met:

- (f) The Underground Servicing Plan set must be initialed by the Town. This set typically includes, but is not limited to:
 - i.) Title Page
 - ii.) Index Page that only lists drawings included in the set
 - iii.) General Services Plan(s)
 - iv.) Plan & Profile Drawing(s)
 - v.) Storm Drainage Plan(s)
 - vi.) Stormwater Management Facility Drawing(s)
 - vii.) Construction Management Plan(s)
 - viii.) Standards and Details Plan(s)

Two full-sized and two reduced hard copies of the drawing set will be required.

- (g) Construction Management Report, accepted by Engineering;
- (h) Provision of Construction Management Security in the amount of \$50,000.00;
- (i) Provision of external services security (100% of the estimated costs as per the cost estimate);
- (j) Payment in full of Engineering Design Review Fee as per Fees & Charges By-law;
- (k) Payment in full of Engineering Inspection Fees as per Fees & Charges By-law;
- (l) Payment in full of Underground Servicing Approval Fee, as per Fees & Charges By-law;
- (m) Provision of Certificates of Insurance, which shall be on the Town's Certificate of Insurance form;
- (n) Provision of Approved CLI-ECA forms.

A4.00 Engineering Drawings – Capital Projects

A4.01 General

Colour and line tables, sample drawings, symbols and template drawings are available

upon request for the creation of all engineering drawing sets for capital projects.

The engineering drawing set will normally include the following drawings:

- (a) Cover Sheet with Key Plan, Index of Drawings and Project Description
- (b) General Notes and Legend
- (c) Horizontal Control Plan (1:1000)
- (d) Plan and Profile Drawings of all proposed roads and sewers (H 1:250, V 1:50)
- (e) Typical Cross-Sections and Details (H 1:100)
- (f) Design Cross Sections and Entrance Profiles (1:100)
- (g) Erosion and Sedimentation Control Plans (1:1000)
- (h) Line Marking (1:1000)
- (i) Other Drawings as Required (Traffic, Staging and Landscaping) (1:50)
- (j) Regional Drawings (Sanitary, Watermain and Traffic Signals) (1:250)
- (k) Photometric Plan (s) of new lighting levels for the rights of Way (1:500)

A4.02 Drawing Requirements

- (a) Drawings shall be ARCH "D" size (609 mm x 914 mm). The title block for all drawings shall conform to Town of Whitby Standard Drawing No. 508. All plans shall have a "North" arrow and a key plan.
- (b) All data shall be referred to the closest Town of Whitby geodetic benchmark which shall be noted on the alignment drawings and on each plan and profile. The drawings shall incorporate horizontal control grid lines based on the Universal Transverse Mercator (UTM) NAD 83, Zone 17N coordinate system. Any new benchmarks or horizontal control monuments established within the limits of the project shall be added to the drawings prior to submission of as-built drawings.
- (c) All plans and profiles shall be drawn such that each street may be separately filed.
- (d) When streets require more than one plan, match lines shall be provided with no overlapping information.
- (e) All drawings shall be neat and legible and shall be created in a version of AutoCAD that is compatible with the Town's AutoCAD version. Refer to Appendix A for digital file submission requirements, layering structure, object data and other related material.
- (f) Stamps, tapes and stick-on labels shall not be used except for the Professional Engineer's stamp, which must be signed and dated prior to the final submission.
- (g) Information to be included on plan and profile drawings is as outlined in Appendix B.

A4.03 Submissions and Approvals

Submissions are to be made to the Town of Whitby at completion of 50% of design,

again at 90% of design completion and final pre-tender review. Plans, documents and other information required are according to the Capital Works – Design Check List and Forms in Appendix C.

A5.00 Construction

A5.01 General

Construction for new development works shall be arranged by the developer directly with any contractor who has proper experience and who shall provide Worker's Compensation Board clearance certificates initially and upon request as the work proceeds and prior to release of holdbacks. The developer shall retain a consulting engineer and qualified inspection and testing consultant(s) to oversee construction and certify that it is in accordance with applicable standards.

For construction of capital projects, the Town of Whitby will retain a qualified contractor directly and provide inspection services with Town of Whitby staff or a consulting engineer retained by the Town of Whitby.

Construction of all works in the Town of Whitby shall be in accordance with the current Occupational Health and Safety Act and Regulations for Construction Projects and other applicable legislation as well as Traffic Control Manual for Roadway Work Operations.

Construction shall generally conform to Ontario Provincial Standard Specifications and Drawings and the Town of Whitby Engineering Standards, as well as the specific contract specifications and drawings prepared for the work and approved by Engineering Services.

Construction of sanitary sewers and watermains in the Town of Whitby shall be done in accordance with Regional Municipality of Durham Standard Specifications for Construction of Regional Services-Division 2 – or latest edition. Note that other specifications and standards may apply in specific contracts as outlined in the contract documents.

A5.02 Project Meetings

The consulting engineer, contractor and Town of Whitby inspection staff shall meet at the construction site at regular intervals as determined by the Town of Whitby inspection staff during the course of construction to: monitor construction progress, discuss planned construction activity and potential problems, discuss outstanding questions or problems related to the work, and discuss any other business related to the work such as payments, change notices, etc.

A5.03 Construction Layout

For both new development and capital projects, construction layout shall be provided by the contractor and verified by the consulting engineer as outlined in the specific contract documentation documents. Construction layout shall be performed in such a way as to provide minimum disruption to the public and maximum opportunity for smooth construction operation and accurate installation of the designed works.

A5.04 Materials Testing

A qualified testing and inspection consultant(s) shall be retained by the developer for new developments and by the Town of Whitby for municipal projects to provide the following testing and inspection services:

- (a) Soils, compaction and asphalt (for bedding, pipe cover, trench backfill, road subgrade, granular and asphalt road pavement materials);
- (b) Concrete (slump, air entrainment and compressive strength);
- (c) Reinforcing steel (material strength and placement);
- (d) Welding (on site and/or at manufacturer premises);
- (e) Camera inspection of storm sewers, shall be completed and provide CCTV videos in .mpg format. Two video inspections shall be required, the first prior to any flushing of the storm sewers and not after a rain event (to identify any cross connections), second shall be after flushing the storm sewer (to identify any sediment low points). Final camera inspection video submission shall not be older than two years from placement of top asphalt and prior to assumption.;
- (f) Copies of all laboratory and field test shall be provided on a weekly basis to the Town of Whitby inspector along with a cover letter outlining any deficiencies noted through the testing process and describing what corrective measures have been or should be taken. All testing shall be in accordance with OPSS and procedures.

A5.05 CCTV Inspection of Storm Sewers

- (a) For all maintenance holes that are opened, a visual assessment noting any structural deficiencies should be made. Structural deficiencies include but are not limited to; missing or failing Moduloc, missing or failing ladder rungs, or broken lids.
- (b) The CCTV inspection of storm sewers will be completed with the help of the Town approved equipment. In general, the CCTV equipment shall consist of a monitoring unit and self-contained camera with pan, tilt and zoom capability. This equipment shall be specifically designed and constructed for such inspection purposes. The camera shall be mounted on a crawler or adjustable skids and have a height adjustment to facilitate the inspection of different sizes of pipes.
- (c) The camera shall have a remote-controlled self-contained lighting system capable of producing effective illumination for all sizes of pipe. The lighting system shall be capable of lighting the entire periphery of the pipe. The equipment shall be capable of providing full-colour and clear digital recording of the interior of the sewers.
- (d) All videos shall be in colour, in digital MPEG format and will be submitted to the Town in a portable USB external hard drive. The contractor will ensure that all text is legible in all videos (e.g. white text with black halo) and will try to limit 'dead time' in videos by pausing the recording when the crawler and camera are

still. Recorded picture quality and definition shall be to the satisfaction of the Town.

- (e) The report shall include the location of all service connections together with a statement of opinion as to whether or not the service connections are subject to joint infiltration and/or the degree of blockages due to calcification or sediment. Intrusions of service connections into the main line shall be noted with reference to the degree of intrusion.
- (f) Full-colour photographs of 2.0 megapixels or better of storm sewer defects and service connections shall be taken. The photographs shall be coordinated with the written report by reference numbers. A minimum of one photograph per line or maintenance hole-to-maintenance hole segment shall be taken to show a representative view of the workmanship.
- (g) Each maintenance hole-to-maintenance hole section of pipe shall be located on the report form in such a way as to be readily identifiable. Identify such items as street names, maintenance hole numbers, type of pipe, joint length, direction of flows, pipe diameter and inspection date. The location information for all the sewers will be provided by the Town.
- (h) All digital media shall be numbered and cross-indexed to the written report. Video footage shall indicate the size of the sewer, the maintenance hole-to-maintenance hole segment being inspected, segment ID, street address or location and date of inspection.

A5.06 Approved Materials

All construction in the Town of Whitby shall be done with materials which are the Region of Durham's Approved Products List or Elexicon's Approved Products List. Each list is available upon request from the appropriate agency. Materials must also meet specific requirements outlined in the contract drawings and specifications and are subject to acceptance testing by the developer or the Town of Whitby.

A5.07 Erosion and Sediment Control Plan

General

Prior to the commencement of any on site work, the developer for the subdivision or the contractor for the capital project must implement an erosion and sediment control plan to effectively reduce on-site erosion and minimize the transport of silt off site, either overland or via the municipal storm sewer system, or into treed and/or environmentally sensitive areas within the development or project. It shall include provision to minimize windblown dust and mud tracking onto adjacent roads.

Erosion and Sediment Control (ESC) plan(s) shall be prepared by the consulting engineer for the development and be included with the engineering submission(s) for approval by Engineering Services. For capital projects similar plans are required (where applicable) with erosion and sediment control drawings required as part of the contract document. The ESC plan(s) shall be prepared in accordance to the Erosion and Sediment Control Guide For Urban Construction prepared by Toronto Region Conservation Authority as amended.

All erosion control items shall be inspected on a weekly basis and after any rainfall event. Any repairs required shall be made immediately. During all active phases of construction (i.e. servicing, roads, home building) all existing roads and those with occupancies shall be kept clean and free of debris which will include at a minimum, daily sweeping and weekly flushing, preferably Fridays, or as required by weather conditions and the Town of Whitby. The Developer/Contractor shall be responsible for ensuring that any open public roads are safe for travel and accessible to emergency services at all times.

Erosion and Sedimentation Control Plan(s)

This ESC plan(s) must be prepared to address specific requirements for each stage of the construction as follows:

- Stage 1: topsoil stripping, clearing and grubbing, and rough grading
- Stage 2: site servicing and road construction
- Stage 3: building construction

The phasing of the subdivision development or capital project must be taken into account during the design of the temporary erosion and sediment control measures including the location(s) for topsoil stockpiles. A primary consideration shall be to expose the smallest possible area of land to erosion for the shortest possible time.

Typical accepted measures to mitigate erosion during construction are at the discretion of the Director of Engineering and listed as follows: silt fencing, mud mats, interceptor swales, rock check dams, catchbasin buffers, sediment traps, lot drains, half-bulkheads, and sediment ponds with associated emergency spillways and extended detention outflow devices.

Other requirements may be necessary where creek or stream crossings for sewers and water mains; bridge or culvert construction across active streams; channel diversions; and outfalls to active streams are encountered. Plans shall outline measures to reduce the impact on the streams including the timing of construction activities to minimize disruption as required by other agencies.

A5.08 Construction Management Report and Plan(s)

All development applications shall require a Construction Management Strategy consisting of a report and plan(s) to facilitate the orderly construction of services, roads and houses and will be subject to Town of Whitby approval. The strategy shall be approved prior to construction activity.

Refer to the Construction Management Report Guidelines for Developers, Consultants and General Consultants and General Contractors for Subdivision Application and for Site Plan Applications available upon request from Development Engineering.

A6.00 Record Drawings

Upon completion of construction and prior to assumption of services by the Town of Whitby, hard copy of the original engineering drawings which have been revised to include record conditions, shall be submitted to Engineering Services for their permanent records. Any other files and/or specifications required for plotting should be

included with submission. Record storm sewer design sheets shall also be provided in digital spreadsheet format.

The consulting engineer shall be responsible for obtaining record inverts and ties for all underground services, tees and lateral connections. This record information shall be checked against the design as the construction proceeds to discover at an early date any discrepancies so corrective action can be taken if required. Sufficient record information shall be obtained to allow record drawings to be prepared as described in Section A6.00.

The engineering consultants' on-site or resident inspector shall keep one set of contract drawings on site for the sole purpose of record information. record information will be recorded throughout the project and be available for review by the Town of Whitby inspection staff at all times. All digital files shall conform to the layering/object data system and other requirements described in Appendix `A' - Digital Format Requirements.

In addition to record drawings, the consultant shall also provide record service connection records as per Standard Drawings No. 510 and 511 which document the location and inverts of all buried service connection stubs.

All drawings shall incorporate the NAD 83, Zone 17 UTM co-ordinate grid and shall show the record locations of new benchmarks and horizontal control monuments.

The record engineering drawings shall be prepared using the final survey of the subdivision services and construction records.

Information required for the record engineering drawings include:

- (a) Verification of location, survey of invert and rim elevations of all sewers, maintenance holes, catchbasins, and rear yard catchbasins.
- (b) Distance between sewer maintenance holes, including pipe sizes and calculated sewer grades. Sewer lengths are to be shown to the nearest 0.1m and sewer grades calculated to two decimal places. Text for record inverts, lengths and grades shall be drafted in boxes beside original design text, which shall be displayed in legible "strikeout" text.
- (c) Verification of location of all curbs, sidewalks, light poles, tree planting and fencing where applicable.
- (d) Verification of location of transformers, utility pedestals, super mailboxes (if installed), transit pads, and utility crossings on the utility co-ordination plan(s).
- (e) Verification of invert elevations and widths in overland flow routes and capacity at outlets including curb heights, sidewalk elevation, boulevard slopes and unobstructed widths.

See Section B5.00 "As-Constructed Storm Sewer Requirements, for record acceptance criteria.

Within five years after final acceptance, the Town of Whitby may request the Consultant

to revise and recheck the record drawings if discrepancies between the record drawings and the field conditions are found.

A7.00 Development with Private Services (Well and Septic)

A7.01 General

As mentioned in Section A1.00 - General, these engineering design criteria specifically relate to issues under the jurisdiction of the Town of Whitby. Other agencies and bodies also govern developments with private services and the Town of Whitby Planning Department should be contacted for site plan approval requirements. Engineering Services will review site plans and reports supporting the development.

Also see Section J - General Conditions of Site Plan Approval.

A7.02 Private Water Supply and Sewage Disposal

Where development is proposed on privately serviced lots, the developer shall retain qualified consultant(s) who specialize in the design of private wells and sewage systems.

The private water supply system (wells) shall be constructed in accordance with the Ontario Water Resources Act, Durham Region Department of Health and applicable Ontario Regulations.

All private waste disposal systems shall be constructed in accordance with the Ontario Environmental Protection Act, Durham Region Department of Health and applicable Ontario Regulations.

A7.03 Rural Driveways and Culverts

Where the developer is servicing lots along an existing ditched roadway, arrangements must be made with the applicable road authority (Town of Whitby, Region of Durham or Ministry of Transportation of Ontario) to have the driveway location approved and to have driveway culverts installed in the existing roadside ditch.

Driveway design shall match the grade at the back of the existing shoulder and shall provide a minimum 6.0m long level (-1% to +3%) platform behind the shoulder.

A7.04 Lot Grading

Grading design shall be in accordance with Section D - Lot Grading as applicable and shall also be in accordance with requirements of the Planning and Development Department for tree and natural environment preservation.

Lot grading certification shall be provided by the developer's Consulting Engineer and/or sewage system consultant who shall certify that the record grading is in conformity with the approved site. Where "as-constructed" conditions are not in conformity with the approved design, a detailed letter outlining differences, reasons and any impacts shall be provided by the Consulting Engineer.

Lot Grading and Stormwater Management Requirements for Infill Developments are

detailed in Section D5.04.

Section B - Storm Drainage Design and Storm Water Management

B1.00 General

Storm drainage design and storm water management are relatively dynamic areas of engineering design. This chapter is intended to provide guidance to the designer but is not intended to inhibit newer standard practice or carefully thought-out innovation. Designers are encouraged to discuss their design plans with Engineering Services early in the design process so that all efforts can be productive.

B2.00 Watershed Planning/Storm Water Management

The Town of Whitby drains into four different watersheds. Sub-watershed plans have been prepared for Lynde Creek and Oshawa Creek and master drainage plans have been prepared for Pringle Creek and Corbett Creek. Storm drainage facilities within these watersheds must conform to these plans.

CLOCA has also released a new “Technical Guidelines for Storm Water Management Submissions” dated October 2020, and this document shall be referred to (or latest editions) when preparing a storm water management submission to the Town of Whitby.

For all new development, a storm water management (SWM) report shall be prepared which addresses the following;

- (a) storm water quantity
- (b) storm water quality
- (c) erosion potential (new outfalls, channels and along existing stream banks)
- (d) base flow maintenance (water balance/budget)

The SWM report should address these issues within the framework of the sub-watershed plan, where one exists. The *Storm Water Management Practices - Planning and Design Manual* (MOE; March 2003 or latest edition) provides extensive guidelines for SWM plan selection in the absence of a sub-watershed plan. The SWM plan must address all of the concerns of the other governing agencies (e.g. MOE, MNR, CLOCA, DFO, MTO etc.). Where appropriate MTO Drainage Design Standards January 2008 or as amended shall be referenced.

The Town of Whitby has a Consolidated Linear Infrastructure Environmental Compliance Certificate (CLI-ECA) from the Ministry of the Environment, Conservation and Parks (MECP). Stormwater management systems (storm sewers, facilities, foundation collection drains, etc.) are to be designed in compliance with the designed requirements specified in the CLI-ECA documentation including the document Schedules and Appendices.

B2.01 Lot Level Controls

- (a) Minimum lot grades shall be 2.0%.
- (b) The use of rainwater harvesting (e.g. rain barrels, cisterns, etc.) where the roof leaders are allowed to be disconnected shall be encouraged wherever feasible to not only reduce storm water runoff but to conserve the potable water supply as the captured rainwater can be used for irrigation purposes. Refer to Section B3.13.1 – General, for roof leader requirements.
- (c) On-site storage shall be provided on industrial, commercial, and mixed-use developments so that post-development flows do not exceed pre-development flows up to the 5-year storm frequency event. If downstream SWM controls are in place (e.g. end of pipe controls) and the receiving storm sewers have been sized appropriately, then it shall be demonstrated that the 100-year storm does not exceed the allotted minor system flows for the site (e.g. major system control). Note that for specific sites with downstream constraints, more stringent requirements may be established by Engineering Services.
- (d) Underground storage shall be permitted to achieve quantity control of post-development flows. Only roof top flows and pre-treated flows shall be permitted to infiltrate from underground storage chambers.
- (e) Industrial, commercial, and mixed-use properties are to provide on-site stormwater quality controls, achieving 80% Total Suspended Solid (TSS) removals. Where downstream SWM controls are in place (e.g. end of pipe controls) and the receiving SWM Facility has been sized appropriately, the site will be required to provide a minimum 50% TSS removal for stormwater discharging to the storm sewer. Note that for specific sites with downstream constraints, more stringent requirements may be established by Engineering Services.
- (f) Where Mechanical Treatment Devices (MTD) and Oil Grit Separators (OGS) are used, the products are to be Canadian Environmental Technology Verification (ETV) verified and sized using the Canadian ETV grain size distribution.

B2.02 Conveyance Controls

- (a) Grassed swales shall be used wherever practical. Flow velocities shall be considered, and appropriate erosion measures implemented.
- (b) Foundation drains shall drain via gravity to the storm sewers wherever practical.
- (c) Overland flow resulting from a 100-year storm shall be contained within the road right-of-way and conveyance routes that are designed for this purpose. Refer to Section B3.02.2 – Major/Minor System Design, for design criteria.
- (d) Required infiltration/exfiltration galleries shall be provided with effective pre-treatment of incoming storm water flows (if applicable) to limit the potential clogging of the galleries. Infiltration trenches within private properties shall be a minimum of 0.5m from any property line.
- (e) Oil-Grit Separators (OGS) are required on sites where there is a potential for

hazardous spills (e.g. fuel filling areas). On other site plans, OGS's will be assessed on a site-by-site basis as deemed not feasible based on the watershed constraints. Where OGS's are deemed unwarranted, a cash in lieu contribution may be considered, subject to the approval of Engineering Services.

B2.03 End-of-Pipe Storm Water Management Facilities

- (a) The *Storm Water Management Practices - Planning and Design Manual* (MOE; March 2003 or latest edition) outlines several alternative end-of-pipe SWM facilities. Wet ponds are the preferred method for storm water quality and quantity control.
- (b) The required storage volume for storm water quality control will be based on **Enhanced protection** (formerly Level 1 protection) and the 24-hour extended detention of the runoff generated by a short duration 4-hour 25mm storm event. For stream bank erosion protection, the aforementioned extended detention criteria shall be used, unless there is a requirement for an additional analysis as determined by Engineering Services or CLOCA.
- (c) The required storage volume for storm water quantity control will be based on the control of peak post-development runoff rates to the peak pre-development runoff rate for the 2 through 100-year storms unless otherwise approved by the Town of Whitby and/or CLOCA. A range of design storms (e.g. 2-to-100-year return period) shall be analyzed in order to identify the operation of the system over a range of flows.

Analysis shall be completed using the following:

i.) Sites \leq 5ha – Modified Rational Method.

- Where the modified Rational Method is used to calculate stormwater quantity control volume, the following attenuation volume formula is to be used:

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

Where:

$$V_p = \text{Volume (m}^3\text{)}$$

D = Duration of rainfall (minutes)

Q_p = the runoff peak for that duration (m³/s)

Q_o = the maximum allowable discharge from the area (m³/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

ii.) Sites \geq 5ha – Visual OTTHYMO, SWMHYMO, DDSWMM, INFOSWMM or PCSWMM.

- (d) Where SWM Facilities require both stormwater quality and quantity controls, the quantity control storage begins above the extended detention elevation (i.e., stacked volumes).
- (e) the SWM report shall also address the following issues:
- landscaping,

- operation and maintenance,
- erosion and sediment control (both during and after construction),
- and safety.

B2.04 Storm Water Quality Treatment Facility Requirements

Stormwater quality facilities shall, as minimum requirements, include design and maintenance enhancements as outlined *'The Storm Water Management Practices Planning and Design Manual'*; (MOE; March 2003 or latest edition) and as follows:

- (a) Access - 4.0m wide maintenance roads with a maximum 8.0% longitudinal slope and a maximum 2.0% crossfall shall be provided to access pond inlet and outlet structures, by-pass maintenance holes, the bottom of forebays and the main cell. The roads shall be designed for heavy equipment required for sediment removal and depending on grade, may be paved with asphalt, granular surface or open cell concrete block. Special attention is to be paid to the access roads above and below the normal water level (permanent pool) to account for the freeze/thaw effect of the normal water level.

Where feasible, two access points are to be provided from the municipal road or access be looped around the pond. Where this is not practical, a cul-de-sac with a minimum centerline radius of 12.0m or a hammerhead with a length of 17.0m shall be provided to the satisfaction of the Town's Operational Services Division.

Removable bollards are to be placed at any maintenance access points from the public right of way. Bollards to be locked with a Master Lock Pro Series High Security Model #0464 and 0357, body with 2 5/8", shackle clearance 3/4" and shackle diameter is 7/16". Locks to be purchased from and installed by the Town of Whitby's Operations Centre.

- (b) Maintenance access roads must provide access to the furthest points of the sediment forebay, this shall accommodate typical maintenance vehicles (cube van).
- (c) Forebay - shall be provided to facilitate maintenance by concentrating sedimentation at the inlet area of the pond. The forebay area should have a length to width ratio greater than 2, be greater than 1.0 m deep to minimize bottom scouring activity; be less than 1/3 the total pond area, have less than 20% of the total permanent pool required and be designed to accommodate 10 years sediment accumulation. The forebay berm shall be set at the normal water level and be a minimum of 2.0m wide and have flow through culverts and inverts set at the predicted 10-year sediment level or 0.6m, whichever is greater and have a minimum of 0.3m cover to the top of the forebay berm.
- (d) Sediment drying area - a sediment drying area is to be located adjacent to the forebay area and near the maintenance access road to facilitate dewatering of sediment prior to its removal from the site to an approved disposal area. This area is to be sized based on the predicted 10-year sediment volume piled 1.0m high, have a minimum 2.0% and maximum 5.0% crossfall directed back into the facility.
- (e) Maintenance/draw down pipe - shall be provided with valve control to permit

gravity draining of the facility to within 0.5m of the pond bottom for routine pond maintenance and sediment removal. If gravity flow is not feasible, a suitable pumping protocol and associated structures are to be designed and detailed on the facility drawings.

- (f) Inlet Structure – all efforts will be made to ensure that storm sewer inlets into the facility are to be designed such that the invert is at or above the normal water level (permanent pool elevation). The Town of Whitby will only consider submerged inlets when no other reasonable option is available.
- (g) Outlet structures – bottom draw outlet structures shall be used in all instances and shall be located a minimum of 1.0m off the facility bottom.
- (h) If feasible, shut off capability shall be provided to stop the extended detention portion of the flow out of the facility in the event of a spill in the drainage area.
- (i) Winter drainage outlet shall be a design consideration to allow drainage above the facility ice level in the event of significant runoff due to winter thaws. Elements e), f) and g) shall be contained in a concrete pre-cast maintenance hole.
- (j) Maintenance bypass – details on the methodology of by-passing flows shall be provided to divert all flow from the facility during maintenance and sediment removal procedures.
- (k) Pond bottom - the facility shall be provided with a hard bottom if native soils are not strong enough to support sediment removal activities and equipment. This shall be confirmed by a qualified Soils Consultant and submitted to the Town of Whitby.
- (l) Pond liner – a geotechnical investigation for the facility shall be completed detailing the need for liners and/or construction related methodologies in the event groundwater is encountered.
- (m) Side slopes - for safety reasons a 2.0m wide safety platform with a maximum 5% crossfall is to be provided above the normal water level. Side slopes above and below the safety platform are to be maximum 4:1 and supported by geotechnical analysis.
- (n) Top of berm – perimeter berms shall have a minimum of 3.0m top width where trail or maintenance access is not located on the berm. Anything narrower shall be substantiated by a Soils Consultant. Berms 3.0m high (or greater) are to be designed to meet "dam" engineering and design requirements.
- (o) Overflow spillway – shall be incorporated to provide relief to the system in the event of a severe storm event or blockage of the drainage system. The 100-year storm flows or maximum facility design storm flows, shall be used in the overflow design assuming the facility is full and all outlets from the facility are 100% blocked. A freeboard of 0.15m to the top of slope around the perimeter of the facility from the emergency water level elevation shall be maintained. The invert of the spillway shall be at or above the 100 year or highest design water level within the facility.

- (p) Warning signage – warning signage is to be installed near pedestrian traffic routes or walkways located adjacent to or within the storm water management block. The number of signs to be provided will be determined by the Town of Whitby on a site-by-site basis. Signs are to conform to the Town of Whitby standard and shall be provided by the developer. Signs shall be purchased from the Town of Whitby Operations Centre.
- (q) Pond Outlets - pond outlets to the creek shall be designed to minimize potential beaver activities where possible.
- (r) A metric staff gauge shall be installed adjacent to the storm sewer inlet headwall so that the zero reading is set at the permanent pool elevation.
- (s) As-built certification – prior to assumption of the subdivision, all design aspects of the SWM facility shall be certified by the consulting engineer including, but not limited to, storage volumes and elevations, both permanent pool and active requirements, control structures sizes and inverts, all storm pipe sizes and inverts. Any hydrologic modeling used in the design of the facility shall be updated based on the as-built conditions and submitted to the Town of Whitby for review. Sediment accumulations shall be removed to the original facility design volume and disposed offsite to an approved disposal location. A revised storm water management report shall be prepared to reflect the as-built condition. Topographic Survey (by an OLS) supporting the facility certification, shall be provided in three parts as follows:
- Immediately following facility construction, prior to facility operation;
 - Immediately following placement of topsoil and fine grading, prior to any landscape planting; and,
 - Immediately prior to assumption of the subdivision by the Municipality.

B2.05 Stormwater Management Facility Operations and Maintenance Manual

An Operations and Maintenance (O&M) Manual shall be provided to Engineering Services, completed in accordance with the MOE Stormwater Management Planning and Design Manual (March 2003, or as amended). At a minimum the following shall be included:

- (a) Background information: location, key map, municipal address, Facility ID, drainage area tributary to the facility etc.
- (b) Description of facility characteristics: water quality, erosion and quantity control.
- (c) Design parameters: Sediment forebay, permanent pool volume, extended pool volume, NWL elevation, highest WSE, drawdown time, design storm treated, drainage area, diversion structure details, outlet control features including orifice, maintenance by-pass valve and emergency spillway etc.
- (d) Inspection checklists:
- i.) Frequency of Inspection;
 - ii.) Check inlet and outlet structures;

- iii.) Check for unusually long extended detention drawdown time that could indicate a blockage in the outlet structure;
- iv.) Check for sediment accumulation in the forebay and downstream of the facility;
- v.) Check for vandalism including illegal access (e.g., gates) or encroachment about the perimeter of the facility;
- vi.) Confirm that safety and security measures are in good working order;
- vii.) Check for the presence of any unusual erosion around berms and inlet or outlet structures;
- viii.) Complete visual inspection to confirm that vegetation is healthy;
- ix.) Complete visual inspection to confirm no oil sheen present on water surface or the presence of other visible contaminants or odours;
- x.) Check drawdown valve for proper operation; and,
- xi.) Provide recommended maintenance procedures for items including but not limited to the following;
 - Grass cutting;
 - Weed control;
 - Upland and fringe plantings;
 - Shoreline fringe plantings;
 - Aquatic vegetation replanting;
 - Outlet adjustments;
 - Bathymetric survey to assess the need for sediment removal;
 - Trash removal; and,
 - Winter maintenance.

(e) Sediment removal guidelines;

- i.) Indicate the procedure required to dewater the permanent pool prior to sediment removal and how to divert storm flows away from the facility during maintenance operations.
- ii.) Provide a sediment handling, removal and disposal plan including any permit requirements.
- iii.) Identifying maintenance works and duration.
- iv.) Erosion and sediment control plan to prevent the release of TSS to the downstream receiver; treatment, sediment dewatering and drying techniques to be used; and,
- v.) The required chemical analyses to be completed in accordance with Ontario Regulation 558/00 prior to disposal.

(f) Anticipated annual maintenance costs:

- i.) Provide calculations of the estimated annualized operation and maintenance costs and sediment accumulation and cleanout frequency calculations for the SWM facility. Costs should include but not limited to the following:
 - Debris and litter removal; grass cutting and weed control (if applicable);
 - Maintenance of aquatic/shoreline fringe and upland/flood fringe vegetation.
 - Sediment testing; sediment removal and disposal; inlet/outlet structure repairs;

- Side slope and access road repairs; and retaining wall repairs.

(g) Copies of the facility design drawings (full size and half size):

- i.) SWM facility location plan'
- ii.) Post-development drainage area plan tributary to the SWM facility,
- iii.) General plan for the SWM facility ; and,
- iv.) Detailed drawings of key elements (e.g., inlet, outlet control structure, maintenance valve, spillway etc.).

(h) SWM facility stage-storage-discharge relationship and curve.

A final approved operations and maintenance (O&M) manual updated based on as-constructed conditions shall be provided to Engineering Services prior to assumption.

B2.06 Non-conventional Stormwater Management Facilities

Developments proposing non-conventional underground stormwater management facilities (NCSWMFs) that will be future Town assets, such as underground storage facilities, as an alternative or in addition to conventional stormwater management ponds, shall be evaluated on a case-by-case basis using the following general framework.

The proponent shall provide a stormwater management (SWM) report or brief prepared by a qualified stormwater engineer, identifying and documenting the benefits of the proposed NCSWMF while considering the specific aspects of the development. The report should also address factors such as environmental protection, social and economic benefits, technical design factors, operation & maintenance requirements, and the associated costs including maintenance and capital replacement costs.

The following shall be considered in the review and approval of NCSWMFs:

- (a) Adherence to Standards: The design should adhere to the design criteria and guidelines outlined in the Ministry of the Environment Conservation and Parks (MECPs) Stormwater Management Planning and Design Manual, as amended.
- (b) Certifications: NCSWMFs shall have all necessary certifications. It is essential that proposed products have obtained the 'Approved for Use' classification from The Road Authority. For developments with small catchment areas (e.g., five hectares or less) and private sites, NCSWMFs that do not have 'Approved for Use' classification from The Road Authority may be considered.
- (c) Proven Record of Use: They shall also have a proven record of successful use in other municipalities.
- (d) Pretreatment: Consideration shall be given to pretreatment of flows upstream of the NCSWMF by an ETV certified Manufactured Treatment Device (MTD) (i.e. OGS, Jellyfish, etc.).
- (e) Location Restrictions:
- (f) Road Right of Ways: NCSWMFs proposed under road right of ways should be avoided due to the potential for future encumbrances to Town infrastructure and disruption to residents, particularly when rehabilitation is required.

(g) Park or Open Space Considerations: NCSWMFs proposed under park or open space/municipal blocks, the following shall be considered at a minimum:

- i.) Land availability;
- ii.) Park programming and facility fit flexibility and design restrictions;
- iii.) Trail locations and associated infrastructure;
- iv.) Technical details such as soil properties, structure footings, tree root and canopy requirements;
- v.) Disruption due to routine operation and maintenance;
- vi.) Long-term life cycle costs on park and/or trail feature replacement due to NCSWMF structure maintenance/repairs; and,
- vii.) Additional capital costs arising from structural constraints due to the proximity of the proposed NCSWMF to park infrastructure.

The location of the NCSWMFs is subject to the approval of the appropriate Town department or division.

(h) Operations and Maintenance Manual: A site-specific and detailed O&M manual will be required for each individual NCSWMF. The required scope will be determined by the Town on a case-by-case basis depending on the nature of the proposal.

(i) Financial Contribution: At a minimum the proponent will be required to provide a one-time financial contribution for all NCSWMFs representing a minimum of one cycle of the recommended maintenance program to the satisfaction of the Town. The number of maintenance cycles for financial contribution will be determined on a case-by-case basis, subject to the anticipated sediment loading for the NCSWMF.

B2.07 Industrial, Commercial and Institutional (ICI) Developments

Private Multi-residential, Industrial, Commercial and Institutional (MICI) developments, in general, will be required to achieve all stormwater management (SWM) objectives within their site. SWM objectives will be based on the master drainage studies or reports applicable to the area and subject to Section B2.01. above.

Notwithstanding, consideration for multi-residential developments can be reviewed on a case-by-case basis.

Generally, municipal drainage and SWM facilities shall not provide SWM treatment to flows from MICI developments unless otherwise approved by Engineering Services.

B3.00 Hydrology and Design Flows

B3.01 Sub-Watershed Drainage Areas

The sub-watershed area shall be determined from contour plans and verified in the field where necessary and shall include all areas that naturally drain into the system and any fringe areas not provided for in adjacent storm drainage areas, as well as other areas which may become tributary by reason of regrading. Further information may be obtained from Engineering Services.

A plan of the sub-watershed area shall be prepared, to scale 1:1000 or as appropriate, depending on the size of the area, and shall show all streets, lots and watercourses affected. The intended storm sewer system shall be shown on this plan including each maintenance hole numbered consecutively* for design reference. Maintenance holes shall be located at each and every change of pipe size, grade and alignment.

*see A2.02(j) for Town of Whitby maintenance hole numbering.

Maintenance holes shall be the tributary points in design and areas tributary to each maintenance hole shall be clearly outlined on the storm drainage area plan and the area in hectares (to two decimal places) clearly shown, preferably in a circle 15mm in diameter with the runoff coefficient also shown.

for example: $\frac{4.67 \text{ ha}}{0.5}$

Town of Whitby maintenance hole numbering shall comply with A2.02(j) in this document.

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

In determining tributary areas to maintenance holes, the proposed grading of lots must be considered and taken into account in order to maintain consistency in design. Catchment areas tributary to catchbasins and other inlets shall also be used where the detailed interaction of the major and minor system flows is being analyzed.

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

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

B3.02 Major/Minor System

B3.02.1 Overland Flow Routing Plan

A detailed plan shall be provided that shows the overland flow routing, including major system maximum flow rates, maximum depths of flow in the gutter, maximum extents of flows, maximum velocities on landscaped areas and direction of flows. These values shall be shown for all significant changes in direction or slope and at all outlets for combinations of overland flows. The capacity of the overland flow routes shall be demonstrated by calculations acceptable to Engineering Services.

Overland flow shall be designed to be on public property or dedicated easements. Overland flow shall be contained within the right of way and shall discharge to public parks and open space blocks wherever possible. Where it is not possible to contain the overland flow on public property, easements for overland flow inundation on private property shall be provided.

B3.02.2 Major/Minor System Design

The storm drainage system shall be designed with the minor, or storm sewer system sized to convey the 5-year storm event and the major or overland system designed to convey the 100-year storm event. To account for a decrease in the imperviousness during major storms, the recommended safety factors as identified within MTO's Drainage Design Standards 2008 as amended shall be used. For the 100-year storm event, the factor shall be 1.25 times the calculated peak flow using the peak intensity factor of the 100-year storm event. The design flow of the major system shall not be less than the difference between 1.25 times the 100-year design flow and the 5-year design flow (assumed to be captured by the minor system).

$$Q(\text{major}) = 1.25 * Q(100) - Q(5)$$

All overland flow calculations shall be based on this flow rate.

B3.02.3 Maximum Depth and Velocity of Overland Flow

For all Town of Whitby roads, the maximum gutter depth from the overland flow depth or static ponding shall not be more than 0.40m. The maximum centre line depth of overland flow on the Town of Whitby roads shall be as per the following:

- Local Streets: 0.20m
- Collector Roads: 0.15m
- Arterial Roads: 0.10m

Under no circumstances shall the maximum centre line depth of an overland flow exceed 0.30m on routes determined to be Emergency Accesses.

The maximum depth of flow and the maximum velocity on other roads shall be as directed by the road authority having jurisdiction. Static ponding depth shall be either to the minimum spill elevation or the calculated depth for the ponding volume for the worst-case storm event duration and intensity plus 0.05m. Flow depth shall be based on accepted hydraulic principles such as Manning's open channel calculations or weir flow depth.

Downstream flow depths during peak events may be reduced to account for upstream storage in the overland flow route.

As per the MNR Technical Guide – River and Streams System: Flooding Hazard Limit, Appendix 6:

- Roadway overland flow velocities, perpendicular to the roadway, shall not exceed 4.5m/s
- The product of velocity and depth ($v*d$) shall not exceed 0.8.

B3.02.4 Sanitary Sewer Infiltration

Sanitary sewer maintenance hole covers within the overland flow route shall be protected from infiltration as per Regional standards.

B3.02.5 Inlet Protection

To determine if inlet protection is required, the unrestricted capacity of a catchbasin or ditch inlet in the 100-year design flow shall be compared to the maximum 5-year design flow for the local inlet catchment area. The unrestricted capacity of the inlet at the calculated depth of flow shall be based on the MTO Drainage Management Manual Design Charts. Where the minor system is not designed to handle the 100-year design flow, the inlets shall be protected against surcharge by inlet control devices wherever the unrestricted inlet capacity exceeds the 5-year design flow for the inlet.

The allowable 5-year design flow for the inlet must be adjusted to account for flows from directly connected downspouts and other inlets in the local inlet catchment area. Inlet control devices used for inlet protection to the 5-year design flow on public property shall have framed inlet controls with removable orifice plates to permit maintenance and cleaning.

All inlet control devices used for quantity control on private property that restrict flows to less than the 5-year design flow shall be tamper proof.

Orifices smaller than 75mm in diameter or equivalent opening area shall be protected from blockage as a result of the possible accumulation of debris.

B3.03 Runoff Quantity

The design of the storm sewers shall be computed on the Town of Whitby Storm Sewer Design Sheets, Standard Drawing No. 513 format. All storm sewers draining tributary areas less than 5 hectares shall be designed according to the Modified Rational Formula where:

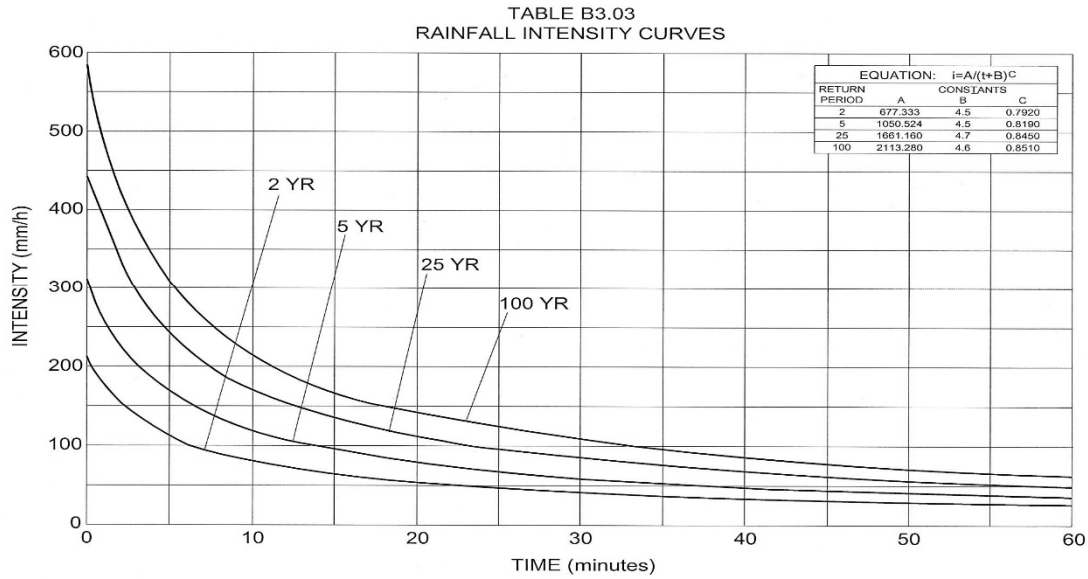
$$Q = 2.78 * A * I * R$$

A = Area (hectares)

I = Average rainfall intensity - (mm/hr)

R = Runoff coefficient

Q = Runoff quantity (litres/sec.)



Equation: $i = A/(t+B)^C$			
Return Period	A	Constants B	C
2	677.333	4.5	0.7920
5	1050.524	4.5	0.8190
10	1295.149	4.5	0.8290
25	1661.160	4.7	0.8450
50	1899.920	4.7	0.8490
100	2113.280	4.6	0.8510

The values of rainfall intensity shall be taken from the Town of Whitby Rainfall Intensity - Duration Curve, Table B3.03 using a storm return period of 5 years.

Standard values for the runoff coefficient "R" are listed on Town of Whitby Standard Drawing 513. The sewer designer shall provide calculations to demonstrate that the actual runoff coefficient "R" used is appropriate for tributary areas.

Storm sewers for tributary areas larger than 5 hectares shall be designed using computer modeling techniques such as those referenced in the *MTO Drainage Management Technical Guidelines* (1989 or latest revision).

B3.04 Pipe Capacity

- (a) Manning's Formula shall be used to compute the capacity of storm sewers such that $Q_{\text{peak flow}} \leq 0.8 Q_{\text{pipe flowing full}}$.

Refer to Table B3.04 for Discharge and Velocity Pipe Capacity Charts.

- (b) Time of Concentration shall be shown as the following;
- i.) Urbanized residential areas, a 15-minute entry time shall be used at the upstream end of the system.
 - ii.) Urbanized commercial and industrial areas, a 5-minute entry time shall be used.
 - iii.) In the existing downtown core area, a 10-minute entry time shall be used.

If another entry time is more appropriate, this may be proposed to Engineering Services, who shall make a final determination.

- (c) Critical Slope criteria shall be met such that $Q_{\text{peak flow}} \leq Q$ at S_c where S_c is critical slope determined by the formula,

$$S_c = 9 / (D^{1/3}) \times (n/0.013)^2 \qquad D = \text{pipe diameter in mm.}$$

Adjustments to design pipe slope and/or diameter shall be made, if necessary, in order to satisfy this criterion, refer to Table B3.05.

- (d) 100 Year Hydraulic Grade Line calculations shall be performed and adjustments to the 5-year design pipe slope and/or diameter shall be made, if necessary, in order to satisfy the criteria that all basement floor elevations will be a minimum of 0.50m above the 100-year hydraulic grade line. While it is recognized that storm sewers and catchbasin spacing designed using the Town's criteria may not capture the 100-year event, the onus is on the consultant to demonstrate the actual flow capture within the proposed storm sewer system using the Town's 100-year design storm event.

Dual drainage analysis computer models (e.g., DDSWMM, PCSWMM, INFOSWMM) shall be used to generate the inflow captured by the minor system during the 100-yr storm event. The Chicago type distribution shall be used to derive the design storm hyetograph from the Town's IDF curve with 10-minute or less intervals. Alternatively, the 100-year design flow can be assumed to be captured. These flows shall then be used in the HGL calculations. Inlet Control Devices (ICD's) will be considered to limit the flows into the storm sewer system if necessary. The starting elevation for the HGL calculation shall be the higher of the 100-year water surface elevation within the receiving system (i.e., downstream SWM facility, floodplain) or the obvert of the outlet pipe from the system. The HGL is to be plotted on all plan and profile drawings and calculations provided.

Where external drainage is captured, the peak flow used on the storm sewer design sheet shall be the maximum peak flow for the combined theoretical hydrographs for the external and internal system. External entry time and contributing area for the peak flow shall be calculated using industry standard

equations (i.e. Uplands, Airport or Bransby Williams equations for instance).

(e) The minimum design slopes for storm sewers shall be as follows:

<u>Sewer Size</u>	<u>Minimum Slope</u>
300 - 450mm	0.5%
525 – 825mm	0.4%
900mm and over	0.3%

The first leg of the sewer system shall have a minimum slope of 1% unless otherwise approved by Engineering.

B3.05 Roughness Coefficients

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

- (a) Concrete pipe, Polyvinyl Chloride (PVC) pipe and Vitrified Tile: $n = 0.013$ for all sizes of pipes.
- (b) Corrugated Metal: According to manufacturer's specifications.

B3.06 Velocity

The velocity in storm sewers shall be limited to:

- (a) minimum value of 0.75m/s; and,
- (b) maximum value of 4.5m/s.

B3.07 Minimum Sizes of Pipe

- (a) Sewer Mains - 300mm
- (b) Catchbasin Connections
 - Single Catchbasin - 250mm
 - Double Catchbasin - 300mm
 - Rear Yard Catchbasin - 300mm

B3.08 Minimum Depth

The depth measured from the final centerline road elevation to the sewer invert shall be a minimum of 1.8m or sufficient to provide a suitable outlet for the building foundation weeping tile with provision for the 100-year hydraulic grade line to be a minimum of 0.5m below basement floor elevations (see Section B4.00 Minimum Basement Elevation). The minimum cover to the pipe obvert shall be 1.2m.

**TABLE B3.04
SEWER CAPACITY**

Slope (%)	Sewer Diameter (mm)																																			
	150		200		250		300		375		450		525		600		675		750		825		900		975		1050									
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V								
0.20																																				
0.25																																				
0.30																																				
0.35																																				
0.40																																				
0.45																																				
0.50																																				
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5.00																																				

Slope (%)	Sewer Diameter (mm)																																			
	1200		1350		1500		1650		1800		1950		2100		2250		2400		2550		2700		3000		3600											
	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V	Q	V										
0.20																																				
0.25																																				
0.30																																				
0.35																																				
0.40																																				
0.45																																				
0.50																																				
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Notes:
 1. Q = Capacity (m³/s), V = Velocity (m/s)
 2. Actual Pipe Diameter used to calculate Capacity and Velocity
 3. All values represent pipes flowing 100% full.

Table B3.05 Critical Slope and Flow, by Pipe Size			
Nominal Dia. (mm):	Critical Slope (%)	Critical Velocity m/s)	Critical Capacity @ Slope l/s
150	1.69%	1.13	21
200	1.54%	1.31	42
250	1.43%	1.46	74
300	1.34%	1.60	117
375	1.25%	1.79	204
450	1.17%	1.96	322
525	1.12%	2.12	474
600	1.07%	2.27	662
675	1.03%	2.40	888
750	0.99%	2.53	1156
825	0.96%	2.66	1467
900	0.93%	2.78	1823
975	0.91%	2.89	2227
1050	0.89%	3.00	2681
1200	0.85%	3.21	3743
1350	0.81%	3.40	5025
1500	0.79%	3.58	6539
1650	0.76%	3.76	8298
1800	0.74%	3.93	10315
1950	0.72%	4.09	12600
2100	0.70%	4.24	15164
2250	0.69%	4.39	18019
2400	0.67%	4.53	21174
2550	0.66%	4.67	24639
2700	0.65%	4.81	28424
3000	0.62%	5.07	36990

B3.09 Maintenance Holes

- (a) Maintenance holes shall be provided at each change in alignment, grade, material and at all junctions with unpainted/uncoated maintenance hole covers.
- (b) Maintenance holes shall be spaced at a maximum of 100m; for sewers 1200mm diameter and greater the spacing may be increased to 150m.
- (c) Type and size of maintenance hole shall be specified on the profiles and a detail of the benching to be shown on the plan portion of the drawing for cases where the benching differs from the Town of Whitby Standard Drawing No. 100.
- (d) Maximum pipe sizes for typical inlet and outlet pipe configuration for precast maintenance holes of 1200, 1500, 1800, and 2400mm diameter are shown on Town of Whitby Standard Drawing No.100.
- (e) The maximum change in direction of flow in maintenance holes for sewer sizes 1200 mm diameter and over shall be 45°.
- (f) The change in direction of flow in any maintenance hole will not be permitted at acute interior angles.
- (g) Maintenance holes shall be designed with sufficient drop to compensate for energy loss due to changes in direction, velocity and depth of flow. The minimum drop across the maintenance hole for all straight runs – 30 mm, all other – 60 mm.
- (h) The velocity change across a maintenance hole, in the direction of flow, shall not exceed 0.6 m/s.
- (i) Where the difference in invert elevation between the inlet and outlet pipes exceeds 0.9 m, a drop structure shall be provided as detailed in Town of Whitby Standard Drawing No. 101.
- (j) In any maintenance hole the inlet pipe obverts shall be higher than or equal to the obvert of the outlet pipe.
- (k) All maintenance holes shall be benched to the spring line of all pipes.
- (l) All benching inside maintenance holes shall be a minimum of 225 mm in width.
- (m) No maintenance hole shall be located closer than 1.5m from any curb face or other utility to outside of barrel of 1200mm diameter chimney portion 2 m to centre.
- (n) Although the Town of Whitby Standard Drawings provide details for maintenance holes up to certain maximum depths; the Consulting Engineer shall analyze individually each application of the standards related to soil conditions, loading and other pertinent factors to determine structure stability. In all cases where the standards are not applicable, maintenance holes must be individually designed and detailed.
- (o) When any horizontal dimension of a maintenance hole exceeds 3.6m, the

maintenance hole must be individually designed and sufficiently detailed to permit poured in place construction.

- (p) A minimum clearance of 0.2m shall be provided between the outside of all pipe barrels at all points of pipe crossings. Concrete encasement may be required.
- (q) Safety gratings shall be required on all maintenance holes when their depth exceeds 5.0m. Maximum spacing between safety grates is 5.0m as per OPSD 404.020. Platforms to be installed at the halfway point.
- (r) Blank (solid) removable orifice plate shall be used in maintenance holes to isolate HGL interactions when warranted (i.e. starting run of a storm sewer share a common MH with another storm sewer run).
- (s) Temporary sewer terminations shall use temporary MHs instead of stubs where feasible.

B3.10 Catchbasins

- (a) Standard catchbasin designs are detailed in the Ontario Provincial Standard Drawings OPSD 705.010, 705.020 and grate 400.010 for roads and OPSD 705.030 and grate 400.020 for rear yards.
- (b) Special catchbasins and inlet structures shall be fully designed and detailed.
- (c) Catchbasins shall be selected, located and spaced in accordance with the conditions of design. The design of catchbasin location and type shall take into consideration the contributing drainage areas, lot grades, pavement widths, road grades and intersection locations. The acceptable spacing requirements shall be as follows:

<u>Maximum Spacing Pavement Width</u>	<u>Maximum Spacing 4% Grade or Less</u>	<u>Greater than 4%</u>
8.5 m	90 m	60 m
11.0 m	80 m	55 m
Over 15.0 m	60 m	40 m

- (d) The catchbasin spacing may be altered for grades over 4.0% for special cases by using side inlet catchbasins or special grates. Double catchbasins are required where drainage is received from more than one direction.
- (e) Catchbasins shall be located immediately upstream of sidewalk crossings at intersections and upstream of all pedestrian crossings.
- (f) Catchbasins shall not be located in driveway curb depressions.
- (g) Catchbasin grate and connection shall provide for the expected maximum minor system (5-year return period storm) flow.
- (h) For Single Catchbasin - the connection shall not be less than 250 mm diameter pipe laid at 1.0% minimum grade.

- (i) For Double Catchbasins - the connection shall not be less than 300 mm diameter pipe laid at 1.0% minimum grade.
- (j) Catchbasin leads shall be installed in accordance with Town of Whitby Standard Drawing No. 107. Rear yard catchbasin leads shall be installed entirely on one lot offset 0.5 m from the lot line. A 3.0 m wide easement centered on the lot line and containing the lead and catchbasin shall be dedicated to the Town of Whitby. Concrete encasement (15-20 MPa) shall be utilized as per Town of Whitby Standard Drawing No. 107.10.
- (k) Road subdrain as per Town of Whitby Standard Drawings No. 108 and No. 109 shall be connected to catchbasins as outlined in these drawings.
- (l) Notwithstanding any requirements for spacing of inlets, the maximum impervious area, calculated by multiplying the area times the runoff coefficient, to be connected to a single catchbasin inlet shall be 0.18 impervious hectares (example 0.2 ha at 0.9 runoff coefficient). Similarly, the maximum impervious area for a double catchbasin shall be 0.36 impervious hectares.

B3.11 Sewers / Pipes

- (a) Pipe bedding and class shall be designed to suit loading conditions. The class or strength, size and bedding shall be shown on the profiles.
- (b) All storm sewers shall be located as shown on the appropriate road cross-section standard. Refer to Town of Whitby 400 series Standard Drawings.
- (c) All storm sewers shall be laid in a straight line between maintenance holes except where radius pipe is permitted (see (e) below).
- (d) The pipe size shall not decrease from a larger size upstream to a smaller size downstream regardless of any increase in grade. A decrease in pipe size from upstream to downstream will only be permitted where the larger pipe is designed for storm water detention.
- (e) Radius pipe will be permitted in sizes 1050 mm diameter and over. The minimum radius shall be in accordance with the pipe manufacturer. Radius pipe sections shall be designed with at least one maintenance hole at one end of the section.

B3.12 Inlet and Outfall Structures

- (a) Inlet and outfall structures, including head walls, shall be fully designed and submitted in detail. Where possible, structures shall conform to applicable Ontario Provincial Standard Drawings. In each case, existing topography should be shown as well as the protective works necessary to prevent erosion of the site around the structures, including erosion from the outfall flows.
- (b) In general, inlet grates shall consist of inclined parallel bars or rods set in a plane sloping approximately 45° away from and in the direction of the flow. Outfall grates shall consist of horizontal bars or rods. Spacing of bars or rods shall not exceed 150 mm clear. All metal parts shall be hot dip galvanized or stainless

steel. When the vertical face of any structure exceeds 0.60 m high it shall be fitted with a handrail in accordance with Town of Whitby Standard Drawing No. 103.

B3.13 Storm Drain Connections

B3.13.1 General

- (a) Storm service connections shall be installed to service each lot, block and unit in the subdivision and shall extend 1.5 m to 3.0 m inside the property line.
- (b) The services shall be installed in accordance with the Town of Whitby Standard Drawings.
- (c) In general, service connections should not be made to a trunk sewer.
- (d) Risers shall be constructed when the invert of a sewer exceeds 4.5 m in depth. No riser shall exceed 3.0 m in height unless approved by Engineering Services.
- (e) Front roof leaders shall connect directly to the storm system. Single family and semi-detached rear roof leaders must discharge to the ground surface via a splash pad. Townhouse (freehold or condominium) roof leaders shall connect to the storm system unless backing onto open space or as otherwise directed. Refer to Town of Whitby standard drawing No.106.10 for storm drain under basement floor if needed.
- (f) All roof leaders (front and rear) for any public laneway housing type, shall be directly connected to the municipal storm sewer within the fronting right-of-way, unless otherwise approved by Engineering Services.
- (g) PVC pipe for storm drain connections is to be white in colour.

B3.13.2 Single Family, Semi-detached and Street Townhouses

- (a) Storm drain connections shall be designed in accordance with Town of Whitby Standard Drawings No's. 104, 105 and 106. The designer shall confirm that pipe loading conditions and soil conditions are suitable for standard strength pipe and standard bedding details.
- (b) The connection to the main sewer shall be made with an approved manufacturer's tee for main sewer sizes up to and including 375 mm diameter and in accordance with the details on Town of Whitby Standard Drawings for larger sizes.
- (c) Storm connections for Single Family, Semi-Detached & Street Townhouse Units shall be PVC SDR 28 with a minimum 2.0% grade. A 50 mm x 100 mm wooden marker shall be placed at the end of the connection and shall have the top 600 mm painted green and above the lot grade.
- (d) The minimum depth at the street line shall be 1.8 m and the maximum depth 3.1 m, measured from the final centerline road elevation. Risers shall be used when the invert depth of the sewer main exceeds 4.5 m. Risers shall not exceed 3.0 m

in height without approval of Engineering Services.

- (e) Service connections shall not connect into a catchbasin, or maintenance hole, unless otherwise approved.
- (f) Joints and bedding for connections shall be equivalent to joints and bedding on the main sewer.

B3.13.3 Multi- Family Blocks and Non-residential Storm Connection

- (a) Parking lots, driveways and/or other hard surfaced areas servicing multiple family, commercial and other blocks, shall be drained by a properly designed internal drainage system (including catchbasins, maintenance holes and pipe) which shall connect to the storm sewer system or other suitable outfall as determined by Engineering Services.

Refer to Section J for Site Plan Approval requirements.

B3.14 Construction

- (a) Construction of all service connections shall be in accordance with the current and appropriate Town of Whitby Design Criteria and Standard Drawings.

B3.15 Materials

- (a) Materials shall have the “Approved For Use” classification from The Road Authority’s website at <https://www.roadauthority.com/> and appropriate certification bodies.
- (b) Storm sewers shall be constructed of concrete pipe or polyvinyl chloride (PVC) pipe. Corrugated steel pipe shall only be used in special cases with approval from Engineering Services. PVC pipe shall only be used on storm sewer mains up to and including 375 mm diameter and may be used for service connections and catchbasin leads. Concrete or PVC pipe shall be used for 450mm storm sewer mains. HDPE pipe may be used for underground storage in sizes up to and including 750 mm.
- (c) Concrete sewer pipe shall conform to the following C.S.A. requirements for classes shown below.
 - Non-reinforced concrete pipe Class 1, 2 and 3 CAN/CSA A257.1- M92.
 - Reinforced concrete pipe with strength classifications 50-D, 65-D, 100-D and 140-D. CAN/CSA A257.2-M92.
- (d) Polyvinyl Chloride (PVC) pipe shall conform to the fabrication requirements of CSA B182.2 - B182.4, as well as ASTM D 3034, F 679, F794 and UNI-B-5, B-6, and B-9.
- (e) Corrugated steel pipe shall conform to the requirements of CAN 3-G401. For pipe diameter less than 900 mm, Aluminized Steel Type 2 with 1.6 mm wall thickness to be used. For pipe diameter from 900 mm to 1200 mm, Polymer Laminated Steel with 2.0 mm wall thickness to be used. For pipe greater than

1200 mm, Polymer Laminated Steel with 2.8 mm wall thickness to be used.

- (f) Maintenance holes shall be constructed of poured or precast concrete according to Ontario Provincial Standard Drawings or approved specific design drawings.
- (g) Maintenance hole covers and frames shall be as detailed in Ontario Provincial Standard Drawings. Bolt down covers are to be used in all park, open space areas and wherever a maintenance hole is located outside of the road pavement.
- (h) Catchbasin covers and frames shall be as detailed in Ontario Provincial Standard Drawings. Roadway and walkway catchbasin grates shall be "bicycle proof".
- (i) Pipes shall be joined by means of approved rubber gaskets, conforming to A.S.T.M. Specification C-443-60T or latest amendment.
- (j) Road subdrains shall be 100 mm diameter perforated polyethylene plastic pipe with factory installed filter fabric and conform to the requirements of OPSS 405.

B4.00 Minimum Basement Elevation

Minimum Basement Elevation (MBE) for typical lots shall be determined based on the highest of the following:

- (a) 1.0m above San obvert;
- (b) 0.5m above 100-yr HGL (see Sect. B3.04);
- (c) 0.7m above STM obvert; or,
- (d) 1.2m above STM obvert if SAN service lateral is required to cross over the storm sewer.

B5.00 As-Constructed Storm Sewer Requirements

Prior to the placement of base asphalt, the Engineering Consultant shall provide the Town with an acceptable updated SSDS reflecting the as-constructed record sewer information.

Category I

As-constructed storm sewers are considered acceptable when the as-constructed storm sewer design sheets submitted in the Town of Whitby's approved format indicate the following:

- (a) Peak flow is less than 90% of as-constructed capacity of pipe flowing full;
- (b) As-constructed pipe grade is no less than the minimum design slope (as per Town of Whitby Design Criteria B3.04) and less than the critical slope, unless approved otherwise by original design; and,
- (c) The Minimum/maximum flow velocity within the pipe (velocity) is within the Town of Whitby Design Criteria B3.06.

Category II

When as-constructed storm sewers design sheets indicate that Category I parameters

cannot be met, the storm sewer installation is not acceptable and corrective measures are required as follows:

(a) The storm sewer system is to be re-laid accordingly if:

- Peak flow is greater than 120% of as-constructed capacity of pipe flowing full; or,
- Velocities are less than the minimum allowable as per the Town of Whitby Design Criteria B3.06.

Otherwise:

(b) If peak flow is less than 120% of the as-constructed capacity of pipe flowing full, the Engineering Consultant responsible for the installation is required to submit the as-constructed 100-year hydraulic grade line (H.G.L.) information for the Development.

- The as-constructed H.G.L. will be considered acceptable if it is at a minimum of 0.5m below the respective basement floor elevation.
- In isolated areas, where the as-constructed H.G.L. is between 0.3m to 0.5m below the respective basement floor elevation. The Town of Whitby will consider backflow preventers as acceptable mitigation measures.
- In cases where the as-constructed H.G.L. does not conform to the above noted criteria, the storm sewer system is to be re-laid accordingly.

and

(c) If the as-constructed pipe slope is less than the minimum design slope (as per Town of Whitby Design Criteria B3.04) and/or greater than the critical slope, if not by approved design, the Engineering Consultant responsible for the installation is required to review the as-constructed velocity within the sewer system.

- Where the as-constructed velocity is within the acceptable limits per the Town of Whitby Design Criteria B3.06, the as-constructed pipe slope shall be deemed acceptable.
- Where the as-constructed velocity is greater than the maximum as per Town of Whitby Design Criteria B3.06, the Engineering Consultant shall flag the velocity to the Town for review. Acceptable mitigation measures shall be determined on a case-by-case basis.

B6.00 Water Course Protection

In as much as is possible, existing water courses shall be left in their natural state. Their banks shall be able to contain the flow of the regional storm or the 100-year storm, whichever are the governing criteria, as prescribed by Central Lake Ontario Conservation Authority (CLOCA).

The watercourse invert and banks shall be protected from excessive erosion as defined by CLOCA. Alteration to watercourses will be in accordance with Engineering Services, CLOCA, the Ministry of Natural Resources (MNR) and any other government agencies who may have jurisdiction in the specific location. Work which may disturb the aquatic environment shall be carried out in accordance with the Department of Fisheries and the MNR guidelines and approvals.

As described in Section B2.00 - Master Drainage Plans have been prepared for Pringle Creek (2018), Corbett Creek (2021) and Lynde Creek (2019, updated in 2022 with climate change impact). These should be consulted when designing any works which will impact on a watercourse.

Pre-design consultation is recommended in all cases so that the designer may understand specific concerns each agency has prior to proceeding with any design.

Section C - Roadways

C1.00 General

In general, all roadway design shall be in accordance with the Town of Whitby Design Criteria and Engineering Standards and the Transportation Association of Canada's Geometric Design Guide for Canadian Roads. A Design Criteria form shall be approved by the Town of Whitby prior to proceeding with the detailed design.

C2.00 Road Classification, Pavement Design and Construction

C2.01 Road Classification

Roadways shall be designed in accordance with the road classification as identified within the Transportation Schedule of the Town of Whitby Official Plan. This classification shall be confirmed with the Town of Whitby prior to the commencement of the design.

C2.02 Minimum Pavement Design

Minimum pavement design thicknesses are given according to street classifications in Table C2.02. These are minimum requirements only and may require additional depths subject to specific design considerations.

Table C2.02 Minimum Pavement Design Thickness				
Class	Type	Asphalt	Granular 'A'	Granular 'B'
Local	Residential/ Public Laneway	40 mm – HL3 50 mm – HL8	150	300
	Industrial	40 mm – HL3 (HS) 65 mm – HDBC	150	300
Collector	Residential	50 mm – HL3 (HS) 65 mm – HDBC	150	400
	Industrial / AADT>3,000	50 mm – HL3 (HS) 90 mm – HDBC	150	450
Arterial	Type C	50 mm – HL3 (HS) 110 mm – HDBC	150	550
	Type B	50 mm – HL1 160 mm – HDBC	150	600

NOTE:

- (a) The pavement design thickness assumes adequate positive drainage of the subbase.
- (b) Minimum 10:1 taper at transitions in road make up.

C2.03 Geotechnical Report

- (a) Pavement design for local, collector and arterial roads will be considered on an individual basis. Minimum pavement design thickness for different road classifications are shown on Table C2.02. The composition and construction thickness of the road pavement shall be designed based upon the following factors:
- i.) Mechanical analysis of the sub-grade soil;
 - ii.) Drainage;
 - iii.) Frost susceptibility;
 - iv.) Future volume and class of traffic expected to use the pavement and,
 - v.) Construction loading considerations.
- (b) Sub-grade samples for mechanical analysis laboratory testing shall be taken at a maximum of 50 m intervals along all road alignments and at any locations judged to be lower in bearing capacity. California Bearing Ratio (C.B.R.) tests shall be performed for each representative soils type. All tests must be conducted by a qualified soils consultant. Copies of all tests and the road design proposed by the soils consultant shall be submitted for the approval of Engineering Services.
- (c) Where the construction will involve trenching for installation of sewers and water mains, the soils report shall comment on trenching, pipe bedding, cover, backfill and compaction requirements. It shall provide recommendations with respect to construction methods to be employed to reduce risk of settlement occurring.

For reconstruction projects, the report shall include analysis of existing granular and asphalt materials and include recommendations regarding reuse.

C2.04 Pavement Construction (Paving in Echelon)

Echelon paving with a shuttle buggy materials transfer vehicle shall be used for paving base and top asphalt on all roads exceeding 100m in length. If paving in echelon is not feasible, infrared joint treatment or other treatments shall be used with prior approval from the Town.

C3.00 Geometric Design

C3.01 Design Criteria

Table C3.01 - Design Criteria					
Item	Local Road (Note 1)	Collector	Arterial Type C	Arterial Type B	
Right-of-Way Width (Notes 2 and 3)	18 - 20m (Note 4)	20 - 26m	26 - 30m	30 - 36m	
Geometric Design	Pavement width (measured to face of curb)	(Note 5)			
	Design speed (km/hr)	50	50 / 60	70 / 80	
	Minimum K values for sag curves on illuminated roads (Note 10)	6 (Note 6)	6 / 9	12 / 16	
	Minimum K values for sag curves on unilluminated roads	12	12 / 18	25 / 32	
	Minimum K values for crest curves	7	7 / 13	23 / 36	
	Maximum grade for through roads at intersection	3.0%	3.0%	3.0%	
	Maximum grade for stop roads at intersection	2.5%	2.0%	1.5%	
	Minimum centerline radius (m)	115 (Note 7)	185 (Note 8)	As per TAC	
	Minimum tangent length for intersection approaches from street line (m)	45	60	75	75
	Minimum intersection spacing along roadway between closest pavement edges (Excl. roundabout and laneway) (m)	60	60	200	400
	Minimum boulevard width from curb to sidewalk/MUP (m)	1.5	1.5	4.25	
	Typical lane width (m)	4.25	3.25 – 3.5 (Note 11)	3.5	
	Width of turn lane (m)	As per TAC			
	Minimum sight distance (m)	As per TAC			
	Minimum grade for urban roads	0.5%			
	Maximum grade	5.0%			
	Standard crossfall	2.0%			
	Minimum crossfall through intersection	1.0%			
	Minimum curb radius at intersection	See Table C3.03			
	Intersection angle	80 - 100°			
Minimum intersection offset for local roads (m)	40 (Note 9)				

Table C3.01 - Design Criteria (Cont'd)					
Item		Local Road (Note 1)	Collector	Arterial Type C	Arterial Type B
Active Transportation (Refer to OTM Book 18)	Sidewalk width (m)	1.8 - 2.5			
	Minimum side clearance to roadside utilities and objects (m)	0.3			
	Required width of bike lane exclude gutter (m)	1.8 (Note 12)			
	Required buffer between on-road bike lane and travel lane (m)	1.0 (Note 12)			
	Width of two-way in-boulevard cycle track (m)	4.0 (plus 0.5 m buffer)			
	Minimum width of paved shoulder for cycling (m)	1.5			
	Minimum width of multi-use path	3.0			
On-Road Parking	Minimum width of parking lane (m)	2.0			
	Minimum buffer between parking and bike lane (m)	1.0			

Notes

- 1) Local Roads criteria shall generally be applied to the design of Public Laneways. All deviations shall be approved by Engineering Services.
- 2) Right-of-Way widths are based on the current Whitby Official Plan Amendment 105 as approved by Region of Durham, June, 2018.
- 3) Additional right-of-way width may be required for operational needs, roundabouts, turn lanes and the accommodation of active transportation.
- 4) Minimum right-of-way width for window streets is 15m.
- 5) Pavement width to be determined based on operational needs, roundabouts, turn lanes and the accommodation of active transportation.
- 6) Minimum K value of 8 for industrial local roads with illumination.
- 7) Minimum centerline radius to be 15m for 90 degree turns on local roads and 12m for laneways.
- 8) Based on a reversed crown cross-section - to be approved through detailed design submission.
- 9) Intersection offset for collector and arterial roads to be determined based on traffic requirements.
- 10) Minimum K value of 4 may be used for stop-controlled legs of intersections.
- 11) Lane width shall be 3.5m by default and use of 3.25m under special circumstances only, subject to approval of Engineering Services.
- 12) Alternative widths may be considered on a case-by-case basis subject to OTM Book 18.

C3.01.1 Minimum Visibility Triangle Requirements

Table C3.02 indicates the minimum visibility triangle requirements for various intersecting roadway situations under ideal conditions. Visibility triangles shall otherwise be sized according to safe sight distance requirements when conditions dictate. Visibility triangles shall form part of the higher order road.

Table C3.02 Minimum Visibility Triangle Requirements		
Right of Way Width	Intersecting Right of Way (m)	Minimum Visibility Triangle Requirements (m)
Public Laneway (8.5)	18-23	5x5
18	18-20	5x5
20	20	8x8
18-20	23	8x8
23	23	8x8
23	26	8x8
23	30	8x8
30	30	5x13
30	36	5x13
36	36	5x13

C3.01.2 Minimum Curb Radius Requirements

The following Table C3.03 indicates the minimum curb radius requirements for various intersecting roadways at 90° intersections. On routes with truck traffic or buses, and for all industrial roadways and for intersections meeting at other than 90°, the intersection design shall be checked with truck turning templates and the curb radii modified if necessary.

Table C3.03 Minimum Curb Radius Requirements		
Intersecting Road Types	Residential (m)	Industrial (m)
Public Laneway Local/Collector	7.5	15*
Local – Local	7.5	
Local – Collector	10	
Local – Arterial		
Collector – Collector		
Collector – Arterial		
Arterial – Arterial	13	

* Based on the assumption that WB-20 turning vehicles will not encroach onto opposing traffic on collector and arterial roads.

C3.02 Horizontal Alignment (Refer to Table C3.01)

Where a 15 m radius is used on a 90° bend on a local road the right of way and pavement shall be widened with an eyebrow as detailed on Town of Whitby 400 series Standard Drawings. Such eyebrows are not required where access to the land is not required, on single loaded service roads, and where residential frontage widths are sufficient to accommodate driveway spacing in accordance with Town of Whitby Standard Drawing No.411.

The radius of curvature shall be labelled on the centerline of the proposed road on the plan and curb radii shall be indicated adjacent to the curb.

C3.03 Vertical Alignment (Refer to Table C3.01)

C3.03.1 Vertical Curves

- (a) All grade changes in excess of 1.0% shall be designed with vertical curves. Vertical curves shall be used at all intersections, generally, with a minimum K-value of 4 permitted when under stop control.
- (b) Vertical curve designs shall consider/show the following:
 - i.) K Value to be rounded to a whole number wherever possible;
 - ii.) At intersections, sags should be designed to minimize ponding/flooding limits;
 - iii.) Intermediate grade points shall be calculated every 10.0 m and shown on the profile;
 - iv.) Vertical curve data such as K-value, length, station of tangent intersection, station for beginning and end of vertical curve (BVC/EVC) stations shall be shown on the plan, and
 - v.) Vertical curves shall not encroach into the driving lane of any abutting roads.

C3.03.2 Minimum/Maximum Grades

Vertical alignment requirements are shown in Table C3.01. Minimum grades are to be avoided in superelevated urban roadways.

C3.03.3 Minimum Gutter Grades

The minimum gutter grade shall be 0.5% except for eyebrows, 90-degree bends, and cul-de-sacs where it shall be 1.0%. Where 1.0% cannot be achieved, catchbasins shall be placed at the direction of Engineering Services.

C3.03.4 Gutter Grade Details for Intersections, Eyebrows and Cul-de-Sacs

All intersections, eyebrows and cul-de-sacs shall be detailed at a larger scale than the road plan. The details shall show crossfall and gutter, crown and other grades sufficient to determine that the road will properly drain and to be used as a basis for layout. Refer to Section C3.03.3 for minimum gutter grade requirements.

C3.04 Temporary Cul-De-Sac

Temporary cul-de-sacs are required where a road will be continued for future phasing of

development, but currently dead ends. Land easements within the subdivision must be dedicated to the Town of Whitby to facilitate installation of temporary cul-de-sacs.

Requirements for the temporary cul-de-sacs are:

- (a) ROW or easement limit radius shall be set as required by temporary grading requirements
- (b) Temporary asphalt curb radius shall be at least 13.25 m.

Permanent pedestrian facilities (i.e., sidewalk and multi-use path) shall terminate at the beginning of the temporary cul-de-sac with a temporary ramp connecting the pedestrian facilities on both sides of the road.

Where feasible, permanent base curb and gutter shall be installed through the temporary bulb, and the permanent portion of roadway paved with normal crown elevation and crossfall. Temporary asphalt curb or concrete barrier curb (no gutter) may be utilized for the bulb portion. Engineering Services will approve the final temporary bulb configuration and construction elements after taking into consideration all variables, constraints and opportunities associated with each individual site.

C3.05 Intersections

- (a) Minimum curb radii requirements for intersecting pavements are shown on Town of Whitby Engineering Design Criteria section C3.01.2 Table C3.03. At the intersection of two roads, the transition of the minor classification road shall not interfere with the normal cross-fall of the higher order road, unless otherwise required by the overland flow route design.
- (b) A 1.0% to 2.0% backfall shall be provided on all road profiles. This requirement will not necessarily require the use of a double catchbasin. A larger scale splining (gutter grade) detail showing crossfall, gutter, crown and other grades, sufficient to determine that the intersection will drain properly and sufficient for layout, shall be provided. Catchbasins shall generally be located upstream of pedestrian crosswalks.
- (c) Intersection design for Collector/Collector, Collector/Arterial and Arterial/Arterial shall be designed according to TAC Section 2.3.2.3, Vertical Alignment and Cross-Slope.

C3.06 Roadside Ditches

All new urban roads shall be curb and gutter unless approved by Engineering Services.

Rural roads shall conform to Town of Whitby Standard Drawing No. 403 unless otherwise approved by Engineering Services. Rural roadside ditches shall be designed as follows:

- (a) 3:1 front slope and minimum 2:1 back slope (3:1 desirable).
- (b) Inverts shall be minimum 150 mm below the granular/sub-grade interface where it daylight into the ditch unless an invert subdrain is designed to pick up subgrade drainage.
- (c) Desirable minimum longitudinal ditch grade shall be 1.0% with absolute minimum being 0.3%.

- (d) Ditch grades greater than 3.0% shall have staked sod protection; and;
- (e) Ditches greater than 5.0% shall have hand laid rip rap protection.

C3.07 Subdivision Emergency Access

- (a) The following criteria shall be used for the approval of urban subdivision developments:
 - i.) Cul-de-sacs shall not exceed 230 metres in length;
 - ii.) The entrance portion to P-Loops and B-Loops shall not exceed 90 metres;
 - iii.) Where the circumference of a P-Loop (or one half of a B-Loop) exceeds 490 metres, the entrance portion shall have a minimum pavement width of 12 metres, measured from curb face and exclusive of any median required. Circumference shall be measured at centre line of road;
 - iv.) The maximum circumference of a P-Loop (or one half of a B-Loop), or any combination of street pattern, shall not exceed 700 metres; and,
 - v.) With respect to emergency access, it is assumed that any P-Loop or B- Loop shall include a service lane adjacent to a collector or arterial road. Where a service lane is not included in the design of a P-Loop or B-Loop, a permanent walkway providing emergency access shall be required where a P-Loop or B-Loop exceeds 430 metres, subject to the minimum design standards.
- (b) Where the limits of the items in C3.07 (a) are exceeded, a second means of access shall be provided.
- (c) The following design criteria shall be used when an emergency access, temporary or otherwise, is required:
 - i.) Minimum width of 4.0 metres;
 - ii.) Maximum slope of 8.0%;
 - iii.) 12.0 metres minimum centerline turning radius;
 - iv.) 5.0 metre minimum overhead clearance from grade;
 - v.) Asphalt or other permanent surface;
 - vi.) For emergency access, barrier consisting of bollards and chain or other acceptable measures; and,
 - vii.) Adherence to the Ontario Building Code.
- (d) Prior to the issuance of a building permit the emergency access will be required to be fully constructed and operational.

NOTE:

1. Circumference is measured at centre line of road.

C4.00 Boulevards, Sidewalks and Walkways

C4.01 Sidewalk

Sidewalks are required on both sides of all roadways (Local, Collector and Arterial) including courts, cul-de-sacs and crescents. All local roadways adjacent to parks, schools and commercial areas shall have at least a 2.5m sidewalk on the adjacent side and a 1.8m sidewalk on the opposite side.

All sidewalks are to be designed in accordance with the Town of Whitby Standard Drawing No. 208 and shall be installed at locations shown on the typical road cross-sections. All longitudinal slopes at sidewalk ramps shall meet the Accessibility for Ontarians with Disabilities Act (AODA) guidelines.

At all driveway locations the sidewalk thickness shall be increased to 175mm for both residential and commercial driveways. On commercial driveways, a 150mm x 150mm wire mesh shall also be placed in accordance with Town of Whitby Standard Drawing No. 208.

A curb keyway shall be incorporated into the curb where sidewalks are constructed adjacent to curbs as detailed on Town of Whitby Standard Drawing No. 206 and OPSD 600.404.

Requirements for temporary asphalt sidewalks are shown in the Town of Whitby Standard Drawing No. 210.

C4.02 Boulevards

Boulevards are to be graded according to the Town of Whitby Standard Drawing No. 208. On new construction the grade of the boulevard shall be constant from the back of the curb to the street limit or sidewalk.

Where required, coloured impressed concrete is to be installed as per Town of Whitby Standard Drawing No. 211.

C4.03 Walkways

Walkways shall be constructed in accordance with Town of Whitby Standard Drawing No. 209 to promote proper circulation of pedestrian traffic and also to provide an overland flow route for storm flows, unless otherwise approved by the Director of Engineering.

C4.04 Multi-use Pathways

Multi-use Asphalt Pathways shall be constructed in accordance with Town of Whitby Standard Drawing No. 214.

C5.00 Utilities

C5.01 Location of Utilities

For all new roads the location of utilities within the road allowance shall be as detailed in the Town of Whitby Standard Drawings No. 400 to 404.30. Utility pedestals shall be paired with streetlights or with other utilities wherever possible. If pairing is not possible, the Consultant shall provide justification to the Town of Whitby's satisfaction. A minimum of 1.0m clearance is required between the edge of a driveway and any proposed above ground utility.

C5.02 Locations of Community Mailboxes

Community mailboxes (CMB) shall be placed according to the Canada Post Corporation

requirements. Design locations for mailboxes should incorporate factors such as pedestrian safety, lighting, driveway locations, traffic flow, drainage and aesthetics. Community mailbox locations shall be indicated on the Utility Coordination Plans and Plan & Profile drawings. Where possible a streetlight will be placed adjacent to a CMB location to ensure appropriate lighting levels are met.

C6.00 Driveways and Entrances

C6.01 Driveways

C6.01.1 Residential Driveways

Where paved driveways are installed within either the public right of way or on private property, between the curb and garage floor the top of driveway shall be flush with curb, sidewalk and garage floor.

- (a) The minimum depth for residential driveway shall be:
 - i.) 50 mm hot-mix, hot-laid asphalt HL3A to be placed in one lift only.
 - ii.) 150 mm crusher run limestone or Granular "A".
- (b) The maximum design grade for an access driveway shall be 6.0%. Maximum as-built grade shall be 8.0%. The minimum grade shall be 2.0%. Refer to Town of Whitby Standard Drawing No.'s 304 and 305 for driveway profile and layout.
- (c) Within the public right-of-way, the driveway (D/W) opening shall be designed to accommodate the following minimum widths without conflict to other street furniture and in accordance with the Town's Zoning By-law, as amended. The final design driveway width will be determined at the time of the house sitting.

	<u>D/W width</u>	<u>D/W width plus tapers</u>
Single	3.0m	3.6m
Single & Half	5.0m	5.6m
Double	6.0m	6.6m

C6.01.2 Industrial, Commercial and Institutional Driveways

Paved driveway entrances are required between the curb and sidewalk. The following are minimum depth requirements:

- (a) Light Industrial, Commercial and Multi-residential Driveways
 - i.) 50 mm hot mix, hot laid HL3 to be placed in one lift.
 - ii.) 50 mm hot mix, hot laid HL8 to be placed in one lift.
 - iii.) 200 mm crusher run limestone; or 150 mm Granular "A"; and 225 mm Granular 'B'.
- (b) Heavy Industrial Driveways
 - i.) 50 mm hot mix, hot laid HL3 to be placed in one lift.
 - ii.) 75 mm hot mix, hot laid HL8.
 - iii.) 300 mm crusher run limestone or 150 mm Granular "A"; and 300 mm

Granular "B".

Equivalent depths of "deep" strength asphalt will be permitted as a substitute for the pavement specified above provided frost susceptibility is addressed in the design.

C6.01.3 Rural Driveways

On rural roads where sidewalks are not required, driveway entrances are to be minimum 150 mm of Granular 'A' or 19 mm crusher run limestone. Refer to Town of Whitby Standard Drawing No. 306.

Where appropriate, the Town of Whitby may require asphalt within the boulevard portion of the driveway.

C6.02 Driveway Entrances

Driveway entrances shall be designed in accordance with the following:

- (a) Residential driveways shall be as detailed on Town of Whitby Standard Drawing No. 305;
- (b) Residential driveways on cul-de-sacs shall be in accordance with Town of Whitby Standard Drawing No. 411;
- (c) Mutual driveways between two adjoining properties shall have continuous curb depression; and,
- (d) Multi-residential, commercial and industrial driveways shall take into account the basic width of the driveway and radius of curvature as further outlined below.
 - i.) The radius of curvature from the road into apartment, commercial and industrial driveways shall be designed to accommodate the anticipated vehicular traffic without causing undue interference with the traffic flow on the street. The minimum curb radius shall be;
 - 7.5m for apartment and residential block developments,
 - 15.2 m for heavy industrial and commercial entrances off 2-lane roads and 4-lane roads.
 - All apartments, commercial and industrial driveways shall be provided with curb constructed in accordance with details as outlined on Town of Whitby Standard Drawing No. 410.

C6.03 Concrete Curb and Gutter

C6.03.1 Curb Standard – New Developments

The following curb standards shall be used:

- (a) For urban streets and roads with pavement width of 10.0 m or greater, full height curb and gutter as per Town of Whitby Standard Drawing No. 206 is required on both sides;

- (b) For local urban roads with pavement widths of 8.5 m and Public Laneways with a pavement width of 6.5m, curb and gutter as per OPSD Drawing No. 600.04 is required and may be of two-stage construction as per Town of Whitby Standard Drawing No. 206;
- (c) For 15.0 m window streets, single-stage full height curb and gutter shall be utilized on the side of the roadway adjacent to the higher order road;
- (d) For temporary turning circles where a gutter is not required, asphalt curb or barrier curb as per OPSD Drawing No. 600.110 may be used for the bulb portion,
- (e) For site plans associated with building permits as outlined in Section J.

Any deviation from these standards must be approved by Engineering Services.

C6.03.2 Curb Standard - Reconstruction

Concrete curb and gutter as per OPSD Drawing No. 600.040 to be used on reconstruction projects unless approved otherwise by Engineering Services. Concrete curb and gutter on the high side of superelevated urban roadways to be according to OPSD 600.040 Tangent.

C7.00 Traffic Calming

With the Town of Whitby's continued focus on developing holistic, safe and people-centric neighborhoods, traffic calming plans that include traffic calming measures (i.e. area specific 40km/h speed limits, speed humps, raised intersections, bump outs, pedestrian crossovers, etc) shall be required at the discretion of Engineering Services.

Refer to Town of Whitby Standard Drawing 216 for speed humps details.

C8.00 Active Transportation Facilities

Active transportation facilities should be incorporated in accordance with the Town of Whitby Active Transportation Plan. While this study has identified the preferred routes and facility types, confirmation is to be provided by Transportation Services prior to implementation. In general, active transportation facilities are to follow guidance found in OTM Book 15 (Pedestrian Crossing Treatments) and Book 18 (Cycling Facilities).

C8.01 In-Boulevard Multi-Use Paths

In-boulevard multi-use paths are typically 3.0m wide asphalt paved paths located within the boulevard or in a dedicated right of way. Often these paths are located parallel to the road and separated from it by a grassed or landscaped buffer. Refer to Town of Whitby Standard Drawing No. 214, 214.10, 214.20 and 214.30.

Multi-use paths are intended to accommodate a wide spectrum of active transportation users including cyclists, pedestrians, other human powered transportation and mobility devices.

C8.02 Shared Use Lanes

Shared-use lanes are traffic lanes marked with Shared Use symbols (Sharrows) and Wc-19 (OTM) or Wc-24 (OTM) Share the Road signs indicate a shared lane environment for bicycles and automobiles. Shared-use lanes are recommended for low speed/low volume roadways and where there is insufficient pavement width for dedicated bike lanes. Share the Road signs are generally placed every 200m to 300m. Sharrows are placed every 75m to 150m as needed.

C8.03 Paved Shoulder Bike Routes

Paved shoulder bike routes are provided on higher speed/volume roadways to accommodate stopped and emergency vehicles, pedestrians, and cyclists. Paved shoulder bike routes are 1.8m wide and are separated from traffic lanes by a 100mm solid white line. Green M511 (OTM) "Bike Route" signs may be provided every 200m to 300m.

Paved shoulder bike routes on rural roads shall include a 0.5m-1.0m buffer.

C8.04 Bicycle Lane (Conventional)

Reserved bike lanes are provided on core commuter cycling routes to ensure safe and efficient utility cycling routes to recreational, employment, and commercial lands where a strong cycling culture is desired or present.

Conventional Bicycle Lanes are 1.8 m wide and are separated by a 100mm solid white line.

C8.05 Bicycle Lane (Separated)

Separated bicycle lanes are similar in function and design to conventional bicycle lanes however, they differ in that a protective buffer of 1m separates the bicycle lane from auto traffic.

Buffered bicycle lanes are preferred where there are high traffic volumes or speeds, or a high probability of "dooring" due to on-street parallel parking increasing risk to cyclists.

Buffered Bicycle Lanes are to be 1.8 m wide and are separated by a 1m painted or physical buffer.

C9.00 Construction

The construction of all roads in the Town of Whitby shall be in accordance with current Town of Whitby Design Criteria and Engineering Standards , Ontario Provincial Standard Drawings and Ontario Provincial Standard Specifications unless otherwise outlined in the contract drawings and specifications and approved by Engineering Services.

C10.00 Roundabouts

A roundabout is an intersection at which all traffic circulates counterclockwise, to the

right of a central island. Entering drivers must yield to traffic already in the roundabout. A roundabout should be considered in the Town of Whitby under the following conditions:

- (a) At any new intersection.
- (b) At an existing intersection where an all-way stop or traffic signals are warranted or projected to be warranted within 10 years.
- (c) At an existing intersection where capacity or safety problems are being experienced or reported.

There are two processes for implementing a roundabout, depending on whether an intersection is new or existing.

C10.01 New Intersections

A roundabout should be considered when a new intersection is to be created, either on an individual basis, for instance when a road is planned to be extended, or on an area-wide basis, for example when a development application is received. If a road is planned to be extended, the Town should decide whether any of the newly created intersections might be significant enough to warrant more than side-street stop control, in which case they would be potential candidates for roundabouts. Once a new intersection is considered a potential candidate for a roundabout, then it is subjected to an Intersection Control Study (ICS).

C10.02 Existing Intersections

A roundabout should be considered at an existing intersection where an all-way stop or traffic signals are warranted or projected to be warranted within 10 years, or where capacity or safety problems are being experienced at an existing all-way stop or signalized intersection. The capacity or safety problems should be quantified by carrying out an Initial Roundabout Screening.

If two or more of the Initial Roundabout Screening conditions are met, then the existing intersection is subjected to an ICS.

C10.03 Initial Roundabout Screening

The intent of an Initial Roundabout Screening is to provide an assessment of whether it would be worthwhile to pursue converting an existing intersection to a roundabout. If “Yes” is indicated for two or more of the following Initial Roundabout Screening conditions, then such an endeavour may be worthwhile:

- (a) Is the current collision frequency high at the intersection? (Annual Review or based on per 1 million vehicles entering.)
- (b) If yes to the above, are the current collision types experienced at the existing intersection related to left turns or non-adherence to traffic control (i.e. right-angle, turning movement and head-on collisions)?
- (c) Is an all-way stop or traffic signals warranted, projected to be warranted within 10 years or being requested?
- (d) Does the intersection have more than 4 legs?
- (e) Does the intersection have unusual geometry?

- (f) Will planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate turning lanes)?
- (g) Is the intersection located at a transition between rural and urban environments such that a roundabout could act as a means of speed transition?
- (h) Is the location a gateway to a neighbourhood or community destination?
- (i) Is there sufficient property at the intersection? (Refer to Appendix D in the Design Criteria for Roundabout Standard Drawings.)

If the Initial Roundabout Screening indicates that it may be worthwhile to pursue converting an existing intersection to a roundabout, then an ICS should be conducted to determine whether a roundabout or another alternative (i.e. converting stop control to signal control, widening the existing signalized intersection) is preferred at the subject location.

C10.04 Intersection Control Study (ICS)

An Intersection Control Study (ICS) is a comparison of intersection types (i.e. stop control, traffic signals or a roundabout). The study is carried out through the use of a Decision Matrix incorporating up to 12 criteria. A brief description of how roundabouts compare to signalized intersections under these criteria are as follows:

- (a) Construction cost - Roundabouts usually cost considerably more to retrofit than adding traffic signals to a stop-controlled intersection but can cost similar to signalized intersections in new developments.
- (b) Property impacts - Roundabouts tend to require more property at an intersection.
- (c) Safety for all users - Roundabouts are statistically safer for motorists and pedestrians, but results are mixed for cyclists.
- (d) Pedestrian accommodation - Although pedestrians are statistically safer because of shorter crossing distances and having to look for traffic in only one direction at a time, some do not feel as safe because of the lack of a pedestrian signal. This also makes roundabouts not as accessible to people impacted by blindness. Pedestrian convenience is higher because wait times are shorter.
- (e) Cyclist accommodation - Cyclists can navigate a roundabout by claiming the lane and using it as a motor vehicle, or by using the sidewalks as a pedestrian. Sometimes cycle tracks or a multi-use path are provided, in which case cyclists must legally dismount when crossing the roundabout entries and exits unless a traffic signal is in place.
- (f) Transit accommodation - Roundabouts tend to result in bus stops being located farther from the intersection, which is less convenient for transfers, and roundabouts are less conducive to achieving transit priority.
- (g) Peak period traffic operations - Roundabouts are usually more efficient for the same number of lanes, especially if there are heavy left-turn flows.
- (h) Off-peak traffic operations - Roundabouts are more efficient.
- (i) Speed control - Roundabouts control traffic speeds within a certain distance upstream and downstream.
- (j) Access management - Roundabouts facilitate U-turns, and one at either end of a road section can allow driveways in between to be right-turns-only with no loss of access.

- (k) Environmental considerations - Through lower and more uniform traffic speeds, roundabouts reduce vehicle noise, fuel consumption and emissions. They usually result in less impermeable pavement area.
- (l) Streetscaping/gateway potential - Roundabout central islands provide an opportunity to add landscaping and identify a community.

An example Decision Matrix incorporating all 12 criteria is shown below:

Criteria	Weight	Signalized Intersection	Roundabout
1. Construction cost	1	4	2
2. Property impacts	4	5	1
3. Safety for all users	4	2	4
4. Pedestrian accommodation	3	4	2
5. Cyclist accommodation	2	4	2
6. Transit accommodation	2	4	2
7. Peak period traffic operations	1	2	4
8. Off-peak traffic operations	1	1	5
9. Speed control	3	1	5
10. Access management	1	1	5
11. Environmental considerations	2	2	4
12. Streetscaping/gateway potential	3	1	5
Total		74	88

The ICS process shall consist of the following steps:

- (a) Determine which of the criteria apply to the subject intersection or study area and eliminate the irrelevant rows in the Decision Matrix.
- (b) At the start of the ICS, assign a weight to each criterion from 1 to 4, based on its subjective importance to the subject intersection, with 1 being “important enough for the criterion to be considered” to 4 being “very important for intersection control selection”.
- (c) During the course of the ICS, assign a score for each alternative of 1 to 5. Scores should be reflective of the relative differences between alternatives and should be based on actual quantitative calculations where possible (i.e. cost estimates, Synchro analyses, etc.). The total score for each criterion should add to 6 if there are two alternatives being evaluated, and the total score should add to 9 if there are three alternatives being evaluated.
- (d) Document the rationales and assumptions used for the assigned weights and scores.

C10.05 Detailed Design and Submission Requirements

Roundabouts in new developments shall conform to the Town of Whitby Standard Drawings for 36m inscribed circle diameter and 27 m inscribed circle diameter roundabouts. Prior justification must be provided if another diameter of roundabout is planned. At the 30% stage of design, a Design Checks Package shall be provided that contains drawings showing design vehicle accommodation and entry path radii for each

roundabout being proposed. The package should be approved by the Town before proceeding to further stages of roundabout design.

Roundabouts at existing intersections will need to be more flexible in terms of diameter, to best accommodate existing site constraints. However, a Design Checks Package is still required at the 30% stage of design. The package shall be approved by the Town before proceeding to further stages of roundabout design.

Additional detailed design and submission requirements:

- (a) Roundabout designs shall be based on Transportation Association of Canada (TAC) Canadian Roundabout Design Guide (January 2017) and good engineering design principles.
- (b) Signs and pavement markings shall conform to the latest edition of the TAC Manual of Uniform Traffic Control Devices (MUTCD). Pedestrian and cyclist accommodation shall follow Ontario Traffic Manual (OTM) Books 15 and 18, respectively.
- (c) All pedestrian crosswalks shall be constructed as per Figure D8.

C11.00 Public Laneways

The Town of Whitby has introduced Public Laneways to be responsive to development needs and desires for a more urban streetscape, and more pedestrian-oriented corridor for higher density residential developments fronting high order roadways.

Per Council Resolution #368-15, public laneways can be used in new subdivisions provided that the following criteria are met:

- (a) The use of public laneway shall be limited to narrow lot (8 m or less) residential developments;
- (b) The alignment of public laneways shall be able to accommodate existing maintenance equipment;
- (c) Public laneways shall be connected to public streets but not other public laneways; and
- (d) Adequate space for snow storage shall be considered as part of the overall development design where public laneways are included.
- (e) Hydrants are to be located at the end of laneways or as required by the Region of Durham to provide sufficient hydrant coverage.

All other laneways or drive aisles shall be privately owned and operated. Refer to Section J – General Conditions for Site Plan Approval for design criteria pertaining to private sites.

C11.01 Public Laneway Design Alternatives

When a public laneway design is considered, the laneways could be either single or double loaded. The following three (3) public laneway design alternatives (i.e. all utilizing an 8.5 m-wide right-of-way and a 6.5 m-wide pavement) can be considered which provides Developers/Home Builders with multiple housing design options.

- (a) Alternative 1: Single Loaded Public Laneway
- (b) Alternative 2: Double Loaded Public Laneway – Tandem Parking
- (c) Alternative 3: Double Loaded Public Laneway – Side-by-Side Parking

See Standard Drawing Nos. 406.20, 415, 415.10, 415.20 and 415.30 for typical design details, dimensions and notes.

C11.02 Laneway Drainage Design

Laneways shall be designed to minimize the need for additional storm sewers within laneways. With placement of roadway catchbasins at or near the intersections of laneways and public streets, laneways shall be graded to drain toward these structures. If this design is not feasible due to grading or design constraints, sufficient space shall be provided for storm sewers within the proposed laneway design.

Storm sewers within the laneway may be considered subject to review of cross-sections to establish adequate laneway width requirements.

Section D – Residential Lot Grading

D1.00 General

The following lot grading design criteria and associated engineering standards shall be used in the preparation of all lot grading plans for new urban residential developments, including in-fill lots where appropriate. These criteria and standards will have to be implemented and/or exempted on a case-by-case basis as appropriate for new urban residential developments, infill lot grading, or as part of a capital project. Lot grading and stormwater management requirements for infill developments are detailed in Section D5.00.

Grading design criteria includes proper surface drainage, overland flow routing, maximization of useable land area, preservation of existing trees, and consideration of impacts to abutting properties. All proposed sodded areas to be completely top soiled with a minimum of 150 mm uniform depth of topsoil and No. 1 nursery sod. (Isolated depth of 100 mm topsoil may be approved by Engineering Services)

D2.00 Design

D2.01 Lot Grading Design

The front yard of all lots shall be graded to drain towards the street. No front yard catchbasins shall be allowed in new developments, unless otherwise approved by Engineering Services.

All drainage shall be directed away from the houses in defined swales. Lot grading design shall conform to Town of Whitby Standard Drawings Section 300 Grading.

All lot surfaces shall be designed to:

- (a) 2.0% minimum lot grade;
- (b) 5.0% maximum lot grade, if maximum lot grade exceeds 5.0% and no redesign alternative exists then the difference shall be made up with embankment(s);
- (c) Embankments shall be designed with the following criteria:
 - i.) Where possible, embankment should be placed on the lower lot;
 - ii.) Slope shall be designed to 3:1 maximum, unless otherwise approved by Engineering Services;
 - iii.) The height of the uppermost tier of any embankment may be increased to 1.5m to avoid additional platforms for partial slopes; and,
 - iv.) The maximum embankment height criteria is exempt for sloping between building envelopes.
- (d) The use of retaining walls to achieve satisfactory lot grading design should be minimized wherever possible. Where it is not possible to avoid the use of retaining walls, the retaining walls shall be designed with the following criteria:
 - i.) Retaining wall 0.6m or higher shall require a minimum 1.2m high fence at the top of the wall;
 - ii.) The maximum height of any wall/fence combination shall be 3.0m;

- iii.) For tiered walls, a minimum platform of 1.0m from the face of the lower wall to the toe of the higher wall shall be provided;
- iv.) Where the retaining wall is located between two private properties being developed at the same time or permission from the adjacent property owner is obtained, the wall/fence is recommended to be constructed at the common property line.

A private access/shared ownership reciprocal easement shall be registered on both properties indicating shared ownership of the wall/fence at the property line. The easement should be sufficient in size to accommodate the wall/fence structure, including footings and drainage backfill, as well as future maintenance/reconstruction requirements. Under this scenario, the retaining wall/fence combination is recommended to be constructed in the following order of preference:

- On the property line with the fence cored into the retaining wall;
 - The retaining wall located on the lower lot with the fence placed behind the wall, on the property line;
- v.) Where the retaining wall is located between two private properties being developed by different developers, at different times or as infill development in an existing area, where permission is not obtained from the adjoining property owner, the retaining wall (and fence, if applicable) shall be placed wholly on the property under development, including footings/drainage backfill;
 - vi.) Where the retaining wall is located adjacent to hazard lands, open spaces storm water management blocks, parks or other municipally owned property:
 - The wall, including footing and drainage backfill, shall be placed wholly on private property unless otherwise approved by the Town;
 - The height of the wall shall not exceed 0.6m; and,
 - The normally 1.2m high chain link fence (CLF) located on property line shall be increased to 1.8m in height. The face of wall design drawing shall confirm that the CLF will have a continuous minimum 1.2m high exposure from the private property side; and,
 - vii.) Refer to Section E2.00 for retaining Wall Structure requirements.

- (e) All rear lot catchbasins and storm sewer leads shall be constructed on one lot. The centre of the catchbasins and storm sewer pipe shall be at least 0.5 m from the lot line. Refer to Town of Whitby Standard Drawing 107.10.
- (f) A 0.6 m strip shall be left undisturbed along the boundary of the new development next to adjacent properties until such time as final grading works are undertaken.
- (g) The lot grading plan shall include interim (prior to development) contours and ultimate grading details for all blocks of land shown on the registered plan. Any blocks not developed by the time all other obligations of the Subdivision Agreement have been fulfilled, shall be graded to facilitate the drainage pattern shown on the lot grading plan prior to final assumption of the services.

D2.02 Drainage Swale Design

All rear yard drainage directed around houses shall be directed away from houses in defined swales which outlet at the curb or sidewalk.

Drainage swales shall be designed as follows:

- (a) Longitudinal slope to be 2.0% minimum; For front-draining lot grading types, a minimum of 2.5% is preferred for the side yard swales.
- (b) Side slopes 3:1 maximum;
- (c) Depth 150mm minimum and 450 mm maximum;
- (d) The maximum area permitted to discharge via a single swale directly onto a road allowance or into one rear yard catchbasin shall be from 8 rear yards or a maximum of 0.2 ha;
- (e) Maximum length of swale between drainage outlets – 100 m. Drainage outlets shall be designed to outlet at the earliest opportunity, swale outlet locations shall be shown on the lot grading plans;
- (f) Driveways shall not be used as outlet for any swales; and,
- (g) Grading shall be designed so that, in the case of blockage, there is an overflow outlet for each RYCB. In the case of blockage, the depth of water shall not exceed 0.4 m. Adjacent top of foundation wall, or unprotected openings, shall be a minimum of 0.1m above the overflow outlet elevation. This possible ponding shall not be within 0.1m of any adjacent top of foundation or unprotected (no window well) window opening.

D3.00 Subdivision Lot Grading Plan Requirements

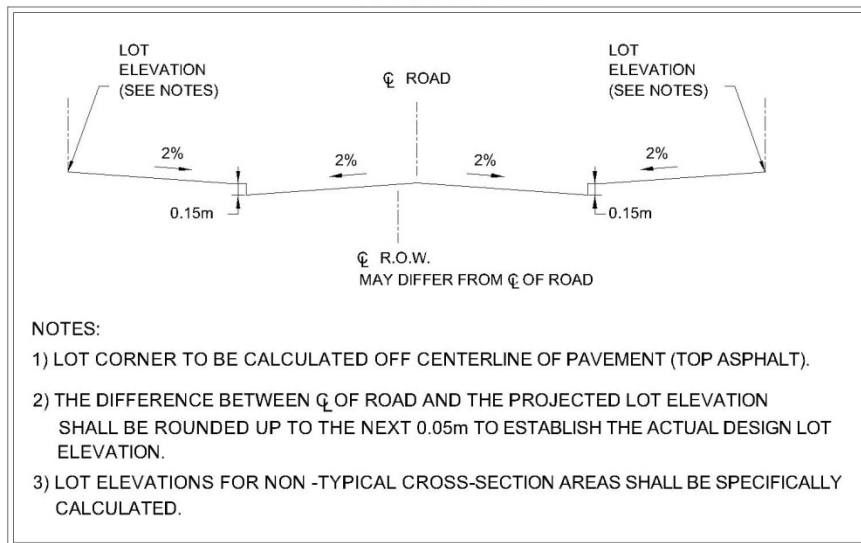
A lot grading plan shall be prepared at a scale of not less than 1:500 and shall be submitted to Engineering Services for approval as part of the Engineering Drawings.

All grading design elevations shall refer to a Town of Whitby geodetic benchmark, which shall be labelled on the plan.

All applicable drawing requirements outlined in Section A2.00 shall be followed with the addition of the following information:

- (a) All lot numbers, blocks and proposed easements shall be shown as per the Registered Plan for the Subdivision;
- (b) Existing contours shall be shown at a maximum of 0.5m interval within and outside the subdivision limits as required to demonstrate the prevailing drainage pattern;
- (c) Location of hydrants, utility poles, transformers, community mail boxes and driveways, where applicable;
- (d) Proposed road grades, lengths and elevations at 25 m intervals on all streets with symbols at grade changes indicating direction of slope;
- (e) Existing and proposed elevation at all lot corners and intermediate points of grade change required to illustrate the lot grading concept and drainage patterns. Property corner elevations at street line shall be in accordance with Figure D3.1;

FIGURE D3.1



- (f) The proposed house grade at the front and rear of a nominal building envelope (defined by zoning setbacks or intended construction, if known) in the middle of the lot;
- (g) The direction of the surface water runoff for each lot is to be shown by arrows
- (h) All terracing shall be shown with the intermediate grades specified;
- (i) All rear lot catchbasins shall be shown along with the rim elevation and the invert of the outlet pipe;
- (j) All drainage swales shall be shown with % grade and elevations at regular intervals;
- (k) Indicate all house types on plans as per Town of Whitby Standard Drawings No's.300, 301, and 302. (ex. walkout, backsplit);
- (l) Standard Notes for Lot Grading Plans - Town of Whitby Standard Drawing No. 303;
- (m) Identify all lots or blocks which require Engineered Fill;
- (n) Where a lot or block has special design requirements such as top of foundation wall, maximum underside of footing and/or unprotected openings it shall be appropriately noted right on the lot. Refer to Section D7.01 Foundation Control Certification; and,
- (o) Minimum Basement Elevation (MBE) shall be shown on the plan for each applicable lot where the MBE elevation falls within 1.8m of the centerline of road elevation.

D4.00 Individual House Siting Plans

Individual house Siting Plans for each lot shall be designed specifically for the house type being constructed and designed in accordance with the approved general grading

plans. All Siting Plans shall be submitted on the Town's Standard Templates 509.10 or 509.20 without alteration, unless otherwise approved by Engineering Services.

Sittings shall be drawn to a scale of 1:200 or 1:250; utilizing the largest scale possible to fill the space on the siting.

Single, Semi-detached and Linked houses shall be drawn on Standard Template 509.10. Where large lots of these types cannot fit on legal paper size at a scale of 1:250, the applicant may use Standard Template 509.20 (ledger paper size).

Townhouse blocks and estate lots shall be drawn on Standard Template 509.20. Where large lots/blocks of these types cannot fit on ledger paper size at a scale of 1:250, the applicant may use a larger paper size, but must ensure to display the exact same information and in the same layout as the Standard Template's 509.10 and 509.20.

Please refer to the Engineering Standard 300 series drawings for Individual Siting Plan details and notes.

Town Standard Templates 509.10 and 509.20 can be found on the Town's website in AutoCAD format. Sample sitings are also available in PDF format, for a visual example of the minimum information the Town requires prior to issuing approvals.

D4.01 Foundation Walls

Exposed foundation walls shall be designed to extend not less than 250mm above finished ground level. As-built exterior foundation walls shall comply with the Ontario Building Code.

D5.00 Lot Grading Requirements for Infill Development

D5.01 Introduction

The following is an outline of the Town of Whitby's policy regarding grading, drainage and stormwater management of infill developments. This section is to be read in conjunction with the requirements of the Infill Development By-law 8067-24 (as amended) and the Guidelines to Infill Developments when applying for a Grading, Servicing, and Drainage Permit available online or by request prior to an application for Building Permit.

Infill Development (or Infill Lot) means the development of a new lot or re-development of an existing lot up to 10 units with a new building or structure beyond that of the original footprint that includes an increase of the impervious surface of the lot or an alteration of drainage pattern and/or grading of the lots. Infill Development may vary in size, consist of more than one residential unit/lot and include different types of residential dwellings, such as single, semi-detached, and townhouse blocks. Other types of small-scale developments may fall under the Infill Developments definition, at the sole discretion of the Director of Engineering.

Consistent with the Ontario Building Code requirements, a site shall be graded so that water will not accumulate at or near any building and will not adversely affect adjacent properties.

D5.02 Responsibility of the Grading Consultant

It is the owner's responsibility to retain a Grading Consultant with experience in site grading and drainage to:

- (a) Prepare and **sign** a site-specific grading/servicing plan for inclusion with the Grading, Servicing and Drainage Permit and Building Permit applications,
- (b) Provide field review to ensure compliance with the site grading/servicing plan and,
- (c) Issue a final grading certificate to the Engineering Services upon completion of the final grades.

The Grading Consultant will ensure that no new instances of ponding will occur as a result of construction. Pre-construction problems may still exist as the ramifications of the existing grade are still felt. As such, the Grading Consultant is required to maintain the intent of the existing grading. Improvement is not a requirement, unless noted otherwise at the discretion of Engineering Services.

A 'Grading Consultant' must be one of the following:

- (a) A Professional Engineer registered in Ontario (P.Eng.) within the discipline of Civil Engineering,
- (b) An Architect registered in Ontario,
- (c) An Ontario Land Surveyor,
- (d) A Certified Engineering Technologist (C.E.T.) within the discipline of Civil Engineering; or,
- (e) A Designer holding a Building Code Identification Number (BCIN).

For lots requiring specific stormwater controls, the Town recommends hiring a consultant with relevant expertise in grading and stormwater management to prepare a site-specific Stormwater Management Brief to the satisfaction of Engineering Services.

A Construction Management Report is also required to be submitted with requirements listed within Appendix C of the Guideline to Infill Development.

Additional supporting documentation may be required based on site specific conditions at the discretion of Engineering Services.

D5.03 Lot Grading Criteria for Infill Housing

The following must be addressed and included by the Grading Consultant, as a minimum, in preparing the grading/servicing plan:

- (a) A north arrow shall be shown. If available, the Municipal Address shall be shown. All drawings received shall be printed to scale of either 1:250 or 1:200. **Freehand drawings are not acceptable.**
- (b) Include Lot Grading notes on plan in accordance with Town standard 303.
- (c) Show the location of the buildings, existing and/or proposed, including those on adjacent lands, where applicable.

- (d) Show the location of downspouts, splash pads, area drains, and discharge from sump pumps, window wells, walkouts, etc. for both the infill and houses on adjacent lots. Provide details to support, as necessary.
- (e) Show the location of hard surfaces such as driveways, walkways, porches, retaining walls, etc. All surfaces are to be distinguished by material type (i.e. concrete, grass, asphalt, etc.).
- (f) Show the location of service connections, including type, material, slope, and invert.
- (g) Show the location and diameter of **all** trees on Town of Whitby property in front of, adjacent to and within 7.5 m either side of the subject lot.
- (h) Show existing and proposed elevations at all lot corners. Any significant changes in grades along property lines shall be clearly indicated.
- (i) Show proposed external building elevations at corners and adjacent critical property line points.
- (j) Provide existing elevations on the road, ditch, boulevards, curbs, subject lot and adjoining lands. They shall be at 5.0m intervals in a grid pattern including boundaries and on adjoining lands. Sufficient existing grades on adjacent properties must be shown to indicate the drainage pattern within 10m of the subject lot.
- (k) Provide the elevations of proposed finished basement, first floor, garage floor, sufficient driveway elevations to establish the slope, as well as elevations of porches, decks, curbs and sidewalks and the number of steps or risers at all entrances.
- (l) Indicate all existing features and all proposed work within the Town of Whitby road allowance, such as but not limited to, service connections, invert elevations, road cuts, asphalt restoration areas, existing/proposed driveway, curbs, sidewalks, culverts, trees, all utilities (streetlights, hydro poles, Bell/Rogers, Canada Post, etc.), on the grading/servicing plan.
- (m) The lot area and building length for irregularly shaped lots must be provided.
- (n) The plan must illustrate any proposed low impact development stormwater management measures for the proposed lots, including, but not limited to, extra depth topsoil, infiltration trenches, underground storage chambers, etc.

Please be advised a scalable digital PDF submission of any required documents listed within this section must be included with all submissions for Grading, Servicing and Drainage Permit and Building Permit applications.

D5.04 Lot Grading and Stormwater Management Criteria for Infill Developments

In general, lot grading of infill lots shall be in accordance with the criteria and standards set out in Sections D2.01 and D2.02, with the following additional requirements:

- (a) The intent of the existing drainage pattern in the area of the site should be maintained.
- (b) Note any concerns with respect to the overall performance of the existing drainage system in the surrounding area.
- (c) Grading must meet or exceed the minimum requirements set forth in the Lot Grading Criteria, and the Town of Whitby Standards No. 300 to 304. Indicate both existing and proposed grade elevations at all corners of the house, property lines and lot corners.
- (d) Side yards should be drained at surface slopes not less than 2.0% to one or more existing positive drainage outlets connected to public drainage systems, or if necessary to proposed positive drainage outlets, unless otherwise approved where existing grades are not being altered.
- (e) Rear yard slope should not exceed 5.0% except where existing grades are not being altered.
- (f) The front grade of a house must be at least 300mm higher than the centerline of the road.
- (g) A 0.6 m strip shall be left undisturbed along the boundary of the new lot next to adjacent properties until such time as final grading works are undertaken. All grades must meet existing on lot lines unless written permission of adjacent property owner is attached.
- (h) During construction, siltation control methods shall be used around the lot perimeter or construction area for larger lots, in order to prevent erosion or siltation on adjacent properties.
- (i) All disturbed areas shall be restored with at least 300mm depth of topsoil.
- (j) Where a municipal storm sewer is not available for downspout connection, provisions shall be made to prevent turf/soil erosion at all downspout outlets. i.e.: splash pads to a side yard swale. Downspouts may also be directed to or directly connected to a stormwater management feature.
- (k) Minimize use of retaining walls at boundaries.
- (l) If retaining walls are proposed to replace an approved 3:1 slope refer to Sections D2.01 and E2.00 of the Town's Design Criteria for more information.
- (m) Provide a field review as required and submit a Sealed Final Grading Certificate to the Town of Whitby, Engineering Section. The form shall be as per Section D7.04.
- (n) Infill developments on residential lots typically consist of removing and replacing the existing home(s) or building an addition to an existing house. This increase in impervious surface typically increases stormwater runoff generated from the property and has the potential to impact the existing Town drainage system. To mitigate the impact of the increased impervious area,

the Town requires the infill development to provide infiltration or storage features to minimize increased flows leaving the site. The Town requires the development to infiltrate the runoff volume generated by the increased impervious area for the 6-hour, 5-year storm event.

Per OBC, any infiltration feature is to be a minimum of 5m away from building foundation drain.

D6.00 Construction Requirements

Prior to commencement of rough grading, the Developer must implement an erosion control program to reduce on site erosion and minimize the transport of silt off site, into trees or environmentally sensitive areas or into the Municipal storm sewer system, to the satisfaction of Engineering Services.

The Developer and his Engineer shall control the placement of imported fill material on all registered lots including those where private sewage disposal systems are required. Imported fill material placed on registered lots must meet or exceed the original ground's capability to support a private sewage disposal system as required by the Durham Region Department of Health Services.

Where the proposed grading plan identifies fill over registered lots, "engineered fill" shall be placed according to the approved design and under the supervision of the qualified Geotechnical Engineer, who shall certify the fill's stability and load bearing capacity and provide a copy of this certificate to Engineering Services.

If required by Engineering Services, or Chief Building Official or by the builder's purchase and sales agreement, the Geotechnical Engineer shall provide footing inspection certificates for each house which has engineered fill within the building envelope.

D7.00 Foundation Control and Lot Grading Certification

D7.01 Foundation Control Certification

Where lots are identified as requiring special Foundation Control Certification (FCC) by the Developer's Grading Consultant on the engineering lot grading plans for the subdivision, and the Town of Whitby determines that the proposed foundation grades are close enough to the control elevations to warrant special attention by the builder, the following stamp shall be used on the individual lot grading:

Framing not to begin prior to certification of foundation control elevation for:	
<input type="checkbox"/>	TFW
<input type="checkbox"/>	MBE
<input type="checkbox"/>	Max USF
As per Town of Whitby Design Criteria D7.01	

In the stamp, the abbreviations shall be interpreted as follows:

- TFW shall mean the minimum elevation of the top of foundation wall and may include minimum sill opening elevations;
- MBE shall mean the minimum basement and
- Max USF shall mean the maximum underside of footing and shall be interpreted

to indicate the depth to which footings shall be extended.

The builder shall have the FCC prepared prior to beginning the framing of the unit for lots identified with the above stamp.

Where the TFW, MBE or Max USF has been identified as a critical elevation for a lot or block, it shall be the builders responsibility to ensure that acceptable critical elevations have been met prior to proceeding with further construction. If modifications are required by the municipality upon receipt of the FCC, the builder is responsible for implementing all changes at their sole cost. For this purpose, the FCC shall indicate that the required elevations are within permitted tolerances.

Foundation Control Certification shall be done by an Engineer, Certified Engineering Technologist, Ontario Land Surveyor, Architect licensed to practice in Ontario or recognized equivalent acceptable to the Chief Building Official. The format of the Foundation Control Certificate shall be as shown in Section D7.02.

Builders must provide the Town of Whitby Engineering Services and Developers Grading Consultant with a Foundation Control Certification as per Town of Whitby Design Criteria Section D7.02, identifying "As-Built" underside of footing, top of foundation elevations (all locations), garage door sill elevations and actual setback distances as specified under the appropriate Zoning By-law. If a variance exists between these "As-Built" elevations and the approved house siting plan, the Grading Consultant shall provide details of the variance from the approved plans and shall include recommendations for rectification of the problem, if required.

D7.02 Foundation Control Certificate

The Corporation of the Town of Whitby

Engineering Services

Foundation Control Certificate

Dated: _____

Municipal Address (es): _____

Name of Subdivision: _____

Subdivision No.: _____ Phase: _____

Lot or Block No. (s): _____

Reg. Plan: _____

Attention: Director of Engineering Services or Chief Building Official

This is to certify that I have checked the as-constructed control elevations of the above noted lot(s) and confirm that the foundation:

- a) critical control elevations listed below conform to the elevations shown on the approved engineering site grading plan:
 - TFW (top of foundation wall),
 - MBE (minimum basement elevation),
 - Max USF (maximum underside of footing);
- b) "as-constructed" will not impede the completion of the lot grading in accordance with the approved Lot Grading Plan; and
- c) "as-constructed" will permit the construction of the garage floor at an elevation to provide for grading of the driveway in conformity with Town of Whitby Design Criteria and Engineering Standards, including consideration of the proposed sidewalk and/or curbs abutting the lot.

Yours truly,

(Required: Name, Company, Stamp & Position Title) (Optional: Address & Phone Number)

Instructions:

- 1.The above is to be stamped and signed by the licensed grading consultant who shall be an Engineer, Certified Engineering Technologist, Ontario Land Surveyor or Architect licensed to practice in Ontario.
- 2.Initial the control elevations listed above are confirmed to be within acceptable grading tolerances.
- 3.Where verification of control elevations is required prior to framing, submit a duplicate original of the above to the Chief Building Official with the request to begin framing.
- 4.Submit an original of the above to the Director of Engineering Services.

D7.03 As-Constructed Certification

Prior to the release of any lot from the conditions of the Subdivision Agreement, the Developer's Grading Consultant shall provide written certification to the Town of Whitby that the grading and drainage of the lot is in accordance with the approved lot grading and drainage plans.

If a variance exists between these "As-Constructed" elevations and the approved house siting plan, the Grading Consultant shall provide details of the variance from the approved plans and shall include his recommendations for rectification of the variance, if required.

Final lot grading certification by the Grading Consultant shall be preceded by a pre-sodding site inspection by the Grading Consultant and builder who will jointly determine which lots are certifiable and ready for sodding based on visual inspection, which lots the Grading Consultant must survey to confirm the grading functions and is in accordance with the approved design, and which lots require deficiency repairs and the nature of those repairs. In all instances, "As-Constructed" geodetic elevations must be recorded on Engineering Services approved siting plan after sodding (typically 15 ground elevation shots per lot, refer to Town of Whitby Standard Drawings 300 to 302) and forwarded to the Town of Whitby, with the lot grading certificate (See Section D7.04 for Certificate) which shall note any variation from original design elevations. Any as-constructed submissions which do not contain the minimum survey locations, per Standards 300 to 302, will not be accepted by the Town and will be returned to the Grading Consultant. The Town of Whitby will review the certified lots and arrange for the release of the security deposit(s), if acceptable.

D7.04 Lot Grading Certificate

The Corporation of the Town of Whitby

Engineering Services

Lot Grading Certificate

WHEREAS, Sentence 9.14.6.1 of Ontario Regulation 413/90, made under the authority of the Building Code Act, requires that the building shall be located, and the building site graded so that water will not accumulate at or near the building and will not adversely affect adjacent properties.

I, _____ hereby certify that I have conducted a field review of the site and find it to be in compliance with the approved Site Grading Plan submitted and reviewed by the Town of Whitby, Engineering Services.

Application Number: _____ Project Description: _____

Project Location: _____

Lot Number: _____ Plan Number: _____

Name of Owner (in full): _____

Owners Address: _____

Postal Code: _____ Telephone Number: _____

Consultant: _____

Signature of Grading Consultant: _____ Date: _____

Affix Seal Below

The Corporation of the Town of Whitby
Engineering Services



Section E - Structures

E1.00 General

All structures shall be fully designed and detailed on engineering drawings and shall be protected against possible erosion during and after construction. Where applicable, structures shall conform to Ontario Provincial Standard Drawings and Ontario Building Code requirements.

All other structures not noted below may require certification by a qualified Engineer at the sole discretion of Engineering Services.

For channel culverts, bridges and/or erosion control projects the proponent is responsible for obtaining all necessary approvals from the appropriate approval agencies such as the Conservation Authority, Ministry of Natural Resources, the Ministry of Environment, Conservation and Parks, and the Ministry of Transportation of Ontario.

E2.00 Retaining Walls

All retaining walls are to be constructed of durable materials such as stone, cast in place or precast concrete. For recommended location of wall structure, see Section D2.01. Retaining walls attached to or part of a building are subject to the requirements of the Ontario Building Code and are thus excluded from review under this standard.

- (a) Where the retaining wall is less than 0.6 m in height, shop drawings or precast concrete manufacturer's standard details shall be provided at the time of siting approval prior to issuance of a building permit. Certification is not required for walls less than 0.6m in height.
- (b) Where the retaining wall exceeds 0.6m in height, an engineering design or pre-engineered design shall be stamped and signed by an Engineer experienced in the design and construction of retaining walls. A geotechnical review shall be completed, and present full calculations for both local and global stability analysis.

Where the wall is adjacent to hazard lands or open space, regardless of height, the above shall be required and shall demonstrate that the appropriate factor of safety is achieved and complies with the Ontario Ministry of Natural Resources (MNR) Technical Guide, River & Stream System: Erosion Hazard Limit, 2002 (or as amended).

The required engineering design and geotechnical analysis shall be submitted to the Town of Whitby Engineering Services, Development Section for approval at the time of subdivision grading review and approval and may be deferred to no later than siting approval as required by Engineering Services.

The design package submitted to the Department for review and approval shall be stamped and signed by the manufacturer or structural engineer, and shall, at a minimum, contain:

- Cross section details;
- Face of wall details; and,
- Details for any applicable requirements for fence/railing, drainage, tie backs and end treatments.

During construction, the retaining wall shall be inspected and upon completion the wall or fence/wall combination shall be certified by an Engineer experienced in the design and construction of retaining walls.

For lot grading design and fencing requirements, see Section D2.01.

E3.00 Culverts and Bridges

E3.01 Roadway Culverts and Bridges

Detailed design drawings shall be required for all reinforced concrete structures that are poured in place. This includes all head walls, outfalls, maintenance holes and culverts where OPSS and OPSD do not specifically detail the structure. Bridges and other major drainage structures shall require special designs as determined by Engineering Services in consultation with MTO, CLOCA and MNR. Hydraulic calculations will be required to show the hydraulic capacity of the proposed channel and what level of service or flood frequency the roadway is protected for.

Structures shall be designed based on the following criteria:

- a) New roadway culverts and bridges shall have sufficient capacity to pass the Regulatory Flood in order to avoid adverse backwater effects.
- b) Overland flow flooding shall not exceed the criteria depth as per Section B3.02.3.

E3.02 Driveway Culverts

Driveway culverts shall be specified as Helical CSPA, 450mm x 340mm, 68mm x 13mm corrugation, 1.6mm wall thickness. Culvert must be sized to accommodate 5-year return period storm flows unless otherwise approved by Engineering Services. Rural driveway culverts shall have a minimum length of 6.0m. For minimum cover, refer to Standard Drawing No. 306.

Generally, driveway culverts on existing roads must be installed by or in accordance with criteria and approvals established by the road authority that has jurisdiction over the road allowance (MTO, Region of Durham or Town of Whitby).

E4.00 Noise Fences and Walls

All noise fences and walls are to be constructed as per Town of Whitby Standard Drawing No. 506, 506.10 or otherwise approved. The noise fences/wall design and all certification documentation shall be certified by a qualified Engineer and submitted to Engineering Services prior to assumption of the subdivision. The certification shall include the section of fence being certified, materials used, construction method, structural integrity (including wind loading), and certification that the required noise

abatement levels for the noise fences and/or walls have been met. Additionally, a certificate and survey from an Ontario Land Surveyor shall be provided confirming the as-constructed elevations (top and bottom) and location of the barrier in relationship to property lines.

All noise fences shall be constructed wholly on private property. Prior to construction, all fences 2m and above in height shall be designed and approved by a licensed Structural Engineer. Prior to acceptance of the completed fence, a Structural Engineer certification shall be provided to the Town of Whitby.

E5.00 Entrance Features

Entrance features and treatments will be allowed where approved by council. Features which are intended to be permanent structures shall be designed using vandal proof low-maintenance materials and finishes. Temporary features shall be removed by the developer prior to final acceptance or when requested by the Town of Whitby.

Section F - Signs and Fencing

F1.00 General

The proposed location and type of sign or fence shall be shown on the plan drawings. A signage and pavement marking plan must be approved by the Town of Whitby before any order is placed.

F2.00 Street Name Signs

F2.01 Location

Street name signs shall be installed at all non-signalized intersections and shall identify each street at the intersection. Refer to the Town of Whitby Standard Drawing No. 500 for the location of the street name sign.

For signalized intersections, refer to Durham Region standard (S-410.070).

F2.02 Type

The street name sign shall be white reflective lettering on a reflective blue background. All lettering shall be a mix of uppercase and lower case, and shall be 10 cm on a 15 cm sign and 15 cm on a 20 cm sign. Signs shall be anodized aluminum, minimum 1.6 mm thickness, with signs over 600 mm long being minimum 2.0 mm thick. The sign shall be fastened to a 3.5 mm x 75 mm galvanized round steel post, minimum 10 gauge.

Signs shall conform to Town of Whitby Standard Drawing No 501 and 501.10 with 15 cm signs used where local roads intersect local roads and 20 cm signs used on all other locations.

Temporary or permanent street name signs shall be installed upon completion of the base course asphalt and must be maintained. Permanent street name signs shall be installed prior to final acceptance being given by the Town of Whitby.

F3.00 Traffic Control and Advisory Signs

The design, positioning and mounting of all traffic control and advisory signs shall conform to the latest Ontario Traffic Manuals.

The traffic and advisory signs shall be installed upon completion of the base course asphalt and maintained until the subdivision has final acceptance by the Town of Whitby.

All temporary and permanent traffic control and advisory signs shall be indicated on a separate drawing (Signage and Pavement Marking Plan – SPMP), to be included with the engineering submission drawing set.

F4.00 Pavement Markings

Plastic pavement markings shall be provided in accordance with the latest Ontario Traffic Manuals. Pavement markings are required for lane separation, road centerline,

turning lanes, stop lines, cross walks, turning arrows and island markings.

Pavement markings are to be shown on the SPMP plan(s) required for subdivision developments or capital projects and shall be in accordance with the latest OPSS requirements.

F5.00 Fencing

Fencing which is to be installed as part of a subdivision or development agreement shall be located as outlined in the agreement and shall be designed and constructed as per the approved landscape drawings and in accordance with the following criteria.

- (a) For acoustic fencing/barriers, refer to Section E4.00 Noise Fences and Walls.
- (b) 1.2 m and 1.8 m chain link fencing shall be constructed in accordance with Town of Whitby Standard No 506.30 and 506.40 respectively.
- (c) All fences designed to enclose private swimming pools shall be in accordance with the relevant Town of Whitby By-laws.
- (d) All required fences shall be located using SIB's/property bars installed by an Ontario Land Surveyor (OLS).
- (e) A certificate and survey from an Ontario Land Surveyor shall be required, confirming the as-built elevations (top and bottom) and location in relationship to property lines of all regulatory fencing installed.

Section G - Street Tree Planting/Protection

G1.00 General

In new subdivisions, developers are required to plant trees along all road allowances in accordance with requirements of the subdivision agreement and the Town of Whitby's Standard Drawings. The developer is also required to protect and maintain as many of the existing trees on the development lands as possible.

All landscape design submission shall comply with the Town of Whitby Landscape Plan Guidelines for Site Plan and Subdivision Development and the Tree Protection Requirements for New Development available online.

Section H - Street Lighting

H1.00 Streetlight Design and Submissions

Street lighting systems shall be designed in accordance with the latest edition of RP-8 American National Standard Practice for Roadway Lighting and Town approved streetlight luminaires, brackets and poles.

The streetlight design plans shall be submitted by the owner/developer or their representatives and be included in the first submission of the engineering drawings. The street light design plans shall include streetlight design layout, single line diagram and photometric design.

All Town owned streetlights shown on the design plans shall be individually numbered based on the numbers provided by Elexicon. Each number on the plan shall match the number in the field.

All rights of way, including private roads within condominium developments shall require a photometric plan to show the lighting levels provided by the existing and proposed streetlights shown on the utility coordination plan.

The photometric plan shall include all specifications required for the installation of street lighting and ensure the proper level of lighting. This shall include the proper illumination for proposed building envelopes and future tree canopies. Lighting levels shall be shown either as point values with contours for all of the proposed and existing surfaces of the rights of way including entrances.

Supplier shop drawings for the streetlight material shall be submitted to the Town of Whitby and Elexicon for approvals prior to manufacturing.

Four (4) copies of the shop drawings shall be submitted to Town of Whitby and Elexicon for review and approval. Two (2) copies will be returned to the owner/developer or their representatives with approvals or with revisions for re-submission.

The following standard drawings shall be used for streetlight design for local, collector or arterial roads, and for other designated areas in the Town:

- Drawing No. 502.10 – Standard Streetlight for Arterial and Non-Residential Collector Roads
- Drawing No. 502.20 – Standard Streetlight for Local and Residential Collector Roads
- Drawing No. 502.30 – Standard Streetlight for Designated Heritage Areas
- Drawing No. 502.40 – Standard Streetlight for Designated Downtown Areas

Decorative street lighting shall only be considered in designated areas approved by the Town. Decorative street lighting shall only be installed on local roads. Installation of decorative street lighting on collector and arterial roads is not permitted.

H2.00 Underground Streetlight Distribution

H2.01 Streetlight Cable and Trench Details

The streetlight cable shall be installed in a 50 mm DB2/ES2 PVC duct. The underground ducts shall run continuously from the designated supply point to each roadway lighting pole and to the underground wiring aperture.

Where the street lighting cable is installed in a joint use, reinforced concrete encased crossing, the 50 mm PVC Type 2 duct shall be located within the reinforced concrete encased road crossing.

Refer to Town of Whitby Standards #404.30 Direct Buried - Joint Use Trench for installation of underground streetlight cable in a joint use trench.

Where the trench is solely for underground streetlight cable, there shall be a minimum of 150 mm of sand placed above and below the flexible duct.

There shall be minimum cover of 0.75 m from finished grade to the tip of sand with stone free backfill in accordance with the Town of Whitby specifications.

A warning tape shall be installed 0.3 m below finished grade.

The Town of Whitby inspector shall be present to inspect the streetlight wiring and ducts inside the joint use trench prior to backfilling. To arrange for inspection please contact Operations Centre two (2) working days in advance to schedule an appointment with Whitby's Inspector to inspect the trench and installation of the duct and cable prior to back filling the trench. The Operations Centre can be reached at 905-668-3437 between the hours of 8:00 a.m. and 4:00 p.m. Monday to Friday.

H3.00 Streetlighting Installation Details

H3.01 Pole and Luminaire Installation

Location and type of streetlight poles shall be approved by Town of Whitby. Engineering design drawings shall always be used for construction and "as-built" purposes by the Town of Whitby and Elexicon. All streetlight poles shall be numbered. The numbers on the streetlight plans will be provided by Elexicon.

Poles shall be set to the correct depth as per the standard drawings.

Poles shall be oriented such that the hand hole faces away from the roadway and the below grade wiring apertures are parallel to the roadway. The Electrical Contractor shall provide pole number plates on the side of the pole. The pole number plate installed shall be in accordance with the Town of Whitby Standard Drawing No. 504.50.

While checking for plumpness and with the pole securely held in place, limestone backfill material shall be added and compacted every 100 mm up to the below grade wiring apertures. The below grade wiring installation to the apertures can then be made and backfilled with sand for a depth of 300 mm around the area of the apertures. Filling and compacting up to the grade point can then be completed using stone free native backfill material.

H3.02 Service Entrance (in pole) Breaker Installation

All wiring must conform to the latest edition of the Ontario Electrical Safety Code and is subject to ESA (Electrical Safety Authority) Inspection.

The circuit breakers shall be located in the first streetlight pole. The remaining streetlight poles will identify its corresponding circuit breaker pole location. The Electrical Contractor shall place cable identification tags on the inside of each hand pole of each streetlight pole as per Town of Whitby Standard Drawings. The cable identification tags are to be series 3000 white tags as supplied by U. G. Products or an approved equivalent.

Please refer to the Town of Whitby Standard Drawings 502.10, 502.20, 502.30 and 502.40 in conjunction with these specifications.

H4.00 Streetlight Connections

The streetlight system design shall minimize the number of connection points to the power supply systems.

Electrical Contractor shall supply and complete all electrical connections within the streetlight. Elexicon will complete the final connections at the transformer and energize the streetlight circuit up to the in-pole breaker. The Electrical Contractor shall turn on the circuit breaker to energize the streetlights.

H5.00 Inspection, Approval and Activation

It is the responsibility of the Electrical Contractor to make arrangements with Electrical Safety Authority (ESA) for permits and inspections of both the above ground works and the below ground works. Copies of the permits and the ESA inspection reports shall be forwarded to the Town of Whitby and Elexicon.

The Town of Whitby shall inspect the initial installation of the streetlight. Lamp and photocell must be dated. The streetlight pole must be straight and hand hole cover plates installed complete with tamperproof screws. Any deficiencies shall be recorded, and the contractor will be notified in writing.

H6.00 Warranty Period and Final Inspection

The owner/developer will be responsible to maintain the street lighting for a minimum period of two (2) years from the date of energization of the streetlights. Prior to the expiry of the warranty period the Town of Whitby and Elexicon will perform a final inspection of the streetlights and notify the owner/developer in writing of any deficiencies. All deficiencies must be corrected prior to the Town of Whitby accepting the streetlight plant.

H7.00 Approved Material Listings

It is the responsibility of the Contractor to ensure the streetlight luminaires, brackets and poles ordered by the Contractor are compatible, and can be assembled together on site to successfully complete the streetlight installation as per the standard drawings.

H7.01 Streetlight Cable

The streetlight cable located between the pad-mounted transformer and streetlight in pole breaker shall be 2 - #6 RWU90.

The streetlight cable located beyond the streetlight in pole breaker and the next streetlight shall be 3 - #6 CU RWU90.

For octagonal and decorative poles, the streetlight wire located between the streetlight pole handhole and the streetlight luminaire shall be 2 - #12 CU NMWU completed with internal ground.

For round concrete poles with aluminum davit arms, the streetlight wire located between the streetlight pole handhole, and the streetlight luminaire shall be 3 x 1/c #12 Cu. THNN (black, white and green).

All the above cable shall be CSA approved and must conform with the latest edition of the Ontario Electrical Safety Code.

H7.02 Underground Streetlight Cable Duct

All underground streetlight cable ducts shall be 50 mm diameter P.V.C. Type 2 ducts.

H7.03 Street Light Connections

H7.03.01 Street Light Connectors

Manufacturer	Catalogue Number
Burndy	BIT-2/0 (or approved equivalent)

H7.03.02 Fuse

Manufacturer	Catalogue Number
Cooper Bussmann	KTK-5 (or approved equivalent)

H7.03.03 Fuse Holder

Manufacturer	Catalogue Number
Cooper Bussmann	HEB-AA (or approved equivalent)

H7.03.04 Fuse Boot

Manufacturer	Catalogue Number
Cooper Bussmann	2A0660 (or approved equivalent)

H7.03.05 In-Pole Breaker

Manufacturer	Catalogue Number
Cutler-Hammer	1SL150PCO (or approved equivalent)

H7.04 LED Chip Set/Body, Optics and LED Driver**H7.04.01 LED Chip Set**

Catalogue No.	Body Type
12S	Small
24S	Small
36S	Small
48M	Medium
60M	Medium
72M	Medium

H7.04.02 Optics

Catalogue Number	Optics Type
2LB	Type II Standard
2HB	Type II Backlight
2ES	Type II Max Throw
2EM	Type II Moderate Throw
3LB	Type III Standard
3HB	Type III Backlight
4AH	ANZ High Throw
5SM	Type V Square
5RM	Type V Round

H7.04.03 Drive Current

Catalogue Number	Driver Current
3	350mA
4	450mA
5	525mA
6	600mA
7	700mA

H7.05 Omnidirectional Photocell

Manufacturer	Catalogue Number
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Led Roadway

LRL65223-LF

H7.06 LED Cobra Head Luminaire, Bracket and Pole (for Local, Collector and Arterial Roads)

Refer to the following Town of Whitby Standard Drawings:

- Drawing No. 502.10 – Standard Streetlight for Collector and Arterial Roads
- Drawing No. 502.20 – Standard Streetlight for Local Roads

H7.06.01 LED Cobra Head Luminaire

Manufacturer	Catalogue Number *
Led Roadway	NXT-XXX-0-7-XXX-X-XX-3-UL-S-2H

(* The above catalogue numbers can be modified based on catalogue numbers in Section H7.04.

H7.06.02 Bracket for Cobra Head Luminaire

See Section H8.05 to H8.11 for design requirements.

H7.06.03 Round Concrete Poles (for Collector and Arterial Roads only)

Manufacturer	Pole Height	Finish	Catalogue Number
Utility Structures	27'6"	Mold Finish	HA-275-B-1-PG-40-X-C
Stress Crete	27'6"	Mold Finish	E275-BPR-G-MOO-S/F 166 Davit
Utility Structures	40'	Mold Finish	HA-400-B-1-PG-40-X-C
Stress Crete	40'	Mold Finish	E400-BPR-G-MOO-S/F 118 Davit

H7.06.04 Octagonal Concrete Poles (for Local Roads and Designated Heritage Areas only)

Manufacturer	Pole Height	Finish	Catalogue Number
Stress Crete	25'	Midnight Polished Lace	E250-APO-G-S10 S/F 170 & 132A
Utility Structures	25'	Midnight Polished Lace	MA-250-A-2-ML-XX-F-D
Utility Structures	30'	Midnight Polished Lace	MA-300-A-2-ML-XX-F-D
Stress Crete	30'	Midnight Polished Lace	E300-APO-G-S10 S/F 170 & 132A

H7.07 Decorative Coach Type Luminaire, Bracket and Pole (for Designated Heritage and Downtown Areas Only)

Refer to the following Town of Whitby Standard Drawings:

- Drawing No. 502.30 – Standard Streetlight for Designated Heritage Areas
- Drawing No. 502.40 – Standard Streetlight for Designated Downtown Areas

H7.07.01 LED Coach Type

LED technology shall be used, and the appearance must match existing decorative coach HPS.

The luminaire LED light source shall emit white to cool white light with a nominal CCT at 4000°K. Colour variation from the nominal luminaire rating over the operating life is to observe tolerance ranges consistent with ANSI standard C78.377-2008 "Specifications for the Chromaticity of Solid State Lighting".

Must be Dark Sky Compliant and zero up lighting for the BUG rating.
LED driver shall be designed to operate maintenance free for a minimum of 20 years.
The normal operating voltage shall be 120 -277 VAC at 60Hz.

The luminaire and all subcomponents are to be free of designated hazardous substances that would otherwise prevent it from being disposed of in a normal regulated Ontario Landfill site or recycled without any special type of treatment of disassembly.

H7.07.02 Decorative Scroll Arm / Brackets (for Designated Heritage Areas only)

See Section H8.06 to H8.11 for design requirements.

H7.07.03 Decorative Octagonal Concrete Pole (for Designated Heritage Areas Only)

Refer to Section H7.06.04 for the approved poles and finish.

H7.07.04 Decorative Grandview Octagonal Eight-Fluted Concrete Pole (for Designated Downtown Areas Only)

Manufacturer	Pole Height	Finish	Catalogue Number
Utility Structures	14'	Seluki Bronze Paint	GR-190-A-3-SB-30-A-R-D-A2
Stresscrete	14'	Seluki Bronze Paint	KT14-G-E90 C/W 140-35/35 & BA & DR & FPH

H8.00 Technical Information of Streetlighting Material and Streetlight Luminaires

All luminaires shall comply with all applicable requirements of the CSA Standard C22.2 No. 9.0-96, C22.2 No. 9-0-S1-97 (latest revision) and Electrical Safety Authority (ESA):

H8.01 Electrical Requirements (for Coach Type Luminaire)

H8.01.01 General Requirements

The driver, terminal blocks, capacitor(s), internal wiring and all other components shall be suitable for the supply and the maximum temperature encountered in totally enclosed outdoor weatherproof luminaires. All electrical components shall be CSA approved and fulfill Electrical Safety Authority (ESA) requirements.

H8.01.02 Terminal Block

A terminal block shall be provided for the connection of the supply wires to the driver leads. Screws used on the terminal block shall be captive and suitable for copper and aluminum wire sizes ranging from #10 AWG to #16 AWG. The terminal block shall be placed adjacent to the wire entry location in a readily accessible location with sufficient space to accommodate ease of wire termination.

H8.02 Physical Characteristics (for Coach Type Luminaire)

The luminaire housing shall be cast aluminum with corrosion resistant hardware.

The reflector shall be fabricated of polished, chemically brightened anodized aluminum not subject to distortion and shall be securely fastened.

Gaskets shall be provided between the reflector and refractor and between the reflector and driver to prevent ingress of dirt, insects, etc.

The luminaire assembly when closed and in the operating position shall not be subject to damage by vibration.

All component parts in the luminaire shall be secured using screws and if required, metal brackets. No tape, Velcro or glue shall be used. All screws in the luminaire shall be of one type, preferable hexagonal head.

H8.03 Marking (for Coach Type Luminaire)

H8.03.01 Luminaire

A permanently attached corrosion resistant label shall be provided on the interior of the luminaire indicating:

- The manufacturer's name or trademark
- Catalogue number
- Wattage
- Suitable supply voltage and frequency
- Input current
- Nominal operating voltage of the lamp
- Date of manufacture

A permanently attached corrosion resistant label indicating the driver current setting required to provide the various photo-metric distribution patterns obtainable by use of various LED chip sets shall be provided and attached to the interior of the cobra head

luminaire so that it is clearly visible during maintenance operations.

A permanently attached corrosion resistant label, in accordance with ANSI Standard C 36.15, identifying the type and wattage of the LED chip sets to be used shall be provided on the exterior of the underside of the cobra head luminaires, approximately 127 mm toward the pole from the edge of the glassware.

H8.03.02 Driver

A permanently attached corrosion resistant nameplate shall be provided on each driver clearly indicating:

- The manufacturer's name or trademark
- Catalogue number
- Drive current
- Suitable supply voltage and frequency

H8.03.03 Paint Finish

Luminaires fabricated of steel shall have a hot dip galvanized coating prior to painting.

Luminaires fabricated of steel shall be finished with high grade baked enamel paint and shall be prime painted with high quality primer.

Luminaires fabricated of sheet aluminum shall have a paint finish and shall be finished with a baked polyester powder coating.

Luminaires made of cast aluminum shall have a paint finish and shall be finished with high grade baked enamel paint.

H8.04 Technical Information for Luminaires to be Supplied

Nominal line voltage	Driver size
Input Wattage	PC Receptacle provision
Lamp type	Luminaire classification
Finish	Housing Type

H8.05 Tapered Elliptical Aluminum Brackets

The tapered elliptical aluminum bracket shall comply with the Durham Lakeshore Utilities Group Specification No. 14 (Latest Revision).

Brackets shall comply with all applicable requirements in the latest issues of the following standards:

ANSI Standard C 136.13	Metal Bracket for wood poles used in road lighting
ASTM Standard B221	Aluminum alloy extruded bars, rods, wires, shapes and tubes
ASTM Standard B241	Aluminum alloy seamless pipe and seamless extruded tube

CSA HA Series	Aluminum and aluminum alloys
CSA Standard S244	Welded aluminum design and workmanship (inert gas shielded arc processes)
CSA Standard S157	Strength design in aluminum
CSA Stand W59.2	Welded aluminum construction

H8.06 Mechanical Requirements for Brackets

H8.06.01 Strength

The bracket arm shall be one-piece seamless tubing, fabricated from aluminum alloy No. 6063-T6 one piece seamless tubing as per ASTM Standards B22 1 and B24 1.

The Alloy 6063-T6 shall have a minimum yield strength of 165 MPa (24,000 psi) and a minimum ultimate tensile strength of 193 MPa (28,000 psi) after fabrication and any subsequent tempering.

The bracket shall not be torn apart or otherwise when subjected to an applied load of 115 kg applied vertically and 25 kg applied horizontally, each load being applied separately for ten (10) minutes duration at a point not more than 150 mm from the luminaire end of the bracket.

H8.06.02 Load Test

The bracket, while supporting a luminaire under Class C loading, shall withstand, without permanent deformation, a wind load of 3.6 kg (approx. 88 km/h or 44 mph) and an ice load of 1.27 cm or alternatively, and 18 kg wind load (approx. 130 km/h or 80 mph) without ice.

H8.07 Physical Requirements for Brackets

The bracket shall be fabricated with a 50 mm IPS tenon to permit safe mounting and support of a 400 W style luminaire with a 0.21m² maximum effective projected area and a maximum weight 25 kg.

H8.08 Marking for Brackets

Each bracket shall have a permanent identification marking indicating:

- The manufacturer's name or trademark
- Catalogue number
- Date of manufacture

H8.09 Finish for Brackets

H8.09.01 Natural

The bracket arm shall be rotary polished overall with No. 80 grit and finished to a smooth and uniform natural aluminum appearance, unless otherwise specified.

H8.09.02 Painted

Brackets specified to have a paint finish shall first be suitably cleaned and prepared to permit permanent bonding of finishing coats. Brackets specified to have a paint finish shall have a baked polyester powder coating, electrostatically applied, with a minimum dry film thickness of 4 mm. The colour shall be as specified on each order.

H8.10 Technical Information for Brackets to be Supplied

- Quantity
- Length
- Finish, if other than natural aluminum
- Pole plate, if other than universal style

H8.11 Warranty for Brackets

The manufacturer shall warrant that the brackets furnished shall conform to all the requirements and conditions of this specification.

The manufacturer shall replace or repair, at no expense to the utility, defects due to faulty workmanship, materials or design for the period of five (5) years after installation, but in no case for more than six (6) years after receipt of the unit by the utility.

All shipping charges shall be responsibility of the supplier.

The manufacturer shall provide a further warranty for a minimum period of five (5) years on all replacement brackets from the date of installation.

Section I - General Conditions of Site Plans Approval

I1.00 General

The following general conditions are the **minimum** requirements which are applicable to all site plan applications. Specific requirements pertaining to each application will be over and above these general conditions and they will be included in the Council approved Planning Department's Report. If there is a discrepancy between the specific comments and the General Conditions of Approval, the specific comments shall take precedence.

Please note that any or all of these general conditions may or may not be required depending on the type of application submitted (ex. new versus existing buildings) at the discretion of Engineering Services.

All site grading, road and storm drainage design shall conform to the Town of Whitby Design Criteria and Engineering Standards, unless otherwise noted.

Full size hard copy site plan and grading/servicing plans at a metric scale of not less than 1:500 are required to be submitted with a building permit application and shall comply with the following general conditions.

Other details and requirements that may apply to specific applications may include, but are not limited to the following;

- Universal Transverse Mercator Projection System coordinates;
- Storm Drainage Plan(s);
- Stormwater Management information;
- Traffic Impact Study;
- Signage and Pavement Marking Plan, including pedestrian routing and fire routes;
- Erosion Control Plan;
- Construction Management/Staging Plan; and,
- Parking Management Plan.

For further explanation or clarification please contact Engineering Services, 575 Rossland Road East, Whitby, Ontario L1N 2M8. Telephone (905) 430-4307, Fax (905) 686-7005, Email engineering@whitby.ca

I2.00 Engineering Drawings

I2.01 Site Plan

The site plan shall show the following;

- (a) north arrow;
- (b) key plan;
- (c) legal boundary dimensions and bearings;
- (d) easements and their details;

- existing public services such as sidewalk, curbing, sewers, watermain;
- all existing above ground street furniture (e.g., street trees, streetlights and utilities); and,
- site parking statistics.

I2.02 Grading and Servicing Plan(s)

Grading and servicing plan(s) shall be approved by Engineering Services before a building permit is issued.

The engineering plan(s) shall demonstrate that the surface drainage from the site will be contained on-site and that the proposed grading will not alter or obstruct the surface drainage pattern at the perimeter of this site.

The engineering plan(s) shall include:

- sufficient spot elevations on adjoining properties, based on a recent topographic survey (including curb and centerline of road elevations on adjacent streets);
- note the nearest Town of Whitby Geodetic Benchmark in the UTM NAD 83, Zone 17N coordinate system;
- north arrow;
- legend;
- finished floor elevation;
- all retaining walls and their details;
- storm sewer sizes, length, and slopes;
- upstream and downstream inverts at all maintenance holes;
- stormwater management details (as required);
- all existing and proposed underground services;
- all existing and proposed above ground street furniture.

All roof drainage shall be directly connected to the private storm sewer system unless otherwise approved.

All catch basins shall be constructed meeting Ontario Provincial Standard Drawings OPSD 705.030 and 400.020.

The following information shall be provided to Engineering Services prior to the approval of the Site Servicing and Site Grading Plans:

Where storm sewers and/or streetlights will become Town's assets and are proposed as a part of the Development, the Applicant will be required to provide the storm sewer and streetlight information in a digital format (AutoCAD file) in accordance with Appendix A "Layering Structure and Object Data requirements". In isolated cases, at the discretion of Engineering Services, the required information may be accepted in Excel format (the template Excel file is available electronically upon request).

12.03 Consulting Engineer

The applicant shall engage the services of a consultant who is a Registered Professional Engineer with the Professional Engineers Ontario (P.E.O.). This consultant shall be capable and experienced in designing storm sewers, parking lots and site grading. This consultant shall design the private storm sewer system, supervise its construction and upon completion, test and certify that the storm sewer system is constructed in accordance with the approved plans.

All works (on-site and off-site) are subject to inspection by the Town of Whitby. Upon satisfactory completion, the Town will consider release of financial securities being held for the works.

13.00 Submissions and Approvals

13.01 Road Occupancy Permit

A Road Occupancy Permit must be obtained from the Town of Whitby, Operations before any construction is initiated on a public road allowance under the jurisdiction of the Town. Payment of fees and securities for permanent restoration must be made to the Town before this permit is issued to a qualified contractor.

13.02 Garbage and Recyclable Materials

The application shall provide waste collection and disposal services by a private contractor for all waste streams (compost, recyclable and residual waste) during construction and continually thereafter.

The application shall provide sufficient storage of all waste streams within the subject property.

The applicant shall provide sufficient waste collection facilities within the subject property.

The applicant shall provide a waste collection vehicle turning template demonstrating the waste collection vehicle will not be backing out of the site into the public road allowance. Under no circumstances shall storage or collection of waste intrude or impact the public road allowance.

13.03 Financial Securities

A cash deposit or letter of credit (LC), in a Town approved format, is required for all engineering works both on and off site in order to secure the acceptable performance and completion of all works detailed on the engineering plans.

The applicant's engineering consultant shall provide a detailed cost estimate using the Town issued excel template and supporting information for the engineering portion of the financial security. Items to be included in the detailed cost estimate include, but are not limited to, the following;

- storm sewer system;

- concrete curbing;
- concrete transfer pad for a garbage/recycling bin enclosure;
- concrete sidewalks;
- granular base and sub-base materials;
- granular driving surface or pavement for parking areas and internal road system;
- retaining walls;
- regulatory fencing;
- erosion control measures;
- stormwater management works;
- road cleaning; and,
- road damage.

The supporting information shall include material quantities, unit prices, site plan, and a grading and site servicing plan.

The applicant shall be responsible for removing mud and other debris that accumulates on the public streets during construction. If the applicant does not comply with the Town of Whitby's notification to clean the affected streets within twenty-four (24) hours, then Engineering Services shall have the right to clean the affected streets at the sole expense of this applicant by use of a corresponding portion of the aforementioned financial security.

13.03.1 Internal Works

Fifty percent (50%) of an acceptable cost estimate will be included as the engineering portion of the financial security for on-site works.

This percentage shall be increased to seventy-five percent (75%) for residential site plans comprised of 25 residential units or less or as required by Engineering Services.

Security will be returned by the Town after final inspection, and satisfactory completion of the secured works.

13.03.2 Off-Site Works

Similar information is required for off-site services under the Town of Whitby's jurisdiction that may be required to service the proposed development. One hundred percent (100%) of an acceptable cost estimate will be included in this financial security. Ninety percent (90%) of this financial security will be returned after completion and acceptance by the Town. The remaining ten percent (10%) will be retained for maintenance purposes for a minimum period of one (1) year from the date of acceptance.

13.03.3 Waiving of Financial Securities

The Town of Whitby has waived all financial security requirements for residential non-profit organizations and Boards of Education on condition that the developer agrees to take financial responsibilities to ensure restoration of any damage caused to any of the Town's public services and due compliance with the general servicing requirements of the Development Agreement.

14.00 Design Guidelines

14.01 Driveways and Parking Areas

Proposed driveways and parking areas shall include poured in place concrete curbing around the perimeter of the driving surface. Driveways and parking areas shall be constructed with a hard driving surface that prevents the raising of dust or loose particles. Pavement design shall be provided by a qualified geotechnical consultant.

Proposed driveways shall be located to provide a minimum separation of 1.0 m from edge of driveway and any above ground utility excluding fire hydrants. If necessary, all costs associated with the relocation of utilities to suit the proposed driveway shall be paid by the applicant.

On large sites, consideration should be given to safe pedestrian routing.

Large parking areas shall be designed to incorporate groups of parking into parking fields.

Parking fields shall be delineated and separated by concrete islands. Concrete islands at the end of aisles shall alternate with painted islands and wherever possible, shall anchor signs and lighting standards. Entrances to and from aisles between parking fields shall provide for full two-way directional flow making allowances for the turning template of the largest design vehicle.

The ends of concrete islands shall be rounded and should be pulled back from the end of the adjacent parking spot by at least 0.5 m or depressed to provide the full turning movement for vehicle parking. Curbs or other obstructions adjacent to parking areas shall not be more than 0.15m in height or additional buffer space of 0.2m, for each side that is obstructed, shall be required between the parking spot and the obstruction or curb.

The design of underground parking lots shall use the same principles as surface parking. Column locations within underground parking areas shall be designed to minimize conflicts with the turning movements of the design vehicles. All underground parking structures shall comply with minimum setback requirements under the applicable zoning by-law.

Entrance design shall give consideration to the required traffic demands and shall provide a two-way free flow of traffic from the municipal right of way and may include turning lanes and queuing distances.

Drop off areas shall be designed so as to provide smooth traffic circulation without impeding the flow of traffic at the entrances and circulation roads. Drop off areas shall not be permitted within the municipal right of way.

Accessible parking shall be as per Town of Whitby Standard No 413 and the Town of Whitby Accessibility Plan. Where possible, the accessible parking shall be located next to the building

I4.02 Maximum and Minimum Grades

- Residential driveways - refer to section C6.01.1.
- Driveway entrances - minimum 2.0% and maximum 8.0%.
Service roads - minimum 0.5% and maximum 8.0% (crossfall required).
- Paved parking areas - minimum 0.5% and maximum 8.0%.
- Paved commercial parking areas (with possible use of shopping carts) – minimum 0.5% and maximum 3.0%.
- Sodded areas minimum 2.0% and maximum 3:1.

I4.03 Storm Sewers

Storm sewers on private property are subject to the Ontario Building Code and the following:

- An inspection maintenance hole (MH) shall be required within 1.5m of the property line on private property or on the junction of the sewer main and the service connection.
- Maximum maintenance hole spacing shall be 100 m unless otherwise defined in the Ontario Building Code.
- No change in grade or direction of pipe shall be permitted between maintenance holes or catchbasins.
- Catchbasin type maintenance holes (CBMH) will be permitted at junctions and change in sewer diameters.
- Storm connections for multiple family and other blocks shall be designed individually for the intended use. Minimum pipe grade shall be 0.5%. Minimum size shall be 300 mm diameter concrete or PVC SDR28 (or ribbed) pipe.
 - Minimum velocity - 0.75 m/s
 - Maximum velocity - 4.50 m/s

I4.04 Retaining Walls

Retaining walls shall be designed by a Professional Engineer. The applicant shall provide the following site-specific details that have been prepared by the engineer before any building permit is issued:

- typical cross section showing minimum and maximum heights,
- safety railing where exposed height is 0.6 metres or more,
- method of anchoring safety railing to retaining wall,
- engineering analysis that retaining walls will support earth loads and live loads,
- face of wall design requirement.

This Engineer shall certify that the retaining walls have been constructed in accordance with the accepted plans prior to release of financial securities.

I4.05 Urban Standard for Private Internal Street

Any internal street shall be designed and constructed to the following minimum standards:

Road Width:

- 6.0 m (face of curb to face of curb)
- 8.5 m (on street parking allowed on one side, F/C to F/C)

Minimum Pavement Design:

- HL3 40 mm
- HL8 50 mm
- Granular 'A' 150 mm
- Granular 'B' 300 mm

The components of the pavement design shall be confirmed by or increased to suit the recommendation of the applicant's Geotechnical Engineer.

Garage:

- Up to two garages may be paired together provided an opening is present for pedestrian access adjacent to the garage on the opposite side of the lot.
- Landscaping shall be provided in line with the pedestrian access opening.
- Garage doors shall open vertically and not swing out beyond the garage structure.

Intersections:

- A minimum of 3.0 m x 3.0 m sight triangle shall be provided at all private road intersections. A sightline analysis shall be provided to confirm visibility triangle requirements for intersections with acute angles.
- 9.0 m curb radius shall be provided at all intersections. Radius may be reduced to 7.5 m at intersections to public roads having a minimum pavement width of 8.5 m.

Cul-de-Sac:

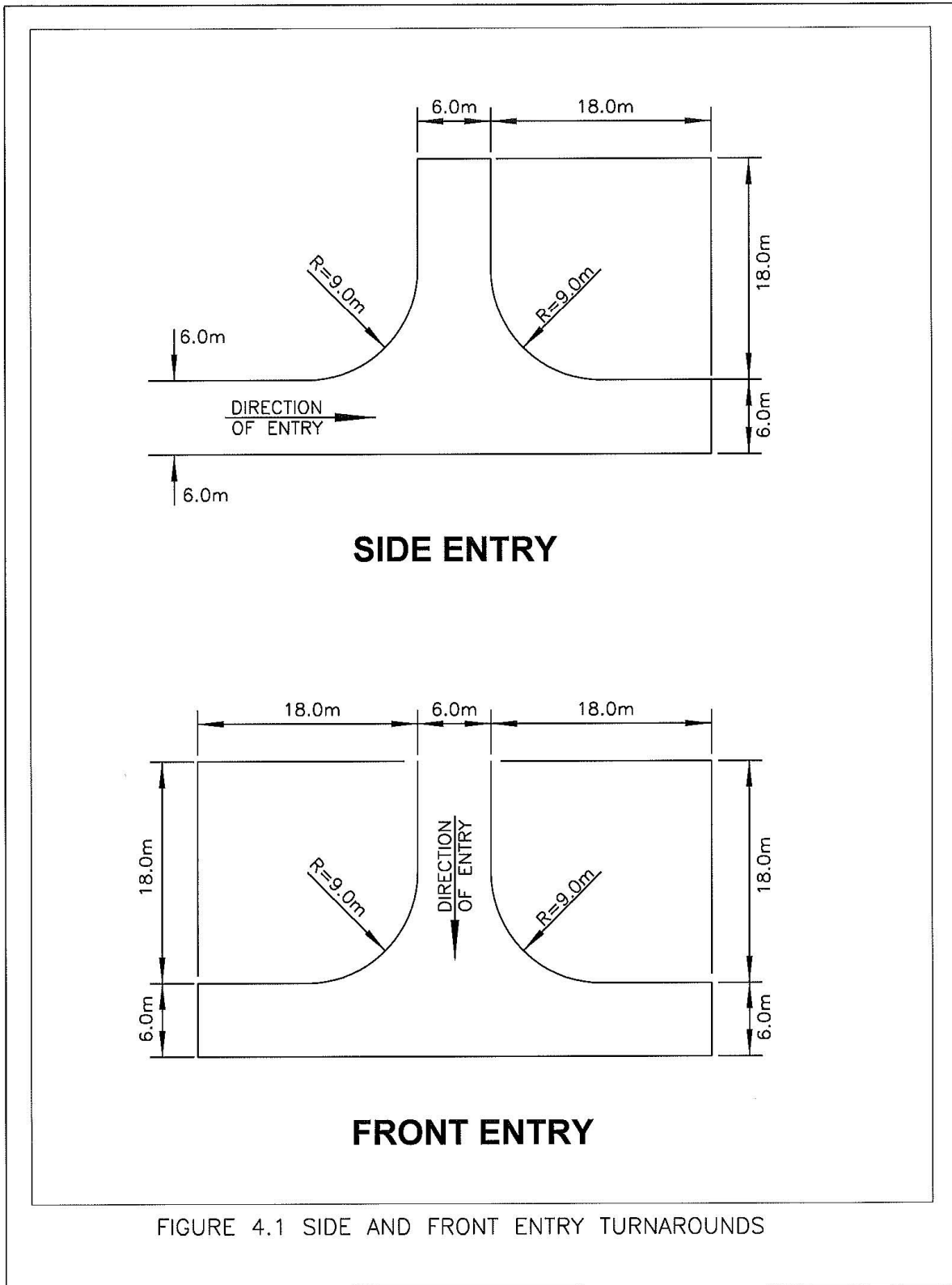
- Private roadways should be designed to connect to other roads at both ends whenever possible.
- Should a dead end be unavoidable, the maximum length shall be 180 m.
- Hammerhead turnaround for emergency vehicles shall be designed with a 9.0 m inner curb radius, 12.0 m centreline radius and 18.0 m turning length, refer to Figure 4.1.
- Alternatively, a cul-de-sac with a 12m centreline radius. If the private road that has a dead end serves an emergency access route (i.e., fire route), it shall be design as per the Access Route Section of the OBC.

Fire Route Signage:

- Fire Route Signage to be provided as per Town of Whitby By-Law 4084-97, if required. Signage to be permanently fixed to building face, only on rear laneway.

Miscellaneous:

-
- Street lighting for the private internal roadway(s) shall comply to the American National Standard Practice for Roadway Lighting, latest edition of RP-08 standard.
 - Snow may not be pushed across any public road or placed within the public right of way.
 - Snow may not be piled within travel portion of any cul-de-sac turnaround.
 - Adequate sightline shall be provided to the satisfaction of Engineering Services.



I4.06 Private Laneway

Any proposed private rear laneway providing access to the rear of a residential

development that has frontage on another public or private street shall be designed and constructed to the following minimum standards:

Geometric Design:

- 6.0 m wide road width measured from face of curb for both one- and two-way operation.
- 2.75 m driveway apron to any sight obstruction.
- 1.0m boulevard on non-driveway side of laneway, if applicable.
- 2.00% crossfall shall be provided to the curb line.
- the maximum length of a tangent section shall be 60 m, otherwise speed management features shall be incorporated to the satisfaction of Engineering Services.

Parking:

- No parking is permitted within the 6.0m road width of the laneway and should be signed as such.
- Where there is sufficient additional pavement width, parallel or diagonal parking may be added on non-driveway side of any laneway.
- At all laneway access to intersecting roads, no parking is permitted on either side of the intersecting road within 30.0 m of either side of the laneway.
- Garage aprons shall not be continuous along the length of the laneway.

14.07 Private Fire Hydrant(s)

Private fire hydrants shall be tested and certified to provide a minimum residual pressure at a specified flow rate as determined by the Fire Departments requirements.

Temporary access routes and hydrants, where required, shall be designated and shown on the site plan for use during construction until permanent fire access routes and hydrants are provided.

14.08 Groundwater Pumping, Drawdown and Foundation Drainage

Category 1 – Temporary Construction Groundwater Discharge

1. Temporary groundwater pumping or lowering by passive drawdown during construction and discharge into municipal storm sewers may be permitted provided all of the following conditions are met:
 - a. Provincial Permit(s) to Take Water (PTTW) or registration in the Environmental Activity and Sector Registry (EASR) have/has been obtained through the Ontario Ministry of the Environment, Conservation and Parks (MECP)
 - b. Discharge rates are acceptable to the Town.
 - c. Compliance with Town of Whitby Sewer-Use Bylaw (as amended).
 - d. Confirmation that sufficient capacity exists within the storm sewer network.

- e. Hydraulic Grade Line Analysis demonstrating no negative impacts to sewer network, specifically in residential areas with foundation drain connections.
2. The Applicant is advised that the evaluation of a temporary groundwater pumping proposal does not imply approval by the Director of Engineering Services.

Category 2 - Permanent Groundwater Discharge

1. Permanent groundwater pumping or lowering by passive drawdown (i.e., long-term dewatering) with discharge into municipal storm sewers, municipal stormwater facilities and/or private on-site stormwater or groundwater management facilities is prohibited without a project-specific, written exemption from the Town.
2. Notwithstanding the above, exemptions may be possible under certain circumstances. Applicants pursuing an exemption shall arrange a preliminary meeting with engineering staff to determine whether an exemption can be considered.

Should the Director of Engineering Services determine that an exemption request can be considered, the Applicant shall submit a proposal and adhere to the requirements of Sections 3 to 6 below and complete Parts 1 to 4 of the *Permanent Groundwater Discharge Application Form & Documents Checklist (Appendix A)*. The Applicant is further advised that the evaluation of an exemption proposal does not imply acceptance by the Director of Engineering Services.

If the long-term dewatering proposal is accepted by the Director of engineering Services, the requirements listed in Sections 7 and 8 below and Part 5 of the Permanent Groundwater Discharge Application Form & Documents Checklist (Appendix A) shall be completed upon Engineering Services' final acceptance of the Permanent Groundwater Pumping proposal.

The Town reserves the right to undertake a peer review of any documentation submitted to confirm findings and conclusions. Peer review costs shall be the sole responsibility of the Applicant.

3. Documentation Requirements:
 - a. Discharge rates are acceptable to the Town;
 - b. Confirmation that sufficient capacity exists within the storm sewer network;
 - c. Hydraulic Grade Line Analysis demonstrating no negative impacts to storm sewer network, specifically in residential areas with foundation drain connections;
 - d. Groundwater analysis confirming that quality complies with Town of Whitby Storm Sewer By-law # 6998-15 (as amended).
 - e. Provide copies of Environmental Site Assessments and/or Record of Site Condition.
4. Hydrogeological and Geotechnical Report Requirements
 - a. Statistical summaries of hydraulic conductivity and flow rate analyses for each water-bearing unit affected by permanent dewatering.

- i. Clear identification of water pressure head elevations for all confined water-bearing layers.
 - ii. Analyses related to long-term migration of subsurface contaminants from off-site to discharge location as influenced by long-term dewatering and associated hydraulic gradients.
 - iii. Interpretation of probable seasonal fluctuation in groundwater pressure head elevation for all water-bearing layers.
- b. Confirmation from both the Geotechnical and Hydrogeological Engineers that the Geotechnical and Hydrogeological reports have been coordinated.
 - c. Groundwater pressures from any water-bearing layer cannot result in flowing conditions at ground surface (i.e., flowing artesian conditions).
 - d. Four boreholes around the project site extending to a depth below ground surface equal to or greater than twice the depth from the ground surface to the underside of all below-ground floors. Sampling of the boreholes using the Standard Penetration Test (ASTM D1586) in each borehole shall be at intervals of no greater than 1.5 m for their full depth.
 - e. One borehole for every 50 m of dewatered area perimeter extending to at least 2 metres below the anticipated drainage system elevation.
 - i. Each perimeter borehole shall include:
 1. Survey of ground surface and top of observation well elevation to benchmark elevation consistent with Provincial Digital Elevation Model (PDEM) to the nearest 0.1 m with UTM coordinates to the nearest 1 m;
 2. One observation well screen sealed within water-bearing layer that will discharge water into foundation/basement dewatering system;
 3. Groundwater level measurements at completion of the well and at weekly intervals thereafter for a minimum of two months;
 4. One single well response test (rising or falling head) completed in accordance with ASTM D4044;
 5. One grain size distribution analysis completed in accordance with ASTM D6913 and ASTM D7928 on a sample obtained within the water-bearing layer that will discharge water into foundation/basement dewatering system;
 6. Classification of soil layers using Canadian Foundation Engineering Manual guidelines and/or ASTM D2487 (latest editions).
 - f. Any water-bearing granular soil (i.e., silt, sand and/or gravel as defined in accordance with ASTM D2487) or rock layer identified below the lowest planned floor elevation shall be characterised by:
 1. At least three observation well screens sealed within the aquifer;

2. Groundwater level measurements at completion of the well and at weekly intervals thereafter for a minimum of two months;
 3. One single well response test (rising or falling head) in each observation well;
 4. One grain size distribution analysis ASTM D6913 (latest edition) with ASTM D7928 on sample obtained within water-bearing layer from each observation well; and
 5. Classification of soils and rock using Canadian Foundation Engineering Manual guidelines or ASTM D2487 (latest editions).
- g. All fine-grained geologic layers categorized as aquitards or aquicludes shall be characterized by at least one sample per borehole/well being subjected to classification testing in accordance with ASTM D4318 (latest editions).
 - h. A minimum of 25 per cent of all soil samples shall be subjected to determination of their natural water content in accordance with ASTM D2216 (latest editions).
 - i. Analyses for filtration compatibility between any imported aggregate or soil materials, synthetic drainage materials, native soils in any combination of adjacent materials contemplated by the Geotechnical Engineer. Filtration analyses shall be supported by detailed references for methodology (e.g., Canadian Foundation Engineering Manual, latest edition).
 - j. Clear recommendations for subsurface drainage systems based on analyses of grain size distribution data and key characteristics of any drainage material effective opening sizes and filtration characteristics.
 - k. Data from minimum of three site-specific oedometer tests completed in accordance with ASTM D2435 shall be used as the basis for any settlement estimates based on consolidation analyses.
 - l. Settlement analyses for the effects of groundwater drawdown on the proposed project and adjacent public and private infrastructure (e.g., buildings, utilities, roads, highways, etc.) considering:
 - i. Uncertainties in radius of groundwater drawdown.
 - ii. Uncertainties in groundwater levels
 - iii. Uncertainties in ground stress-strain properties
 - iv. Uncertainties in the settlement rate for silt and clay soils.
 - v. Combination of settlement from stresses induced by new construction as well as temporary and permanent groundwater level drawdown.
 - m. Hydraulic uplift stability analyses for all temporary excavations and permanent conditions along with recommendations for control of uplift stability via temporary or permanent groundwater pressure reduction.

- n. Typical groundwater pressure head elevations and a summary of the measured variability for each of all water-bearing geologic layers.
 - o. Analysis and summary of aquifer confinement conditions.
 - p. Clearly defined and interpreted subsurface geologic model for the site including illustrated profiles and cross-sections of the site showing:
 - i. Boundaries between geologic layers;
 - ii. Summary classifications for all geologic layers;
 - iii. Groundwater pressure head elevations for design purposes considering seasonal fluctuations;
 - iv. Expected elevations of all below-ground floor levels;
 - v. Expected elevations of all below-ground groundwater management systems.
5. Design drawings shall include:
- a. Identification and specification of all subsurface groundwater control pipes and their diameter, elevations, slopes and any perforations or filtration systems necessary to inhibit long-term clogging;
 - b. Identification and specification of all imported aggregates and synthetic filtration materials;
 - c. Construction and inspection notes regarding continuity of filtration (e.g., joints, pipe penetrations, etc.);
 - d. Identification and specification of groundwater collection sumps and pumping systems;
 - e. Back-up power supplies for pumps;
 - f. Clean-out access locations for long-term maintenance;
 - g. Automated and manual monitoring systems to record cumulative discharge rates and pump operations, water chemistry, data recording frequency, and data storage and storage back-up systems;
 - h. Long-term groundwater control maintenance requirements including frequency of inspections, types and frequency of system testing, and failure contingency plans. Refer to Section (n);
 - i. Sampling access point - When groundwater is discharged to the municipal sewer system, the Town requires a private water sampling access point located on the private property to monitor the quality and quantity of private water discharged to the Town's sewage system in accordance with Town of Whitby Sewer-Use Bylaw (as amended). The Town requires a 24-hour a day, 7 days a week accessible location, upstream of the control maintenance access hole;
 - j. Type, plan locations, and vertical extent of all excavation support systems.

6. Final Acceptance

Prior to final acceptance of a long-term dewatering proposal the Applicant shall:

- a. Obtain Provincial Permit(s) to Take Water (PTTW) or registration in the Environmental Activity and Sector Registry (EASR) have/has been obtained through the Ontario Ministry of the Environment, Conservation and Parks.
- b. Obtain a signed, sealed Geotechnical Design Review Letter from the Geotechnical Engineer of record providing a summary of their design review and concurrence with the dewatering system design details as shown on the design drawings and technical specifications for the project and an opinion regarding compliance with these design standards. If the design submitted as part of the request for exemption is different than that contemplated by the Geotechnical Engineer of record at the time the Geotechnical Engineering report was prepared, the letter shall clearly state the differences, how the differences do or do not affect the viability of the design and discussion of details implemented to comply with these design standards.
- c. Obtain a signed, sealed Hydrogeological Design Review Letter from the Qualified Person (QP) responsible for preparing the Hydrogeological Report providing a summary of their design review and concurrence with the dewatering system design details as shown on the design drawings and technical specifications for the project and an opinion regarding compliance with these design standards. If the design submitted as part of the request for exemption is different than that contemplated by the QP of record at the time the Hydrogeological Report was prepared, the letter shall clearly state the differences, how the differences do or do not affect the viability of the design and discussion of details implemented to comply with these design standards and the PTTW.
- d. Provide a stand-alone Operations and Maintenance Manual including:
 - i. Frequency and Duration of testing.
 - ii. Reporting requirements (Refer Section 7 below).
 - iii. Procedural framework and recommendations on how to address future adverse samples/ test results.
 - iv. Sampling and Testing equipment maintenance schedule.
- e. Complete Part 5 of the Permanent Groundwater Discharge Application Form & Documents Checklist (Appendix F)

7. Site Plan Agreement Conditions

- a. At a minimum, the following conditions shall be included in the Site Plan Agreement:
- b. Provision for a 3-year Groundwater Discharge Monitoring Program to be implemented by the Applicant that includes:
 - i. Details on how adverse samples and/or contaminated water shall be treated, including an extended monitoring period as applicable.
 - ii. Details on how exceedances of flows as identified in the Geotechnical and Hydrogeological Reports will be remedied.
 - iii. A statement acknowledging Monitoring reports to be provided quarterly for the first year and annually thereafter.
- c. An Agreement to permit the Town to enter the subject property during the 3-year monitoring period.
- d. Requirement for a cash security as per the Fees for Services By-law (\$30,000 as of 2023) to ensure the monitoring plan and/or remedial action and/or repairs are completed. To be released upon completion of the 3-year monitoring period or extended monitoring period as applicable.

I5.00 Construction

I5.01 Tiebacks

Tiebacks shall not be permitted within the municipal right-of-way.

In instances where this is unavoidable the proponent's engineer shall advise Engineering Services as early as possible in the approval process. A written request for encroachment is to be submitted detailing the specific rationale for the exemption.

The below minimum criteria shall apply for any development proposal that includes tiebacks:

- a. A Geotechnical Report shall be submitted detailing tieback and shoring methodology.
- b. An assessment letter/report signed and sealed by a qualified Professional
- c. Engineer to ensure there will be no anticipated negatives impacts to either
- d. Municipal or third-party utilities within the right-of-way.
- e. Tieback and shoring design drawings stamped by a qualified Professional Engineer. Provisions of a reasonable clearance window, both horizontally and vertically (i.e. 2.0m x 2.0m) from all underground utilities within the right-of-way, including utility pole bury depths, etc.
- f. No tiebacks shown where the Town has planned future works which might conflict with proposed tiebacks (e.g., below grade transportation

infrastructure, transit subway extension, or Direct Energy geothermal piping, or other).

- g. Letters of Consent from impacted property owners.
- h. A Construction & Licensing Agreement shall be registered on title to the subject lands with provision(s) which require the owner to remove, relocate or other upon demand, at the owner's expense. Applicable only when there is encroachment.

I5.02 Restoration Costs

The applicant will be responsible for all costs to restore all areas within the Town of Whitby public road allowance that are disturbed during construction. Should restoration not be to the Town's satisfaction, financial securities may be drawn upon to complete the work. Charges for permanent restoration of the public road allowance will apply. See Town of Whitby Consolidated Fees and Charges By-law, in force at the time, for restoration rates.

I6.00 Record Drawings

Where works are required within the municipal right of way beyond simple service connections, prior to the release of securities, the consultant shall provide the Town of Whitby with acceptable updated record plan and profile drawings for the road to be retained on Town of Whitby file.

These drawings are to be submitted to the Town within 4 weeks of the completion of works within the municipal right of way and shall comply with the criteria outlined in Section A7.00 Record Drawings.

The drawings with storm sewer and streetlight record information shall be provided in a digital format in accordance with Appendix A "Layering Structure and Object Data requirements". In isolated cases, at the discretion of Engineering Services, the required information may be accepted in spreadsheet format with the template available electronically upon request.

All storm sewer as-constructed acceptance shall be based on the criteria outlined in Section B5.00 As-Constructed Storm Sewer Requirements.

Where there is a major difference between the design and record data, the consultant is required to explain the discrepancy in writing and verify that the record discrepancy does not adversely affect the intent of the initial design. The final decision regarding deficiency correction or mitigation will be made by Engineering Services.

Appendix A

Digital Information Submission

The Consulting Engineer for the project shall submit to the Town of Whitby digital file(s) containing information related to infrastructure. The digital file shall follow the guidelines outlined below:

Submission Information

The file(s) shall contain the following:

- Legal property / parcel fabric including the property boundary lines of the project as produced by an Ontario Land Surveyor;
- The Universal Transverse Mercator Grid System (UTM Grid, NAD83 adjustment, Zone 17);
- Units shall be linear metres and degrees for angles;
- Roadway, curbs, sidewalks and all other information related to the Towns surface structures;
- Storm sewers, maintenance holes, ponds, headwalls, catchbasins, catchbasin leads, service leads, ditches, channels, storm drainage areas and all other information related to storm sewer system, drainage and design;
- Sanitary sewers, maintenance holes and all other information related to sanitary sewer system;
- Watermains, valves, bends, tees and all other information related to the water supply sewer system;
- All 3rd party utility information such as streetlight poles, transformers, pedestals, valves, underground duct bank crossings, mailboxes and all other related information.
- PCSWMM model and dual drainage report shall be submitted at 2nd engineering submission.

The information outlined above shall be stored on separate layers and be properly aligned with respect to one another In accordance with Town's layering structure in this appendix. Subsequently, all data must align with respect to the UTM Grid.

Appendix A - Continued

Digital File Format

- Digital file shall be the current version of AutoCAD being used by the Town of Whitby.
- Digital file shall contain all layers and object data as indicated in Appendix A “Layering Structure and Object Data requirements”.

Digital Drawing Requirements

- All **drawings** must be **Spatially Referenced** (i.e., All data must be at UTM NAD83 adjustment, Zone 17.)
- All **drawings** will require a standard naming convention that will incorporate the Town of Whitby’s Planning Department Subdivision Number (i.e., SW-2010-0X) for all subdivision drawing submissions or the Town of Whitby Project Number (i.e., W2010-0X) for all Capital Works Projects.
- The digital files shall contain all the submitted drawings in “Paper” space ready for printing at any time.
- No generic names such as Lot grading 1, Lot Grading 2 etc will be accepted. Each drawing name should be unique.
- Record Drawings are to contain only ‘As-Constructed’ data.
- Drawings must not contain any externally **referenced** (x-refs) material. All externally referenced data must be ‘**bound**’ to the final submission file.
- Drawings will not contain frozen or turned off layers. All unused layers, blocks, fonts, line types etc. to be purged.
- Page Size: Arch D (609.6 mm X 914.4 mm = 24 in. x 36 in.)
ANSI B half size (279 mm X 432 mm = 11 in. x 17 in.)
- Text Font:
 - RomanS for text height 0.4 to 1.50
 - Arial for text height greater than 1.50
 - Use L80 for Existing text and L120 for Proposed text
 - Apply the corresponding text heights for the scale (1:250 L80 = 0.50, L100 = 0.65; 1:500 L80=1.0, L100=1.30)
- Plot files (plt. files) for each drawing layout should accompany the final package. The plot file should have the same name as the original drawing file.
- Units - Linear – Metres; Angle – Degrees
- Scale (Capital Works Projects)

Appendix A - Continued

- Plan/Profile – Horizontal 1:250 or 1:500, Vertical 1:50
- Design Cross-Section – Horizontal 1:250, Vertical 1:50 or Horizontal 1:200, Vertical 1:40

Submission Timing

Digital information (i.e., AutoCAD drawings) shall be submitted to the Town of Whitby at the following intervals:

- Upon approval of the engineering drawings as a part of “issued for construction” package for both Town’s (capital) and development projects.
- Upon submission of the record drawings for approval by the Town of Whitby for all development projects. Information contained within these files should reflect as-constructed conditions.

The digital files will be checked for compliance with the conditions outlined above. Non-compliance can result in rejection of the submission.

Submission Method

Digital information shall be submitted to the Town of Whitby by the following methods:

- USB drive
- File share site (MS OneDrive)

Appendix A - Continued

Layering Structure and Object Data requirements

Digital Terrain Model and Base Plans

The PCODE Structure Chart is a breakdown of all the existing topo layers with the corresponding point, symbol and text layers. If a base plan is being created from a field survey, refer to the PCODE Structure Chart for the editing of the survey info and for the points and faults (break lines) to be included or removed during the DTM (Digital Terrain Model) surface creation.

Engineering Drawings

The AutoCAD drawing template file that includes existing/proposed layers and attribute data objects (Object Data) is available electronically upon request.

All drawings submitted shall be in accordance with the layering structure and object data requirements as outlined in the following AutoCAD Layering Guide.

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
0	7 (white)	0.25		Continuous	Miscellaneous
Northarrow	7 (white)	0.25		Continuous	North Arrow Layer
LOGO	7 (white)	0.25		Continuous	Logo Line
LOGO-TEXT	7 (White)	0.25		Continuous	Logo Text
PLPR-GRID_1CM	242	0.25		Continuous	Plan and Profile 1 cm Grid
PLPR-GRID_2MM	250	0.06		Continuous	Plan and Profile 2 mm Grid
PLPR-GRID_5CM	100	0.45		Continuous	Plan and Profile 5 cm Grid
PLPR-L60-TXT	7 (white)	0.25	0.40 (L60)	Continuous	Plan and Profile Template 60 Text
PLPR-L80-TXT	232	0.30	0.50 (L80)	Continuous	Plan and Profile Template 80 Text
PLPR-L100-TXT	50	0.40	0.65 (L100)	Continuous	Plan and Profile Template 100 Text
PLPR-L120-TXT	90	0.50	0.75 (L120)	Continuous	Plan and Profile Template 120 Text
PLPR-L140-TXT	130	0.60	0.90 (L140)	Continuous	Plan and Profile Template 130 Text
PLPR-L175-TXT	160	0.70	1.10 (L175)	Continuous	Plan and Profile Template 160 Text
PLPR-L200-TXT	200	0.80	1.30 (L200)	Continuous	Plan and Profile Template 220 Text
PLPR-L240-TXT	200	0.80	1.50 (L240)	Continuous	Plan and Profile Template 240 Text
PLPR-L290-TXT	210	1.40	1.90 (L290)	Continuous	Plan and Profile Template 290 Text
PLPR-L500-TXT	210	1.40	3.20 (L500)	Continuous	Plan and Profile Template 500 Text
PLPR-L700-TXT	210	1.40	5.00 (L700)	Continuous	Plan and Profile Template 700 Text
PLPR-OUTLINE	7 (white)	0.25		Continuous	Plan and Profile Outline or Border
PLPR-PAPER	7 (white)	0.25		DOTX2	Plan and Profile Paper Trim Lines
PLPR-STMCHART	255	0.30		Continuous	Plan and Profile Storm Sewer Chart
PLPR-WMCHART	255	0.30		Continuous	Plan and Profile Watermain Chart

Appendix A - Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
EX-BELL_LOCATE-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Bell Cable Line
EX-BELL_VAULT-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Bell Structure Line
EX-BRIDGE-LIN	9	0.25	0.50 (L80)	Continuous	Existing Bridge Line
EX-BUILDING-LIN	6 (magenta)	1.00	0.50 (L80)	Continuous	Existing Building Structure Line
EX-BUILDING-TXT	7 (white)	0.25	0.50 (L80)	Continuous	Existing Building Identification
EX-BUS_SHELTER-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Bus Shelter Line
EX-BUSH_EDGE-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Edge of Bush Line
EX-CABLE_LOCATE-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Cable TV Line
EX-CEMETARY_EDGE_LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Edge of Cemetary Line
EX-COMM_TOWER_LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Communication Tower Line
EX-CONC_SLAB-LIN	9	0.25	0.50 (L80)	Continuous	Existing Concrete Slab Line
EX-CONDUCTORS	230	0.25	0.50 (L80)	Continuous	Existing Conductors
EX-CREEK_CL-LIN	1 (red)	0.25	0.50 (L80)	CENTER2	Existing Center Line of Creek
EX-CREEK_EDGE-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Edge of Creek Line
EX-CULV_BOX-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Box Culvert Line
EX-CURB_ASPH-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Asphalt Curb Line
EX-CURB_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Concrete Curb Line
EX-DAM-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Dam Line
EX-DITCH_CL-LIN	7 (white)	0.25	0.50 (L80)	CENTER2	Existing Center Line of Ditch
EX-DRWY_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Concrete Driveway Line
EX-DRWY_EOP-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Driveway Edge of Pavement Line
EX-DRWY_GR-LIN	7 (white)	0.25	0.50 (L80)	HIDDEN2	Existing Gravel Driveway Line
EX-EOP-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Edge of Pavement Line
EX-EXP_JOINT-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Expansion Joint Line
EX-FENCE_CHAIN-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Chain Link Fence Line
EX-FENCE_IRON-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Wrought Iron Fence Line
EX-FENCE_PW-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Post and Wire Fence Line
EX-FENCE_SNOW-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Snow Fence Line
EX-FENCE_WOOD-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Wood Fence Line
EX-FUEL_TANK-LIN	9	0.25	0.50 (L80)	Continuous	Existing Fuel Tank Line
EX-GABION-LIN	9	0.25	0.50 (L80)	Continuous	Existing Gabion Line

Appendix A – Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
EX-GARAGE_LIMIT-LIN	9	0.25	0.50 (L80)	Continuous	Existing Landfill Garbage Limit Line
EX-GAS_BOX-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Gas Box Line
EX-GAS_EXPOSED-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Gas Exposed Gas Line
EX-GAS_LOCATE-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Gas Line
EX-GUIDERAIL-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Guide Rail Line
EX-GUTTER_ASPH-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Asphalt Gutter Line
EX-GUTTER_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Concrete Gutter Line
EX-GUY_WIRE-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Guy Wire Line
EX-HANDRAIL-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Hand Rail Line
EX-HW	3 (green)		0.50 (L80)	HW	Existing Headwall
EX-HEDGE-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Hedge Line
EX-HWY_SOU_BARRIER-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Barrier Line
EX-HYDRO_LINE_DATA	230	0.25	0.50 (L80)	Continuous	Existing Hydro Line Data Information
EX-HYDRO_LOCATE-LIN	230	0.25	0.50 (L80)	Continuous	Existing Hydro Line
EX-HYDRO_TOWER-LIN	230	0.25	0.50 (L80)	Continuous	Existing Hydro Tower Line
EX-HYDRO_POLES	230	0.25	0.50 (L80)	Continuous	Existing Hydro Pole
EX-INTERLOCK-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Interlocking Brick Line
EX-LAWN_EDGE-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Edge of Lawn Line
EX-MAIL_BOX-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Mail Box line
EX-MARSH_EDGE-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Edge of Marsh Line
EX-OGS	3 (green)	0.25	0.50 (L80)	Continuous	Existing Oil and Grit Separator
EX-PATIO_SLABS-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Patio Slabs Line
EX-PIER-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Pier Line
EX-PKLT_EOP-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Parking Lot Edge of Pavement
EX-PKLT_GR-LIN	7 (white)	0.25	0.50 (L80)	HIDDEN2	Existing Gravel Parking Lot Line
EX-PLANT_BED-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Edge of Plant Bed
EX-POND_EDGE-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Edge of Pond Line
EX-PORCH_CORNER-LIN	6 (magenta)	1.00	0.50 (L80)	Continuous	Existing Porch Line

Appendix A – Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
EX-PORCH_TOP-LIN	6 (magenta)	1.00	0.50 (L80)	Continuous	Existing Top of Porch
EX-PROPERTY-LIN	13	0.50	0.50 (L80)	Continuous	Existing Property or Right of Way Line
EX_PROPERTY_SERVICE_LINES	230	0.50	0.50 (L80)	Continuous	Existing Hydro Property Service Line
EX-RAIL_CL-LIN	7 (white)	0.25	0.50 (L80)	Centre2	Existing Center Line of Railway Tracks
EX-RAIL_TRACK-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Railway Track Line
EX-ROAD_CL-LIN	7 (white)	0.25	0.50 (L80)	Centre2	Existing Center Line of Road
EX-ROAD_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Center Line of Road
EX-ROAD_GR-LIN	7 (white)	0.25	0.50 (L80)	Hidden2	Existing Gravel Road Line
EX-ROAD_LANE-LIN	7 (white)	0.25	0.50 (L80)	Dashed2	Existing Road Lane line
EX-ROW_CONIF-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Row of Coniferous Trees Line
EX-ROW_DECID-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Row of Deciduous Trees Line
EX-SAN-PF	1 (red)	0.25	0.50 (L80)	Hidden2	Existing Sanitary Sewer Line Profile
EX-SAN-PL	1 (red)	0.25	0.50 (L80)	Continuous	Existing Sanitary Sewer Line Plan
EX-SEPTIC_EDGE-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Edge of Septic Tank
EX-SEPTIC_TANK-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Edge of Septic Tank Line
EX-SHLD_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Concrete Shoulder Line
EX-SHLD_EOP-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Pavement Shoulder Line
EX-SHLD_GR-LIN	7 (white)	0.25	0.50 (L80)	Hidden2	Existing Gravel Shoulder Line
EX-SIDEWALK-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Sidewalk Line
EX-SIGN-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Sign Line
EX-SLOPE_TOE-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Existing Toe (finish) of Slope Line
EX-SLOPE_TOP-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Existing Toe (start) of Slope Line
EX-SLOPE_TOP-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Existing Toe (start) of Slope Line
EX-STEPS-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Steps Line
EX-STM-PF	30	0.25	0.50 (L80)	Storm	Existing Storm Sewer Line Profile

Appendix A - Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
EX-PORCH_TOP-LIN	6 (magenta)	1.00	0.50 (L80)	Continuous	Existing Top of Porch
EX-PROPERTY-LIN	13	0.50	0.50 (L80)	Continuous	Existing Property or Right of Way Line
EX-RAIL_CL-LIN	7 (white)	0.25	0.50 (L80)	Centre2	Existing Center Line of Railway Tracks
EX-RAIL_TRACK-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Railway Track Line
EX-ROAD_CL-LIN	7 (white)	0.25	0.50 (L80)	Centre2	Existing Center Line of Road
EX-ROAD_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Center Line of Road
EX-ROAD_GR-LIN	7 (white)	0.25	0.50 (L80)	Hidden2	Existing Gravel Road Line
EX-ROAD_LANE-LIN	7 (white)	0.25	0.50 (L80)	Dashed2	Existing Road Lane line
EX-ROW_CONIF-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Row of Coniferous Trees Line
EX-ROW_DECID-LIN	3 (green)	0.25	0.50 (L80)	Continuous	Existing Row of Deciduous Trees Line
EX-SAN-PF	1 (red)	0.25	0.50 (L80)	Hidden2	Existing Sanitary Sewer Line Profile
EX-SAN-PL	1 (red)	0.25	0.50 (L80)	Continuous	Existing Sanitary Sewer Line Plan
EX-SEPTIC_EDGE-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Edge of Septic Tank
EX-SEPTIC_TANK-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Edge of Septic Tank Line
EX-SHLD_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Concrete Shoulder Line
EX-SHLD_EOP-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Pavement Shoulder Line
EX-SHLD_GR-LIN	7 (white)	0.25	0.50 (L80)	Hidden2	Existing Gravel Shoulder Line
EX-SIDEWALK-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Sidewalk Line
EX-SIGN-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Sign Line
EX-SLOPE_TOE-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Existing Toe (finish) of Slope Line
EX-SLOPE_TOP-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Existing Toe (start) of Slope Line
EX-SLOPE_TOP-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Existing Toe (start) of Slope Line
EX-STEPS-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Steps Line
EX-STM-PF	30	0.25	0.50 (L80)	Storm	Existing Storm Sewer Line Profile

Appendix A - Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
EX-STM-PL	3 (green)	0.25	0.50 (L80)	Continuous	Existing Storm Sewer Line Plan
EX-SWALE_CL-LIN	7 (white)	0.25	0.50 (L80)	Center2	Existing Center Line of Swale
EX-TELECOM-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Telecom Line
EX-TIN_LINE-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Existing Tin Line
EX-TRAF_SENSOR-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Traffic Sensor Line
EX-TRANS_VAULT-LIN	2 (yellow)	0.25	0.50 (L80)	Continuous	Existing Transformer Vault Line
EX-TRANSFORMER-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Transformer Line
EX-WALK_GR-LIN	7 (white)	0.25	0.50 (L80)	Hidden2	Existing Gravel Walkway Line
EX-WALL_BRICK-LIN	1 (red)	0.25	0.50 (L80)	Continuous	Existing Brick Wall Line
EX-WALL_CONC-LIN	9	0.25	0.50 (L80)	Continuous	Existing Concrete Wall Line
EX-WALL_STEEL-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Steel Wall Line
EX-WALL_STONE-LIN	9	0.25	0.50 (L80)	Continuous	Existing Stone Wall Line
EX-WALL_TIMBER-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Existing Timber Wall Line
EX-WATER-PF	5 (blue)	0.25	0.50 (L80)	Dashed2	Existing Watermain Line in Profile
EX-WATER-PL	5 (blue)	0.25	0.50 (L80)	Continuous	Existing Watermain Line in Plan
EX-WATER_LOCATE-LIN	5 (blue)	0.25	0.50 (L80)	Continuous	Existing Surveyed Watermain or Service
EX-WATER_SERVICE-LIN	5 (blue)	0.25	0.50 (L80)	Continuous	Existing Water Service Line
EX-WATER_TOWER-LIN	5 (blue)	0.25	0.50 (L80)	Continuous	Existing Water Tower Line
EX-WEIGHT_SCALE-LIN	5 (blue)	0.25	0.50 (L80)	Continuous	Existing Weigh Scale Line
MISC	7 (white)	0.30		Continuous	TEMPORARY: Miscellaneous Construction Lines
NO PLOT	7 (white)			Continuous	No Plotting Features
0	7 (white)	0.25	0.75 (L120)	Continuous	Miscellaneous
DAYLIGHT	231	0.35	0.75 (L120)	Hidden2	Proposed Limit of Grading Line

Appendix A – Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
DIMENSIONS	50 (yellow)	0.50	0.75 (L120)	Continuous	Dimensions and Leader Line
PR-CB	4 (cyan)	0.50	0.75 (L120)	CB	Proposed Catch Basin
PR-CBFEEDS-LIN	4 (cyan)	0.50	0.75 (L120)	Storm	Proposed Catch Basin Feeds
PR-CL-CONST	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Centreline of Construction
PR-CONDUCTORS	13	0.5	0.75 (L120)	Continuous	Proposed Conductors
PR-CONTOURS-LIN	9 (grey)	0.25	0.75 (L120)	Continuous	Proposed Contour Line
PR-CULVERTS-LIN	13 (red)	0.50	0.75 (L120)	Continuous	Proposed Culvert
PR-CURB-LIN	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Curb line
PR-DITCH-LIN	231	0.50	0.75 (L120)	hidden2	Proposed Ditch Line
PR-EOP	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Edge of Pavement
PR-FDCMH	4 (cyan)	0.50	0.75 (L120)	MH	FDC Maintenance Holes
PR-FDCSTM	4 (cyan)	0.50	0.75 (L120)	Continuous	FDC Stormlines
PR-FENCE-LIN	4 (cyan)	0.50	0.75 (L120)	Fenceline2	Proposed Fence Line
PR-FLOODLINE-LIN	115	0.70	0.75 (L120)	Dashed2	Proposed Floodline Line
PR-GUIDERAILS-LIN	13 (red)	0.50	0.75 (L120)	Fenceline2	Proposed Guiderail line
PR-PAVEMENT-HATCH	231	0.35	0.75 (L120)	Continuous	Proposed Pavement Hatch
PR-HEADWALL	4 (cyan)	0.50	0.75 (L120)	HW	Proposed Headwall
PR-HYDRO_LINE_DATA	13	0.50	0.75 (L120)	Continuous	Proposed Hydro Line Data Information
PR-HYDRO_POLES	13	0.50	0.75 (L120)	Continuous	Proposed Hydro Pole
PR_HYDRO_LOCATE_LIN	13	0.50	0.75 (L120)	Continuous	Proposed Hydro Location Line

Appendix A – Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
PR-PROPERTY-LIN	4 (cyan)	0.50	0.75 (L120)	Hidden2	Proposed Property Line
PR-PROPERTY_SERVICE_LINES	13	0.50	0.75 (L120)	Continuous	Proposed Hydro Property Service Line
PR-RD-STM-TXT	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Road and Storm Text
PFGC	4 (cyan)	0.50	0.75 (L120)	Continuous	Existing Ground Centreline along the Profile (Centreline of Construction)
PEGC	231	0.50	0.75 (L120)	Storm	Existing Ground Centreline along the Proposed Centreline of Construction
PR-POLES	2 (yellow)	0.25	0.75 (L120)	Pole	Proposed Poles
PR-OGS	4 (cyan)	0.50	0.75 (L120)	MH	Proposed Oil & Grit Separator
PR-RETAININGWALL LIN	13 (red)	0.50	0.75 (L120)	Continuous	Proposed Retainingwall Line
PR-SAN DRAINAGE AREA	240	0.50	0.75 (L120)	Continuous	Proposed Sanitary Sewer Drainage Area
PR-SAN-HATCH	231	0.35	0.75 (L120)	Continuous	Proposed Sanitary Sewer Hatch
PR-SAN-MH	240		0.75 (L120)	MH	Proposed Sanitary Maintenance Hole
PR-SAN-PF	240	0.50	0.75 (L120)	Continuous	Proposed Sanitary Sewer Line in Profile
PR-SAN-PL	240	0.50	0.75 (L120)	PRSAN250	Proposed Sanitary Sewer Line in Plan
PR-SAN-SYM	240	0.50	0.75 (L120)	Continuous	Proposed Sanitary Symbols

Appendix A – Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
PR-SLOPE_TOE-LIN	4 (cyan)	0.50	0.75 (L120)	Dot2	Proposed Toe (finish) of Slope Line
PR-SLOPE_TOP-LIN	4 (cyan)	0.50	0.75 (L120)	Dot2	Proposed Toe (start) of Slope Line
PR-SIDEWALK-LIN	13 (red)	0.50	0.75 (L120)	Continuous	Proposed Sidewalk Line
PR-SIGN	2 (yellow)	0.25	0.75 (L120)	Sign	Proposed Sign
PR-STM DRAINAGE AREA	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Storm Drainage Area
PR-STM-HATCH	231	0.35	0.75 (L120)	Continuous	Proposed Storm Sewer hatch
PR-STM-MH	4 (cyan)		0.75 (L120)	MH	Proposed Storm Maintenance Hole
PR-STM-PF	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Storm Sewer Line in Profile
PR-STM-PL	4 (cyan)	0.50	0.75 (L120)	Storm	Proposed Storm Sewer Line in Plan
PR-STM-SYM	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Storm Symbols
PR-STMPLUG-PF	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Storm Plug Line in Profile
PR-STMPLUG-PL	4 (cyan)	0.50	0.75 (L120)	Continuous	Proposed Storm Plug Line in Plan
PR-STREETLIGHTS	4 (cyan)	0.50	0.75 (L120)	STREETLIGHT	Proposed Street lights
PR-STREETLIGHTCONDUIT	4 (cyan)	0.50	0.75 (L120)	Continuous	Streetlight Conduit
PR-SUBDRAIN	4 (cyan)	0.50	0.75 (L120)	Dashed2	Proposed Subdrains

Appendix A – Continued

Town of Whitby AutoCAD Layering Guide Base					
Layer Name	Colour	Pen Size	Text Height (1:250)	Linetype	Description
PR-SWALECL-LIN	4 (cyan)	0.50	0.75 (L120)	Dashed2	Proposed Swale Centreline Line
PR-TREES	3 (green)	0.25	0.75 (L120)	Trees	Proposed Trees
PR-WATER-HATCH	231	0.35	0.75 (L120)		Proposed Watermain Hatch
PR-WATER-PF	150	0.50	0.75 (L120)	Continuous	Proposed Watermain Line in Profile
PR-WATER-PL	150	0.50	0.75 (L120)	Continuous	Proposed Watermain Line in Plan
MISC	7 (white)	0.25		Continuous	TEMPORARY: Miscellaneous Construction Lines
NO PLOT	7 (white)	0.25		Continuous	No Plotting Features

Text Styles and Height

The AutoCAD Layering Guide gives text height examples for a 1:250 scale drawing. For drawings at 1:500 scale the text heights are multiplied by a factor of 2.

Line Types

All custom Town of Whitby line types are available electronically upon request through Engineering Services.

Symbols

All Town of Whitby standard symbols are available electronically upon request through Engineering Services.

AutoCAD Object Data

Object data is an attribute data that is assigned to individual objects in AutoCAD. This information is stored in object data tables that are attached to CAD entities (pipes, MHs, street lights, etc) within the drawing (see example below).

APPENDIX A – Continued

Object Data Table

OD:STORMLINEDATA	
LENGTH	15.50
DIAM	450
SLOPE	0.72
PIPE_MATER	CONC
UPSTREAM_INV...	102.56
DOWNSTREAM...	102.40
FR_NODE	ST45-139
TO_NODE	ST45-138
FACILITYID	450123

Defined Object Data

Completed

The Town of Whitby AutoCAD drawing template (available electronically upon request) includes all required standard layers and object data.

The layers which have object data are:

Proposed Catchbasins (Layer CATCHBASINDATA) – object data table with 3 attributes

Proposed Conductors (Layer CONDUCTORS) – 4 attributes

Proposed Feeds (Layer FEEDSDATA) – 3 attributes

Proposed Headwalls (Layer HEADWALLDATA) – 2 attributes

Proposed Hydrolines (Layer HYDROLINEDATA) – 6 attributes

Proposed Junctions (Layer JUNCTIONDATA) – 1 attribute

Proposed Maintenance Holes (Layer MAINTENANCEHOLEDATA)– 13 attributes

Proposed Service Lines (Layer PROPERTYSERVICELINES) – 2 attributes

Proposed Poles (Layer PROPOSEDPOLES) – 7 attributes

Proposed Street Lights (Layer PROPOSEDSTREETLIGHTS) – 22 attributes

Proposed Stormlines (Layer STORMLINEDATA) – 9 attributes

Proposed Storm Plugs (Layer STORMPLUGDATA) – 2 attributes

Proposed Conduit (Layer PR-PROPOSEDSTREETLIGHTCONDUIT) - 2 Attributes

FDC Stormlines (Layer PR-FDCSTM) – 9 Attributes

FDC Maintenance Holes (Layer PR-FDCMH) – 13 Attributes

All object data tables in the above noted layers shall be filled in with the appropriate design values for CAD entities (pipes, MHs, street lights, etc).

Appendix A - Continued

Colour Tables

All drawings submitted to the Town of Whitby shall be in accordance with the AutoCAD Colour Dependent Plot Styles Table listed below

Colour Dependent Plot Style Tables

Town of Whitby A1.CTB	
1 (red)	0.25
2 (yellow)	0.25
3 (green)	0.25
4 (cyan)	0.50
5 (blue)	0.25
6 (magenta)	1.00
7 (white)	0.25
8	0.13
9	0.25
10	0.13
11	0.13
12	0.25
13	0.50
20	0.25
30	0.25
40	1.00
41	0.25
42	0.13
50	0.40
52	0.30
60	0.19
75	0.13
80	0.25
90	0.50
100	0.45
101	0.50
110	0.25
115	0.70
130	0.60
150	0.50
151	0.45
160	0.70
170	0.25
171	0.30
180	0.25
200	0.80
210	1.40
212	0.65
220	1.00
221	0.25
230	0.21
231	0.35
232	0.30
240	0.50
241	0.45
242	0.25
250	0.06
251	0.13
253	0.13
254	0.19
255	0.30

Town of Whitby 11 x 17.CTB	
1 (red)	0.10
2 (yellow)	0.10
3 (green)	0.10
4 (cyan)	0.25
5 (blue)	0.10
6 (magenta)	0.50
7 (white)	0.10
8	0.06
9	0.10
10	0.06
11	0.06
12	0.15
13	0.25
20	0.10
30	0.12
40	0.35
41	0.10
42	0.06
50	0.20
52	0.15
60	0.06
75	0.06
80	0.12
90	0.30
100	0.22
101	0.25
110	0.12
115	0.30
130	0.30
150	0.30
151	0.22
160	0.30
170	0.10
171	0.12
180	0.10
200	0.30
210	0.30
212	0.30
220	0.50
221	0.17
230	0.10
231	0.17
232	0.20
240	0.30
241	0.10
242	0.12
250	0.06
251	0.06
253	0.06
254	0.06
255	0.15

Appendix B

Engineering Drawings: Items for Inclusion

Drawings forming part of engineering drawing sets as described in Section A shall include, as a minimum, the items listed following:

Plan and Profile Drawings

Miscellaneous:

- Key Plan
- Scale(s)
- Title, revision and signature block
- Street names, lot and block numbering
- Profile bands/charts for storm, sanitary, clean water collector sewers shall be provided on all profile plans (if applicable)
- Lot lines, street lines
- Right-of-Way dimensions
- Lot dimensions
- North arrow
- Match lines and chainage
- Geodetic benchmark information
- Sidewalks, driveways, fencing, streetlights and hydrants
- Community mailbox locations
- Watermain and sanitary information for Regional requirements
- Sewer crossing information
- Minimum basement elevation (MBE) (where applicable)
- Maximum underside of footing details (USF) (where applicable)
- Engineered Fill information (where applicable)
- All easements for servicing
- Seasonal High Water Table

Storm Sewer Information:

- Maintenance holes with side, standard and identification number
- Pipe diameter, lengths, grades, material, class and bedding
- Inverts at maintenance holes (~~to three (3) decimal places~~)
- Service connections
- Pipe crossing information
- Catchbasins including street, rear yard and ditch inlet
- 100-year H.G.L.
- Drop structures
- Benching details
- Inlet Control Device Table with ID, Type/Size, Invert Elevation (m), Grate Elevation (m), Design Head (m), Design Controlled Flow (L/s), 1:5 Year Peak Flow (L/s)

Appendix B – Continued

Roadway Information:

- Existing ground and proposed grade profiles
- Centre line road grade with distances between change in grade
- 3 decimal places for road segment lengths, chainage station and road elevations
- 2 decimal places for road gradients (%) and K values
- Plan View Centre line elevations every 25 m and at all low points, high point, intersections, changes in grade, at P.I., beginning and end of vertical curves
- Profile View Chainage indication on centre line, every 50 m
- Intersection chainage for all intersecting streets
- Beginning and end of horizontal curves
- Curb and gutter,
- Curb radii and depressions noted where required (ex. Overland flow outlets, sidewalk terminations, CMB pads)
- Gutter grade details on bends, cul-de-sacs and intersections
- Pavement structure design with curb type
- Pavement right of way and boulevard widths
- Traffic calming

Grading Plans

(Not applicable to Capital Projects)

- Key Plan
- Scale
- North arrow
- Lot numbers, street names
- Lot drainage type (ex. W/O, SD, BS, RF)
- Proposed building envelopes
- Curbs, sidewalks, fencing, transformers, hydrants, street lights and driveways
- Community mailbox locations including required curb depressions
- Maintenance holes and catchbasins including street, rear yard and ditch inlet
- Easements
- Maximum underside of footing requirements adjacent to servicing easements or blocks
- Original ground contours, with reference to topographic source
- Original ground and proposed elevations at all lot corners
- Indicate lots with Engineered Fill
- Road centre line profile data with distances and slope between grade changes, elevations every 25 m and at all low points, high point, intersections
- Centre line chainage indicator every 50 m
- 100-year flooding limits
- Lot elevations at all breaks in grade
- Swale direction and location indicators with arrow
- Front and rear lot specified grade elevation
- Retaining wall locations with top and bottom elevations

Appendix B – Continued

- Any sloping
- Existing trees to be removed and/or preserved
- Mark all Fire Break lots by drawing an X through the lot, corners to corners

Utility Coordination Plan

(Not applicable to Capital Projects)

- Key Plan
- Scale
- North arrow
- Legend showing symbols and typical structure size
- Dimensions for any atypical utility structures
- Lot numbers, street names and right of ways/property lines
- Curbs, sidewalks, fencing, transformers, hydrants, streetlights, pedestals and driveways
- Maintenance holes, and catchbasins including street, rear yard and ditch inlet
- Easements
- Utility duct crossing locations
- Community mailbox locations to show temporary and permanent boxes plus the number of modules at each location and the required curb depressions
- Signature/approval block for each utility, Town of Whitby and Region of Durham
- The Potential tree locations

Streetlight Layout and Photometric Design Plans

(Not applicable to Capital Projects)

- Key Plan
- Scale
- North arrow
- Legend
- Lot numbers, street names and right of ways/property lines
- Curbs, sidewalks, transformers, hydrants, street lights, driveways, easements and potential tree locations
- Community mailbox locations
- Signature/approval block for Town of Whitby.
- Photometric Design – roadway lighting design criteria, photometric street light summary and certification meets RP-8 (latest edition) guidelines.
- Streetlight Layout- Duct schedule, street light service chart and clearance notes.

Erosion and Sedimentation Control Plans

General

- Key Plan
- Scale
- North arrow

- Legend
- ESC best practices notes (available upon request)
- Emergency contact details
- contours at 0.5-1m intervals
- watercourses and sensitive areas
- regional floodplain and regulation areas
- stabilized construction access (i.e., mud mat) locations and details

Stage 1: topsoil stripping, clearing and grubbing, and rough grading

- existing drainage boundaries and flow directions
- existing vegetation
- highly erodible areas
- cut/fill plan
- clearing, grading and site boundary limits
- proposed temporary SWM measures including low impact development (LID) practices with details, calculations and table
- construction phasing
- proposed drainage area boundaries including external drainage areas with labels with area and runoff coefficients
- ESC measures including dewatering protocols and pumping water treatment
- appropriate buffers and setbacks from natural features
- stockpile locations, sizes

Stage 2: site servicing and road construction

- Overlay approved draft subdivision plan
- Updated locations and types of ESC measures
- Updated drainage area details

Stage 3: building construction

- Updated locations and types of ESC measures
- Updated drainage area details
- LID locations

Appendix C



The Corporation of the Town of Whitby

Capital Projects - Design Check List and Forms

Index

Roadway Design Criteria	3 Pages
Intersection Design Criteria.....	1 Page
Form A: 50% Detailed Design Submission / Review Check List	5 Pages
Form B: 90% Detailed Design Submission / Review Check List	4 Pages
Form C: Pre-Tender Package Submission / Review Check List	3 Pages
Form D: Tender Package Check List	2 Pages



**Town of Whitby
Roadway Design Criteria**

Project Name and Location: _____

Town of Whitby _____ **Consultant**
Project Manager: _____ **Project Manager** _____

Criteria	Reference/Notes	Design Standards	Proposed Standards
Classification	Town of Whitby Official Plan		
	TAC 2.6.2		
	Table 2.6.2		
Design Speed			
Posted Speed	Town of Whitby Geometric Design		
	Table C3.1		
Minimum Radius	Town of Whitby Geometric Design Table C3.1		
Minimum Stopping Sight Distance	TAC 2.5.3		
Minimum Decision Sight Distance	TAC 2.5.5		
Minimum 'K' Value	CREST TAC 3.3.3.3		
	SAG TAC 3.3.3.4		
	Headlight Control Comfort Control		



**Town of Whitby
Roadway Design Criteria**

Criteria	Reference/ Notes	Design Standards	Proposed Standards
Grades - Maximum			
- Minimum			
Road Width (Face of Curb to Face of Curb)	Standard 400		
Lane Width			
Through Lanes			
Left Turn Lanes (If Applicable)			
Right Turn Lanes (If Applicable)			
Shoulder Width (Rural Roads)			
Paved Shoulder Width (Rural)			
Boulevard Width (Face of Curb to ROW)			
Sidewalk Width North or West Side			
South or East Side			
Bicycle Lane or Path Width (Both Sides)			
Right of Way Width			



**Town of Whitby
Roadway Design Criteria**

Other Information to be Submitted:

	N/A	Attached	Future Submissions
• Geotechnical Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Traffic Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Drainage Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Prepared by: _____
(Consultant)

Date: _____

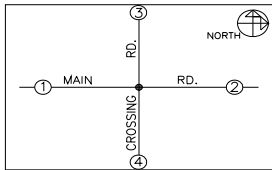
Checked by: _____
(Consultant)

Date: _____

Approved by: _____
(Town of Whitby)

Date: _____

Notes:



**Town of Whitby
Roadway/Intersection Design Criteria**

Criteria	Reference/Notes	Detail			
		Main Road (Arterial)		Side Roads (Collectors)	
		Leg 1	Leg 2	Leg 3	Leg 4
Classification					
Design Speed					
Stopping Sight Distance	TAC 2.5.3				
Road Turning Radius					
Design Vehicle					
Lane Width – Thru Lanes					
Left Turn					
Right Turn					
Shoulder Width					
Boulevard Width					
Left Turn Lane	TAC 9.17				
Set Back					
Storage					
Parallel					
Taper					
Right Turn Lanes	TAC 9.14				
Parallel					
Taper					
Islands (Median)	Region STD S-502				

Prepared by: _____ Checked by: _____ Approved by: _____



**Town of Whitby – Capital Projects
50% Detailed Design Submission/Review Check List
Form ‘A’**

Project Name and Location: _____

Town of Whitby **Consultant**
Project Manager: _____ **Project Manager** _____

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>comments</u>
Design:				
Base Plan				
- Field Survey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Utilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Right-of-Way (Existing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Existing Storm Sewer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Existing Water & Sanitary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Site Photo's with Descriptions & Dated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>2 Copies Required/1 Consultant,1 Town</u>
Confirm Project Scope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Design Criteria (See Attachment)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Typical Section & Options	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Need of Other Users				
- Bicycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Transit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Sidewalks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Illumination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Landscaping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Geotechnical Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Traffic Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Structure / Culvert Assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Existing Vegetation Assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Fish / Wildlife Habitat Assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____



**Town of Whitby – Capital Projects
50% Detailed Design Submission/Review Check List
Form ‘A’**

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Comments</u>
Horizontal & Vertical Alignment Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Preliminary Design Sections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Plan Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Comments</u>
Entrance Designs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Property Impacts/Alternative Designs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Storm Water Management Concept	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Preliminary SWM Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Submit Preliminary Roll Plan & Profile	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>3 copies required</u>
- Preliminary Design Section	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>2 copies required</u>
- Entrance Profiles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>2 copies required</u>
Operation Centre Review & Comment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Field Review - Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Preliminary Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Utilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Regional Work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other Items (Specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____



**Town of Whitby – Capital Projects
50% Detailed Design Submission/Review Check List
Form ‘A’**

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Comments</u>
Utilities / Services:				
Base Plan / Survey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Field Check	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Submit to Utilities for Confirmation of Existing Locations and Future Locations				
- Bell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cable TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Hydro - Whitby	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Hydro One	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Gas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Other (Specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Submit to Region of Durham for Confirmation of Existing Locations and Future Design				
- Watermain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Sanitary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Traffic Signals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Update Base Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Review Conflicts / Relocations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Submit Relocation Requirements				
- Bell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cable TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Hydro - Whitby	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Hydro One	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Gas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Region of Durham	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Other (Specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____



**Town of Whitby – Capital Projects
50% Detailed Design Submission/Review Check List
Form ‘A’**

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Comments</u>
Utility Preliminary Cost Estimate and Schedule:				
- Bell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cable TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Hydro - Whitby	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Hydro One	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Gas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Region of Durham	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Other (Specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Test Pits to Confirm Conflicts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Utility Relocation Meeting(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Preliminary Design Modification to Reduce Relocation Costs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other Items (Specify)				
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____



**Town of Whitby – Capital Projects
50% Detailed Design Submission/Review Check List
Form 'A'**

50% Review Approval:

Project Manager: _____ **Date:** _____
(Consultant)

Project Engineer: _____ **Date:** _____
(Consultant)

Comments:

Town Of Whitby

Engineering Services : _____ **Date** _____
(Project Manager)

Comments:

- Proceed to 90% Design Stage.
- Address Comments and Resubmit



**Town of Whitby – Capital Projects
90% Detailed Design Submission/Review Check List
Form ‘B’**

Page 2 of 4

	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Comments</u>
Storm Sewer Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Storm Water Management Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Finalize Design Cross-Sections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Finalize Entrance Designs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Finalize Property Impacts/Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Tender Form / Quantities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Special Provisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Preliminary Cost Estimates				
- Construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Utilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Identify / Initialize Permits and Approvals (Specify)				
<u>MOE</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<u>CLOCA</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<u>MNR</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
<u>DFO</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Others: (Specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Submit Package to Town				<u>2 Copies of Drawings & Documents</u>
- Contract Drawings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Tender Items / Quantities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Specials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Standard List	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Other Standard Contract Documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Utility Information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Permit Status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Storm Sewer Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Calculation Sheets & Drainage Areas (Sealed)</u>
- Preliminary Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Geotechnical Review of Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Schedule P.I.C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____



**Town of Whitby – Capital Projects
90% Detailed Design Submission/Review Check List
Form ‘B’**

Utilities	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Comments</u>
Bell				
- Relocation Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Cable TV				
- Relocation Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hydro (Whitby)				
- Relocation Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Gas				
- Relocation Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other (Specify) _____				
- Relocation & Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Cost Estimate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Utility Relocation Meeting(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____



**Town of Whitby – Capital Projects
90% Detailed Design Submission/Review Check List
Form 'B'**

90% Review Approval:

Project Manager: _____ **Date:** _____
(Consultant)

Project Engineer: _____ **Date:** _____
(Consultant)

Comments:

Town Of Whitby

Engineering Services _____ **Date:** _____
(Project Manager)

Comments:

- Proceed to Pre-Tender Stage.
- Address Comments and Resubmit



**Town of Whitby – Capital Projects
Pre-Tender Package Submission/Review Check List
Form ‘C’**

Utilities	<u>Yes</u>	<u>No</u>	<u>N/A</u>	<u>Comments</u>
Bell				
-Purchase Order (By Town)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Approved Relocation & Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Cable TV				
- Purchase Order (By Town)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Approved Relocation & Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hydro (Whitby)				
- Purchase Order (By Town)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Approved Relocation & Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Gas				
- Purchase Order (By Town)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Approved Relocation & Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other (Specify) _____				
- Purchase Order (By Town)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
- Approved Relocation & Schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____



**Town of Whitby – Capital Projects
Pre-Tender Package Submission/Review Check List
Form 'C'**

Pre-Tender Approval:

Project Manager: _____
(Consultant)

Date: _____

Project Engineer: _____
(Consultant)

Date: _____

Comments:

Town Of Whitby

Engineering Services _____
(Project Manager)

Date: _____

Comments:

- Prepare Tender Package
- Address Comments and Resubmit



**Town of Whitby – Capital Projects
Tender Package Check List
Form ‘D’**

Page 1 of 2

Contract No. _____ **Project Name and Location:** _____

Town of Whitby **Consultant**
Project Manager: _____ **Project Manager** _____

	<u>Date</u>	<u>N/A</u>	<u>Comments</u>
Consultant Activities			
Town of Whitby Final Comments Received			
- Contract Drawings - Engineering	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
- Contract Documents - Engineering	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
- Purchasing	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Prepare Contract Drawing Mylars	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Print/Copy Contract Drawings & Documents	<input type="checkbox"/> _____	<input type="checkbox"/>	<u>No. of copies</u> <input type="checkbox"/> 20 <input type="checkbox"/> 30 <input type="checkbox"/> Other
Prepare Tender Ad	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Send Tender Ad to			
- Daily Commercial News & Others	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Final Review of Utility Relocation Schedules			
- Bell	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
- Cable TV	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
- Hydro (Whitby)	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
- Gas	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
- Other (Specify) _____	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Contract Approvals by Others Received	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Prepare Public Information Centre Information	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Contract Administration Proposal Submitted	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Review Tender Bids	<input type="checkbox"/> _____	<input type="checkbox"/>	_____
Approve / Recommend Contractor	<input type="checkbox"/> _____	<input type="checkbox"/>	_____

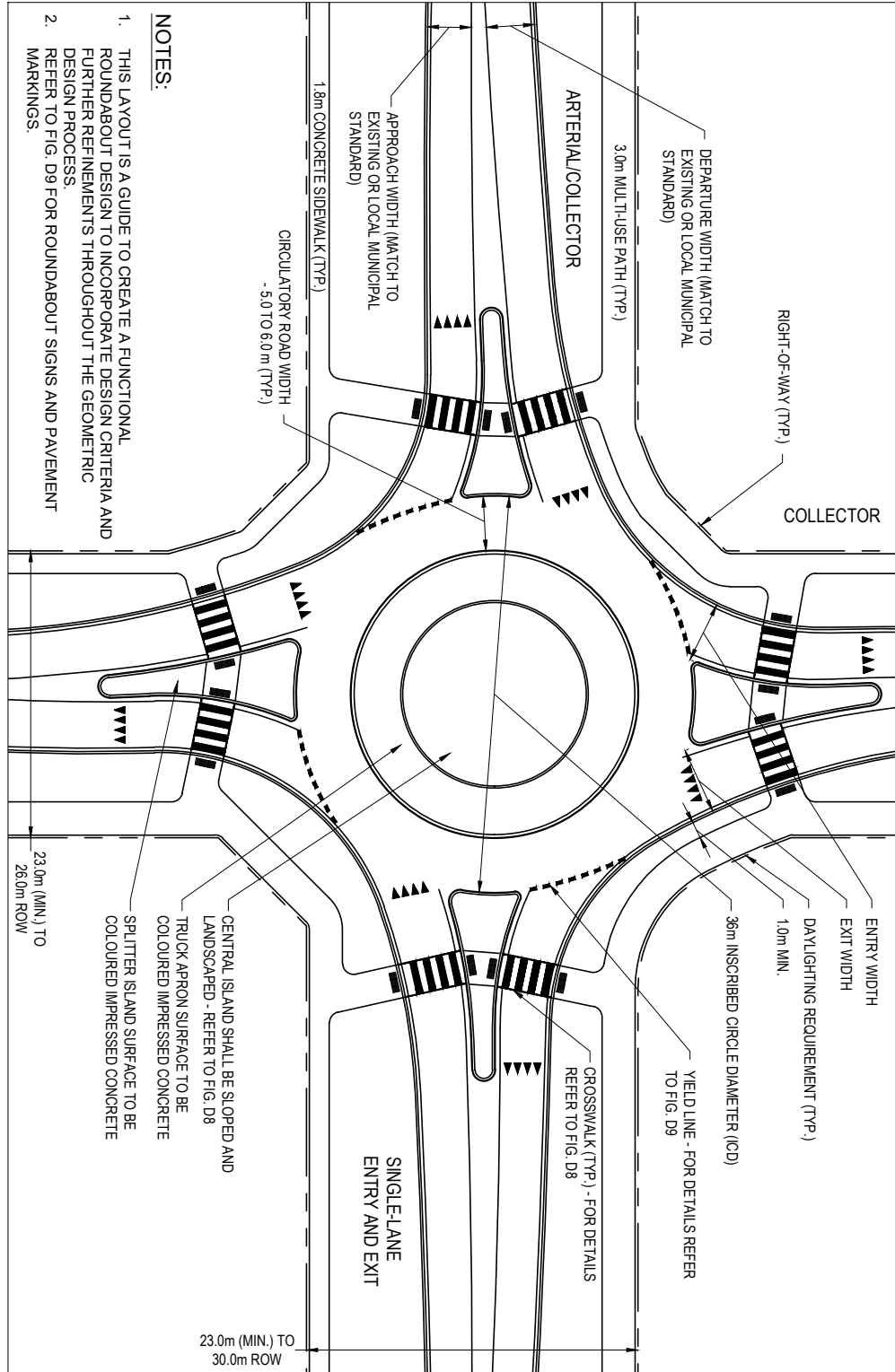


**Town of Whitby – Capital Projects
Tender Package D'**

	<u>Date</u>	<u>N/A</u>	<u>Comments</u>
Town Of Whitby Activities			
Town of Whitby Final Comments			
- Contract Drawings - Engineering	<input type="checkbox"/>	<input type="checkbox"/>	
- Contract Documents - Engineering	<input type="checkbox"/>	<input type="checkbox"/>	
- Purchasing	<input type="checkbox"/>	<input type="checkbox"/>	
Prepare/Mail Project Letters/Notices	<input type="checkbox"/>	<input type="checkbox"/>	
Sign Contract Drawings	<input type="checkbox"/>	<input type="checkbox"/>	
Approve Tender Ad	<input type="checkbox"/>	<input type="checkbox"/>	
Receive Drawings & Documents for Tender	<input type="checkbox"/>	<input type="checkbox"/>	
Approve Contract Administration by Consultant	<input type="checkbox"/>	<input type="checkbox"/>	
Set Public Information Centre Date	<input type="checkbox"/>	<input type="checkbox"/>	
Review Public Information Centre Information	<input type="checkbox"/>	<input type="checkbox"/>	
Review Low Tender/Prepare Cost Sharing/ Tender Report	<input type="checkbox"/>	<input type="checkbox"/>	
Prepare Sundry Items / Costs	<input type="checkbox"/>	<input type="checkbox"/>	
Approve Construction Material Testing	<input type="checkbox"/>	<input type="checkbox"/>	
Review / Resolve Property Issues	<input type="checkbox"/>	<input type="checkbox"/>	
Post Tender			
Prepare / Approve Region Cost Sharing	<input type="checkbox"/>		
Region of Durham Approvals	<input type="checkbox"/>		
Prepare Contractor Documentation	<input type="checkbox"/>		
Contract Documents Executed	<input type="checkbox"/>		
Construction Start Date	<input type="checkbox"/>		
Pre-Construction Meeting	<input type="checkbox"/>		

Appendix D

Typical Roundabout Layouts



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked

Approved

Scale:

N.T.S

Typical - 36m Gateway Roundabout

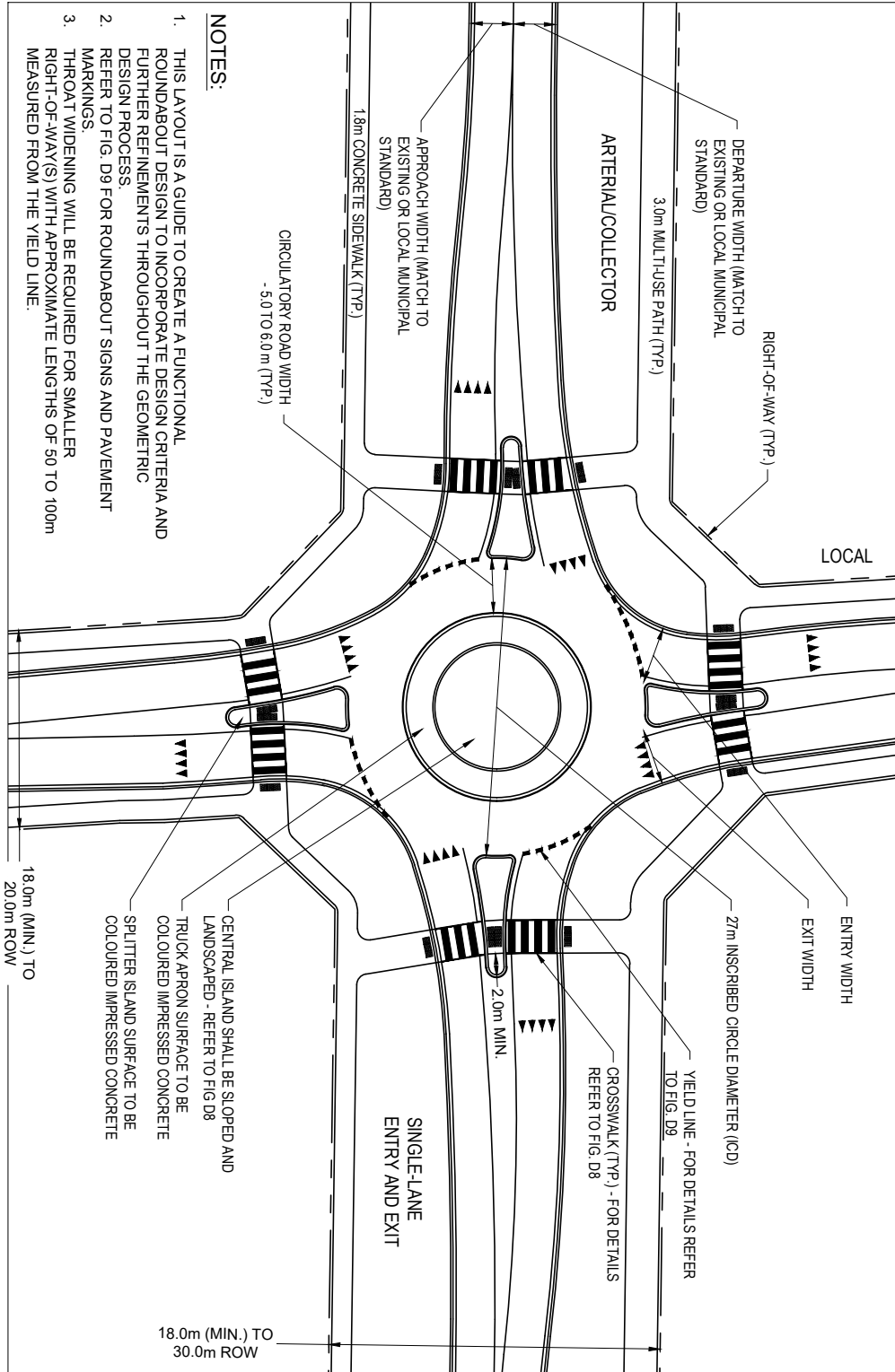
DWG. Date: .

Revision No.:

Revision Date: .

DWG No.

Fig. D1



- NOTES:**
1. THIS LAYOUT IS A GUIDE TO CREATE A FUNCTIONAL ROUNDABOUT DESIGN TO INCORPORATE DESIGN CRITERIA AND FURTHER REFINEMENTS THROUGHOUT THE GEOMETRIC DESIGN PROCESS.
 2. REFER TO FIG. D9 FOR ROUNDABOUT SIGNS AND PAVEMENT MARKINGS.
 3. THROAT WIDENING WILL BE REQUIRED FOR SMALLER RIGHT-OF-WAY(S) WITH APPROXIMATE LENGTHS OF 50 TO 100m MEASURED FROM THE YIELD LINE.

All dimensions in millimetres except where noted

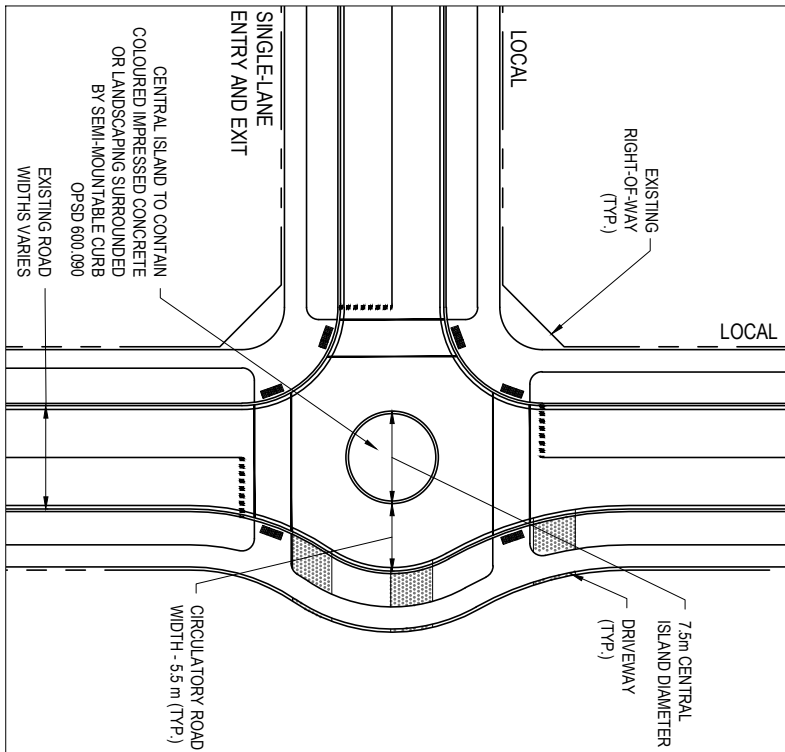
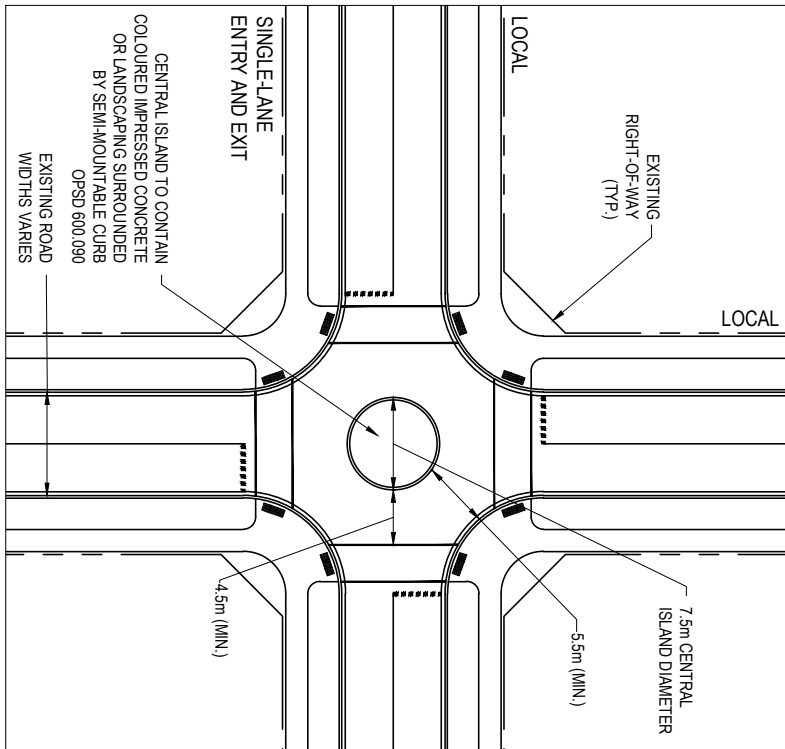
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

Typical - 27m Gateway Roundabout

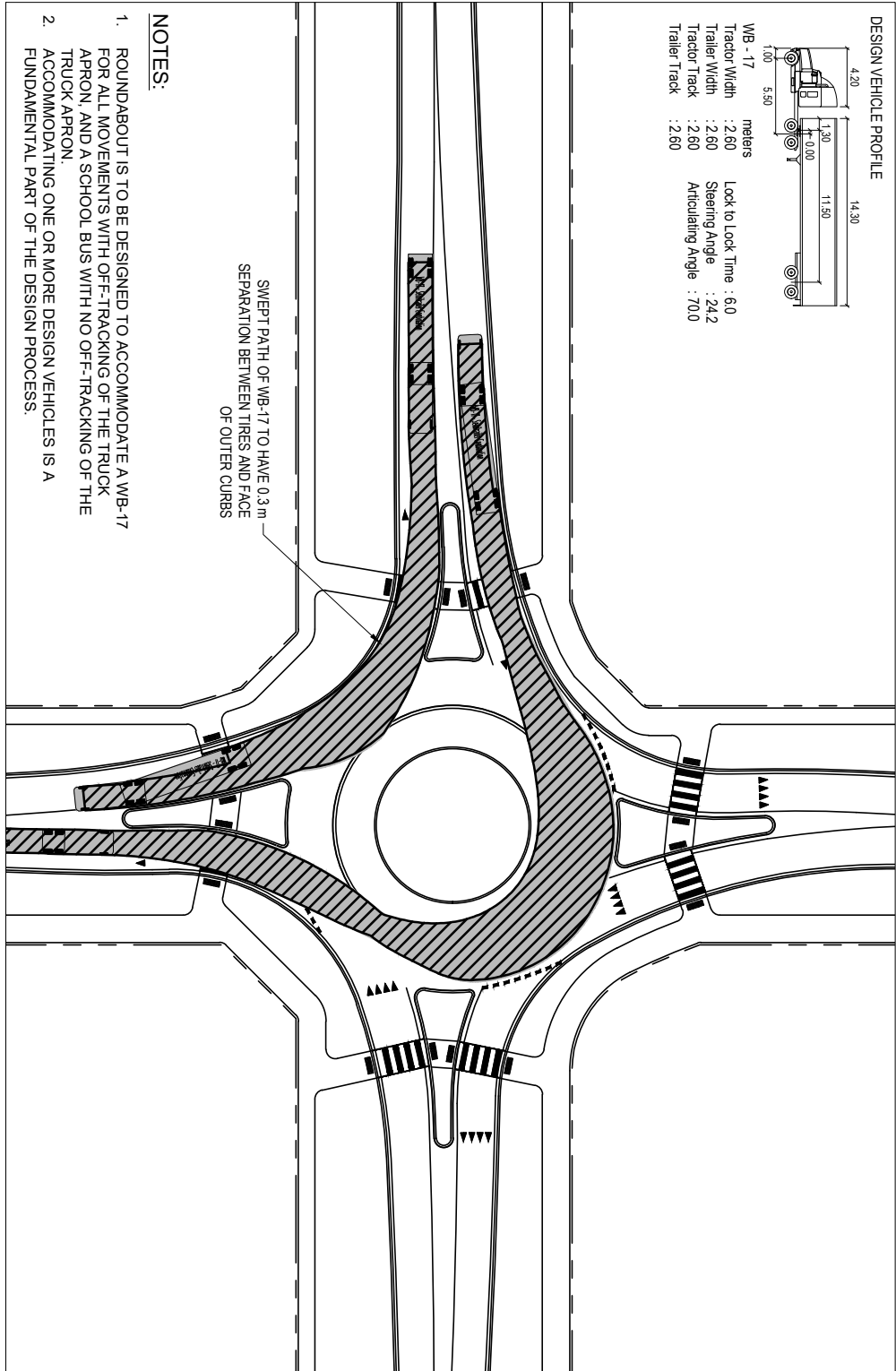
DWG. Date:	.
Revision No.:	.
Revision Date:	.
DWG No.	Fig. D2



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	Typical - Traffic Calming Circle	DWG. Date:	
Approved		Revision No.:	
Scale: N.T.S		Revision Date:	
		DWG No.	Fig. D3

- NOTES:**
1. LAYOUT MAY NOT ACCOMMODATE ALL VEHICLES.
 2. REFER TO FIG. D10 FOR TRAFFIC CALMING CIRCLE SIGNS AND MARKINGS.



DESIGN VEHICLE PROFILE

WB - 17 meters

Tractor Width : 2.60 Lock to Lock Time : 6.0

Trailer Width : 2.60 Steering Angle : 24.2

Tractor Track : 2.60 Articulating Angle : 70.0

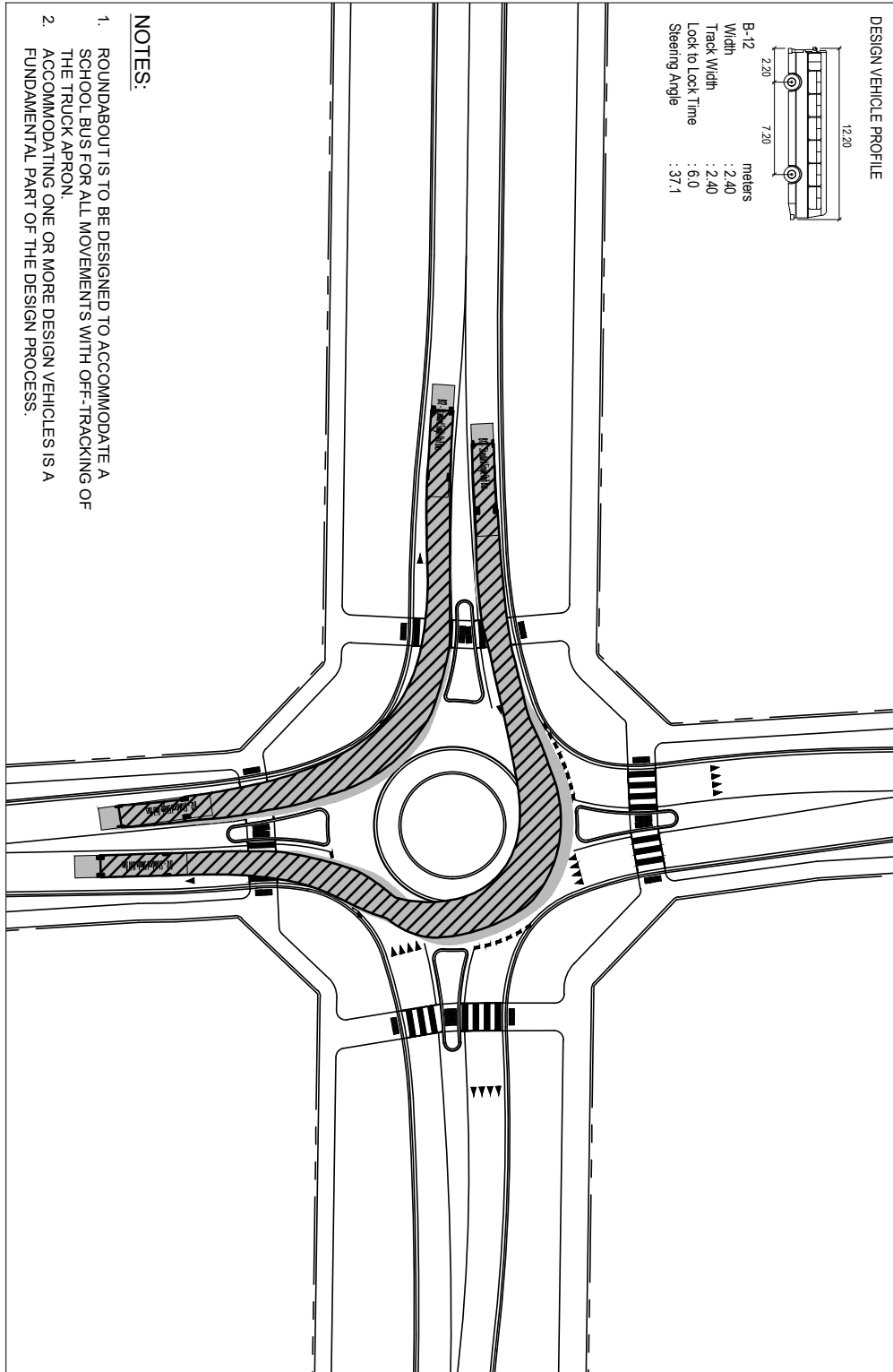
Trailer Track : 2.60

- NOTES:
1. ROUNDABOUT IS TO BE DESIGNED TO ACCOMMODATE A WB-17 FOR ALL MOVEMENTS WITH OFF-TRACKING OF THE TRUCK APRON, AND A SCHOOL BUS WITH NO OFF-TRACKING OF THE TRUCK APRON.
 2. ACCOMMODATING ONE OR MORE DESIGN VEHICLES IS A FUNDAMENTAL PART OF THE DESIGN PROCESS.

SWEEP PATH OF WB-17 TO HAVE 0.3 m SEPARATION BETWEEN TIRES AND FACE OF OUTER CURBS

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked Approved Scale: N.T.S	<h2 style="margin: 0;">Design Vehicle - 36m Roundabout</h2>	DWG. Date: . Revision No.: Revision Date: . DWG No. Fig. D4

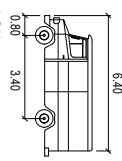


- NOTES:**
1. ROUNDABOUT IS TO BE DESIGNED TO ACCOMMODATE A SCHOOL BUS FOR ALL MOVEMENTS WITH OFF-TRACKING OF THE TRUCK APRON.
 2. ACCOMMODATING ONE OR MORE DESIGN VEHICLES IS A FUNDAMENTAL PART OF THE DESIGN PROCESS.

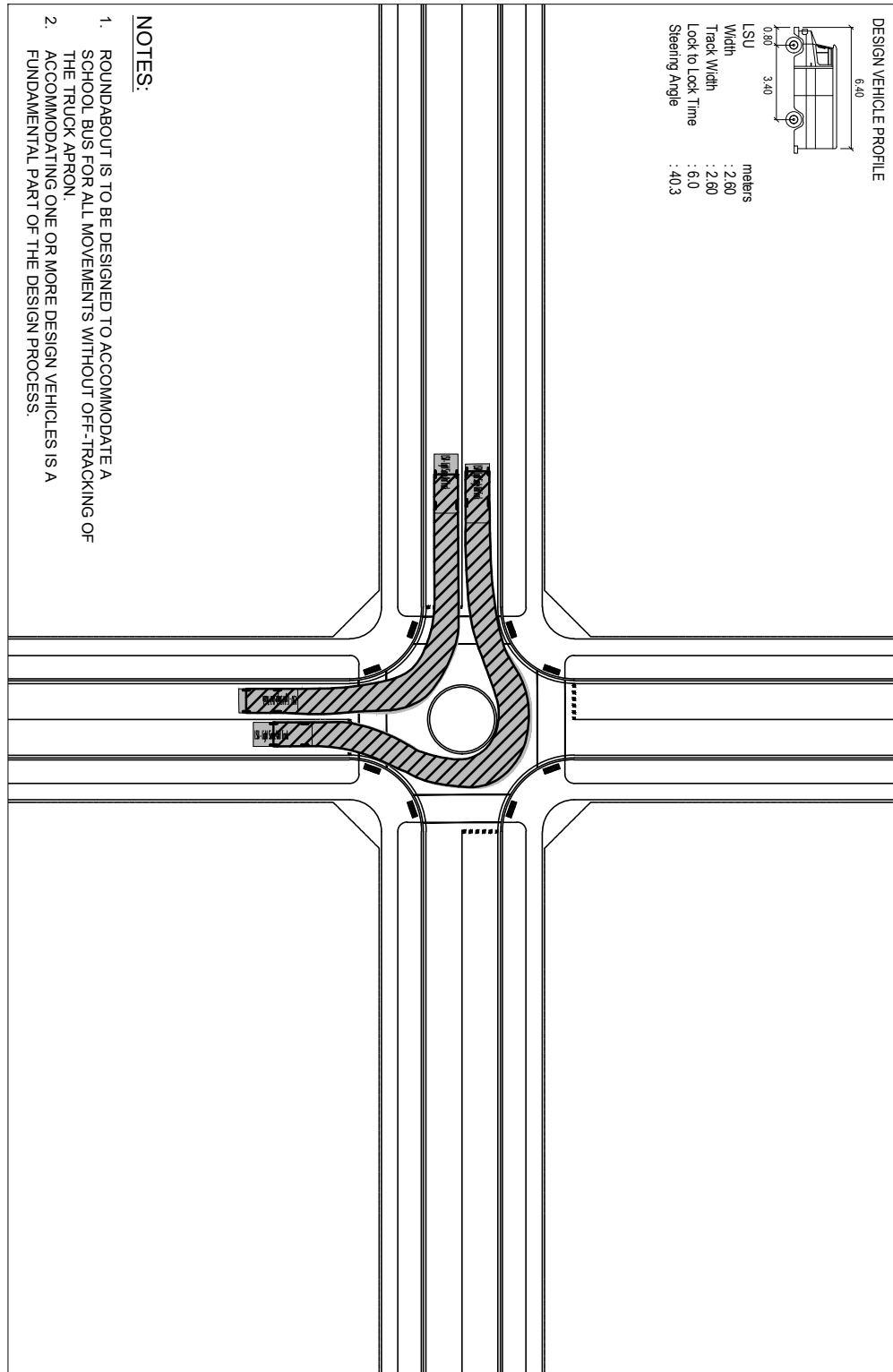
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked Approved Scale: N.T.S	<h2 style="margin: 0;">Design Vehicle - 27m Roundabout</h2>	DWG. Date: . Revision No.: Revision Date: . DWG No. Fig. D5

DESIGN VEHICLE PROFILE



LSU	0.80	meters
Width	3.40	meters
Track Width	: 2.60	
Lock to Lock Time	: 6.0	
Steering Angle	: 40.3	

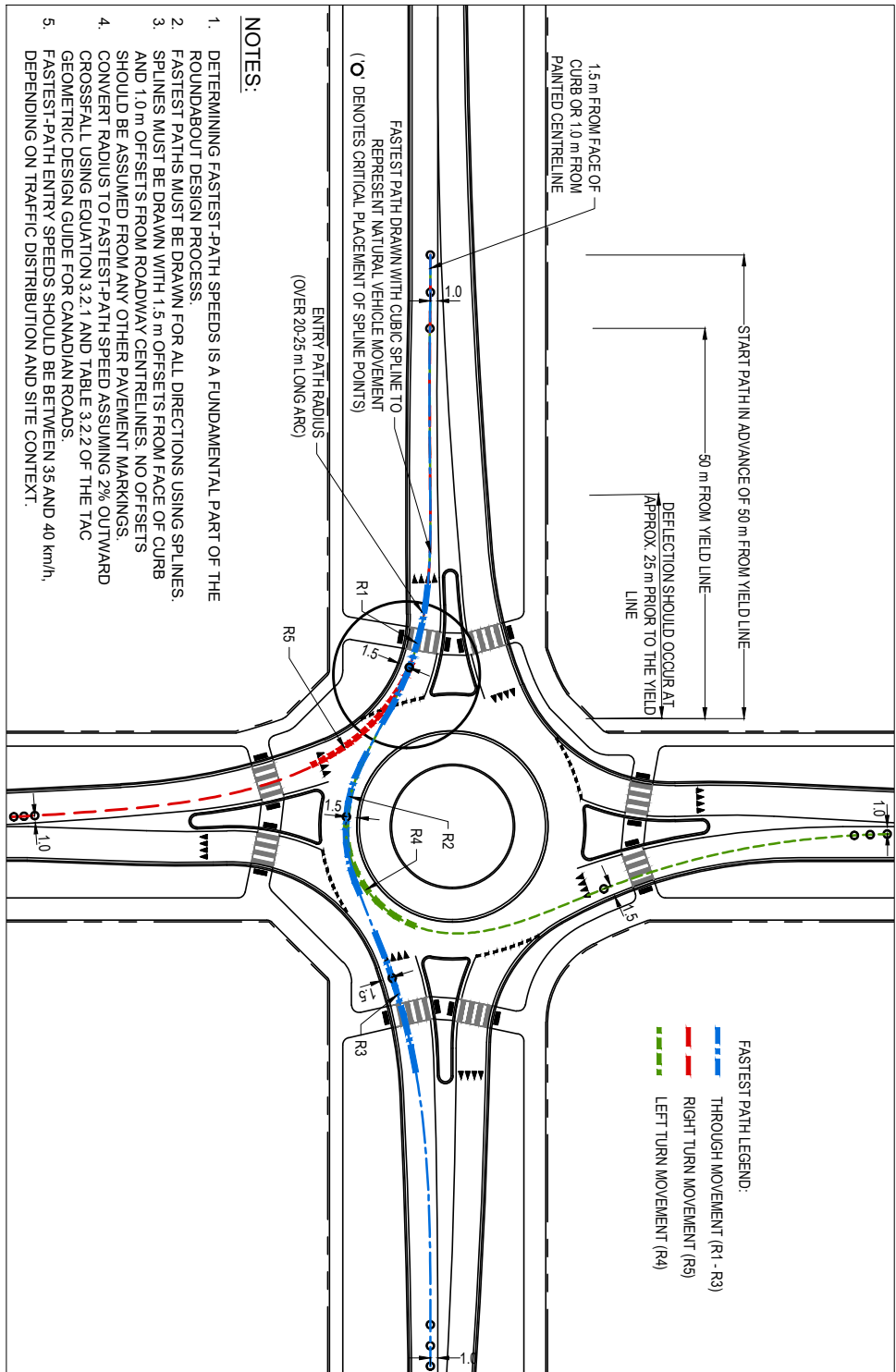


NOTES:

1. ROUNDABOUT IS TO BE DESIGNED TO ACCOMMODATE A SCHOOL BUS FOR ALL MOVEMENTS WITHOUT OFF-TRACKING OF THE TRUCK APRON.
2. ACCOMMODATING ONE OR MORE DESIGN VEHICLES IS A FUNDAMENTAL PART OF THE DESIGN PROCESS.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	Design Vehicle - Traffic Calming Circle	DWG. Date:	
Approved		Revision No.:	
Scale: N.T.S		Revision Date:	
		DWG No.	Fig. D6



All dimensions in millimetres except where noted

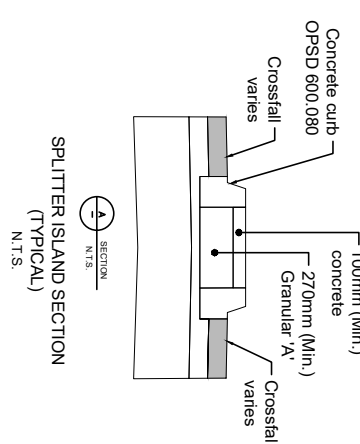
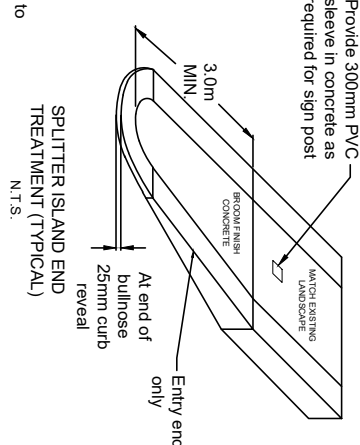
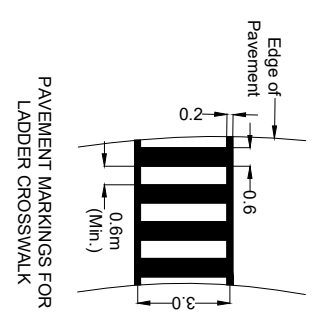
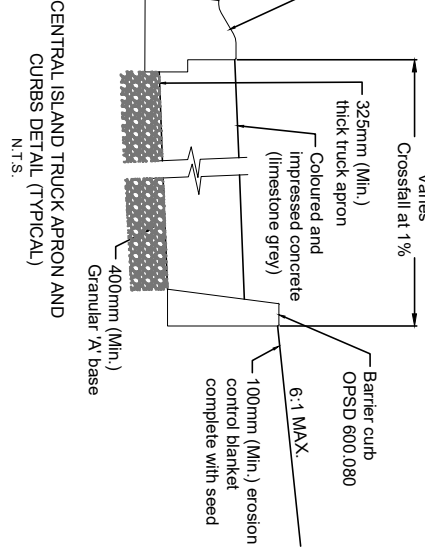
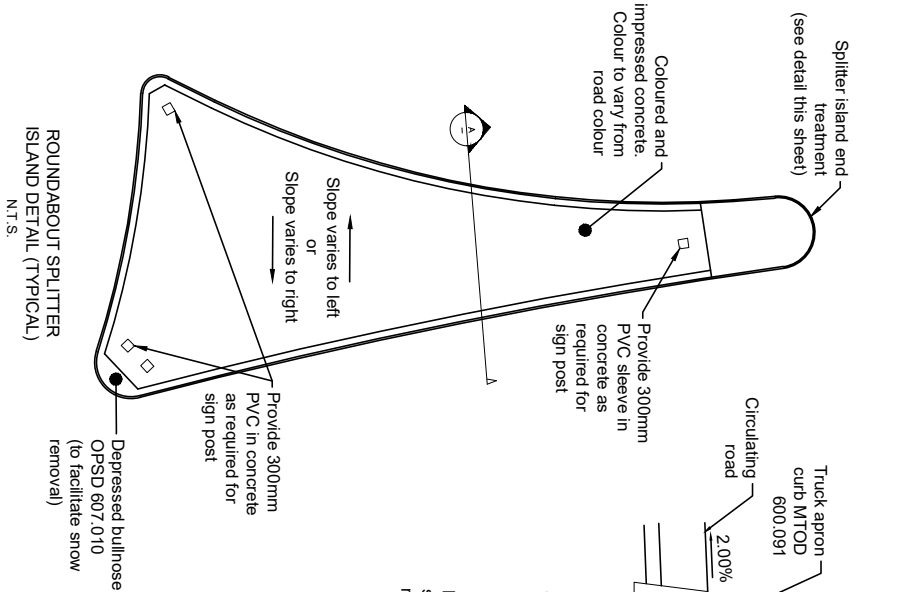
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

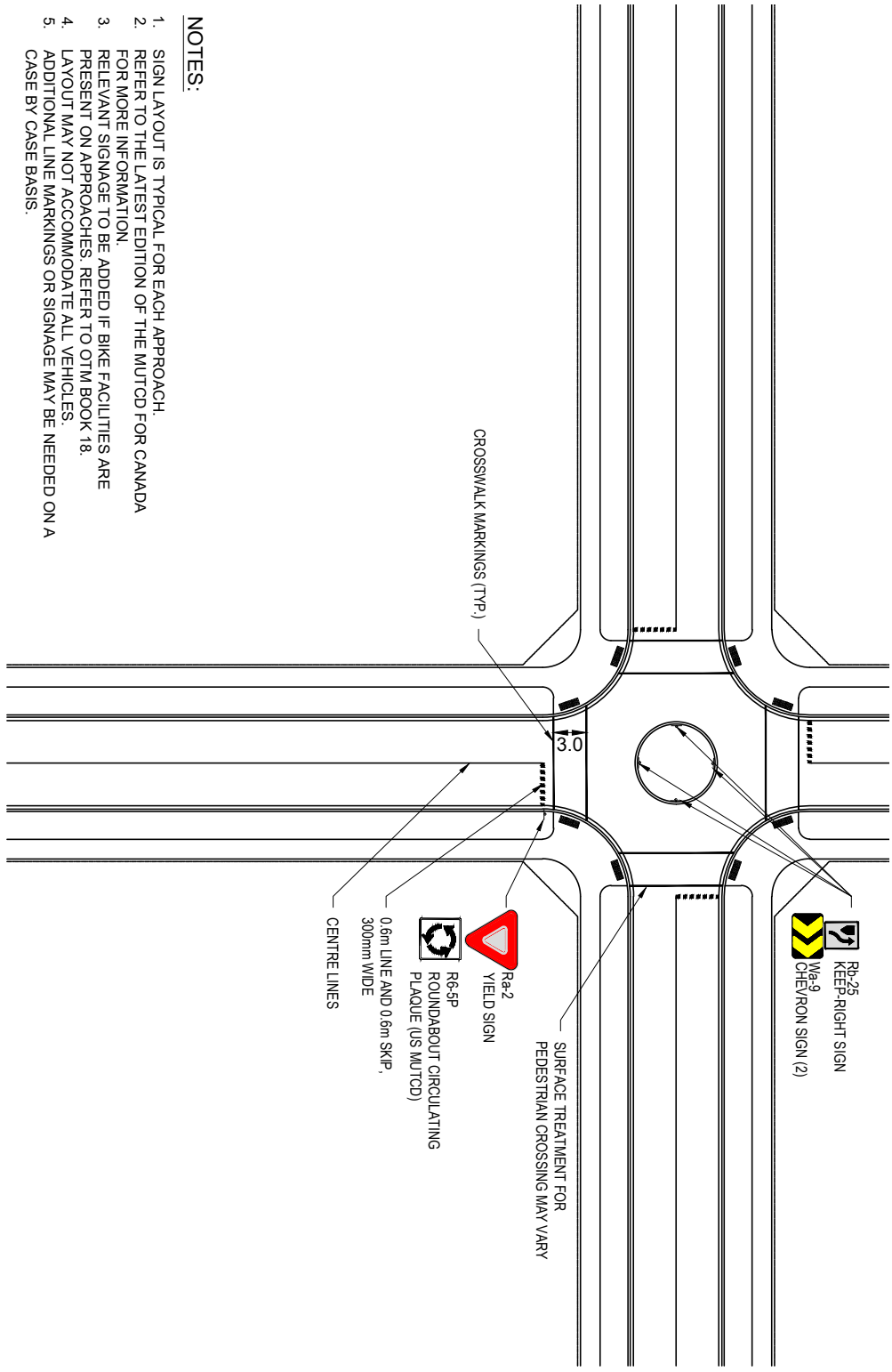
Roundabout Entry Path Radii

DWG. Date:	.
Revision No.:	.
Revision Date:	.
DWG No.	Fig. D7



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	<h2>Roundabout Design Details</h2>	DWG. Date: .	Revision No.:
Approved		Revision Date: .	DWG No. Fig. D8
Scale: N.T.S			



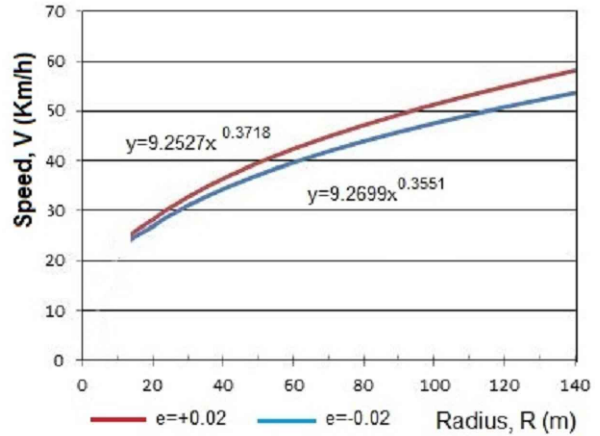
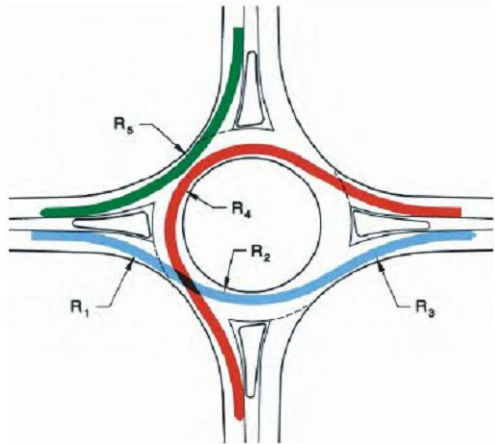
- NOTES:**
1. SIGN LAYOUT IS TYPICAL FOR EACH APPROACH.
 2. REFER TO THE LATEST EDITION OF THE MUTCD FOR CANADA FOR MORE INFORMATION.
 3. RELEVANT SIGNAGE TO BE ADDED IF BIKE FACILITIES ARE PRESENT ON APPROACHES. REFER TO OTM BOOK 18.
 4. LAYOUT MAY NOT ACCOMMODATE ALL VEHICLES.
 5. ADDITIONAL LINE MARKINGS OR SIGNAGE MAY BE NEEDED ON A CASE BY CASE BASIS.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	Traffic Calming Circle Signs and Markings	DWG. Date:	
Approved		Revision No.:	
Scale: N.T.S		Revision Date:	
		DWG No.	Fig. D10

Appendix E

Speed-Radius Calculation & Geometric Design Parameters



Circulatory road is crowned, then use same equation for R2 & R4 as for R1, R3 & R5.

Check of R4 vs conflicting R1 & R5 movements

Approach	Street name								
	R1	R2	R3	R2+A	R4	R5	Max. V	Min. V	Delta V
Accel. Dist. (m)									
Radius, R(m)									
Speed, V (Km/h)									

Approach	Street name								
	R1	R2	R3	R2+A	R4	R5	Max. V	Min. V	Delta V
Accel. Dist. (m)									
Radius, R(m)									
Speed, V (Km/h)									

Approach	Street name								
	R1	R2	R3	R2+A	R4	R5	Max. V	Min. V	Delta V
Accel. Dist. (m)									
Radius, R(m)									
Speed, V (Km/h)									

Approach	Street name								
	R1	R2	R3	R2+A	R4	R5	Max. V	Min. V	Delta V
Accel. Dist. (m)									
Radius, R(m)									
Speed, V (Km/h)									

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	<h2>Speed-Radius Calculation & Geometric Design Parameters</h2>	DWG. Date:	
Approved		Revision No.:	
Scale: N.T.S		Revision Date:	
		Dwg No.	Fig. E1

SB Appr. EB Appr. NB Appr. WB Appr. Leg 5 Leg 6

--	--	--	--	--	--

Critical Design Parameters

Entry Width, E(m)					
Effective Flare Length, L' (m)					
Road Half Width, V(m)					
Entry Radius, R(m)					
Entry Angle, Ø (degrees)					
Inscribed Circle Diameter, ICD (m)					
Upstream Circ. Road Width (m)					
Exit Width (m)					
Pedestrian Refuge Width (m)					

Path Radius Parameters

R1 (Km/h)					
R2 (Km/h)					
R3 (Km/h)					
R4 (Km/h)					
R5 (Km/h)					
Delta (Km/h)					

Minimum Sight Distance Parameters

Approach Design Speed (Km/h)					
Approach SSD (m)					
Circulating (R2) SSD (m)					
Pedestrian (R5) SSD (m)					
Entering ISD (m)*					
Circulating ISD (m)*					

* Note: Intersection sight distances (ISD) based on 4.5s critical gap

Design Vehicle _____
 Circulatory Road _____
 Truck Apron _____
 Pedestrian Facilities _____
 Bicycle Facilities _____
 Other Comments _____

Designer _____
 Reviewer _____
 Reviewer Name and Signature _____

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked
Approved
Scale: N.T.S

Speed-Radius Calculation & Geometric Design Parameters

DWG. Date: .
Revision No.:
Revision Date: .
Dwg No. Fig. E2

APPENDIX F

Permanent Ground Water Discharge Application Form & Document Checklist

Groundwater Pumping, Drawdown and Foundation Drainage

Category 1 – Temporary Construction Groundwater Discharge

1. Temporary groundwater pumping or lowering by passive drawdown during construction and discharge into municipal storm sewers may be permitted provided all of the following conditions are met:
 - a. Provincial Permit(s) to Take Water (PTTW) or registration in the Environmental Activity and Sector Registry (EASR) have/has been obtained through the Ontario Ministry of the Environment, Conservation and Parks (MECP)
 - b. Discharge rates are acceptable to the Town.
 - c. Compliance with Town of Whitby Sewer-Use Bylaw (as amended).
 - d. Confirmation that sufficient capacity exists within the storm sewer network.
 - e. Hydraulic Grade Line Analysis demonstrating no negative impacts to sewer network, specifically in residential areas with foundation drain connections.
2. The Applicant is advised that the evaluation of a temporary groundwater pumping proposal does not imply approval by the Director of Engineering Services.

Category 2 - Permanent Groundwater Discharge

1. Permanent groundwater pumping or lowering by passive drawdown (i.e., long-term dewatering) with discharge into municipal storm sewers, municipal stormwater facilities and/or private on-site stormwater or groundwater management facilities is prohibited without a project-specific, written exemption from the Town.
2. Notwithstanding the above, exemptions may be possible under certain circumstances. Applicants pursuing an exemption shall arrange a preliminary meeting with engineering staff to determine whether an exemption can be considered.

Should the Director of Engineering Services determine that an exemption request can be considered, the Applicant shall submit a proposal and adhere to the requirements of Sections 3 to 6 below and complete Parts 1 to 4 of the *Permanent Groundwater Discharge Application Form & Documents Checklist (Appendix A)*. The Applicant is further advised that the evaluation of an exemption proposal does not imply acceptance by the Director of Engineering Services.

If the long-term dewatering proposal is accepted by the Director of Engineering Services, the requirements listed in Sections 7 and 8 below and Part 5 of the Permanent Groundwater Discharge Application Form & Documents Checklist (Appendix A) shall be completed upon Engineering Services' final acceptance of the Permanent Groundwater Pumping proposal.

The Town reserves the right to undertake a peer review of any documentation submitted to confirm findings and conclusions. Peer review costs shall be the sole responsibility of the Applicant.

3. Documentation Requirements:
 - a. Discharge rates are acceptable to the Town;
 - b. Confirmation that sufficient capacity exists within the storm sewer network;

- c. Hydraulic Grade Line Analysis demonstrating no negative impacts to storm sewer network, specifically in residential areas with foundation drain connections;
 - d. Groundwater analysis confirming that quality complies with Town of Whitby Storm Sewer By-law # 6998-15 (as amended).
 - e. Provide copies of Environmental Site Assessments and/or Record of Site Condition.
4. Hydrogeological and Geotechnical Report Requirements
- a. Statistical summaries of hydraulic conductivity and flow rate analyses for each water-bearing unit affected by permanent dewatering.
 - i. Clear identification of water pressure head elevations for all confined water-bearing layers.
 - ii. Analyses related to long-term migration of subsurface contaminants from off-site to discharge location as influenced by long-term dewatering and associated hydraulic gradients.
 - iii. Interpretation of probable seasonal fluctuation in groundwater pressure head elevation for all water-bearing layers.
 - b. Confirmation from both the Geotechnical and Hydrogeological Engineers that the Geotechnical and Hydrogeological reports have been coordinated.
 - c. Groundwater pressures from any water-bearing layer cannot result in flowing conditions at ground surface (i.e., flowing artesian conditions).
 - d. Four boreholes around the project site extending to a depth below ground surface equal to or greater than twice the depth from the ground surface to the underside of all below-ground floors. Sampling of the boreholes using the Standard Penetration Test (ASTM D1586) in each borehole shall be at intervals of no greater than 1.5 m for their full depth.
 - e. One borehole for every 50 m of dewatered area perimeter extending to at least 2 metres below the anticipated drainage system elevation.
 - i. Each perimeter borehole shall include:
 1. Survey of ground surface and top of observation well elevation to benchmark elevation consistent with Provincial Digital Elevation Model (PDEM) to the nearest 0.1 m with UTM coordinates to the nearest 1 m;
 2. One observation well screen sealed within water-bearing layer that will discharge water into foundation/basement dewatering system;
 3. Groundwater level measurements at completion of the well and at weekly intervals thereafter for a minimum of two months;
 4. One single well response test (rising or falling head) completed in accordance with ASTM D4044;
 5. One grain size distribution analysis completed in accordance with ASTM D6913 and ASTM D7928 on a sample obtained within the

water-bearing layer that will discharge water into foundation/basement dewatering system;

6. Classification of soil layers using Canadian Foundation Engineering Manual guidelines and/or ASTM D2487 (latest editions).
- f. Any water-bearing granular soil (i.e., silt, sand and/or gravel as defined in accordance with ASTM D2487) or rock layer identified below the lowest planned floor elevation shall be characterised by:
1. At least three observation well screens sealed within the aquifer;
 2. Groundwater level measurements at completion of the well and at weekly intervals thereafter for a minimum of two months;
 3. One single well response test (rising or falling head) in each observation well;
 4. One grain size distribution analysis ASTM D6913 (latest edition) with ASTM D7928 on sample obtained within water-bearing layer from each observation well; and
 5. Classification of soils and rock using Canadian Foundation Engineering Manual guidelines or ASTM D2487 (latest editions).
- g. All fine-grained geologic layers categorized as aquitards or aquicludes shall be characterized by at least one sample per borehole/well being subjected to classification testing in accordance with ASTM D4318 (latest editions).
- h. A minimum of 25 per cent of all soil samples shall be subjected to determination of their natural water content in accordance with ASTM D2216 (latest editions).
- i. Analyses for filtration compatibility between any imported aggregate or soil materials, synthetic drainage materials, native soils in any combination of adjacent materials contemplated by the Geotechnical Engineer. Filtration analyses shall be supported by detailed references for methodology (e.g., Canadian Foundation Engineering Manual, latest edition).
- j. Clear recommendations for subsurface drainage systems based on analyses of grain size distribution data and key characteristics of any drainage material effective opening sizes and filtration characteristics.
- k. Data from minimum of three site-specific oedometer tests completed in accordance with ASTM D2435 shall be used as the basis for any settlement estimates based on consolidation analyses.
- l. Settlement analyses for the effects of groundwater drawdown on the proposed project and adjacent public and private infrastructure (e.g., buildings, utilities, roads, highways, etc.) considering:
- i. Uncertainties in radius of groundwater drawdown.
 - ii. Uncertainties in groundwater levels
 - iii. Uncertainties in ground stress-strain properties
 - iv. Uncertainties in the settlement rate for silt and clay soils.

- v. Combination of settlement from stresses induced by new construction as well as temporary and permanent groundwater level drawdown.
 - m. Hydraulic uplift stability analyses for all temporary excavations and permanent conditions along with recommendations for control of uplift stability via temporary or permanent groundwater pressure reduction.
 - n. Typical groundwater pressure head elevations and a summary of the measured variability for each of all water-bearing geologic layers.
 - o. Analysis and summary of aquifer confinement conditions.
 - p. Clearly defined and interpreted subsurface geologic model for the site including illustrated profiles and cross-sections of the site showing:
 - i. Boundaries between geologic layers;
 - ii. Summary classifications for all geologic layers;
 - iii. Groundwater pressure head elevations for design purposes considering seasonal fluctuations;
 - iv. Expected elevations of all below-ground floor levels;
 - v. Expected elevations of all below-ground groundwater management systems.
5. Design drawings shall include:
- a. Identification and specification of all subsurface groundwater control pipes and their diameter, elevations, slopes and any perforations or filtration systems necessary to inhibit long-term clogging;
 - b. Identification and specification of all imported aggregates and synthetic filtration materials;
 - c. Construction and inspection notes regarding continuity of filtration (e.g., joints, pipe penetrations, etc.);
 - d. Identification and specification of groundwater collection sumps and pumping systems;
 - e. Back-up power supplies for pumps;
 - f. Clean-out access locations for long-term maintenance;
 - g. Automated and manual monitoring systems to record cumulative discharge rates and pump operations, water chemistry, data recording frequency, and data storage and storage back-up systems;
 - h. Long-term groundwater control maintenance requirements including frequency of inspections, types and frequency of system testing, and failure contingency plans. Refer to Section (n);
 - i. Sampling access point - When groundwater is discharged to the municipal sewer system, the Town requires a private water sampling access point located on the private property to monitor the quality and quantity of private water discharged to the Town's sewage system in accordance with Town of Whitby Sewer-Use Bylaw

(as amended). The Town requires a 24-hour a day, 7 days a week accessible location, upstream of the control maintenance access hole;

- j. Type, plan locations, and vertical extent of all excavation support systems.

6. Final Acceptance

Prior to final acceptance of a long-term dewatering proposal the Applicant shall:

- a. Obtain Provincial Permit(s) to Take Water (PTTW) or registration in the Environmental Activity and Sector Registry (EASR) have/has been obtained through the Ontario Ministry of the Environment, Conservation and Parks.
- b. Obtain a signed, sealed Geotechnical Design Review Letter from the Geotechnical Engineer of record providing a summary of their design review and concurrence with the dewatering system design details as shown on the design drawings and technical specifications for the project and an opinion regarding compliance with these design standards. If the design submitted as part of the request for exemption is different than that contemplated by the Geotechnical Engineer of record at the time the Geotechnical Engineering report was prepared, the letter shall clearly state the differences, how the differences do or do not affect the viability of the design and discussion of details implemented to comply with these design standards.
- c. Obtain a signed, sealed Hydrogeological Design Review Letter from the Qualified Person (QP) responsible for preparing the Hydrogeological Report providing a summary of their design review and concurrence with the dewatering system design details as shown on the design drawings and technical specifications for the project and an opinion regarding compliance with these design standards. If the design submitted as part of the request for exemption is different than that contemplated by the QP of record at the time the Hydrogeological Report was prepared, the letter shall clearly state the differences, how the differences do or do not affect the viability of the design and discussion of details implemented to comply with these design standards and the PTTW.
- d. Provide a stand-alone Operations and Maintenance Manual including:
 - i. Frequency and Duration of testing.
 - ii. Reporting requirements (Refer Section 7 below).
 - iii. Procedural framework and recommendations on how to address future adverse samples/ test results.
 - iv. Sampling and Testing equipment maintenance schedule.
- e. Complete Part 5 of the Permanent Groundwater Discharge Application Form & Documents Checklist (Appendix A)

7. Site Plan Agreement Conditions

- a. At a minimum, the following conditions shall be included in the Site Plan Agreement:
 - i. Details on how adverse samples and/or contaminated water shall be treated, including an extended monitoring period as applicable.
 - ii. Details on how exceedances of flows as identified in the Geotechnical and Hydrogeological Reports will be remedied.
 - iii. A statement acknowledging Monitoring reports to be provided quarterly for the first year and annually thereafter.
- b. Provision for a 3-year Groundwater Discharge Monitoring Program to be implemented by the Applicant that includes:
 - i. Details on how adverse samples and/or contaminated water shall be treated, including an extended monitoring period as applicable.
 - ii. Details on how exceedances of flows as identified in the Geotechnical and Hydrogeological Reports will be remedied.
 - iii. A statement acknowledging Monitoring reports to be provided quarterly for the first year and annually thereafter.
- c. An Agreement to permit the Town to enter the subject property during the 3-year monitoring period.
- d. Requirement for a cash security as per the Fees for Services By-law (\$30,000 as of 2023) to ensure the monitoring plan and/or remedial action and/or repairs are completed. To be released upon completion of the 3-year monitoring period or extended monitoring period as applicable.

Appendix F

Permanent Groundwater Discharge Application Form & Documents Checklist

Preliminary Proposal Discussion Meeting with Town Staff <input type="checkbox"/>	
Date:	
Property Owner Contact Details (Name, Company, Mailing Address, Contact Number and Email)	
Development/ Project Address:	
Town of Whitby Site Plan File Number:	
Number of Installed Observation Wells:	
Dates of Groundwater Level Observations:	
Maximum Observed Groundwater Surface Elevation in Unconfined Aquifer (masl):	
Maximum Observed Groundwater Surface Elevation in Confined Aquifer (masl):	
Lowest Elevation of Proposed Structure (masl):	
Ground Surface Elevations (masl): Lowest Highest	
Infiltrated Precipitation Only: Yes No Groundwater: Yes No	
Watertight Structure/No Foundation Drainage: Yes No	
On-Site Management/No Discharge to Sewers: Yes No	
Request for Exemption to Discharge to Sewers Prohibition: Yes No	
Subsurface Conditions & PTTW	
Hydrogeological Report <input type="checkbox"/>	Phase One Environmental Site Assessment (O. Reg 153/04 as amended) <input type="checkbox"/>
Geotechnical Report <input type="checkbox"/>	Phase Two Environmental Site Assessment (O. Reg 153/04 as amended) <input type="checkbox"/>
Permit to Take Water Application Copy <input type="checkbox"/>	Record of Site Condition <input type="checkbox"/>
Full Depth Elevation View, Each Wall <input type="checkbox"/>	Foundation Drainage Pumps <input type="checkbox"/>
Foundation Design Drawings <input type="checkbox"/>	Backup Power <input type="checkbox"/>
Drainage Design Drawings <input type="checkbox"/>	
Preliminary Excavation Support Drawings <input type="checkbox"/>	

*metres above sea level (masl)

Appendix F - Continued

Part 5 - Final Sign-off and Reports

Hydrogeological Design Review Letter	<input type="checkbox"/>
Engineer of Record:	Title:
Signature:	Date:
Email:	Phone Number:
Geotechnical Design Review Letter	<input type="checkbox"/>
Engineer of Record:	Title:
Signature:	Date:
Email:	Phone Number:
Operations and Maintenance Manual	<input type="checkbox"/>
Engineer of Record:	Title:
Signature:	Date:
Email:	Phone Number:



The Corporation of the
Town of Whitby
Engineering Services

Engineering Standards

Corporation of the Town of Whitby

Engineering Services

Engineering Section

The Town of Whitby has adopted the Ontario Provincial Standards. They consist of the following: Ontario Provincial Standard Drawings (OPSD) and Ontario Provincial Standard Specifications (OPSS)

Where no comparable Town of Whitby Standard Drawing exists in the Ontario Provincial Standards it has been included in this manual.

When standards are required during the design stage it is recommended that reference to this manual be made first for the applicable Standard; if no Town of Whitby Standard exists refer to the Ontario Provincial Standards.

Links to the Ontario Publications and the Provincial Standards on the MTO Library website are available on the OPS website www.ops.on.ca .

Town of Whitby Standard Drawings

Index

Standard Number	Storm Sewers	Date Drawn	Date Revised
100	Benching for Precast Maintenance holes	Jan. 1993	May 2006
101	Drop Structures for Maintenance holes	Jan. 1993	
102	Backfilling Support for Existing Storm Sewer	Jan. 1993	
103	Handrails for Sewers and Culvert Headwalls	Jan. 1993	Jan. 2009
104	Storm Sewer Residential Service Connection	Jan. 1993	Oct. 2018
105	Storm Sewer Residential Service Connection	Jan. 1993	Oct. 2018
106	Storm Sewer Residential Service Connection	Jan. 1993	June 1999
106.10	Storm Service Connection Under Basement Floor Slab	Jan. 2009	
107	P.V.C. Catchbasin Connection	Apr. 1994	May 2006
107.10	Rear Yard Catchbasin Connection	July 2002	Aug. 2015
107.20	Typical Detail Determining Maximum USF Next to RYCB Lead / Sewer Pipe	Aug. 2015	
108	Subdrains	Jan. 1993	May 2006
109	Subdrains – For Installation Behind/Front of Existing Curb and Gutter	Jan. 1993	Aug. 2015
110	IFC MH Frame and Cover	Oct. 2018	
111	IFC Maintenance Hole Tapered Top Assembly	Oct. 2018	
112	IFC Maintenance Hole Adjustment Top Assembly	Oct. 2018	

Town of Whitby Standard Drawings

Index

Standard Number	Curbs/Sidewalks	Date Drawn	Date Revised
200	Catchbasin Grate Detail – At Base Course Asphalt Elevation	Nov. 1994	May 2006
201	Catchbasin Grate Detail – For full Stage Curb and Gutter at Base Course Asphalt Elevations	Nov. 1994	Jan. 2009
202	Catchbasin Grate Detail – Setting Grate at Surface Course Asphalt Elevation	Nov. 1994	Jan. 2009
203	Rebuilding Existing Catchbasin to Fit Curb and Gutter	Jan. 1993	Oct. 2018
206	Two-Stage Curb and Gutter	June 1999	Oct. 2018
207	Reinstatement of Base Asphalt for Two Stage Curb and Gutter	Apr. 1997	May 2006
208	Concrete Sidewalk	May 1997	June 2022
208.10	Typical Stop Bar Locations and Sidewalk Deflections at Intersections.	Aug. 2015	June 2022
208.20	Typical Stop Bar Locations and MUP Deflections at Intersections.	June 2022	
208.30	Sidewalk Curb Depression	May 2025	
209	Overland flow Walkway	Nov. 1994	Oct. 2018
210	Temporary Asphalt Sidewalk	Nov. 1994	June 2022
211	Coloured Impressed Concrete	Aug. 2015	Oct. 2018
214	Multi-Use Asphalt Pathway	Jan. 2009	May 2025
214.10	Typical Rest Area Along MUP and Sidewalk	June 2022	May 2025
214.20	MUP Signage and Pavement Markings	June 2022	May 2025
214.30	MUP Signage and Pavement Markings Notes	June 2022	May 2025
215	Temporary Sidewalk Barricade	Aug. 2015	June 2022
216	Speed Hump	June 2022	May 2025

Town of Whitby Standard Drawings

Index

Standard Number	Grading	Date Drawn	Date Revised
300	Typical Front Lot Drainage	Jan. 1993	Oct. 2018
301	Rear Lot Drainage	Jan. 1993	Oct. 2018
302	Rear Lot Drainage for Walkout or Back Split House	Jan. 1993	Oct. 2018
303	Standard Notes for Lot Grading Plans	Jan. 1993	June 2022
303.10	Foundation Control Certificate	Jan. 2009	June 2022
304	Driveway Profiles	Jan. 1993	May 2025
305	Residential Driveways	June 1999	Oct. 2018
306	Rural Driveways	Aug. 2015	

Town of Whitby Standard Drawings

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Standard Number	Geometrics	Date Drawn	Date Revised
400	Local Roadway, 15.0m R.O.W.	June 2022	
400.10	Local Roadway, 18.0m R.O.W.	June 2022	
400.20	Local Roadway, 20.0m R.O.W.	June 2022	
401	Collector Roadway, 23.0m R.O.W.	June 2022	
401.10	Collector / Arterial C Roadway, 26.0m R.O.W.	June 2022	
402	Arterial C / Arterial B Roadway, 30.0m R.O.W.	June 2022	May 2025
402.10	Arterial B Roadway, 36.0m R.O.W.	June 2022	May 2025
403	Rural Road –20.0m R.O.W.–6.7m Pavement	Mar. 2004	Aug. 2015
404	Utility Duct Road Crossing Detail for Existing Roads	June 1999	Aug. 2015
404.10	Utility Duct Road Crossing Detail for New Subdivisions	June 1999	July 2019
404.30	Direct Buried – Joint Use Trench for Subdivisions Only – 18.0m R.O.W.	Aug. 2002	June 2022
404.40	Trench Restoration Detail	Jan. 2009	Oct. 2018
404.50	Asphalt Restoration Area	Aug. 2015	
405	Typical 90° Crescent – 20.0m R.O.W.	June 1999	Oct. 2018
405.10	Typical 90° Crescent – 20.0m R.O.W. w/Eyebrow	July 2011	Oct. 2018
406	Typical 90° Crescent – 18.0m R.O.W.	June 1999	Aug. 2015
406.10	Typical 90° Crescent – 18.0m R.O.W. w/Eyebrow	July 2011	Aug. 2015
406.20	Typical 90° Crescent – 8.5m R.O.W. Laneway	May 2025	
407	Typical Cul-De-Sac Terminating – 20.0m R.O.W.	June 1999	Oct. 2018
408	Typical Cul-De-Sac Terminating – 18.0m R.O.W.	June 1999	Aug. 2015
408.10	Maintenance Road Hammerhead Detail	May 2025	
410	Non-Residential and Multi-Family Entrance Detail	Nov. 1994	May 2025
411	Proposed Driveway Approaches in Cul-De-Sac	Jan. 1993	Aug. 2015
412	Median Island	May 2006	Aug. 2015
412.10	Island Detail	Jan. 2009	Oct. 2018
412.20	1.7m Wide Island Ramp End Detail	May 2006	Oct. 2018

Town of Whitby Standard Drawings

Index

Standard Number	Geometrics	Date Drawn	Date Revised
413	Accessibility Parking – Proposed and Retrofit	Jan. 2009	June 2025
413.10	Parking Meter Standard	May 2025	
413.20	EV Pad Details	May 2025	
413.30	EV Pad Installation Details	May 2025	
413.40	SLM60 Metered Pedestal Detail	May 2025	
414.10	Pavement Marking Legend	Oct. 2018	May 2025
415	Public Laneway – Criteria and Notes	Oct. 2018	
415.10	Single Loaded Public Laneway	Oct. 2018	
415.20	Double Loaded Public Laneway with Tandem Parking	Oct. 2018	
415.30	Double Loaded Public Laneway with Side by Side Parking	Oct. 2018	

Town of Whitby Standard Drawings

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Standard Number	Miscellaneous	Date Drawn	Date Revised
500	Street Sign Location	May 1997	May 2025
501	Street Name Sign	Nov. 1994	May 2025
501.10	Heritage Street Sign	Jan. 2009	Oct. 2018
501.20	Storm Pond Sign Detail	Aug. 2015	May 2025
501.30	Mud Mat Detail	May 2025	
502.10	Standard Streetlight for Arterial and Non Residential Collector Roads	Mar. 2004	July 2019
502.20	Standard Streetlight for Local and Residential Collectors Roads	Aug. 2015	July 2019
502.30	Standard Streetlight for Designated Heritage Areas	Mar. 2004	July 2019
502.40	Standard Streetlight for Designated Downtown Areas	Aug. 2015	
502.50	Underground Distribution Standards – Street Light Pole c/w Services Entrance Breaker Connection	Aug. 2015	
502.60	Underground Distribution Standards – Street Light Wire Diagram Non-Service Entrance	Aug. 2015	
503	Typical Municipal Parking Lot Light Standard Detail	Mar. 2004	Oct. 2018
504	Grounding Detail for Streetlight Pedestal and Poles	Mar. 2004	
504.10	Power Supply from Transformer to Pedestal to Streetlights	Mar. 2004	
504.20	Streetlight Wiring Diagram	Mar. 2004	
504.30	Streetlight Pedestal Reference Numbering	Mar. 2004	
504.40	Streetlight Pedestal enclosure	Mar. 2004	June 2022
504.50	Pole Number Plate	Oct. 2018	
505	Benchmark Tablet	Jan. 1993	May 2006
506	Wood Acoustic Fence	July 2002	Aug. 2015
506.10	Wood Acoustic Fence Notes	July 2011	Oct. 2018
506.30	1200MM (4'-00") High Black Vinyl Coated C.L.F.	July 2011	Aug. 2015
506.40	1800MM (6'-00") High Black Vinyl Coated C.L.F.	July 2011	Aug. 2015
508	Drawing Title Block For Capital Projects	Mar. 2004	June 2022

Town of Whitby Standard Drawings

Index

Standard Number	Miscellaneous	Date Drawn	Date Revised
509	Drawing Title Block for New Subdivisions	Mar. 2004	May 2025
509.10	Legal Drawing Title Block For Individual Siting Plans	Oct. 2018	June 2022
509.20	Ledger Drawing Title Block For Individual Siting Plans	Oct. 2018	June 2022
510	Service Connection Record Subdivisions/Site Plans	July 2002	June 2022
511	Service Connection Record Capital Projects	July 2002	June 2022
512	Rainfall Intensity Curve and Values	July 2002	Aug. 2015
513	Storm Sewer Design Sheet	July 2002	June 2022
514	Tree Pit Rooting Zone	Oct. 2018	June 2022
515	Ditch Infill – Typical Details	May 2025	
515.10	Ditch Infill Notes	May 2025	

**Additional Conditions
Required for
Ontario Provincial Standards**

OPSD Section 100

Abbreviations

- No change

OPSD Section 300

Entrances

OPSD Standard 310.010

- Dummy Joint to be saw cut to 50mm deep where applicable or otherwise to be determined by the Contract Administrator
- Expansion Joint Filler to be placed through complete sidewalk depth and is to be flush with sidewalk (no trowelled joint)
- Vapour Barrier to consist of 50um Polyethylene Film
- Granular Base to consist of 100mm of Granular "A"
- Sidewalk thickness to be 125mm except for Residential Driveways (175mm)
- For Commercial and Industrial Driveways sidewalk thickness to be 175mm with 150mm X 150mm wire mesh MW 18*7 gauge to be placed 75mm from the bottom
- Refer to Town of Whitby Standard 304 for driveway profile and sidewalk cross fall
- Concrete to be 32MPa compressive strength at 28 days with 7.0 +/- 1.5% air entrainment and cement ration to be 355 kg/m³.

OPSD Standard 350.010
OPSD Standard 350.010

- Refer to Town of Whitby Standard No 305 and No 410

OPSD Section 400

Frames and Grates

OPSD Standard 400.010

- Town of Whitby requires the use of this frame and grate on all catchbasins on local residential, collector and arterial road allowances.

OPSD Standard 400.020

- Town of Whitby requires the use of this frame and grate on all catchbasins in boulevards or rear yards.

OPSD Standard 401.010

- Town of Whitby requires the use of Type A frame and grate for maintenance holes on local residential, collector and arterial road allowances.

OPSD Standard 401.060

- Town of Whitby requires the use of a locked maintenance hole in any landscaped or sodded area.

OPSD Standard 405.010 -

Town of Whitby requires Hollow Circular Aluminium Ladder Rungs

OPSD Section 600

OPSD Standard 600.040

Curbs and Gutters

- Concrete to be 32MPa compressive strength at 28
 - 600.110 days with 7.0 +/- 1.5% air entrainment and cement ratio to be 355 kg/m³
- Contraction joints are to be placed at intervals not exceeding 3.0 metres. Refer to Town of Whitby Standard No 202 and No 305.

OPSD Section 700

Catchbasins and Manholes

OPSD Standard 705.02

***NOTE**

- For catchbasins all granular materials used as a base or for backfill purposes shall only be 19mm crusher run limestone.

If unstable ground conditions are encountered at the bottom of the sewer, then the material shall be removed and replaced with 50mm clear stone or 15MPa concrete to a depth as directed by the site engineer prior to the placing of normal bedding.

OPSD Section 800

Culverts and Drains

OPSD Standard

- 802.010
 - 802.014
 - 802.020
 - 802.024
- Bedding for P.V.C. pipe shall be 19mm crusher run limestone placed to obvert of pipe.
 - If unstable ground conditions are encountered at the bottom of the sewer, then the material shall be removed and replaced with 50mm clear stone or 15MPa concrete to a depth as directed by the site engineer prior to the placing of normal bedding.
 - 19mm clear limestone to be used if, ground water table is above the trench bed or, if ground water is flowing into the trench through the embedment zone.
 - whenever 19mm clear limestone is used filter fabric is required.

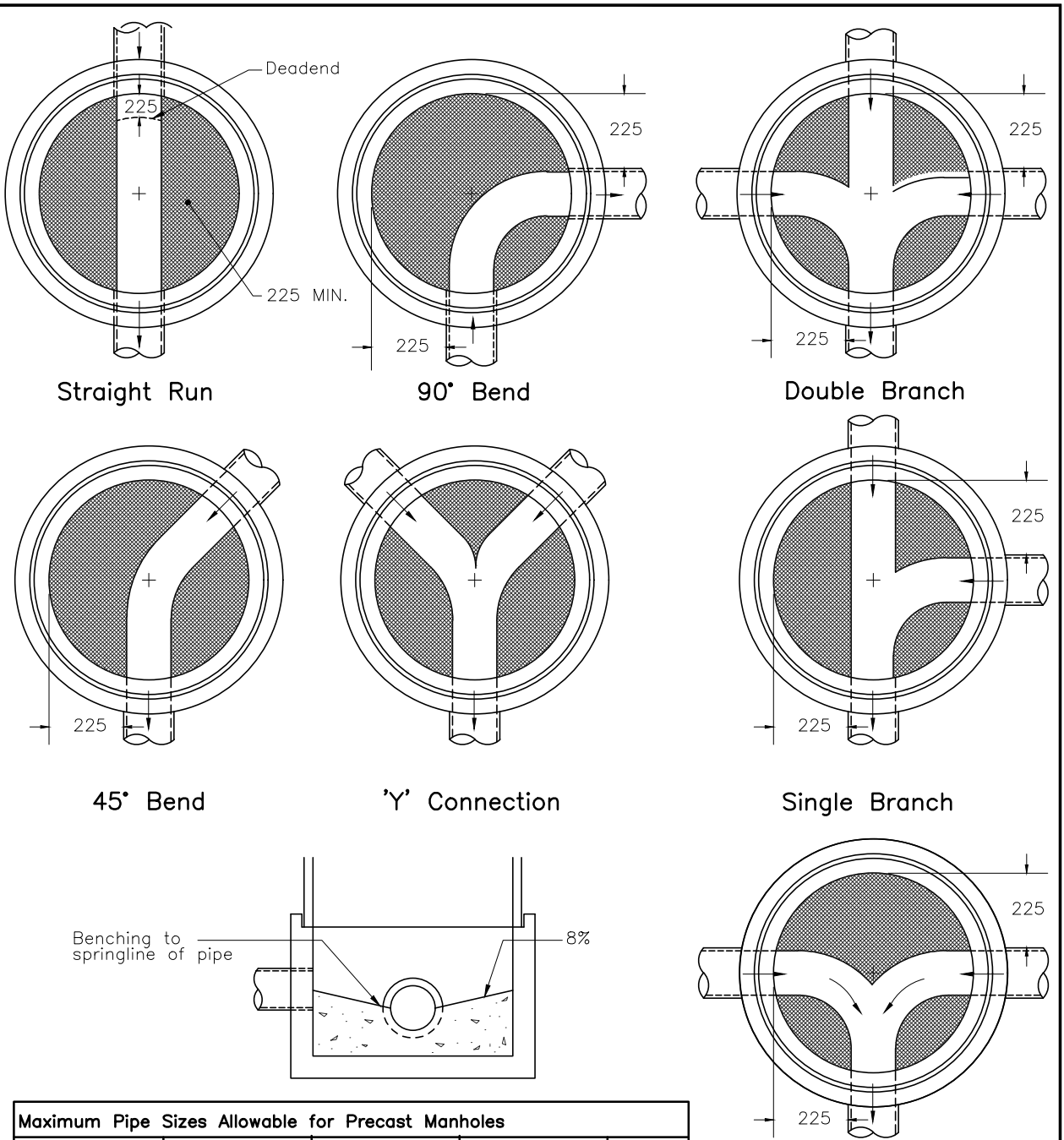
OPSD Standard

- 802.030
 - 19mm pipe - 802.031
 - 15MPa - 802.032
 - 802.034
 - 802.050
 - 802.051
 - 802.052
 - 802.054
 - 803.030
 - 803.031
- Bedding for concrete pipe shall be Class B, using crusher run limestone placed to spring line, first length from manholes are to be encased in concrete to spring line with a minimum 150mm clearance.
 - If unstable ground conditions are encountered at the bottom of the sewer, then the material shall be removed and replaced with 50mm clear stone or 15MPa concrete to a depth as directed by the site engineer prior to the placing of normal bedding.
 - 19mm clear limestone to be used if, ground water table is above the trench bed or, if ground water is flowing into trench through the embedment zone.
 - whenever 19mm clear limestone is used filter fabric is required.
 - Cover material used shall be a minimum of 0.3m of selected sand backfill.

OPSD Section 900

Fencing, Guide Rails

Refer to Town of Whitby
Standard No 506, No 506.10, No 506.30 and No
506.40 for fence details.



Maximum Pipe Sizes Allowable for Precast Manholes							
Manhole Dia.	1200		1500		1800		2400
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	In/Out
Straight Run	600	600	825	825	1050	1050	1500
45° Bend	525	525	750	750	900	900	
90° Bend	450	450	600	600	825	825	1050

Notes:

1. 20 MPa concrete to be used for benching.
2. All benching to be sloped at 8% to channel.
3. Benchings to be 225mm minimum width.

All dimensions in millimetres except where noted

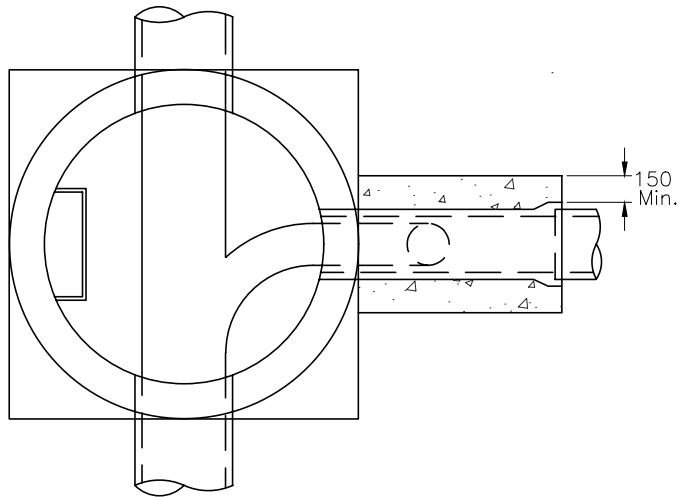
The Corporation of the Town of Whitby

Engineering Services

Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S.

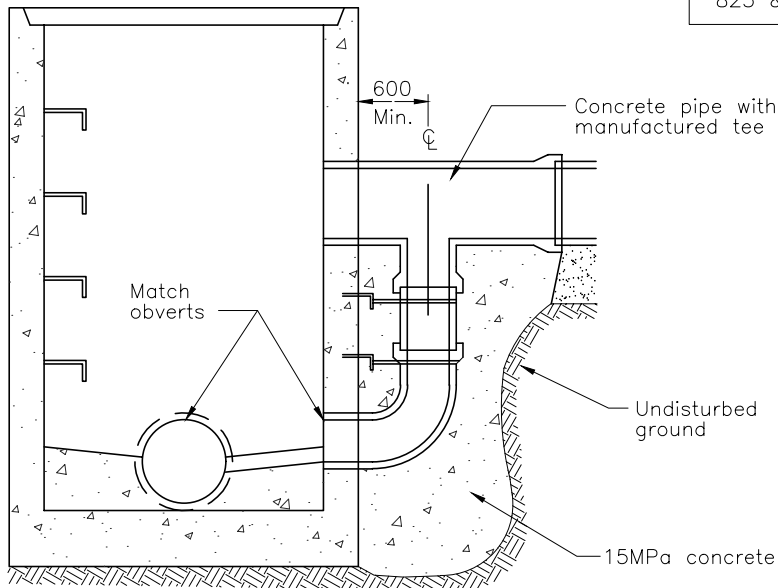
Benching for Precast Maintenance Holes

DWG. Date: January 1993
 Revision No.: 1
 Revision Date: May 2006
 DWG No. 100



Plan

Size of Drop Pipe	
Sewer ID (mm)	Drop Pipe ID (mm)
300 – 450	250
525 – 600	300
675 – 750	375
825 & Greater	450



Section



Notes:

1. Drop structure to be encased in 15MPa concrete to springline of inlet sewer main.
2. Maintenance hole steps to be provided on outside face of maintenance hole with spacing of 300mm O.C. Drop structure to be strapped to steps with a minimum of two stainless steel bands.
3. All drop pipe and fittings shall be PVC SDR 35.

All dimensions in millimetres except where noted

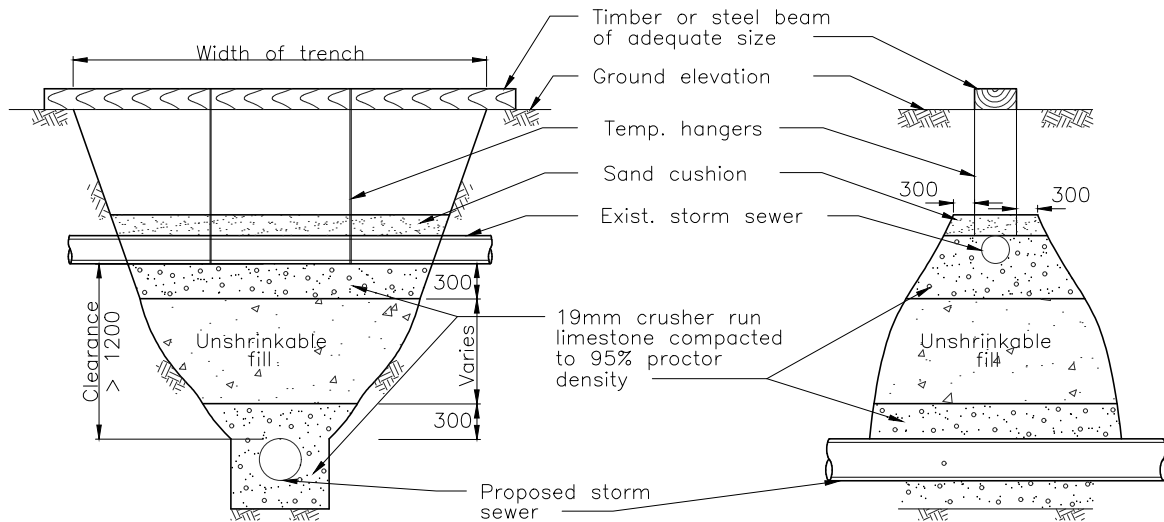
The Corporation of the Town of Whitby

Engineering Services

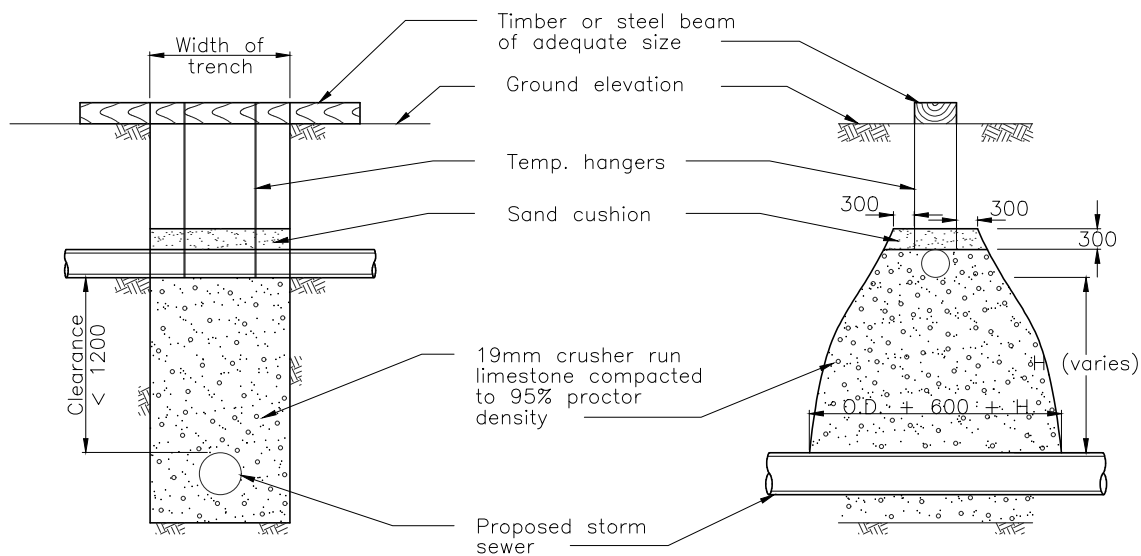
Checked: 
 Approved: 
 Scale: N.T.S.

Drop Structures for Maintenance Holes

DWG. Date: January 1993
 Revision No.: .
 Revision Date: .
 DWG No. 101



Clearance > 1200



Clearance < 1200

Notes:

1. Support specifications for all other utilities shall be obtained from the appropriate agency.

All dimensions in millimetres except where noted

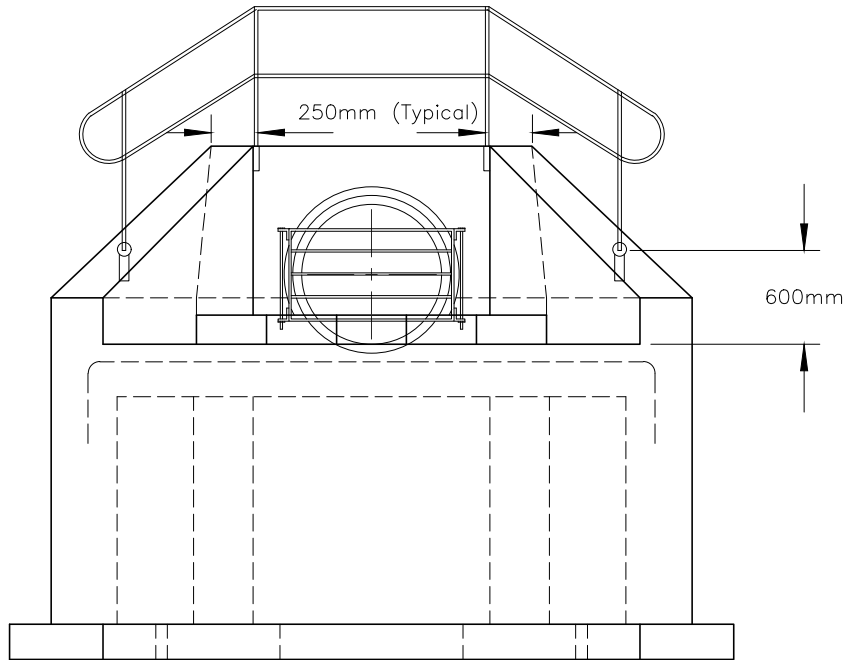
The Corporation of the Town of Whitby

Engineering Services

Checked:	<i>M.</i>
Approved:	<i>GH</i>
Scale:	N.T.S

Backfilling Support for Existing Storm Sewer

DWG. Date:	January 1993
Revision No.:	.
Revision Date:	.
DWG No.	102

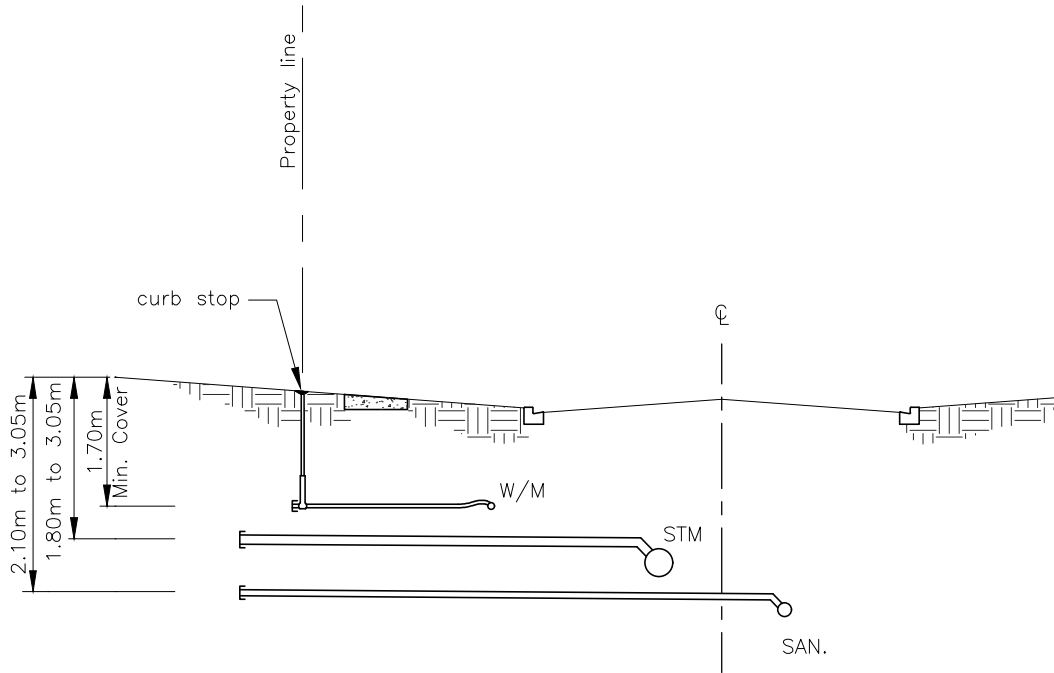
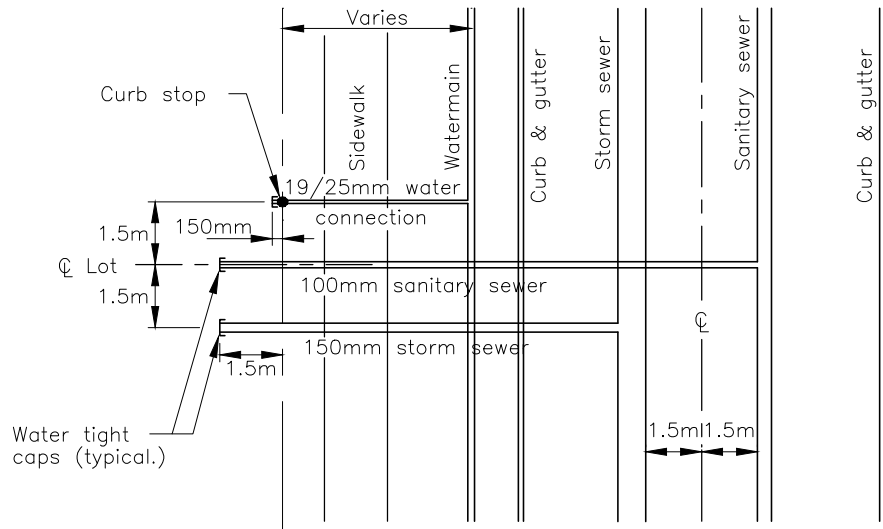


Notes:

1. Handrail required on headwall and wingwall when height is greater than 600mm.
2. Steel handrail as per OPSD 980.101.
3. Posts to be embedded a minimum of 300mm.
4. For grating details refer to OPSD 804.050.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked: 	<h2>Handrails for Sewers and Culvert Headwalls</h2>	DWG. Date: January 1993	
Approved: 		Revision No.: 2	
Scale: N.T.S		Revision Date: January 2009	DWG No. 103



Notes:

1. Watertight caps on all services.
2. All dimensions shown are centre to centre.
3. Storm pipe material is to be PVC SDR 28 and white in colour.

All dimensions in millimetres except where noted

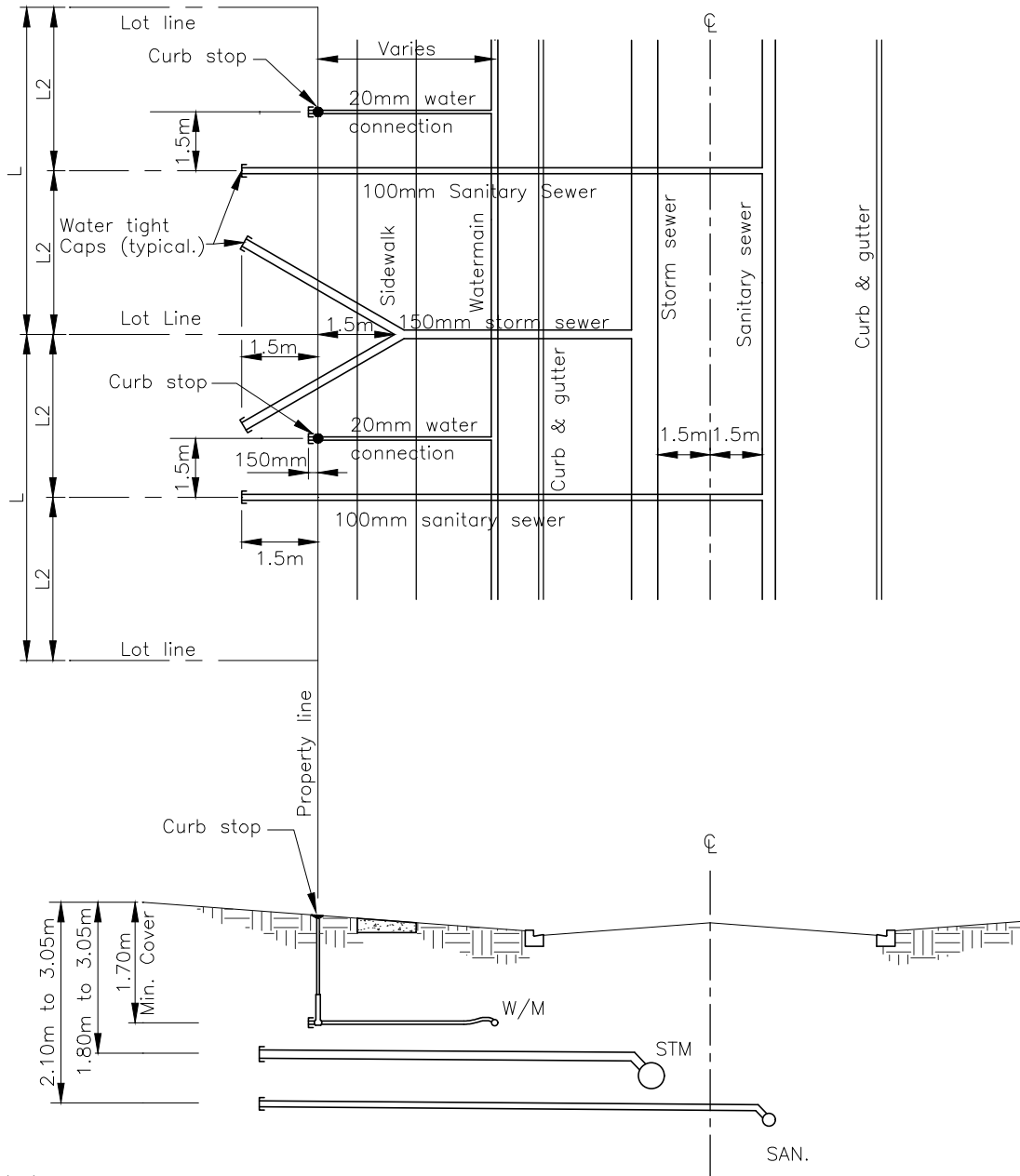
The Corporation of the Town of Whitby

Engineering Services

Checked:	<i>[Signature]</i>
Approved:	<i>[Signature]</i>
Scale:	N.T.S

Storm Sewer Residential Service Connection

DWG. Date:	January 1993
Revision No.:	3
Revision Date:	October 2018
DWG No.	104



Notes:

1. Watertight caps on all services.
2. All dimensions shown are centre to centre.
3. Storm pipe material is to be PVC SDR 28 and white in colour.
4. L = frontage of one unit.
5. 'Y' connections will only be permitted on street town houses

All dimensions in millimetres except where noted

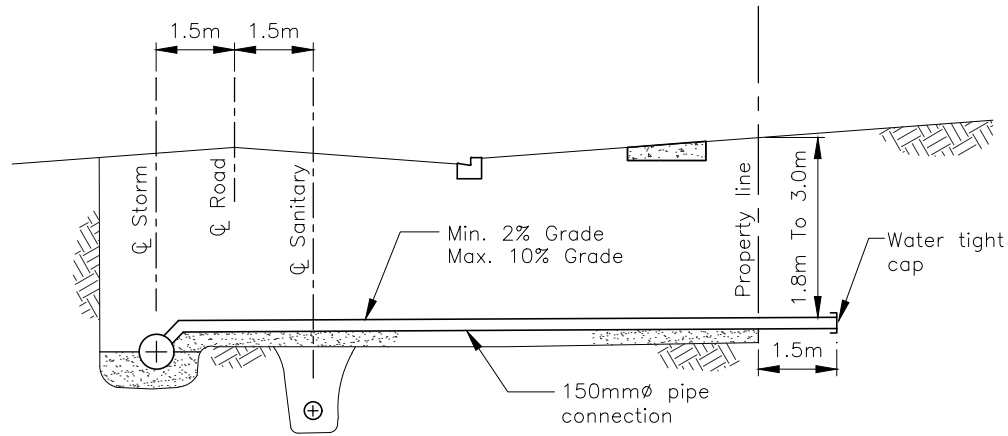
The Corporation of the Town of Whitby

Engineering Services

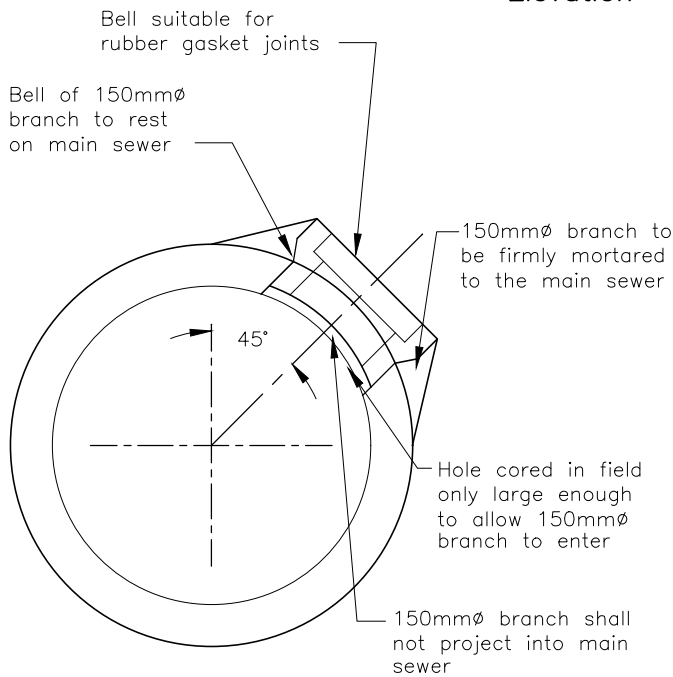
Checked: *AL*
 Approved: *SA*
 Scale: N.T.S

Storm Sewer Residential Service Connection

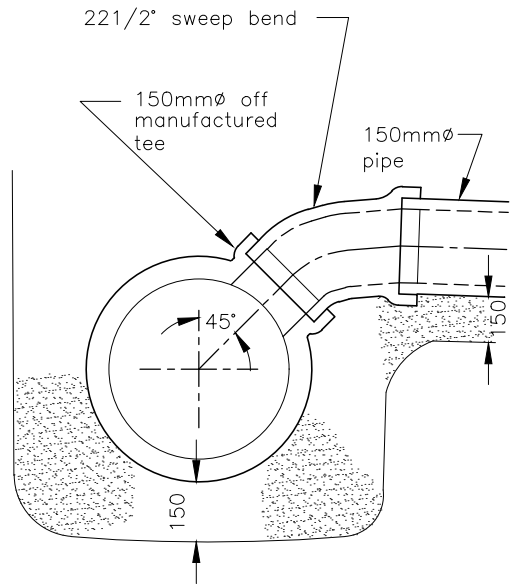
DWG. Date: January 1993
 Revision No.: 3
 Revision Date: October 2018
 DWG No. 105



Elevation



Detail Showing Method of Connection to Sewers 525mmØ & Larger



Detail of Connection at Main Sewer for Storm Sewer Sizes Up to & Including 450mmØ

Notes:

1. Storm house connections to be 150mmØ pipe.
2. Storm pipe material is to be PVC SDR 28 and white in colour.
3. Where PVC pipe is used, concrete sewer main shall be cored on site and connected with a PVC "mortar-on-adaptor" or shall have an approved manufactured tee.
4. For bedding details see OPSD section 800 and Town of Whitby additional conditions.

All dimensions in millimetres except where noted

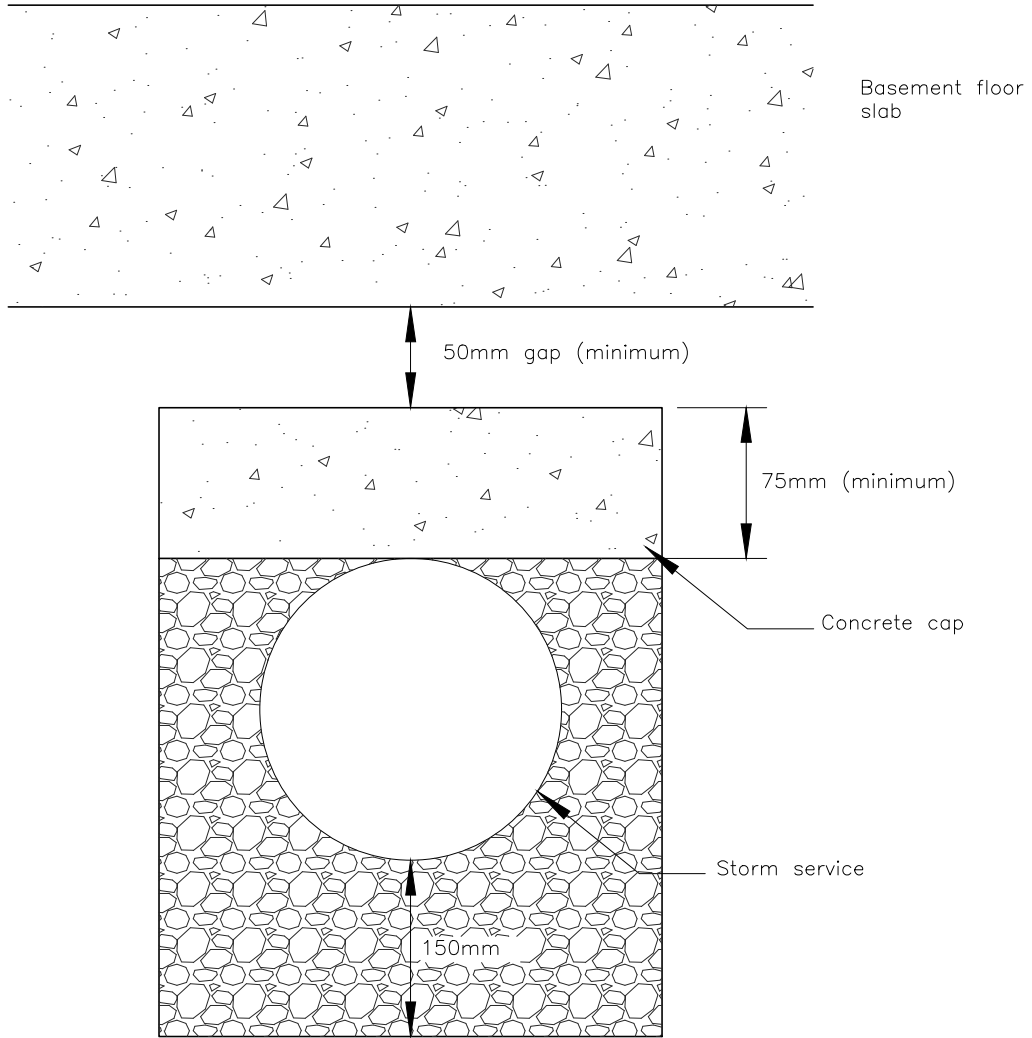
The Corporation of the Town of Whitby

Engineering Services

Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S

Storm Sewer Residential Service Connection

DWG. Date: January 1993
 Revision No.: 1
 Revision Date: June 1999
 DWG No. 106



Notes:

1. For bedding details refer to OPSD section 800 and Town of Whitby additional conditions.

All dimensions in millimetres except where noted

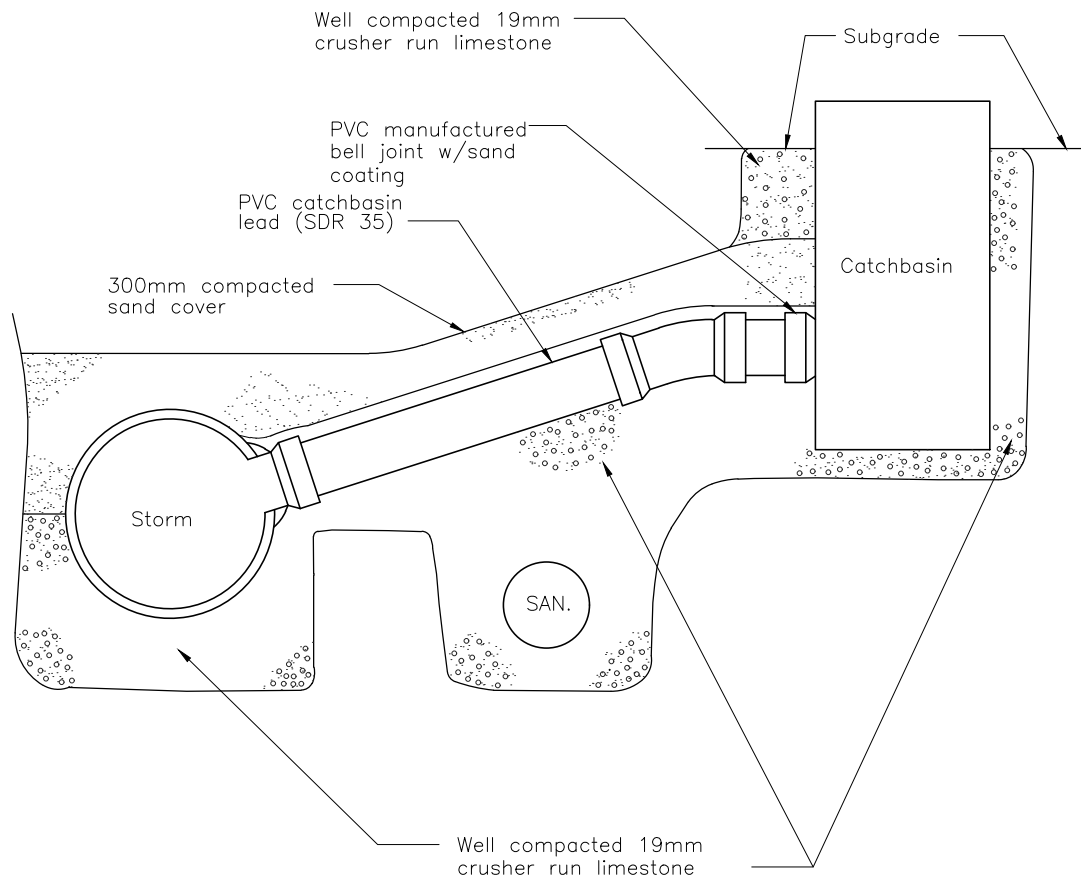
The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	
Scale:	N.T.S.

Storm Service Connection Under Basement Floor Slab

DWG. Date:	January 2009
Revision No:	.
Revision Date:	.
DWG No.	106.10



Notes:

1. Pipe to enter catchbasin at right angle.
2. 250mm ϕ PVC pipe to be used for single catchbasins.
3. 300mm ϕ PVC pipe to be used for double catchbasins.
4. All PVC pipe shall be a minimum strength of SDR 35.
5. For bedding details see Town of Whitby specifications.
6. Connection to storm main shall be cored and a PCV manufactured bell joint w/sand coating used or the storm main shall have an approved manufactured tee.
7. Ribbed PVC may be used as an alternative.
8. Crusher run limestone around catchbasin to subdrain.

All dimensions in millimetres except where noted

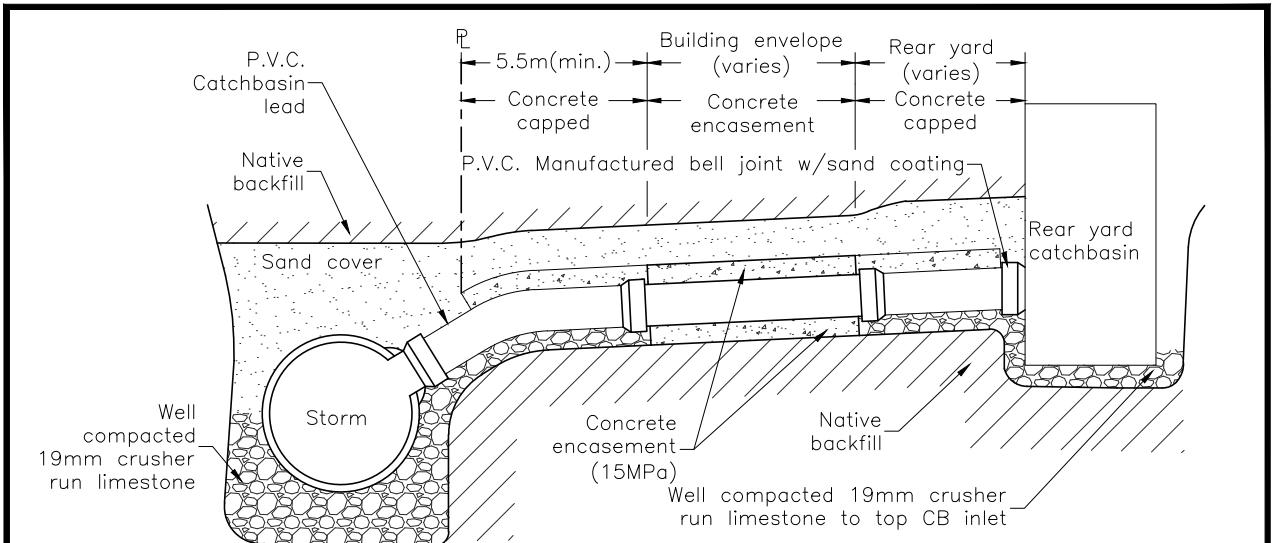
The Corporation of the Town of Whitby

Engineering Services

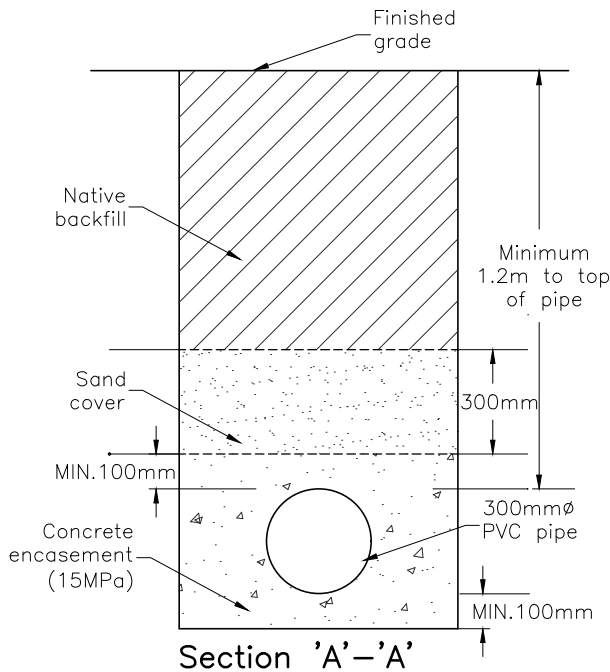
Checked:	<i>AC</i>
Approved:	<i>CSH</i>
Scale:	N.T.S

P.V.C. Catchbasin Connection

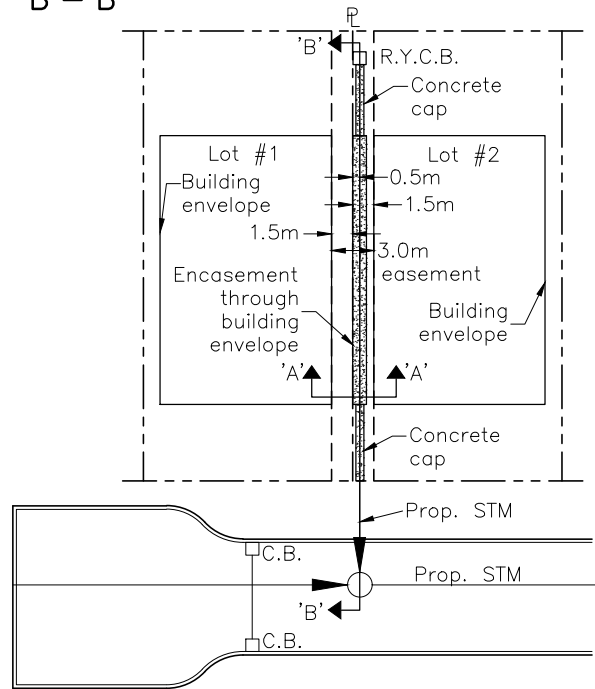
DWG. Date:	April 1994
Revision No.:	2
Revision Date:	May 2006
DWG No.	107



Section 'B'-'B'



Section 'A'-'A'

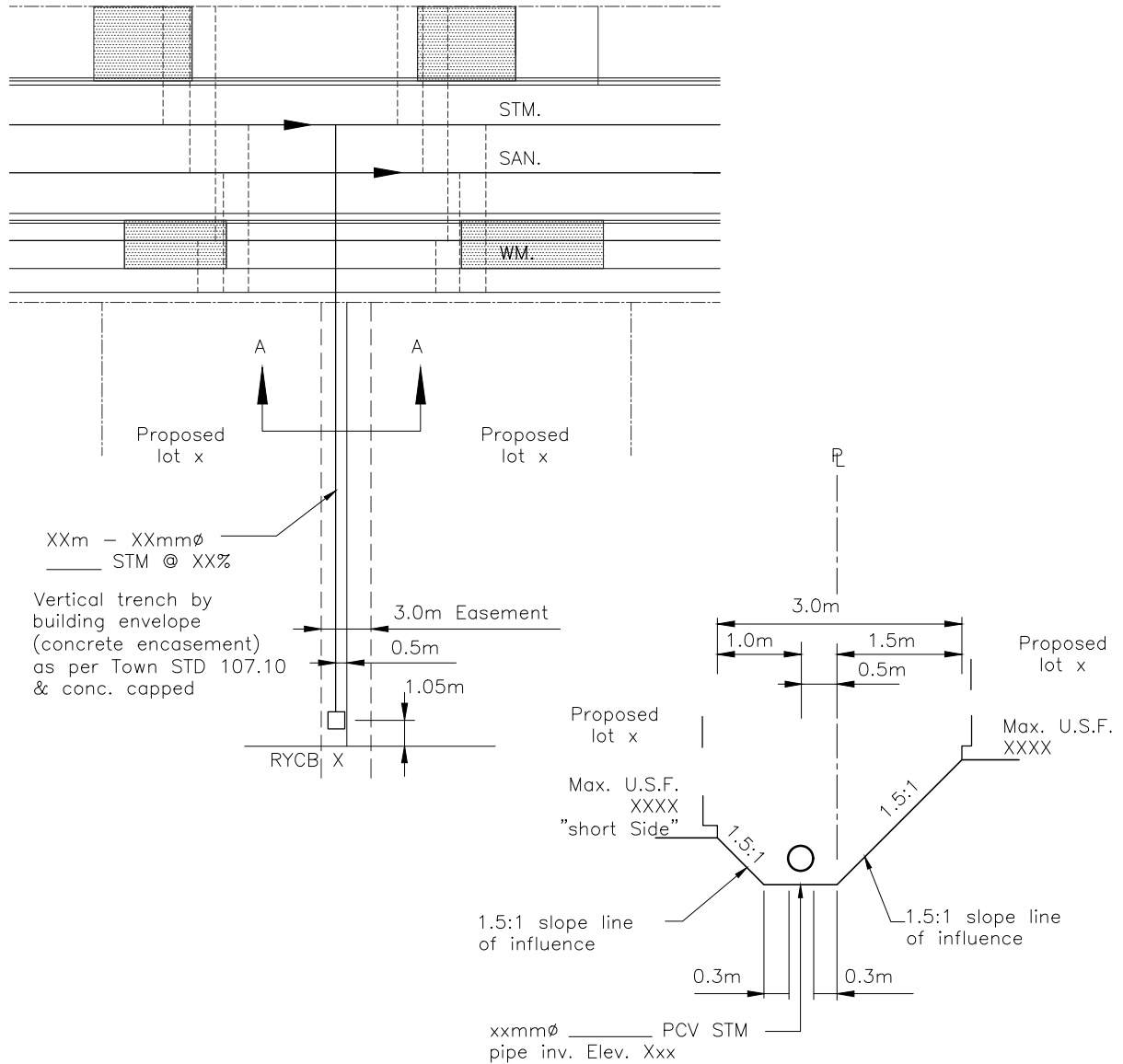


Notes:

1. Pipe to enter catchbasin at right angle.
2. 300mm ϕ PVC or concrete pipe to be used for rear yard catchbasin leads.
3. All concrete pipe shall be a minimum strength of 65d.
4. All PVC pipe shall be a minimum strength of SDR 35 or equivalent.
5. For bedding details see town of whitby specifications.
6. Connection to storm main shall be cored and a pvc manufactured bell joint w/sand coating used or the storm main shall have an approved manufactured tee.
7. CB adjustment units (modulock) shall be parged on the outside and covered in bituminous paint.
8. Concrete cap not required if concrete pipe is used or if pipe is below underside of footing.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	<h2>Rear Yard Catchbasin Connection</h2>	DWG. Date: July 2002
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: August 2015
		DWG No. 107.10



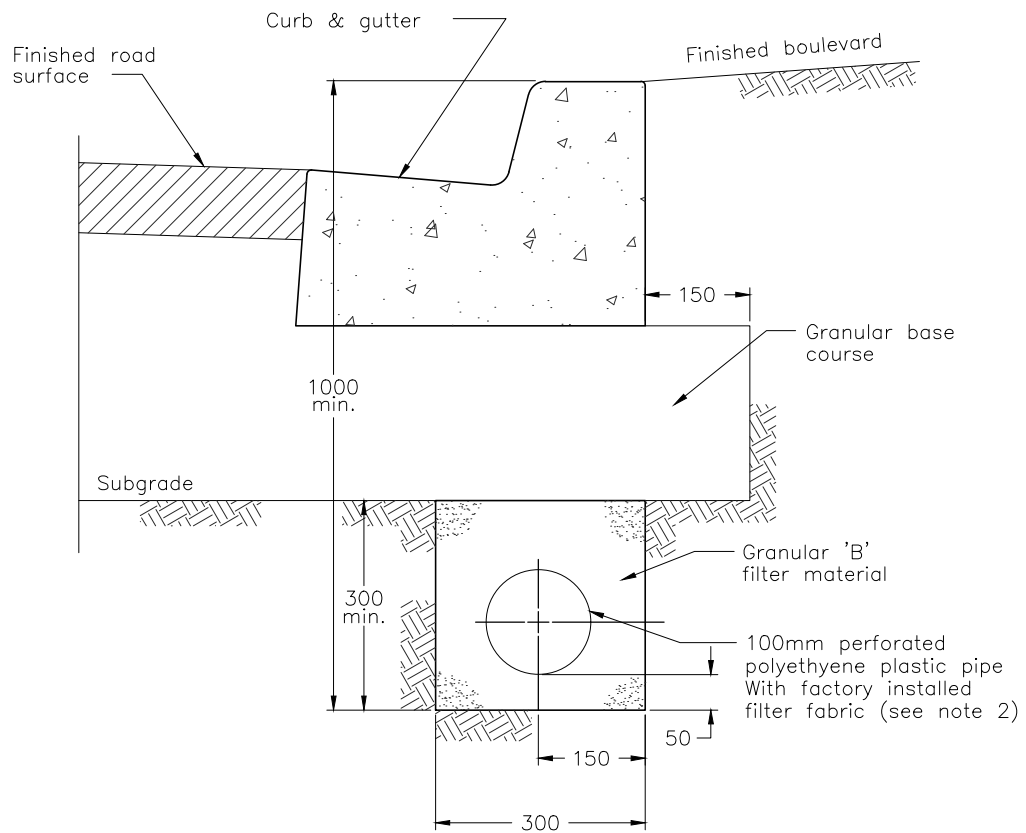
Section A-A

Notes:

1. Detail to be included on plan and profile drawings.
2. Design for 1.5:1 line of influence from bottom of trench (not pipe invert).
3. Trench bottom based on pipe invert minus required bedding depth or invert minus 0.10m per STD. 107.10 for RYCB.
4. For "short side" of RYCB easement add a 0.15m buffer into max USF (I.E: 0.15m lower than the 1.5:1 calculation).
5. Same principles apply to all servicing blocks/easements.
6. For larger pipes also take into consideration pipe wall thickness.
7. Pipe slope to be minimized wherever possible to lessen impacts to underside of footing elevations.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:	Typical Detail for Determining Maximum USF Next to RYCB Lead / Sewer Pipe	DWG. Date: August 2015	
Approved:		Revision No.: .	
Scale: N.T.S		Revision Date: .	DWG No. 107.20



Notes:

1. All connections to be mortared on the inside and outside of the catchbasin walls. Subdrains to be continuous between catchbasins.
2. Subdrains shall be in accordance with OPSS 405.
3. Grade of subdrain is to follow the curb and gutter.

All dimensions in millimetres except where noted

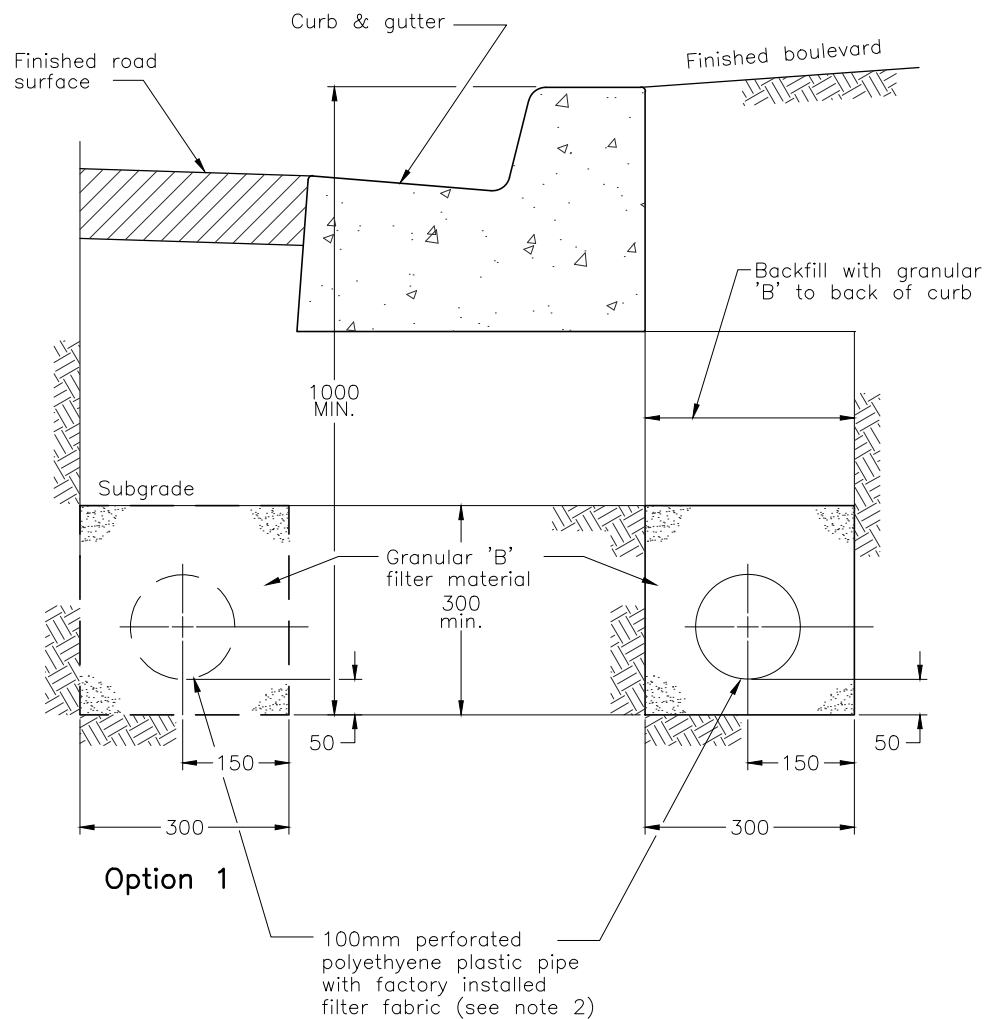
The Corporation of the Town of Whitby

Engineering Services

Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S

Subdrains

DWG. Date: January 1993
 Revision No.:
 Revision Date: May 2006
 DWG No. 108



Notes:

1. All connections to be mortared on the inside and outside of the catchbasin walls. Subdrains to be continuous between catchbasins.
2. Subdrains shall be in accordance with OPSS 405.
3. Grade of subdrain is to follow the curb and gutter.
4. Option 1 to be used only when specified by the Town of Whitby representative or specified in contract documents.

All dimensions in millimetres except where noted

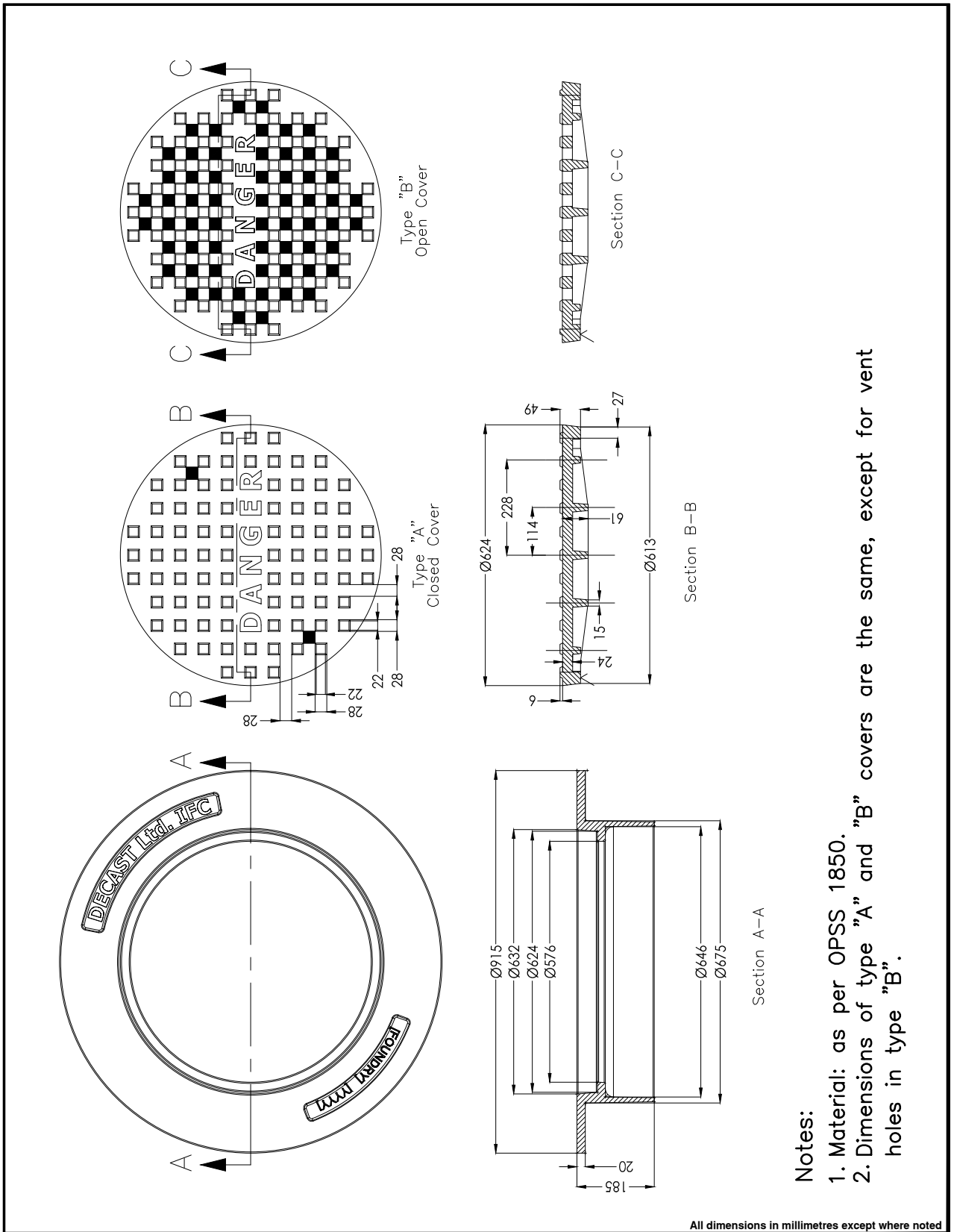
The Corporation of the Town of Whitby

Engineering Services

Checked:	<i>ML</i>
Approved:	<i>SA</i>
Scale:	N.T.S.

**Subdrains
for Installation Behind/Front of
Existing Curb**

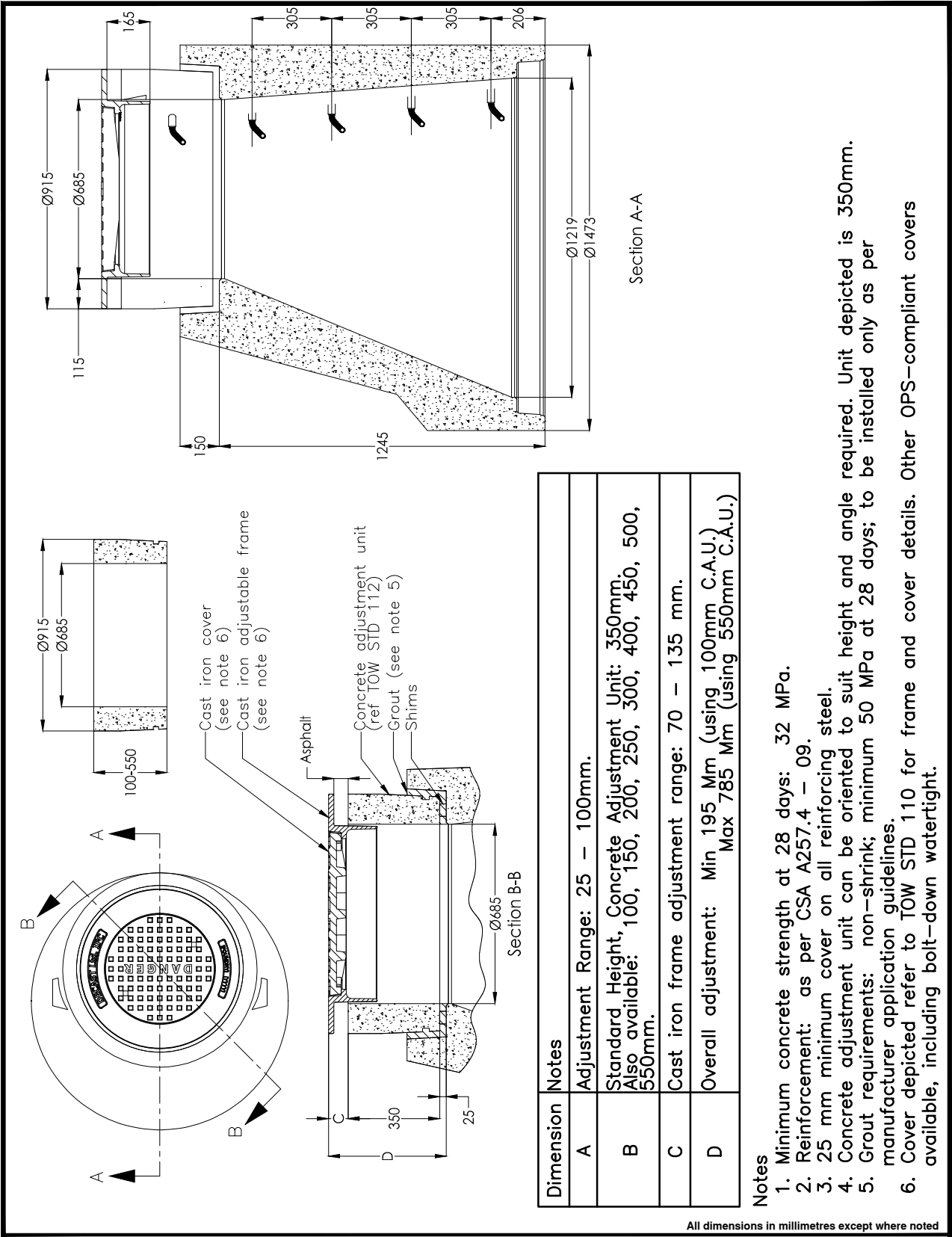
DWG. Date:	January 1993
Revision No:	3
Revision Date:	August 2015
DWG No.	109



All dimensions in millimetres except where noted

- Notes:
1. Material: as per OPSS 1850.
 2. Dimensions of type "A" and "B" covers are the same, except for vent holes in type "B".

The Corporation of the Town of Whitby		Engineering Services	
Checked:	IFC-MH Frame and Cover	DWG. Date: October 2018	Revision No.:
Approved:		Revision Date:	
Scale: N.T.S		DWG No. 110	



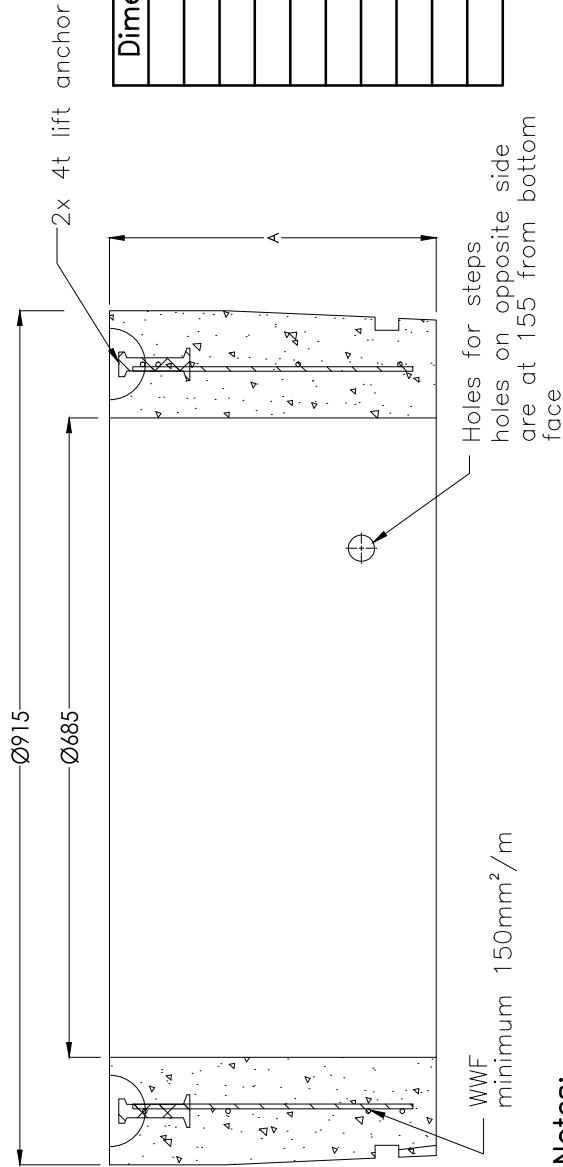
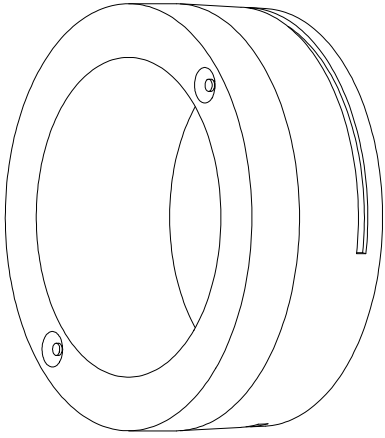
Dimension	Notes
A	Adjustment Range: 25 – 100mm.
B	Standard Height, Concrete Adjustment Unit: 350mm. Also available: 100, 150, 200, 250, 300, 400, 450, 500, 550mm.
C	Cast iron frame adjustment range: 70 – 135 mm.
D	Overall adjustment: Min 195 Mm (using 100mm C.A.U.) Max 785 Mm (using 550mm C.A.U.)

Notes

1. Minimum concrete strength at 28 days: 32 MPa.
2. Reinforcement: as per CSA A257.4 – 09.
3. 25 mm minimum cover on all reinforcing steel.
4. Concrete adjustment unit can be oriented to suit height and angle required. Unit depicted is 350mm.
5. Grout requirements: non-shrink; minimum 50 MPa at 28 days; to be installed only as per manufacturer application guidelines.
6. Cover depicted refer to TOW STD 110 for frame and cover details. Other OPS-compliant covers available, including bolt-down watertight.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:		DWG. Date:	October 2018
Approved:		Revision No.:	
Scale:	N.T.S	Revision Date:	
IFC Maintenance Hole Tapered Top Assembly		DWG No.	111



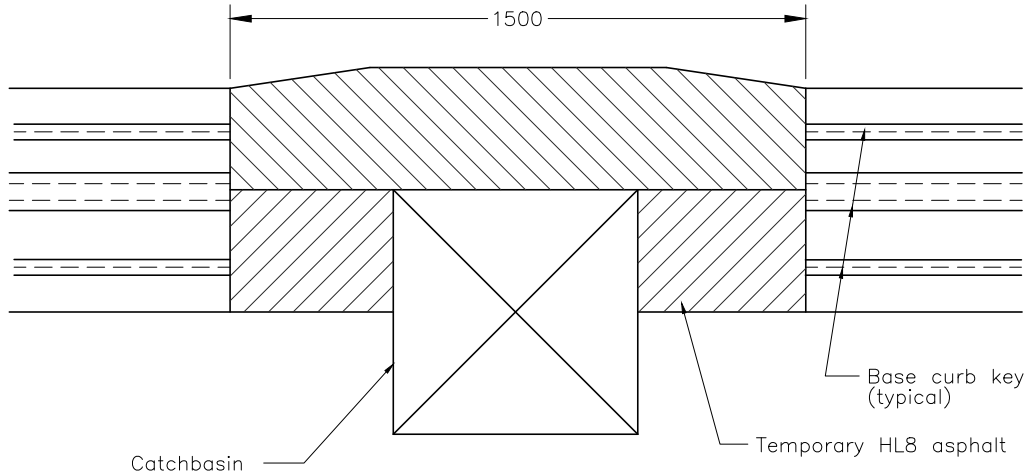
Dimension A	Mass (kg)
100	61
150	95
200	129
250	164
300	198
350	233
400	267
450	302
500	336
550	371

Notes:

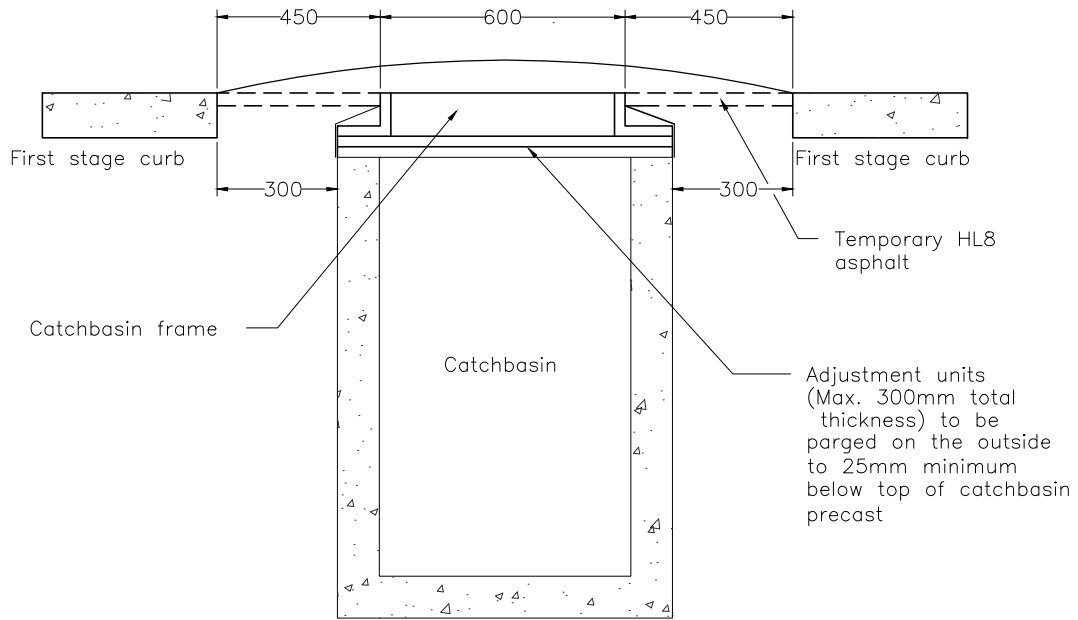
1. Designed and manufactured to C.S.A. A257.4-09.
2. Minimum concrete strength at 28 days: 35 MPa.
3. Reinforcement minimum yield strength: 500 MPa.
4. 25 mm minimum cover on all reinforcing steel.
5. Reinforcement centered in wall ±10mm.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:		DWG. Date:	October 2018
Approved:		Revision No.:	
Scale:	N.T.S	Revision Date:	
IFC Maintenance Hole Adjustment Top Assembly		DWG No.	112



Top View



Front View

Notes:

1. Temporary HL8 asphalt to be tapered to top of catchbasin frame.
2. Maximum corbelling when stepping adjustment units is 150mm. Each individual shift of adjustment units is not to exceed 50mm.

All dimensions in millimetres except where noted

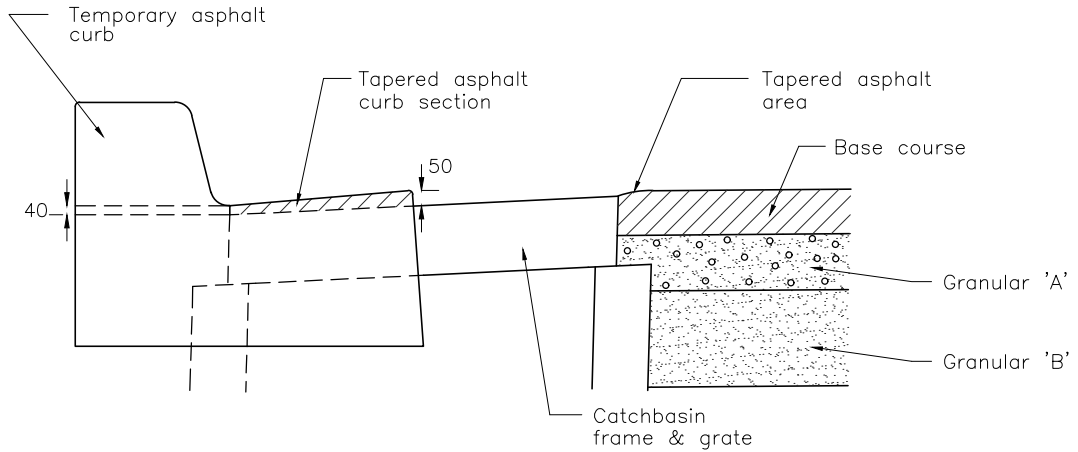
The Corporation of the Town of Whitby

Engineering Services

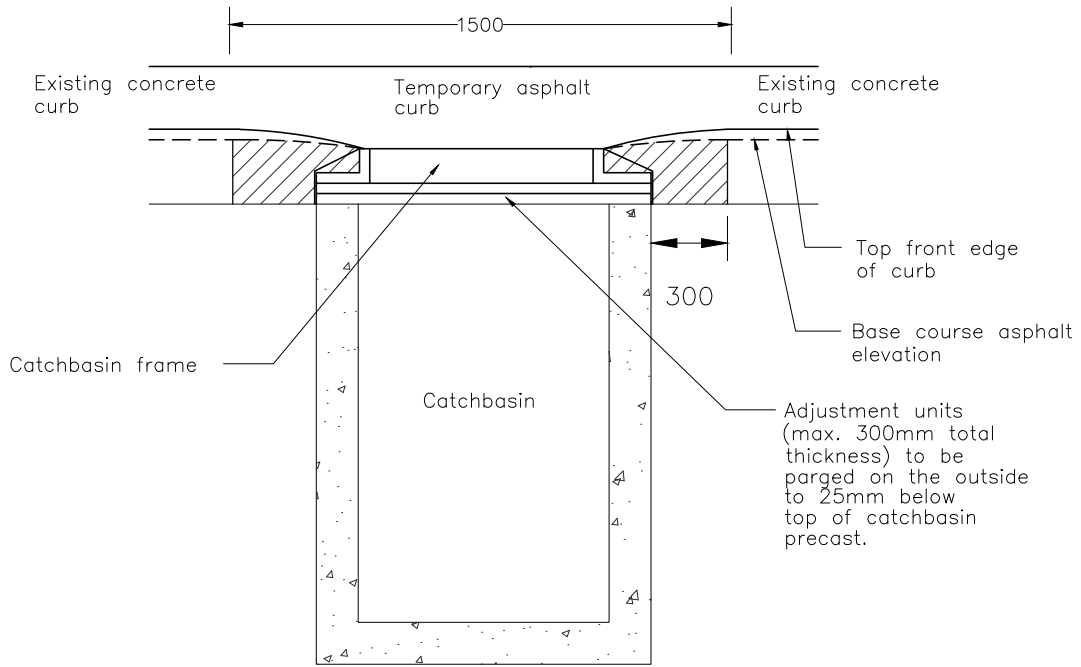
Checked:	<i>AL</i>
Approved:	<i>CH</i>
Scale:	N.T.S.

Catchbasin Grate Detail
At Base Course Asphalt Elevation

DWG. Date:	November 1994
Revision No:	2
Revision Date:	May 2006
DWG No.	200



Side View



Front View

Notes:

1. Temporary asphalt curb to be constructed to match existing concrete curb and gutter.
2. Temporary asphalt curb and gutter to be tapered to top of catchbasin frame.
3. Maximum corbelling when stepping adjustment units is 150mm. Each individual shift of adjustment units is not to exceed 50mm.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

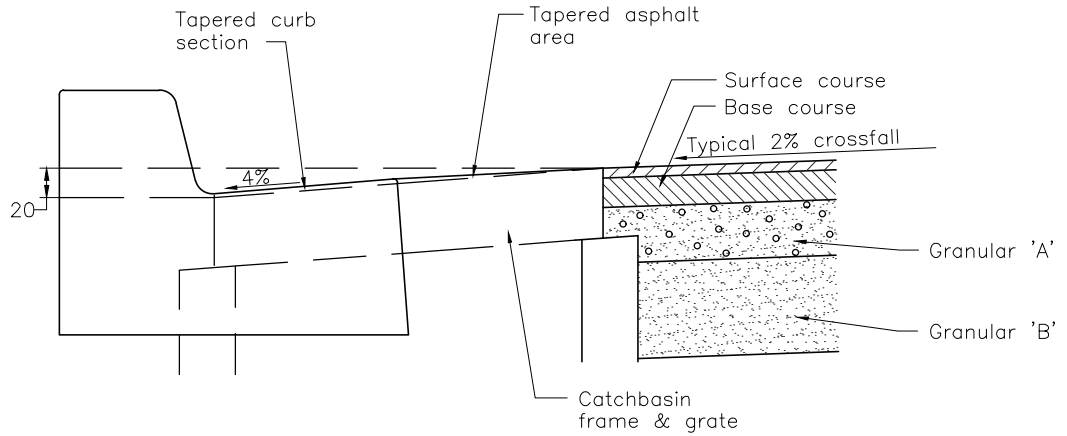
Engineering Services

Checked:	<i>[Signature]</i>
Approved:	<i>[Signature]</i>
Scale:	N.T.S

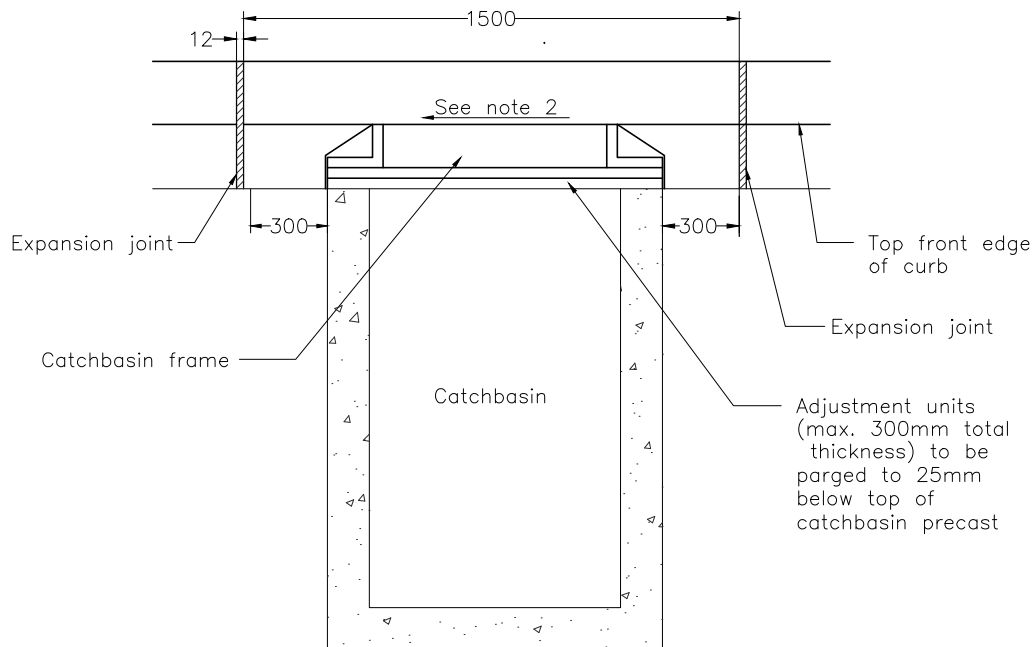
Catchbasin Grate Detail

For Full Stage Curb & Gutter
at Base Course Asphalt Elevation

DWG. Date:	November 1994
Revision No.:	3
Revision Date:	January 2009
DWG No.	201



Side View



Front View

Notes:

1. Curb/gutter to be tapered to top of catchbasin frame.
2. Catchbasin frame to be set to the longitudinal gutter grade.
3. Catchbasin frame shall also be set to a crossfall grade of 4%.
4. Expansion joint material to be 12mm thick, pre moulded bitumen fibre.
5. Maximum corbelling when stepping adjustment units is 150mm. Each individual shift of adjustment units is not to exceed 50mm.
6. Polyethylene adjustment units shall be used for levelling between frame and precast. See OPSS 1854 for details.

All dimensions in millimetres except where noted

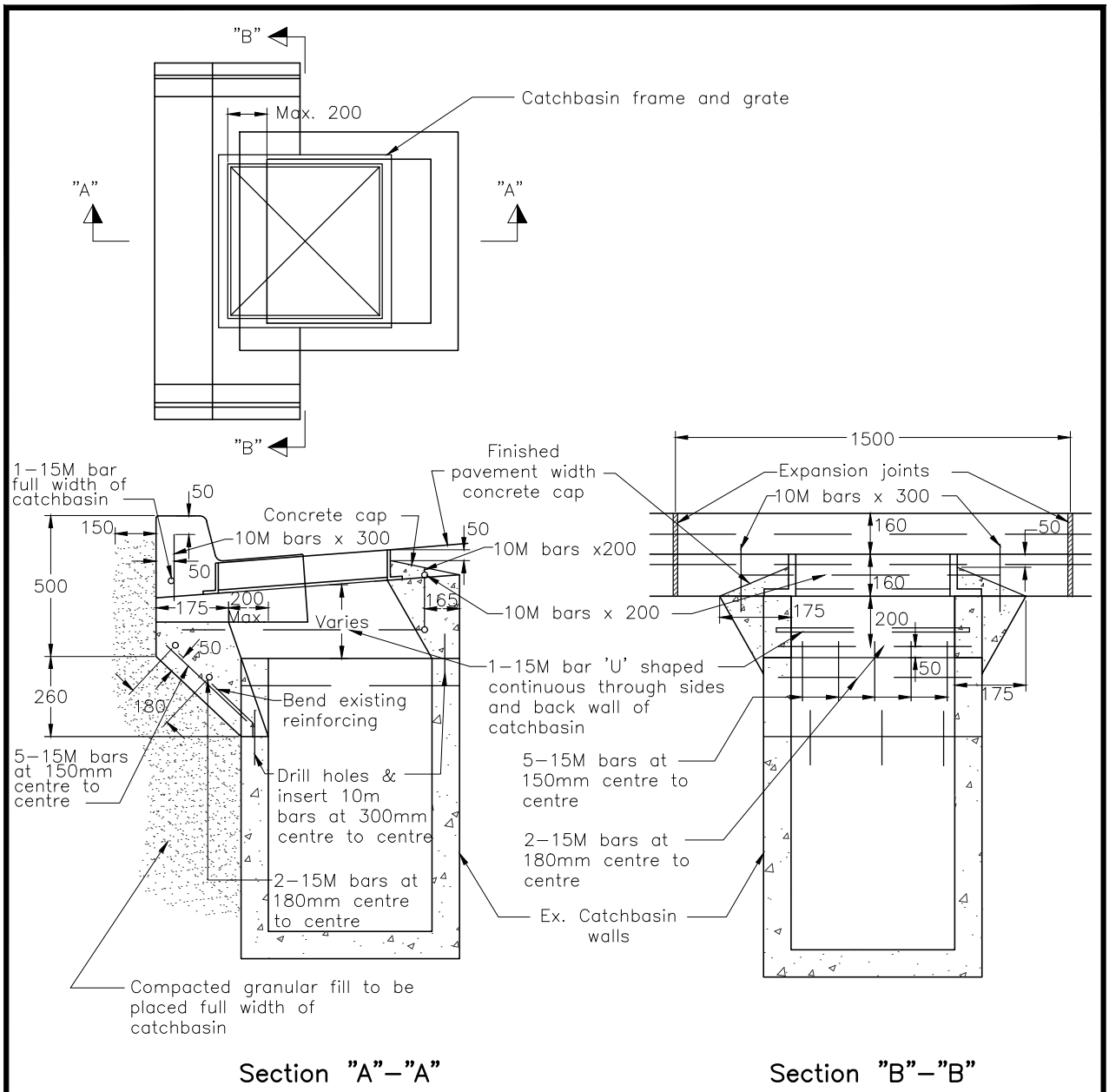
The Corporation of the Town of Whitby

Engineering Services

Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S

Catchbasin Grate Detail
 Setting Grate at Surface Course
 Asphalt Elevation

DWG. Date: November 1994
 Revision No.: 2
 Revision Date: January 2009
 DWG No. 202

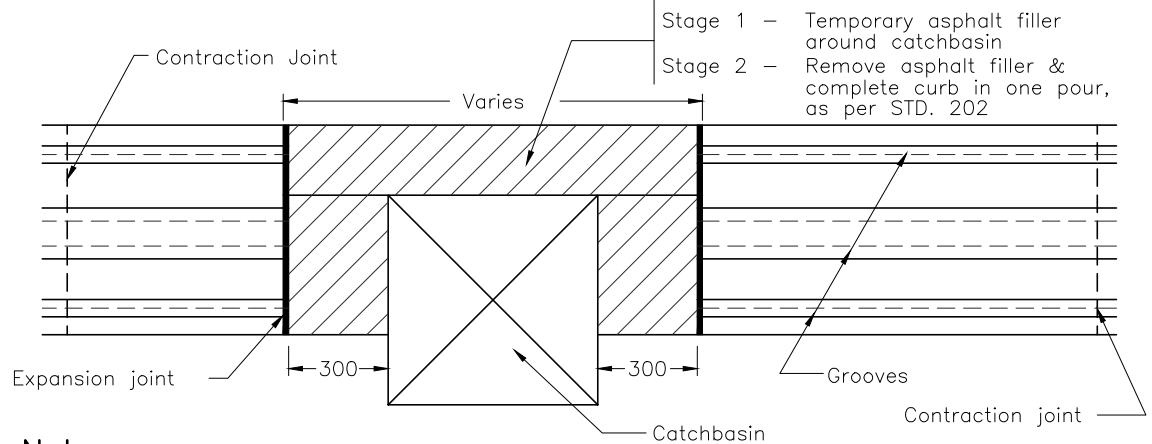
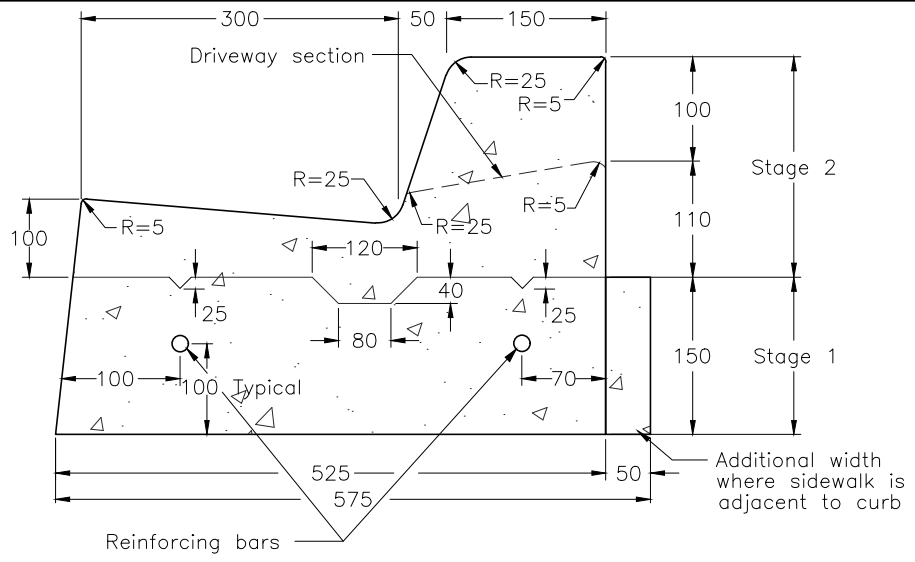


Notes:

1. Maximum allowable offset is 200mm.
2. Back of existing catchbasin wall shall be saw cut prior to removal. The rebar shall be left intact and bent back to fit new wall.
3. Catchbasin grate to be set to surface asphalt grade as per Town of Whitby standard #202.
4. Concrete to be 32MPa compressive strength.
5. Refer to OPSD 600.04 for curb and gutter.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	Rebuilding Existing Catchbasins to Fit Curb and Gutter	
Approved:	DWG. Date: January 1993	
Scale: N.T.S	Revision No.: 1	
	Revision Date: October 2018	
	DWG No. 203	

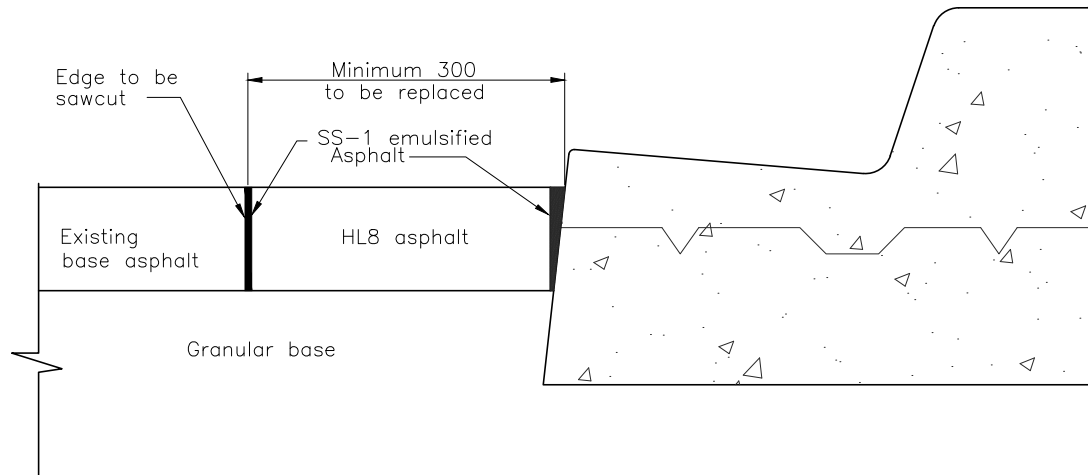


Notes:

1. First stage curb to be a continuous pour. Contraction joints to be sawcut every 3.0m in second stage only.
2. Curing:
 - Stage 1 - water and burlap only (curing compound not permitted)
 - Stage 2 - curing compound
3. Stage 1 to be thoroughly cleaned and wet prior to Stage 2 installation.
4. Grate to be set to the elevation of stage 1, & readjusted for Stage 2 in accordance with the Town of Whitby Standard #202.
5. All reinforcing to have 50mm cover.
6. Base stage concrete to be 32MPa compressive strength at 28 days with $7.0 \pm 1.5\%$ air entrainment, cement ratio shall be 355kg/m, top stage curb and gutter concrete to be 32MPa compressive strength at 28 days with $7.0 \pm 1.5\%$ air entrainment, cement ratio shall be 325kg/m.
7. Refer to OPSS section 353.
8. Reinforcing bar in base is 15m on straight and 10m on curves.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:	<h2>Two-Stage Curb and Gutter</h2>	DWG. Date: June 1999	Revision No.: 6
Approved:		Revision Date: October 2018	DWG No. 206
Scale: N.T.S			



Notes:

1. Depth of new HL8 asphalt fill-in not to exceed depth of existing asphalt.
2. Maximum depth of each asphalt lift not to exceed 75mm.
3. Granular 'A' to be compacted to 98% standard proctor density.
4. HL8 hot mix is to be compacted to 98% standard proctor density by use of an approved steel drum roller or equivalent.
5. All spill over concrete is to be removed prior to re-instatement.

All dimensions in millimetres except where noted

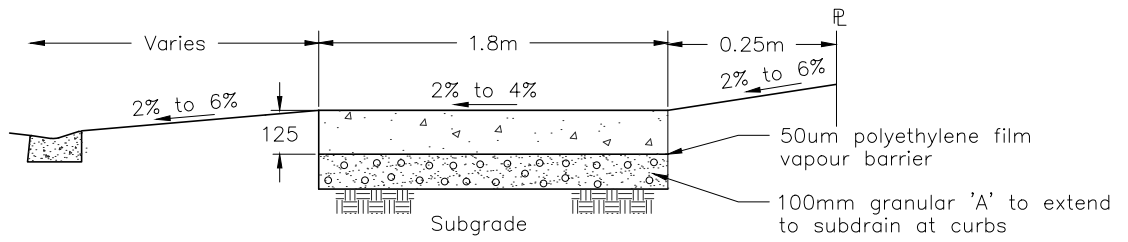
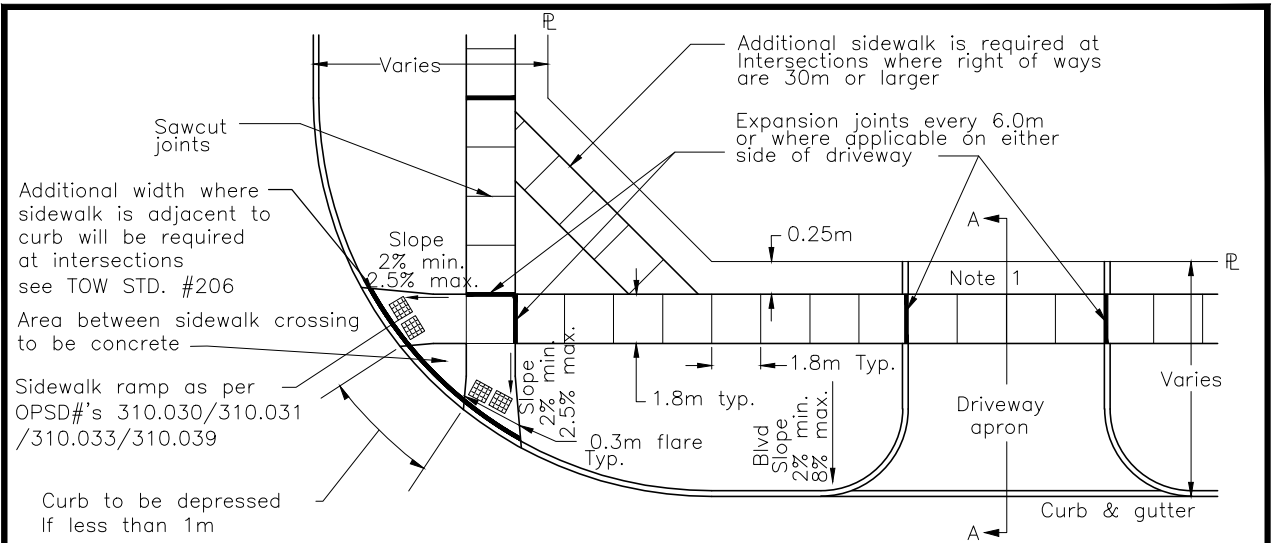
The Corporation of the Town of Whitby

Engineering Services

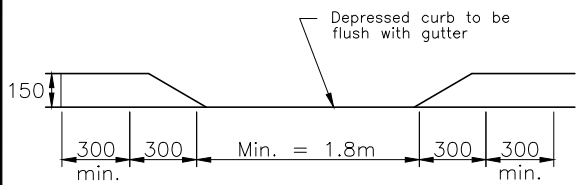
Checked:	<i>AC</i>
Approved:	<i>CH</i>
Scale:	N.T.S

Re-instatement of Base Asphalt for Two-Stage Curb & Gutter

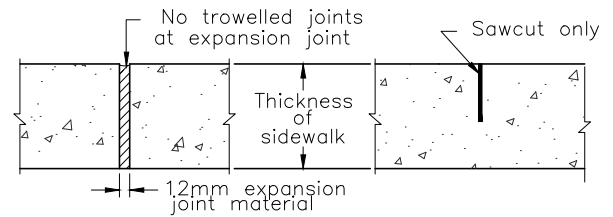
DWG. Date:	April, 1997
Revision No.:	3
Revision Date:	May 2006
DWG No.	207



Typical Section 'A'



Depressed Curb Section



Expansion Joint

Sawcut Joint

Notes:

1. Sidewalk thickness to be 175mm through residential driveway entrances.
2. For commercial and industrial driveways, sidewalk thickness to be 175mm with 150x150 wire mesh mw 18*7 gauge to be placed 75mm from the bottom.
3. Refer to Town of Whitby Standard #304 for driveway profile and sidewalk crossfall.
4. Concrete to be 32mpa compressive strength at 28 days with $7.0 \pm 1.5\%$ air entrainment, cement ratio shall be 355kg/m³. Slump to be 70mm \pm 20mm.
5. The configuration of tactile plates shall be approved by the Town prior to construction. Casting shall be coated with "black asphalt dip".
6. For new sidewalk connections to existing curb, the existing curb must be removed and replaced with depressed curb flush with gutter.
7. Running slope: max.=5% or match road profile.
8. Head room clearance from sidewalk to vegetation obstruction: min.=2.1m.
9. Boulevards shall be graded between 2-8%.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked:

Approved:

SCALE:

N.T.S

Concrete Sidewalk

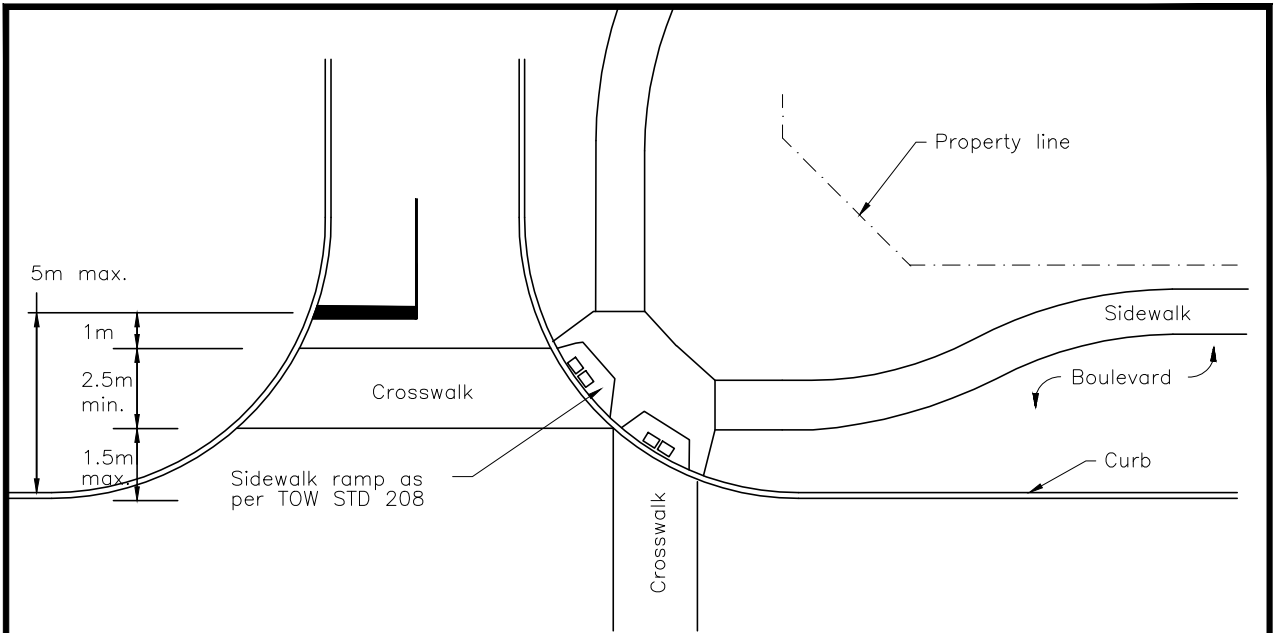
Dwg. Date: May 1997

Revision No.: 8

Revision Date: June 2022

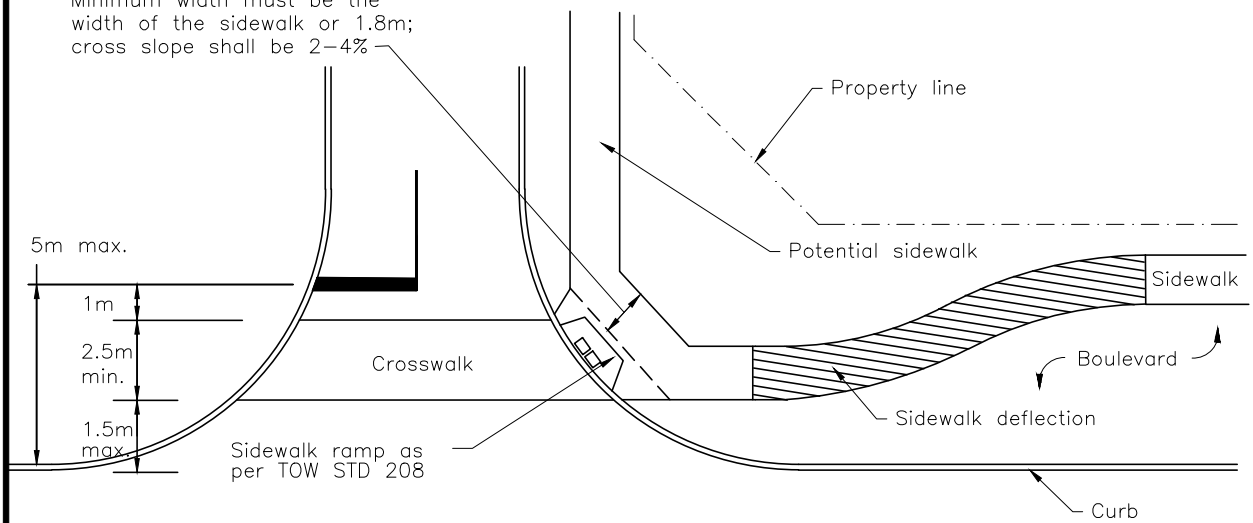
DWG No.

208



Sidewalk Deflection to Angled Crosswalks

Minimum width must be the width of the sidewalk or 1.8m; cross slope shall be 2-4%



Sidewalk Deflection to Parallel Crosswalk

Notes:

1. The construction of sidewalk deflection shall be the same as concrete Sidewalk (Town of Whitby STD 208).
2. This sidewalk deflection standard does not apply to local to local intersections.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked:

Approved:

Scale:

N.T.S

Typical Stop Bar Locations and Sidewalk Deflections at Intersections

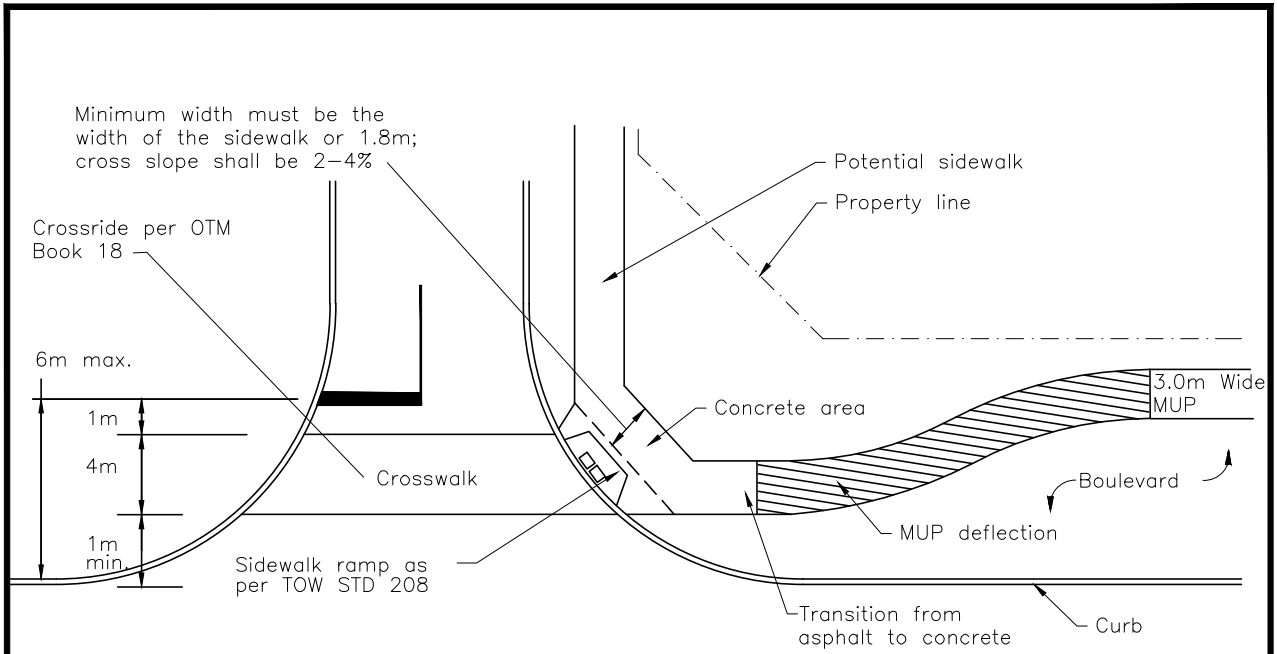
DWG. Date: August 2015

Revision No.: 2

Revision Date: June 2022

DWG No.

208.10



Multi-Use Path (MUP) Crossing and Deflection

Notes:

1. MUP deflection shall be the same as Multi-Use-Pathway (TOW STD 214)
2. Signage required as per OTM Book 18.

All dimensions in millimetres except where noted

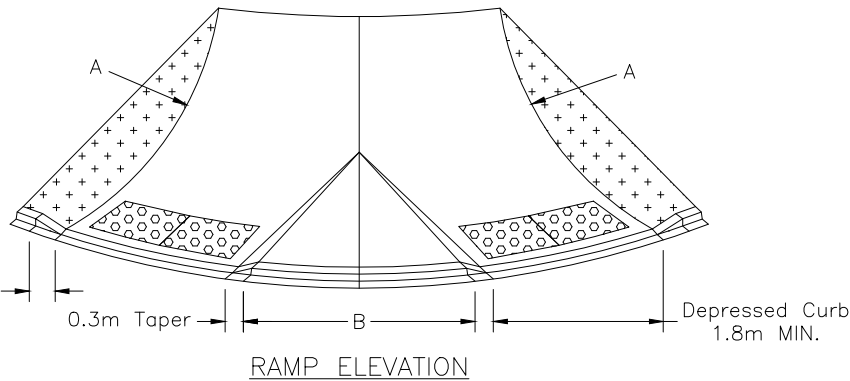
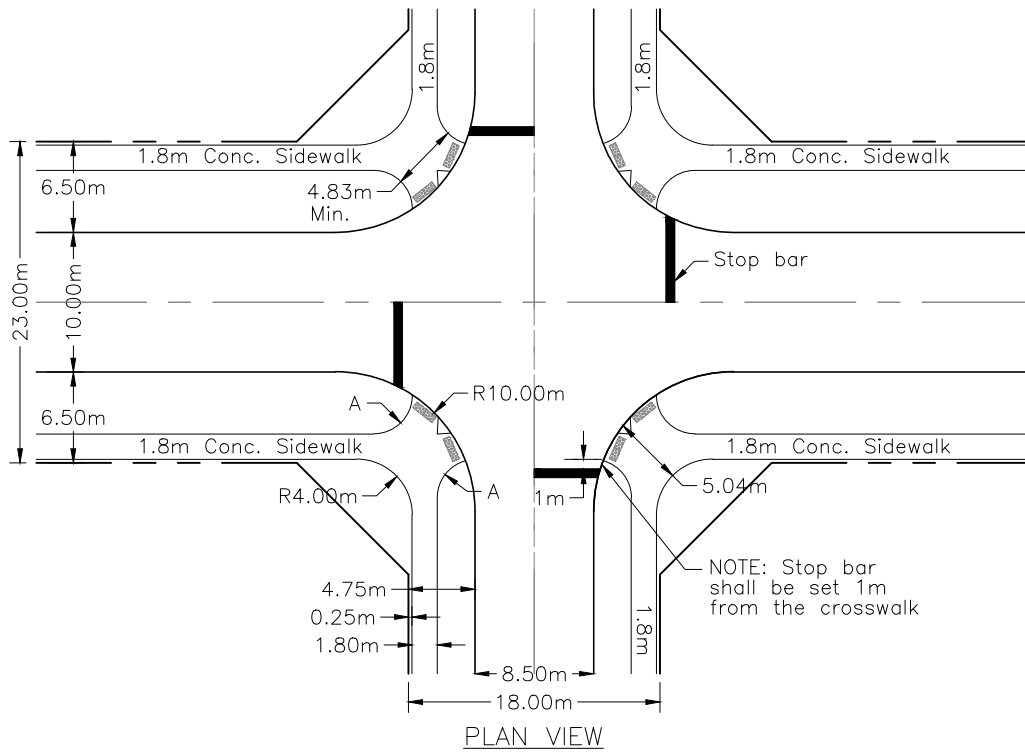
The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	<i>[Signature]</i>
Scale:	N.T.S

Typical Stop Bar Locations and MUP Deflections at Intersections

DWG. Date:	June 2022
Revision No.:	-
Revision Date:	-
DWG No.	208.20

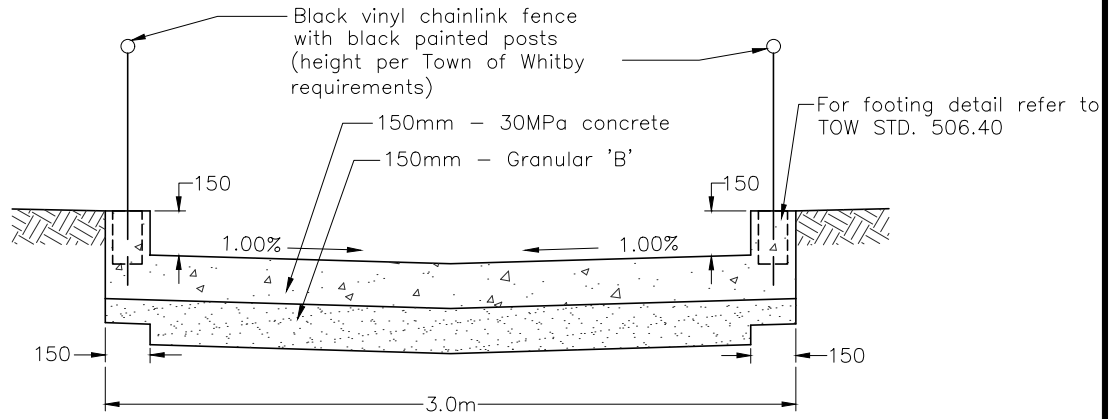


Minimum Curb Radius Design

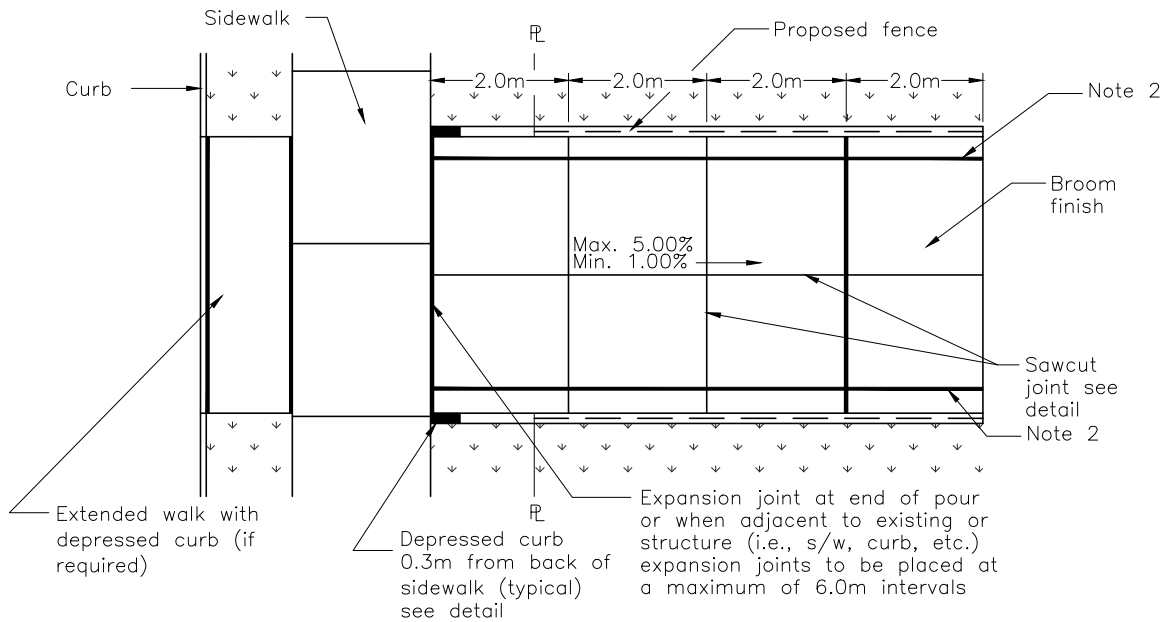
Right of Way	A	B
18X18	2.00m	0.75m
18X20	2.50m	2.00m
18x23	2.75m	3.60m
20x23	3.75m	4.80m

All dimensions in millimetres except where noted

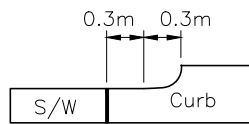
The Corporation of the Town of Whitby		Engineering Services
Checked	<h2>Sidewalk Curb Depression</h2>	DWG. Date: May 2025
Approved		Revision No.:
Scale: N.T.S		Revision Date:
		DWG No. 208.30



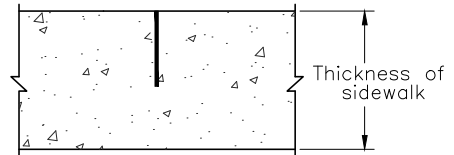
Section View



Plan View



Depressed Curb View



Sawcut Joint

Notes:

1. Concrete to be 32Mpa compressive strength at 28 days with $7.0 \pm 1.5\%$ air entrainment, cement ratio shall be 355kg/m³.
2. 100mm wide solid yellow line to be installed when no fence is present.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked:

[Signature]

Approved:

[Signature]

Scale:

N.T.S

Overland Flow Walkway

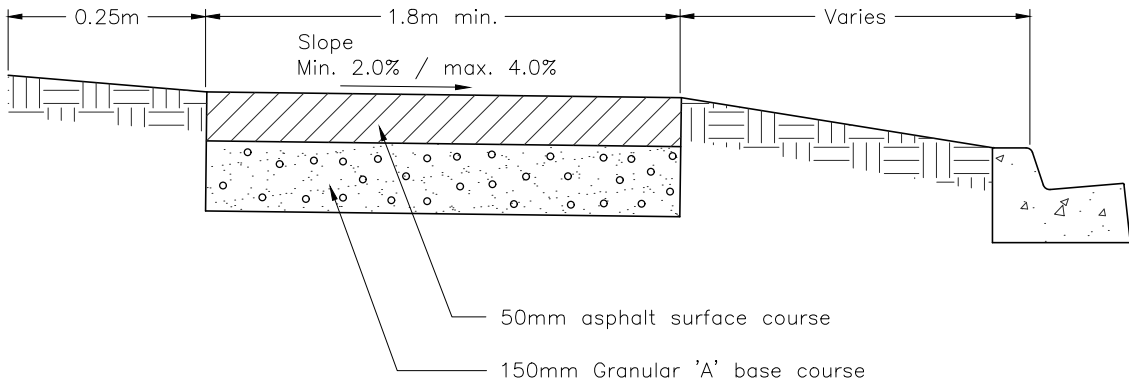
DWG. Date: November 1994

Revision No.: 5

Revision Date: October 2018

DWG No.

209



Note:

1. Asphalt type to be HL3.

All dimensions in millimetres except where noted

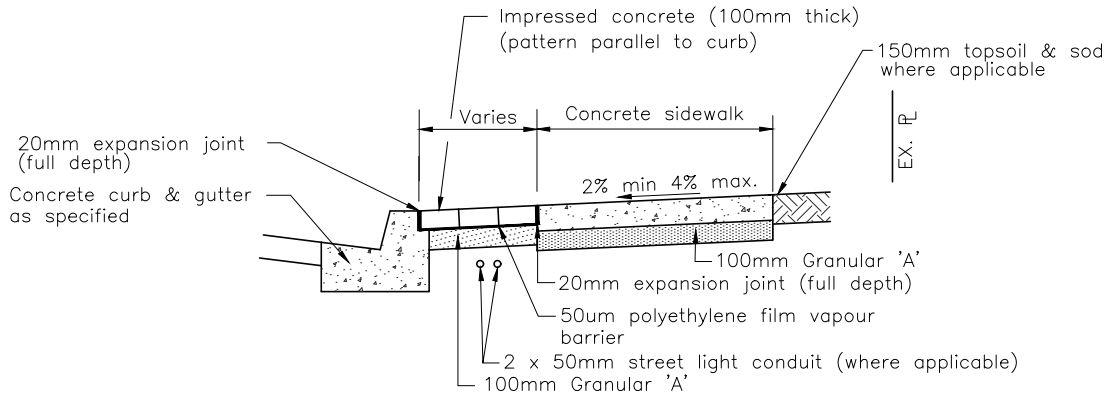
The Corporation of the Town of Whitby

Engineering Services

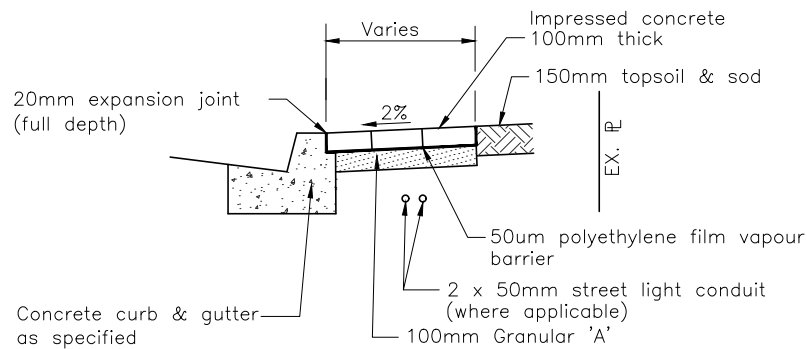
Checked:	
Approved:	<i>[Signature]</i>
Scale:	N.T.S

Temporary Asphalt Sidewalk

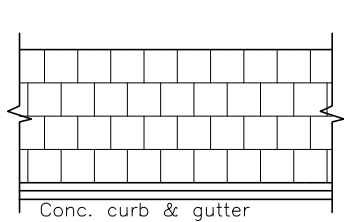
DWG. Date:	November 1994
Revision No.:	2
Revision Date:	June 2022
DWG No.	210



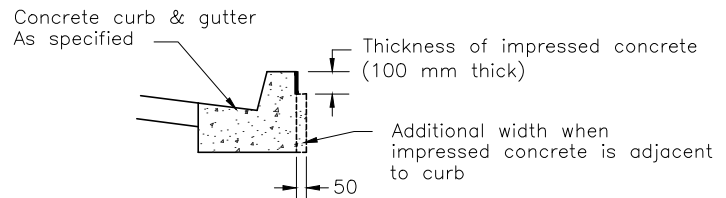
Section at Impressed Concrete Strip
Between Curb and Sidewalk



Section at Impressed Concrete Strip
without Abutting Sidewalk



Impressed Concrete Pattern
200mm X 200mm Square Running Bond



Concrete Curb & Gutter Extra Width
(where applicable)

Notes:

1. Concrete colour to be integral and "Georgia Red" or approved equivalent. Finish to be as per manufacturers specifications.
2. Stamp pattern and colour shall be submitted to the contract administrator for approval prior to construction.
3. Concrete shall be 32 MPa compressive strength at 28 days with 7.0± 1.5% air entrainment and cement ratio of 355 kg/m³.
4. Refer to Town of Whitby Standard # 208 for concrete sidewalk.

All dimensions in millimetres except where noted

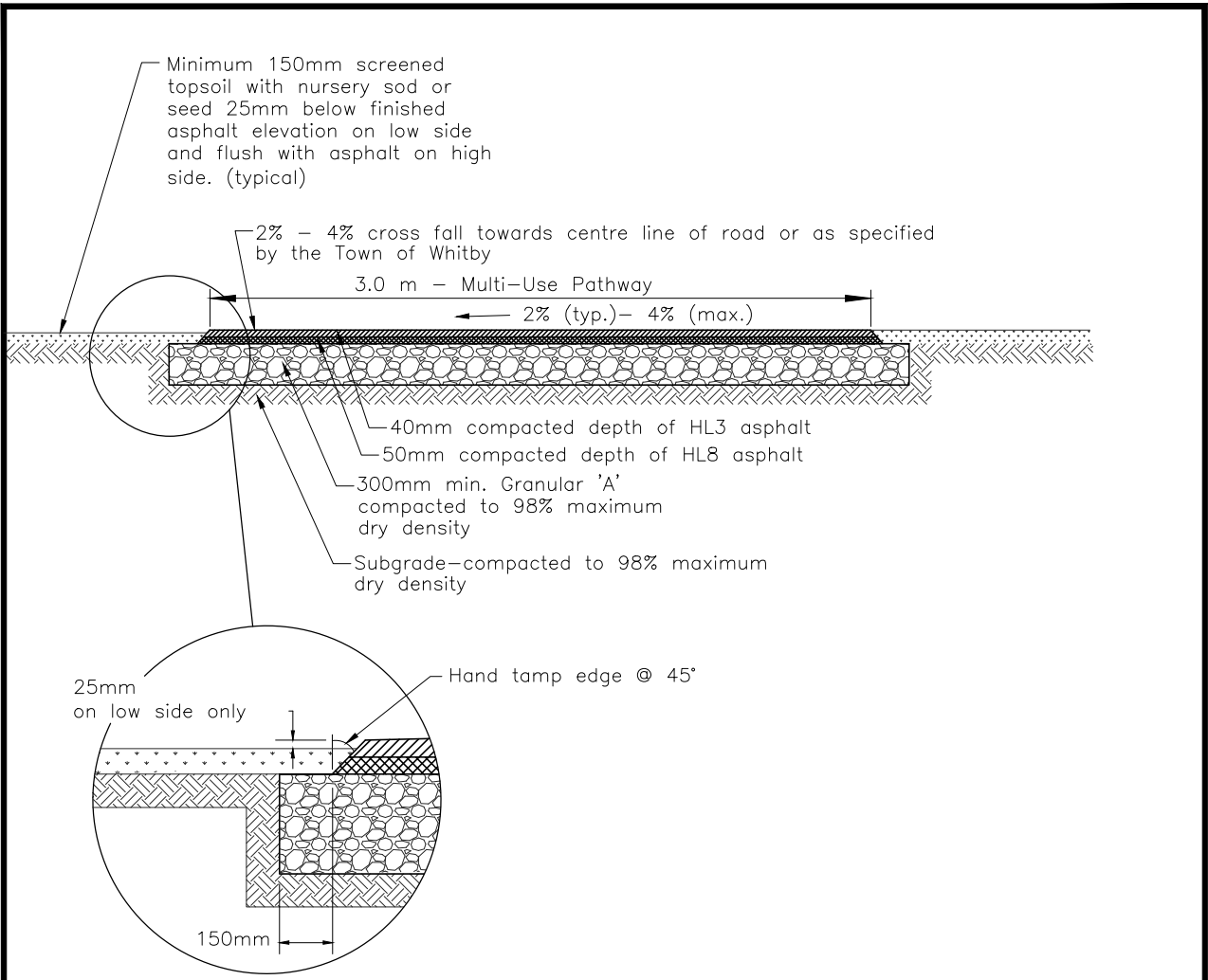
The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	
Scale:	N.T.S.

Coloured Impressed Concrete

DWG. Date:	August 2015
Revision No:	1
Revision Date:	October 2018
DWG No.	211



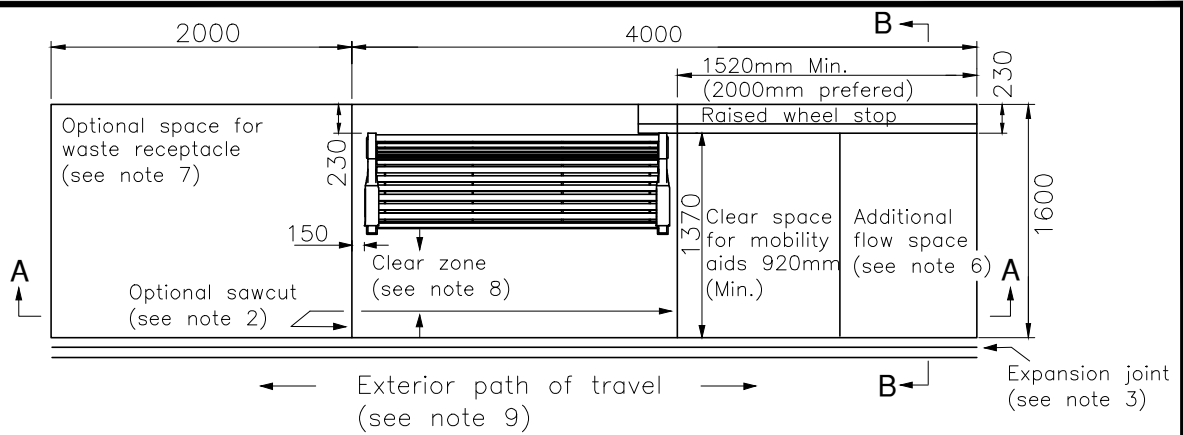
Detail 'A'

Notes:

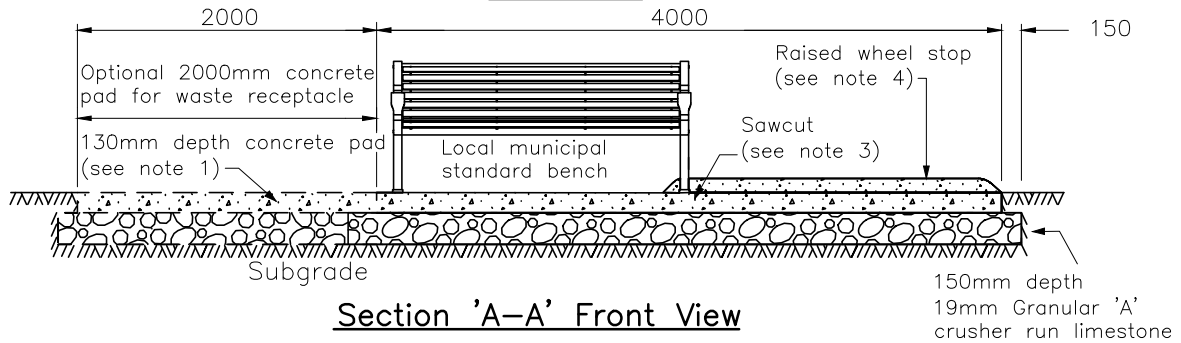
1. Backfill material adjacent to the asphalt edge shall be well compacted.
2. Landscaping to blend with contour of existing ground.
3. Running slope max.=5.0%.
4. Head room clearance from sidewalk to vegetation/ obstruction min.=2.1m.

All dimensions in millimetres except where noted

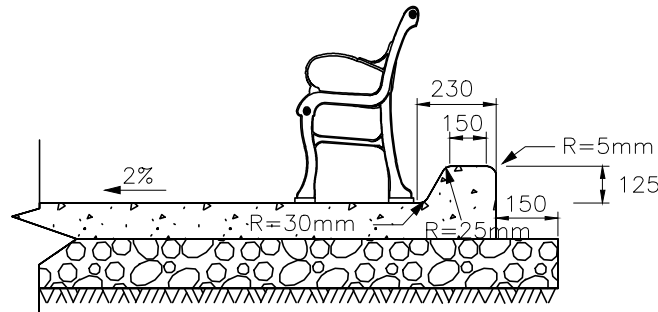
The Corporation of the Town of Whitby		Engineering Services	
Checked:	Multi-Use Pathway	DWG. Date:	January 2009
Approved: 		Revision No.:	2
Scale: N.T.S		Revision Date:	May 2025
		DWG No.	214



Plan View



Section 'A-A' Front View



Section 'B-B' Raised Wheel Stop

Notes:

1. All concrete to be 32MPa; 7% +/- 1.5% air entrained.
2. Sawcut must have a max spacing of 2.0m and shall be a 1/3 depth.
3. Joint filler shall consist of bituminous fibre material abutting all rigid objects of other concrete works.
4. Raised wheel stop shall be poured in conjunction with concrete pad.
5. Bench model shall be consistent with the local municipality in which the rest area is located.
6. Where additional space available, a min. 600mm flow space must be provided.
7. Optional space for waste receptacle shall be 2m wide concrete pad.
8. Location of bench and other obstructions must be located 450mm away from the edge of the sidewalk and outside the clear zone where possible.
9. Exterior paths of travel may be either a sidewalk or a multi-use path.
10. This drawing is to be used as a guideline only and is subject to space availability.

All dimensions in millimetres except where noted

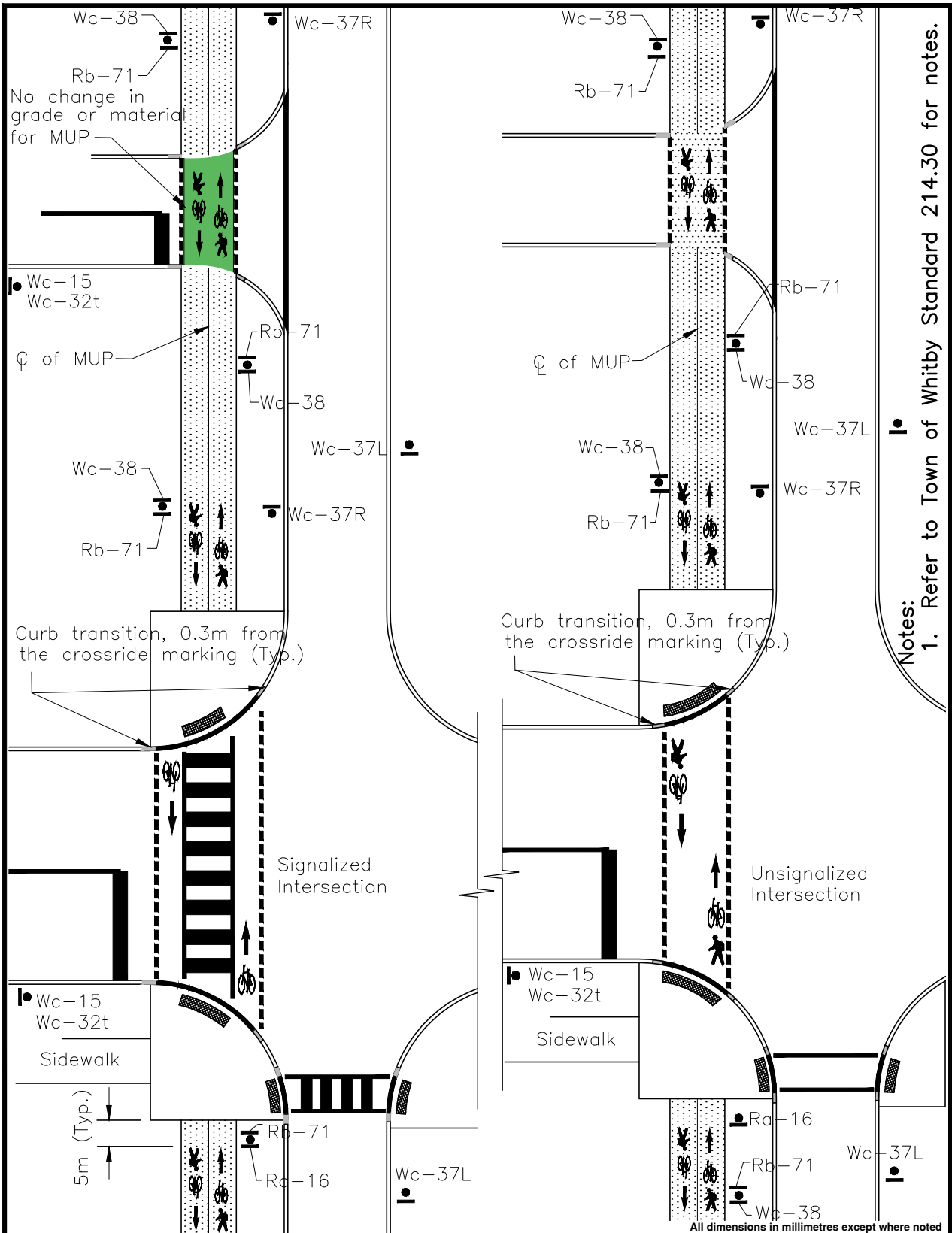
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

Typical Rest Area Along MUP and Sidewalk

DWG. Date:	June 2022
Revision No.:	1
Revision Date:	May 2025
Dwg No.	214.10









Notes:
 1. Refer to Town of Whitby Standard 214.30 for notes.


The Corporation of the Town of Whitby		Engineering Services	
Checked:	MUP Signs and Pavement Markings	DWG. Date:	June 2022
Approved:		Revision No.:	1
Scale:		Revision Date:	May 2025
N.T.S		DWG No.	214.20

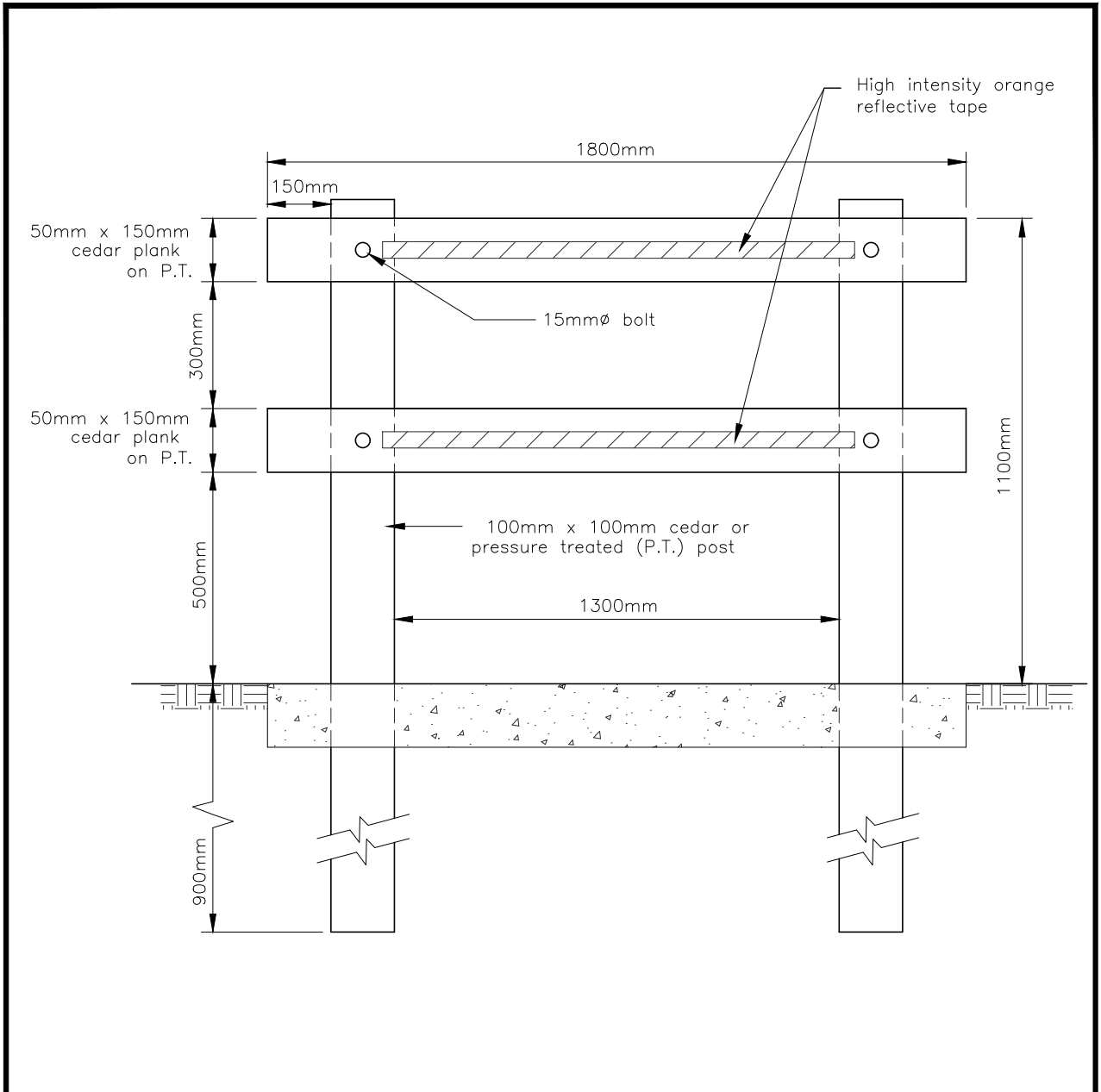
Notes:

1. Pavement markings and signage as per OTM Book 18 "Cycling Facilities".
2. Crossride layout, symbols as per OTM Book 18 "Cycling Facilities".
3. MUP centrelines shall be a 100mm solid yellow line.
4. Green conflict paint shall be applied at high volume entrances (ie. plazas, schools, etc).
5. All signalized intersection crossrides shall be either combined or separated, as required by the design.
6. All non-signalized intersections and major driveways shall be mixed crossride.
7. User symbols, such as Stylized Bicycle and Walking Pedestrian stencil/icon, shall be applied at intersections and repeated as required.
8. Sign mounting heights and lateral offsets shall be in accordance with OTM book 1B, Section 12.
9. The sign locations shall be in accordance with OTM Book 5, Book 6, and Book 18.
10. Signs shall be installed facing the traffic they are intended to serve, except for No Parking and No Stopping signs.

Sign Code	Sign
Rb-71	 Shared Pathway
Ra-16	 Yield to Pedestrians
Wc-15	 Pedestrian and Bicycle Crossing Ahead
Wc-32t	 Crossing Ahead Tab
Wc-38	 Slow, Watch for Turning Vehicles
Wc-37R Wc-37L	 Bicycle Path Crossing Side (Right/Left)

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked: _____ Approved:  Scale: N.T.S	MUP Signs and Pavement Markings Notes	DWG. Date: June 2022 Revision No.: 1 Revision Date: May 2025 DWG No. 214.30

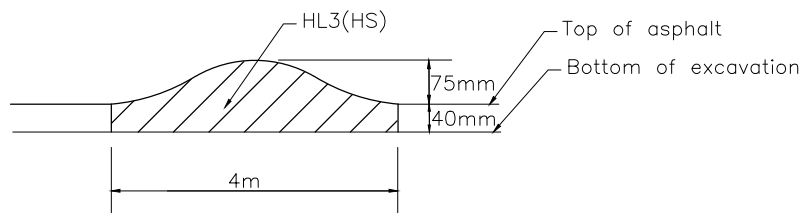
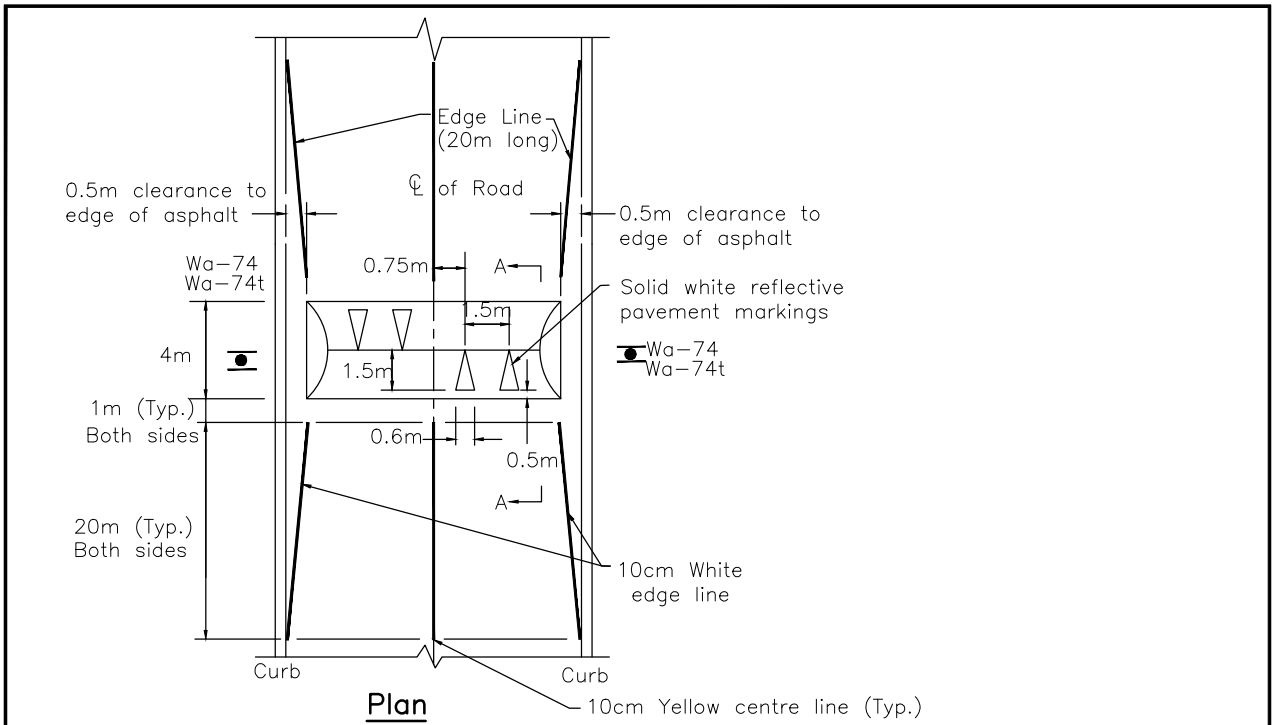


Notes:

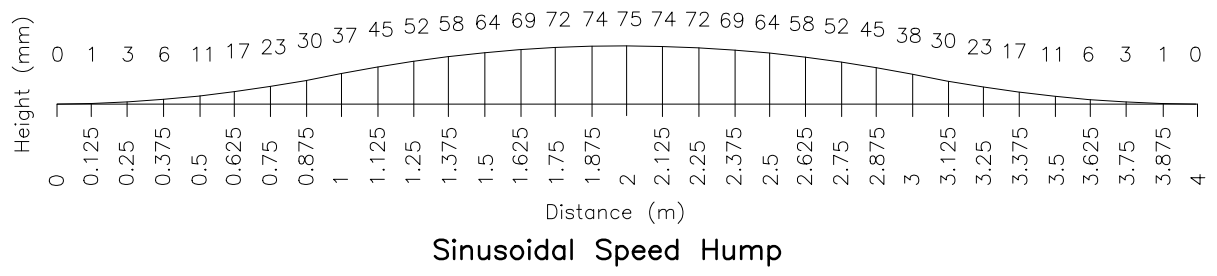
1. To be used at end or side of sidewalk where grade difference would cause a pedestrian hazard.
2. Orange high intensity reflective tape to be applied to cross planks.
3. Cross cedar planks to be painted white.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked: Approved: <i>[Signature]</i> Scale: N.T.S.	<h2 style="margin: 0;">Temporary Sidewalk Barricade</h2>	DWG. Date: August 2015 Revision No.: 1 Revision Date: June 2022 DWG No. 215

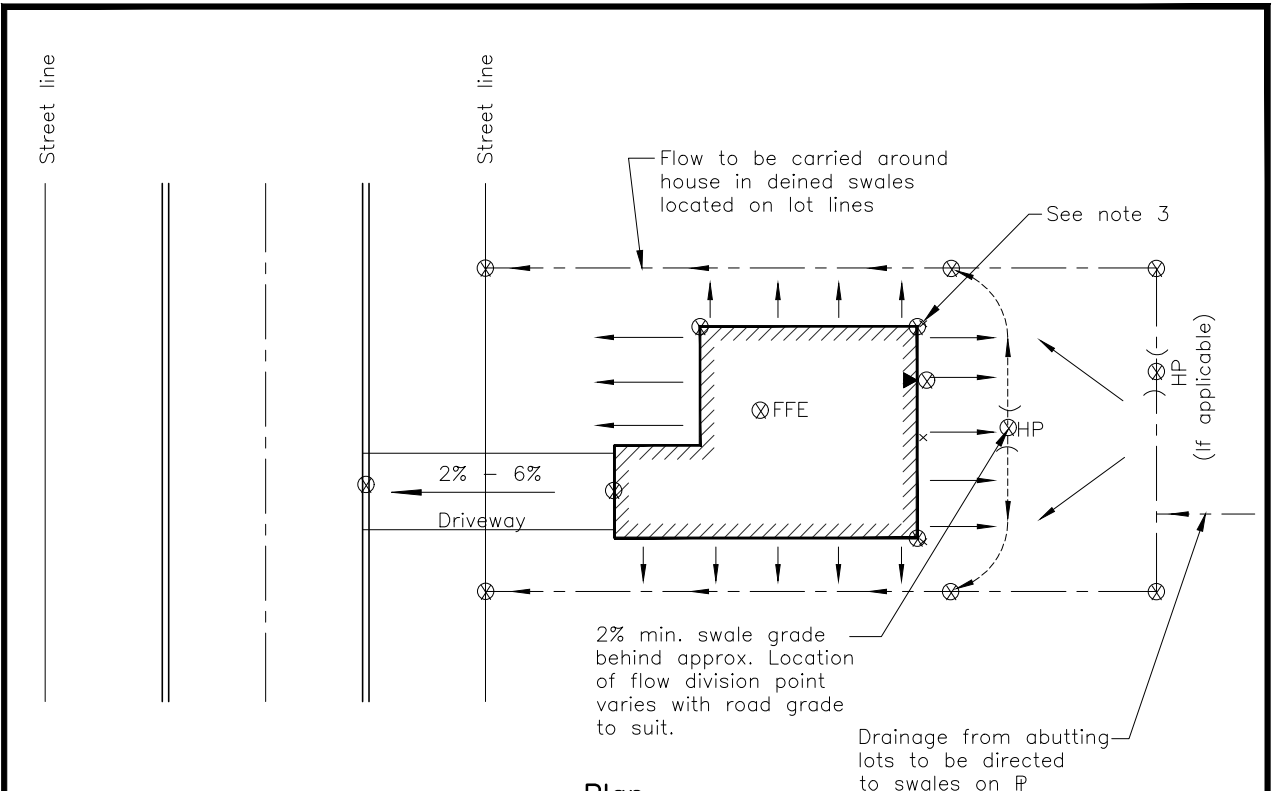


- Notes:
1. Speed humps should be at least 1m away from maintenance holes or driveway(s), where possible.
 2. Speed hump is 4 metres in width.
 3. Maximum height is 75 mm at the centre.
 4. Edge lines to taper from width of speed hump to adjacent EOP/edge of bike lane, 20m long.
 5. Number of reflective arrows may vary depending on pavement width.

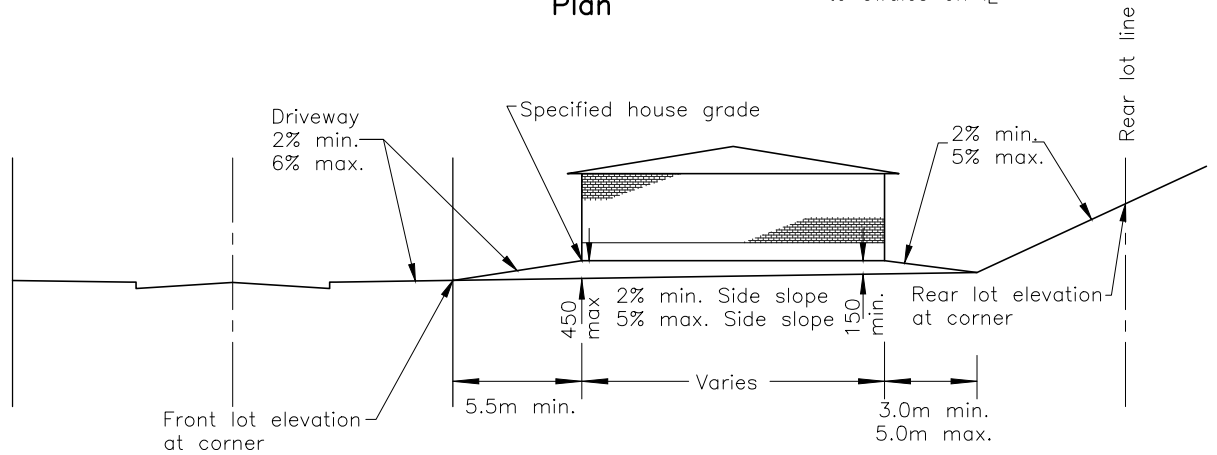


All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:	Speed Hump	DWG. Date: June 2022	Revision No.: 1
Approved:		Revision Date: May 2025	DWG No. 216
Scale: N.T.S			



Plan



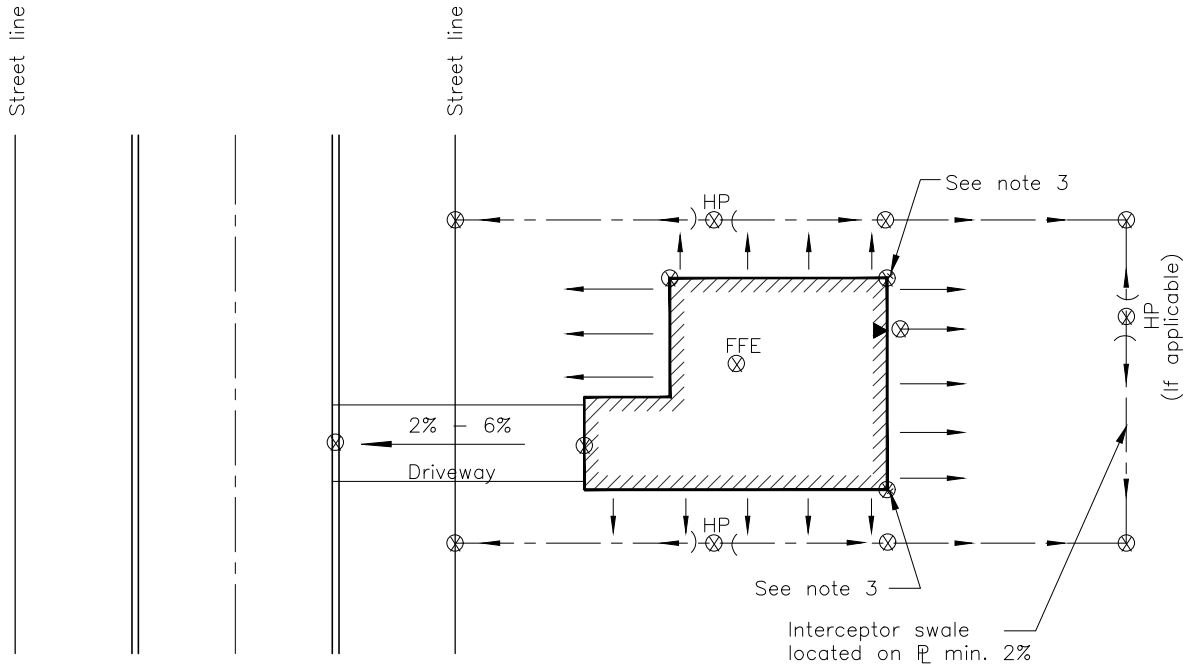
Elevation

Notes:

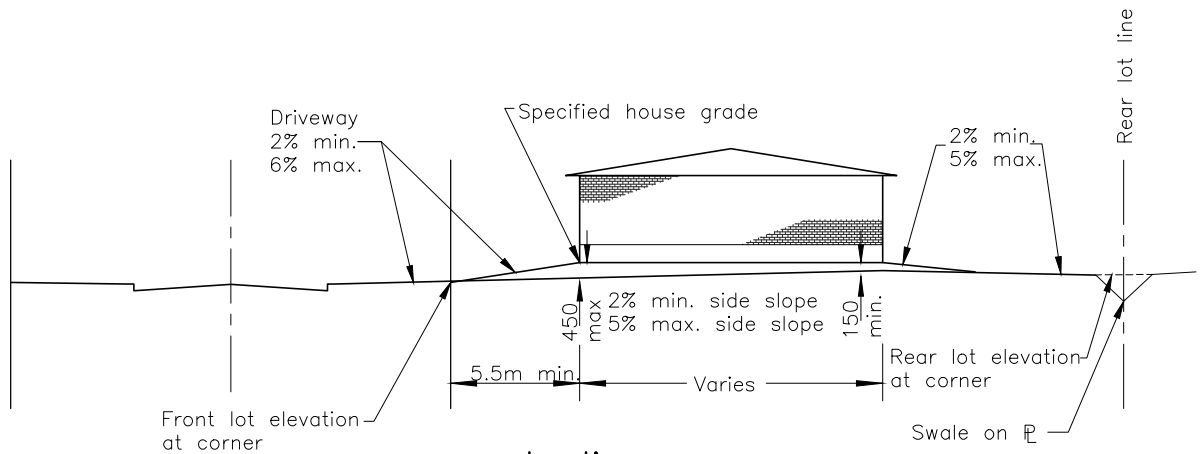
1. Specified house grade shall be a minimum of 300mm above the highest front lot corner or 450mm above the lowest front lot corner, whichever is higher.
2. Refer to Town of Whitby Standard #303 for lot grading notes.
3. Maximum grade differential from the center rear of the house to either rear corner shall be designed not to exceed 0.10m. Exceedances to be approved at discretion of commissioner of public works.
4. ⊗ Minimum mandatory survey locations for as-built lot grading certification.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	<h2 style="margin: 0;">Typical Front Lot Drainage</h2>	DWG. Date: January 1993
Approved:		Revision no.: 5
Scale: N.T.S		Revision date: October 2018
		DWG No. 300



Plan



elevation

Notes:

1. Specified house grade shall be a minimum of 300mm above high front lot corner.
2. Refer to Town of Whitby Standard #303 for lot grading notes.
3. Maximum grade differential from the center rear of the house to either rear corner shall be designed not to exceed 0.20m. Exceedances to be approved at discretion of commissioner of public works.
4. ⊗ Minimum mandatory survey locations for as-built lot grading certification.

All dimensions in millimetres except where noted

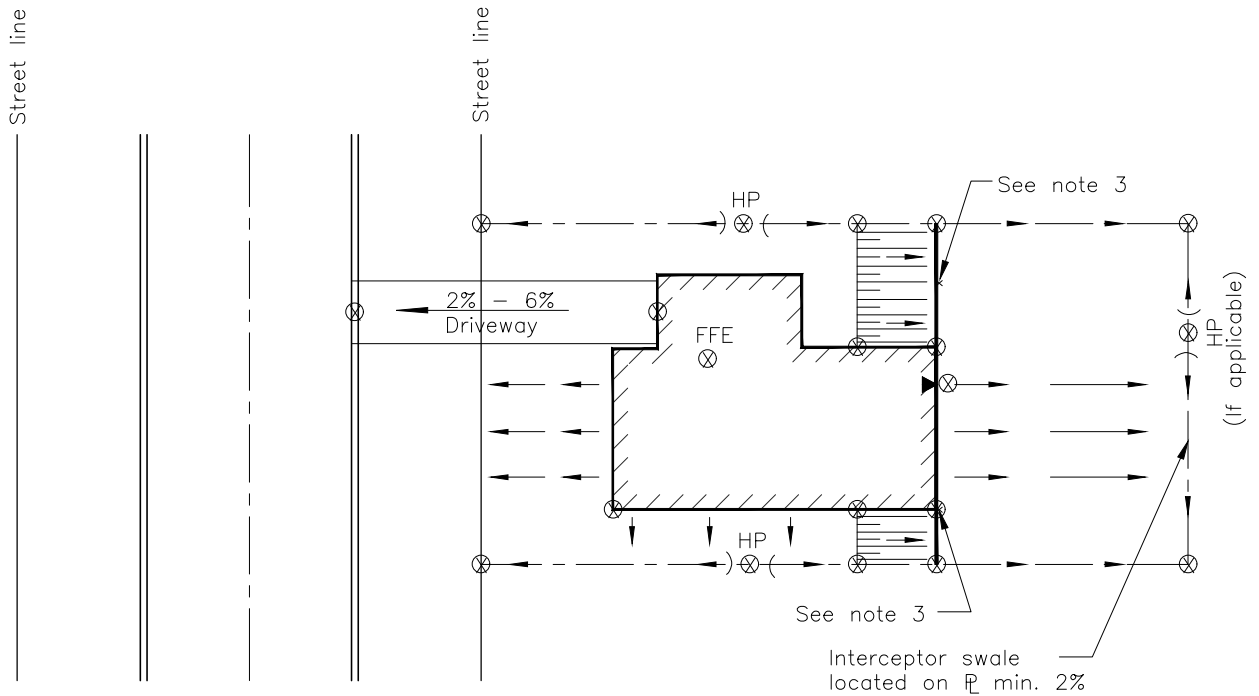
The Corporation of the Town of Whitby

Engineering Services

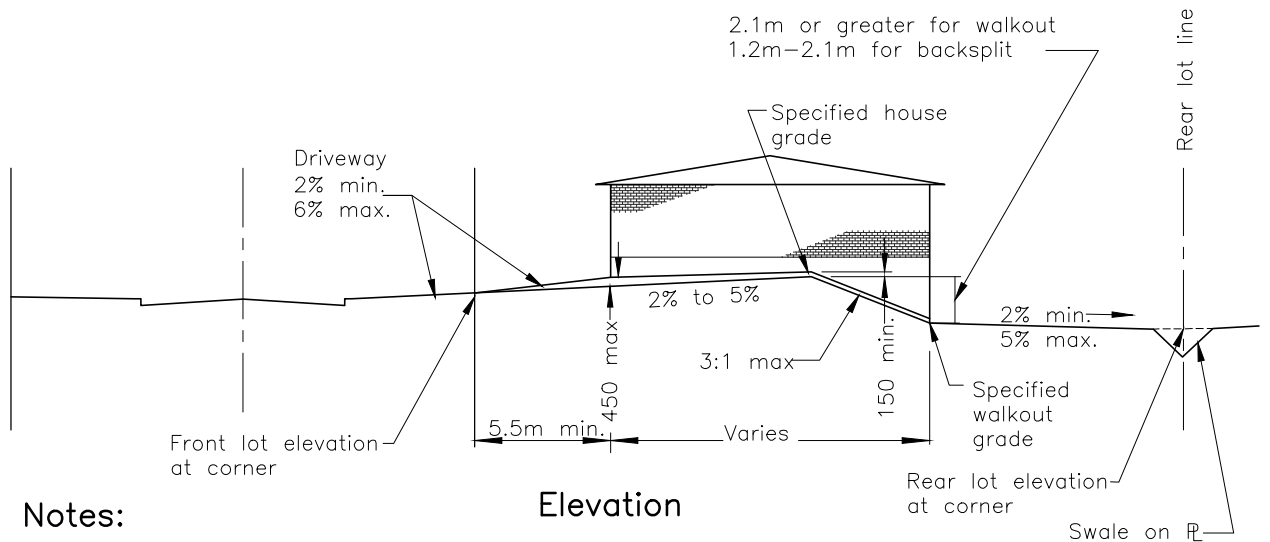
Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S

Rear Lot Drainage

Dwg. Date: January 1993
 Revision No.: 5
 Revision Date: October 2018
 DWG No. 301



Plan



Elevation

Notes:

1. Specified house grade shall be a minimum of 300mm above high front lot corner.
2. Refer to Town of Whitby Standard #303 for lot grading notes.
3. Maximum grade differential from the center rear of the house to either rear corner shall be designed not to exceed 0.20m. Exceedances to be approved at discretion of commissioner of public works.
4. ⊗ Minimum mandatory survey locations for as-built lot grading certification.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S.

Rear Lot Drainage for Walkout or Backsplit House

DWG. Date: January 1993
 Revision No.: 5
 Revision Date: October 2018
 DWG No. 302


The Following Standard Notes Shall
Appear on All General Grading Plans and Apply
to All Individual Siting Plans

1. Prior to submitting individual siting plans for Engineering Services grading approval at the building permit stage, the builder shall have the siting:
 - i. Drawn on the Town Standard templates 509.10 or 509.20.
 - ii. Approved by the subdivider's consulting engineer to ensure that the grading and drainage patterns conform to the approved general grading plans.
 - iii. Approved by the planning department of the Town of Whitby for architectural control.
 - iv. Approved by the planning/building department of the Town of Whitby for zoning conformity.
 - v. Include as constructed sanitary and storm service connection invert elevations for each lot.
2. Exposed foundation walls shall be designed to extend not less than 250mm above finished ground level. As-constructed exterior foundation wall shall comply with the ontario building code.
3. Where indicated on this plan, lots which abut subdivision limit shall be graded to provide a 0.6m metre strip of undisturbed land adjacent to the subdivision limit until such time as final grading works are undertaken.
4. For grading design criteria, see Town of Whitby engineering design criteria section D2.01.
5. Drainage swales shall be constructed by the builder on the property line and to the grades, depths and sections specified herein (and in accordance with Town of Whitby engineering design criteria section D2.02):
 - i. Minimum depth = 0.15m maximum depth = 0.45m
 - ii. Minimum grade = 2.0% maximum grade = 5.0%
 - iii. Maximum side slopes = 3:1
6. For rear to front draining lots the rear apron swale shall be designed to promote drainage to the wider side yard.
7. Rear yards shall be designed for a minimum of 7.0m with a maximum grade of 5%. As-built swales up to the maximum 0.45m depth may be included within the 7.0m.
8. Driveways shall not be used as an outlet for any side yard swales.
9. Driveways shall have a design grade range from 2% to 6% as per Town of Whitby Standard No 304 and constructed as per Standard No 305.
10. Refer to sections d2.01 and e2.00 of the engineering design criteria for retaining wall requirements.
11. When separation between houses is 1.8m or less the builder shall place 19mm clear stone to a depth of 100mm (on filter cloth) in place of sod. A positive grade away from the house at final grade level is mandatory, prior to placing stone.
12. A minimum of 1.0m at 2-5% grade shall be maintained adjacent to walkways, around the exterior perimeter of corner lots and where pedestrian foot traffic is reasonably anticipated.
13. Only one walkway riser shall be permitted within 1.0m of the driveway.
14. The minimum required house elevations that must be shown are:
 - i. FFE – finished floor elevation
 - ii. TFW – top of foundation wall
 - iii. FBS – finished basement slab
 - iv. MBE – minimum basement elevation (if applicable)
 - v. USF – underside of footing
 - vi. Max. USF – maximum underside of footing (if applicable)
 where the above elevations change throughout the building envelope, the siting plan shall clearly indicate all elevations and limits of change.
15. Roof leader connections shall be as per town design criteria section B3.13, and/or as per the approved engineering plans.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	
Scale:	N.T.S.

**Standard Notes for
Lot Grading Plans**

DWG. Date:	January 1993
Revision No:	5
Revision Date:	June 2022
DWG No.	303



Foundation Control Certificate

Municipal Address(es): _____

Name of Subdivision: _____

Subdivision No.: _____

Lot/Block No.: _____

Registered Plan No.: _____

Attention: Director of Engineering

By my/our signature hereunder, I/we certify that the control elevations of the above noted lot(s) have been checked and;

- a) Confirm that the foundation control elevations conform to the elevations shown on the site grading plan submitted with the Building Permit Application.
- b) Confirm that the foundation "as constructed" will not impede that completion of the lot grading in accordance with the approved Lot Grading Plan.
- c) Confirm that the foundation "as constructed" will permit the construction of the garage floor at an elevation to provide for grading of the driveway in conformity with the Town of Whitby Design Criteria and Engineering Standards, including consideration of the proposed sidewalk and/or curbs abutting the lot.

Name of Company

Name of Person Signing for Firm


Position of Person Signing for Firm

Date

All dimensions in millimetres except where noted

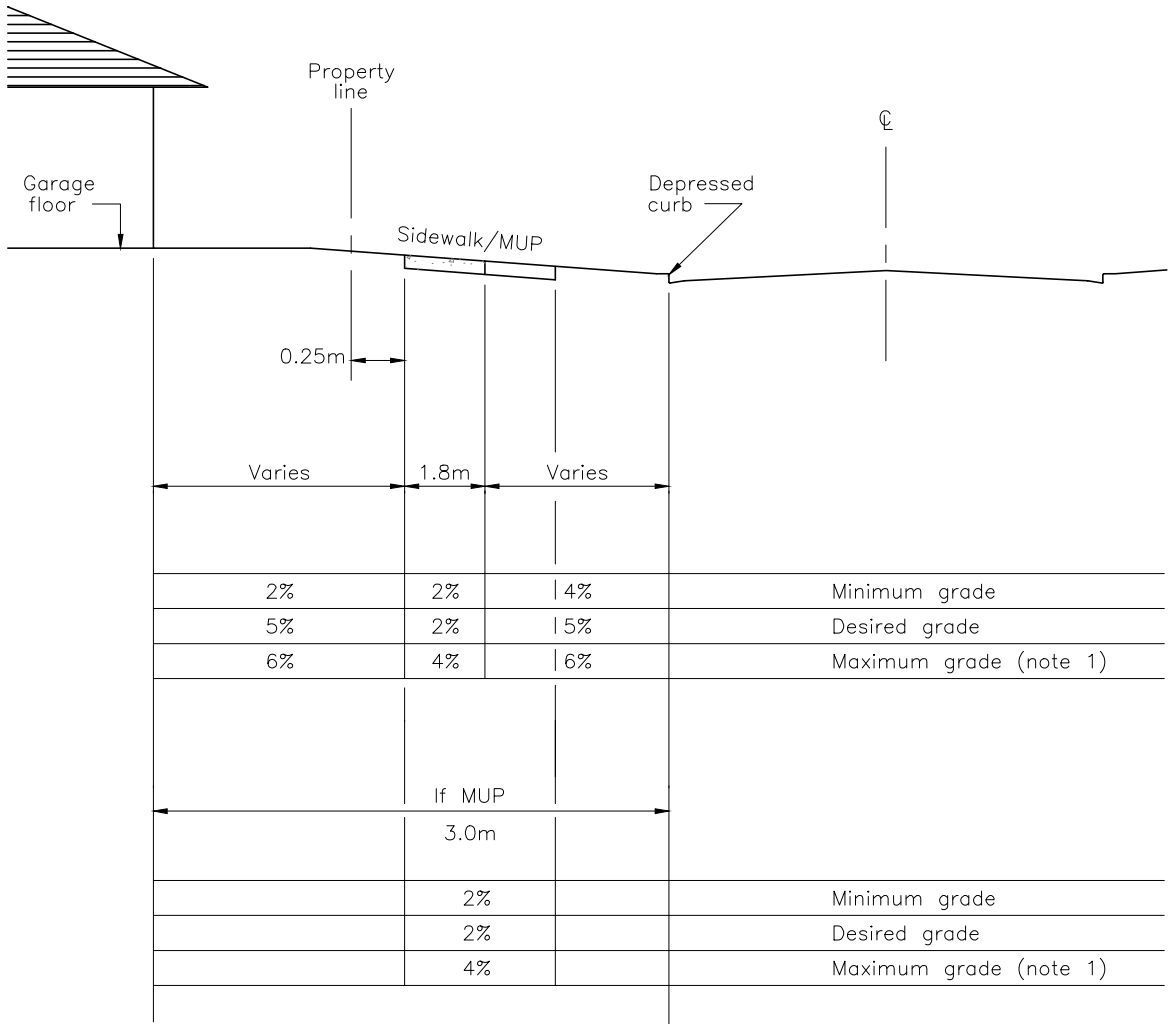
The Corporation of the Town of Whitby

Engineering Services

Checked:
Approved: 
Scale: N.T.S

Foundation Control Certificate

DWG. Date: January 2009
Revision No.: 1
Revision Date: June 2022
DWG No. 303.10



Note:

1. The maximum design grade for an access driveway shall be 6%. The maximum as-built grade for an access driveway shall be 8%.

All dimensions in millimetres except where noted

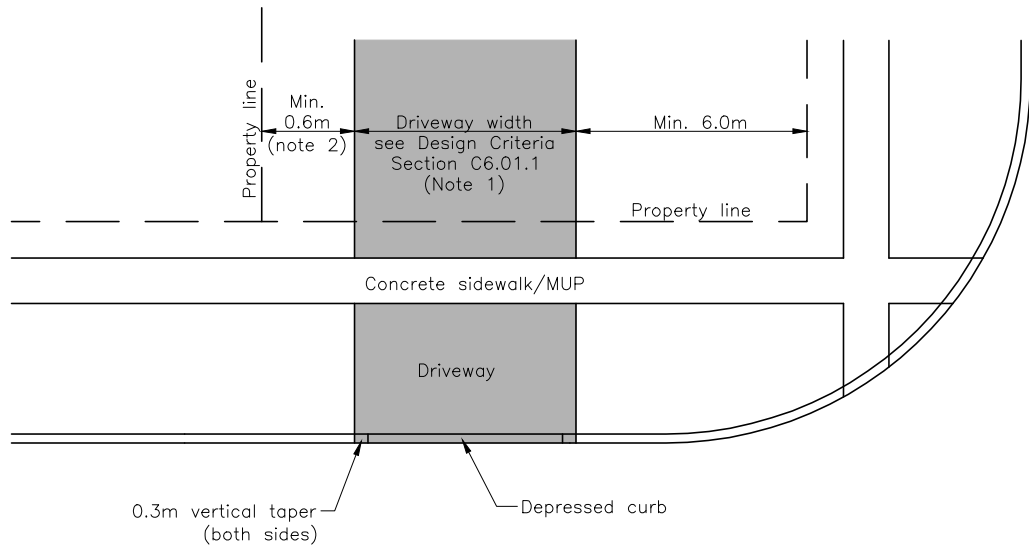
The Corporation of the Town of Whitby

Engineering Services

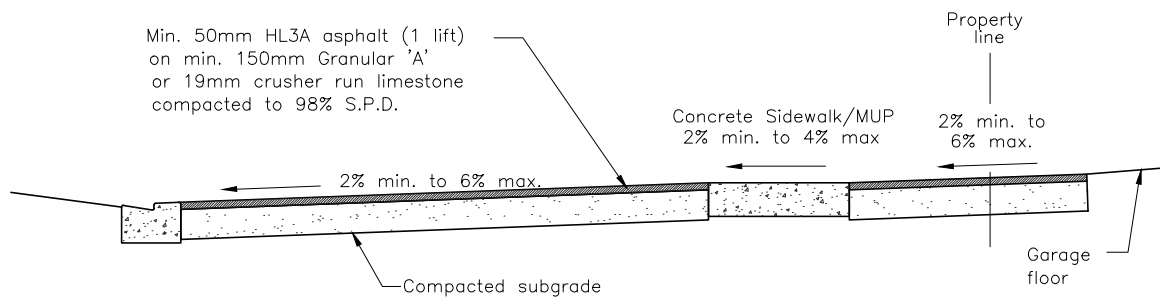
Checked:	
Approved:	<i>[Signature]</i>
Scale:	N.T.S

Driveway Profiles

DWG. Date:	January 1993
Revision No.:	4
Revision Date:	May 2025
DWG No.	304



Plan



Typical Section



Notes:

1. Minimum of 0.6m vegetated / permeable swale shall be maintained between property line and edge of driveway.
2. Refer to Town of Whitby Standard #208 for sidewalk detail.
3. All granular materials shall meet the current opss gradation requirements. Letter of certification from professional engineer shall be provided to the town confirming depth and compaction of granular and asphalt material.

All dimensions in millimetres except where noted

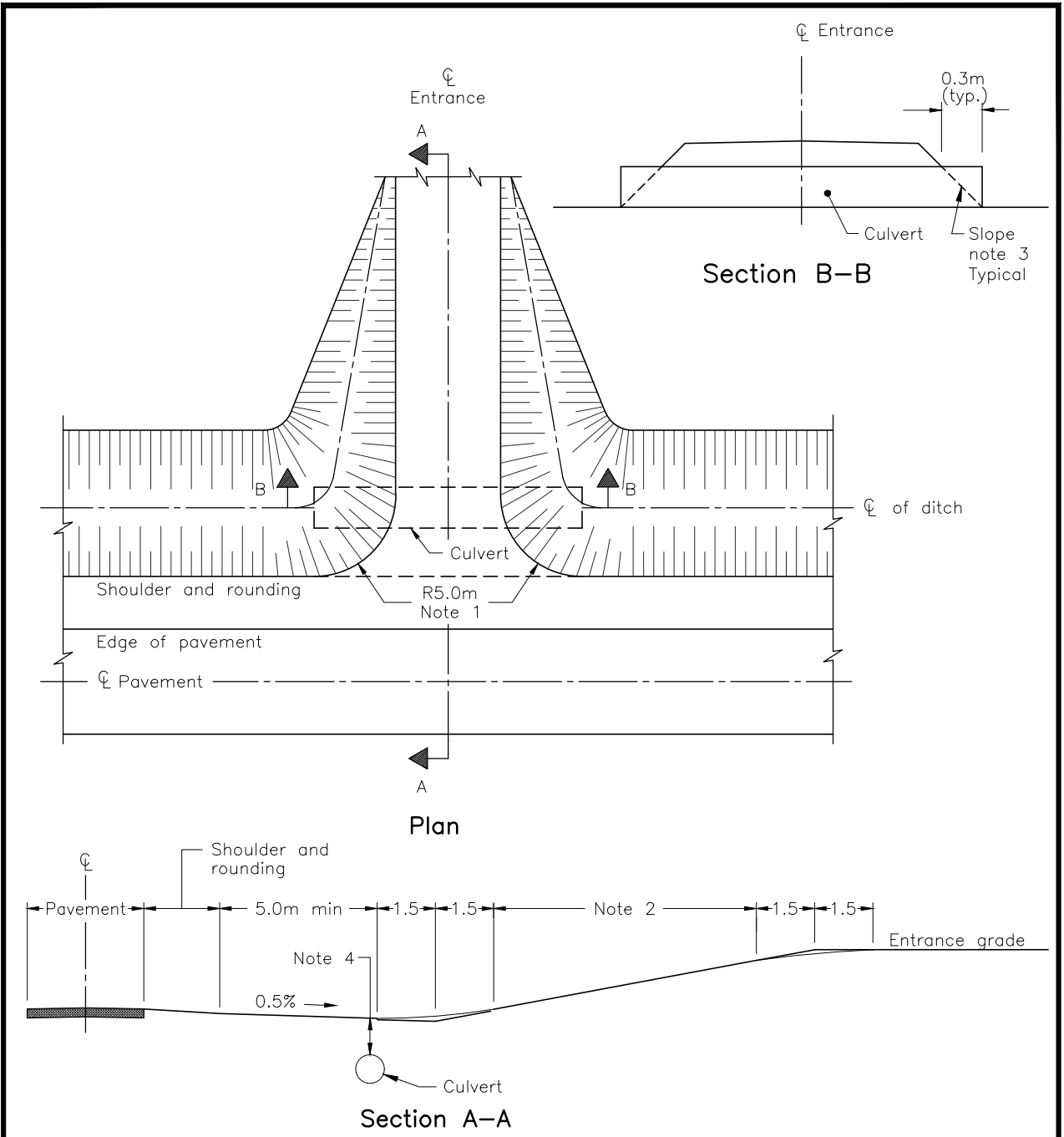
The Corporation of the Town of Whitby

Engineering Services

Checked: 
 Approved: 
 Scale: N.T.S

Residential Driveways

DWG. Date: June 1999
 Revision No.: 4
 Revision Date: October 2018
 DWG No. 305

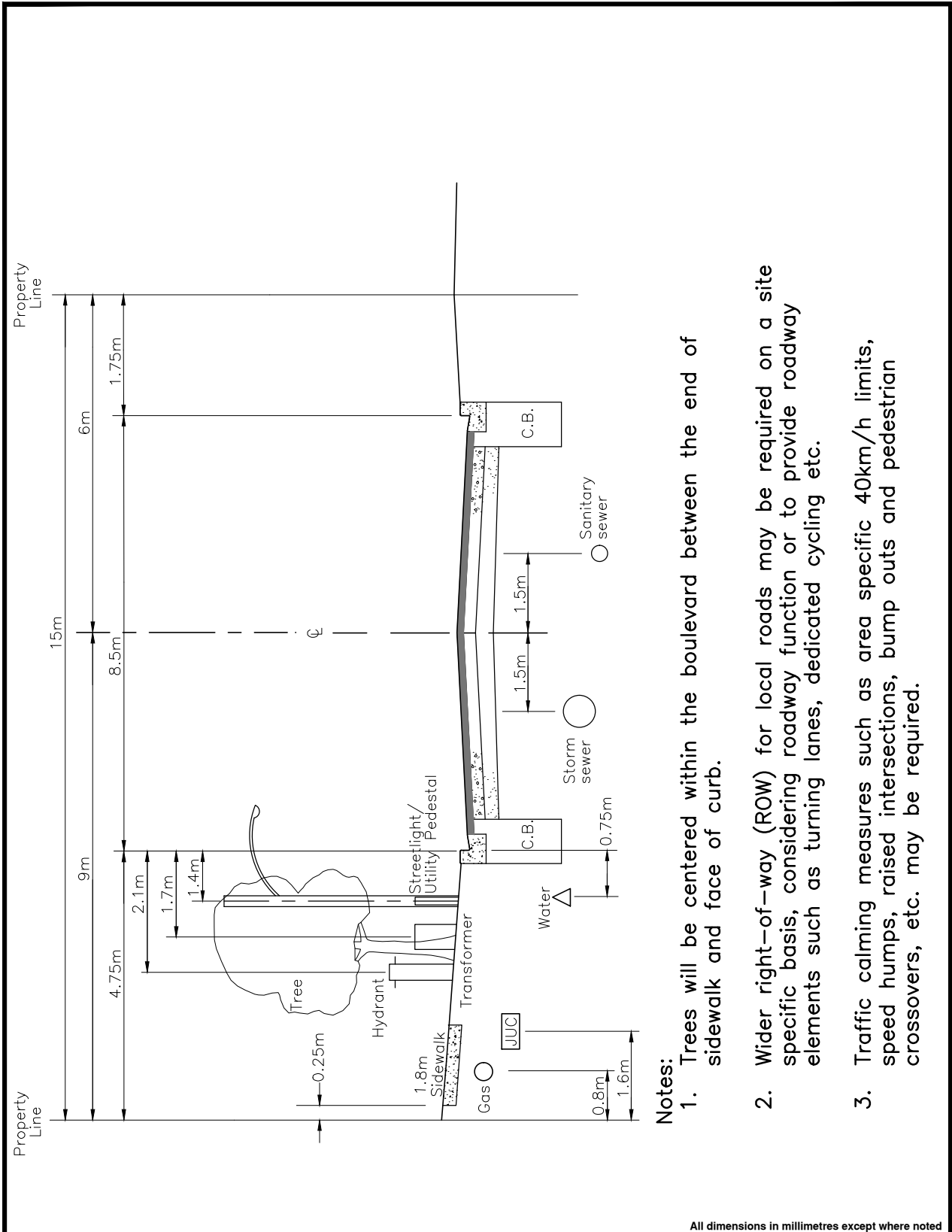


Notes:

1. Radius shall be 8.0m when entrance is used for farm equipment.
2. Maximum gradient: 6% for residential entrances and 10% for farm and field entrances.
3. Slope shall be 3H:1V or flatter when specified.
4. 200mm minimum cover for local roads.
300mm minimum cover for collector and arterial roads.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:	<h1>Rural Driveways</h1>		DWG. Date: August 2015
Approved:			Revision No.: .
Scale: N.T.S			Revision Date: . DWG No. 306

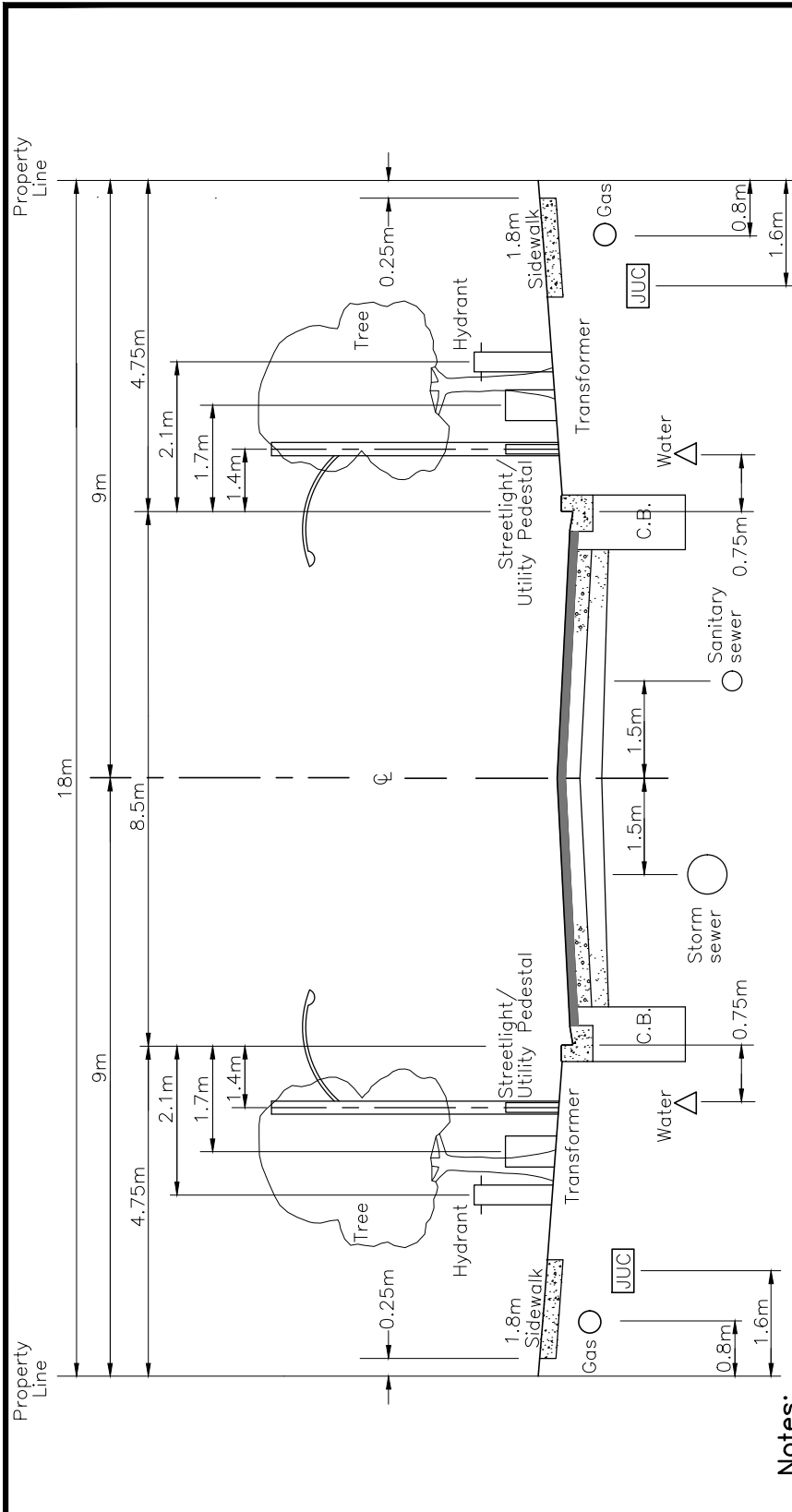


Notes:

1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
2. Wider right-of-way (ROW) for local roads may be required on a site specific basis, considering roadway function or to provide roadway elements such as turning lanes, dedicated cycling etc.
3. Traffic calming measures such as area specific 40km/h limits, speed humps, raised intersections, bump outs and pedestrian crossovers, etc. may be required.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:	Local Roadway 15.0m R.O.W.	DWG. Date: June 2022	Revision No.: -
Approved:		Revision Date: -	DWG No. 400
Scale: N.T.S			



Notes:

1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
2. All local roads with 18m right-of-way (ROW) width shall have 1.8m sidewalks on both sides, including courts and crescents.
3. Wider right-of-way (ROW) for local roads may be required on a site specific basis, considering roadway function or to provide roadway elements such as turning lanes, dedicated cycling etc.
4. Traffic calming measures such as area specific 40km/h speed limits, speed humps, raised intersections, bump outs and pedestrian crossovers etc. may be required.

All dimensions in millimetres except where noted

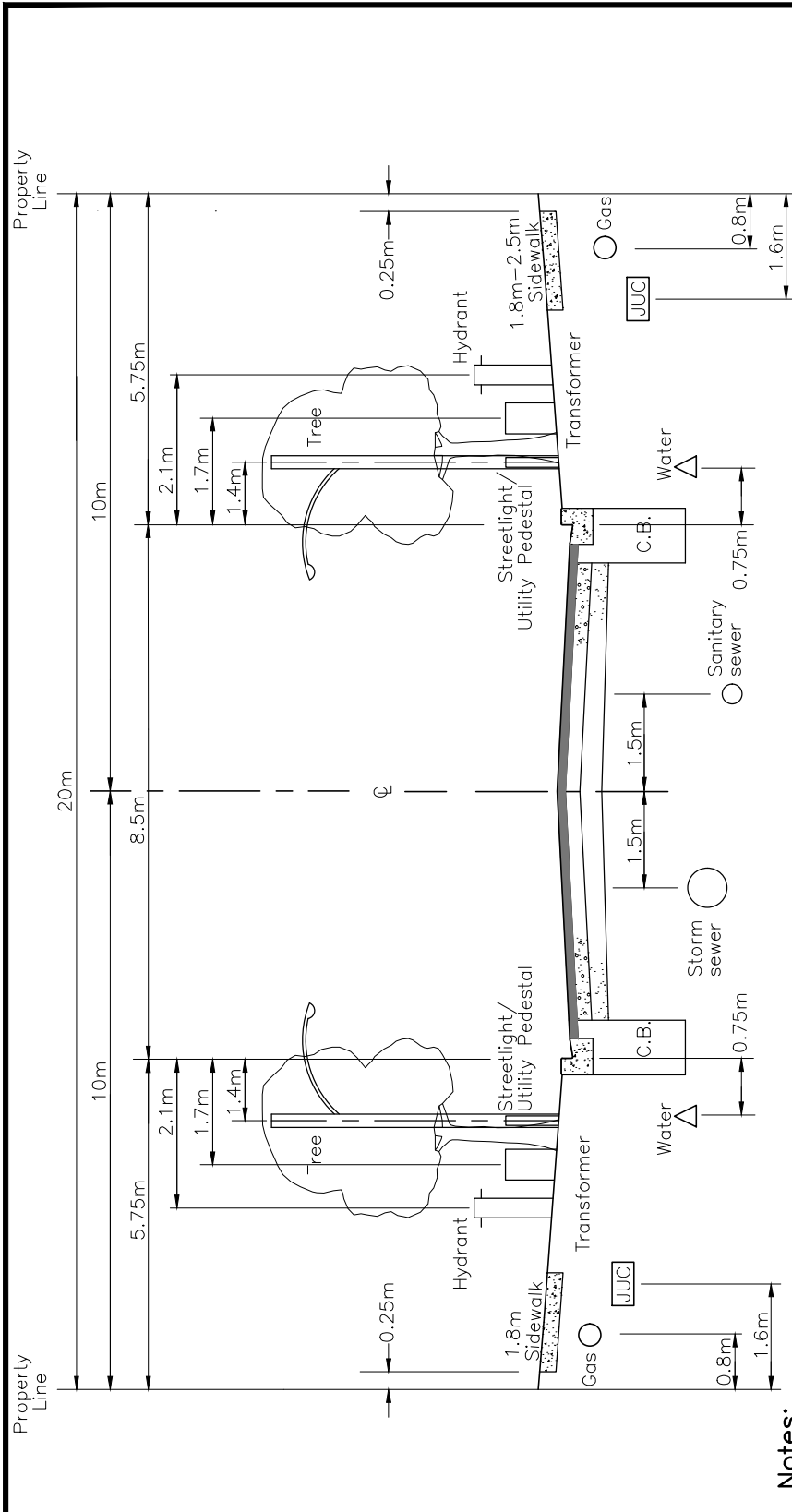
The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	
Scale:	N.T.S

**Local Roadway
18.0m R.O.W.**

DWG. Date:	June 2022
Revision No.:	-
Revision Date:	-
DWG No.	400.10

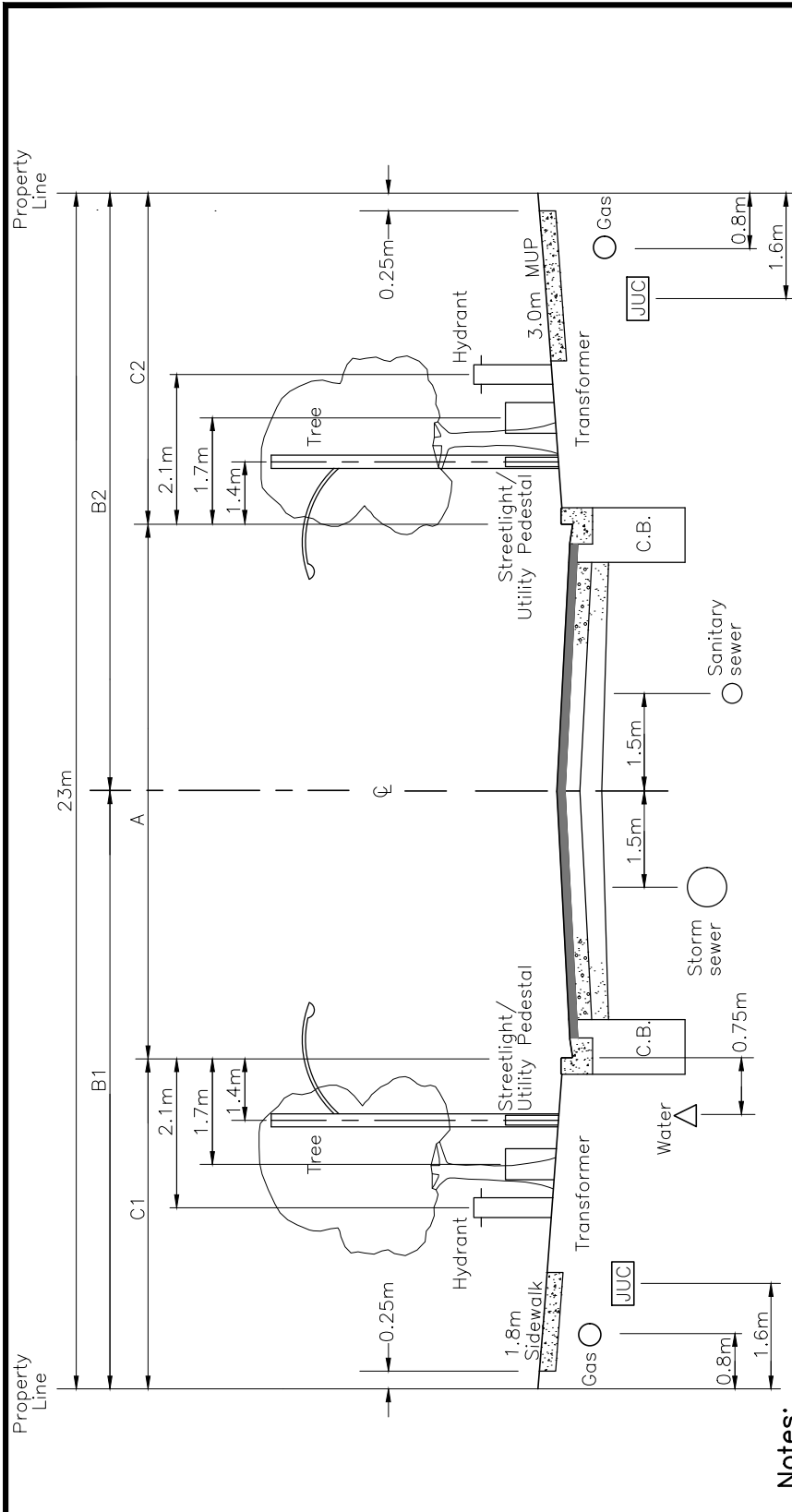


Notes:

1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
2. All local roads adjacent to parks, schools and commercial areas shall have a 20m right-of-way (ROW) with 2.5m sidewalk on adjacent side and 1.8m sidewalk on the opposite side.
3. Transformers shall be installed on the 1.8m sidewalk side of the right-of-way (ROW) where feasible.
4. Wider right-of-way (ROW) for local roads may be required on a site specific basis, considering roadway function or to provide roadway elements such as turning lanes, dedicated cycling etc.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked:	Local Roadway 20.0m R.O.W.	DWG. Date:	June 2022
Approved:		Revision No.:	-
Scale: N.T.S		Revision Date:	-
		DWG No.	400.20



Pavement Widths			
	8.5m	10m	12m
A	8.5m	10m	12m
B1	11.5m	11.5m	10.75m
B2	11.5m	11.5m	12.25m
C1	7.25m	6.5m	4.75m
C2	7.25m	6.5m	6.25m

- Notes:
1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
 2. Transformer shall be installed on the 1.8m sidewalk side of the right-of-way (ROW) where feasible.
 3. Traffic calming measures such as area specific 40km/h speed limits, speed humps, raised intersections, bump outs and pedestrian crossovers etc. may be required.
 4. For any cross section proposed that deviates from the the standard cross section table, the proposed cross section will be subject to detailed design and review by the Town of Whitby.

All dimensions in millimetres except where noted

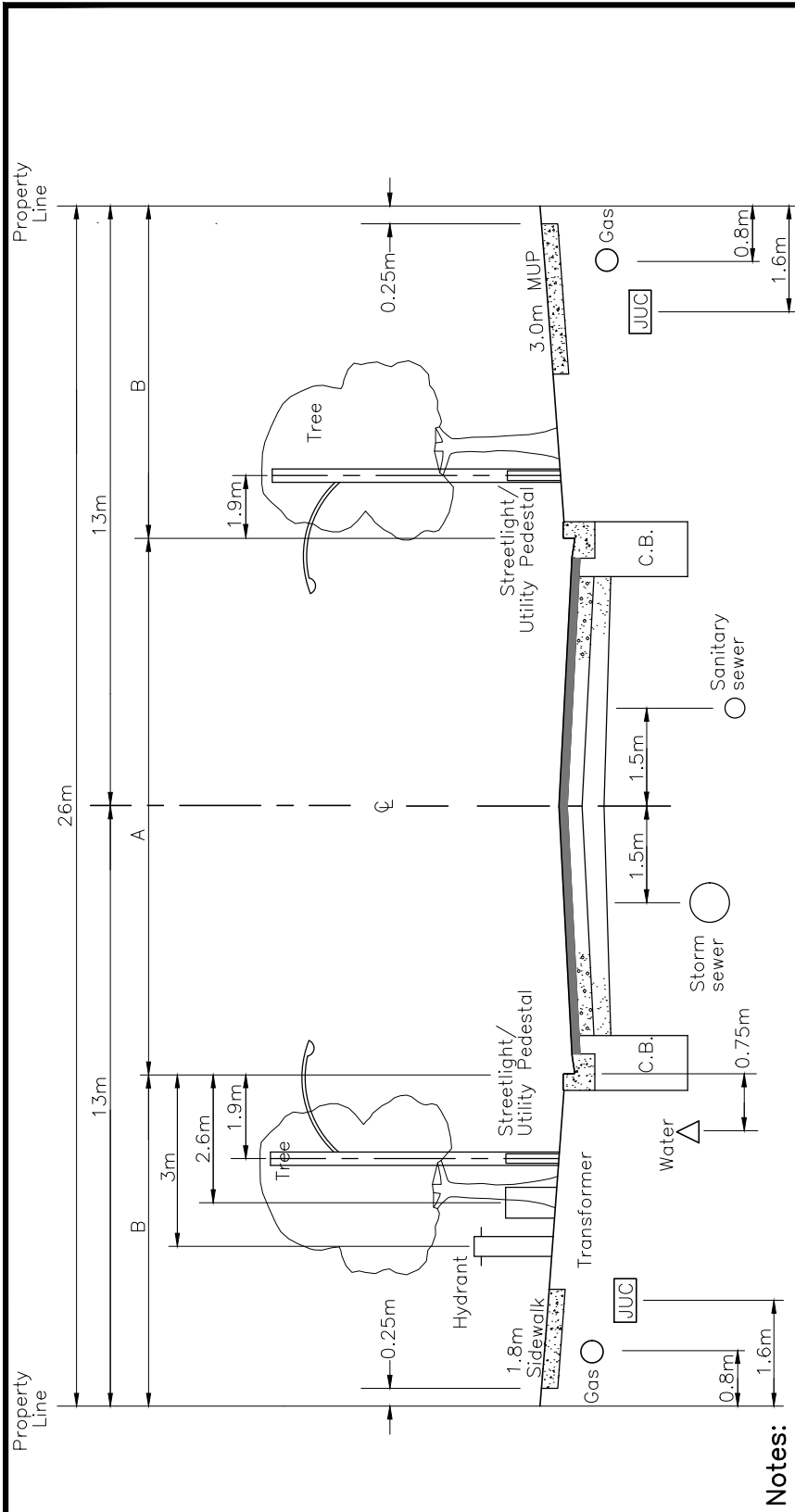
The Corporation of the Town of Whitby

Engineering Services

Checked:
Approved:
Scale: N.T.S

Collector Roadway
23.0m R.O.W.

DWG. Date: June 2022
Revision No.: -
Revision Date: -
DWG No. 401



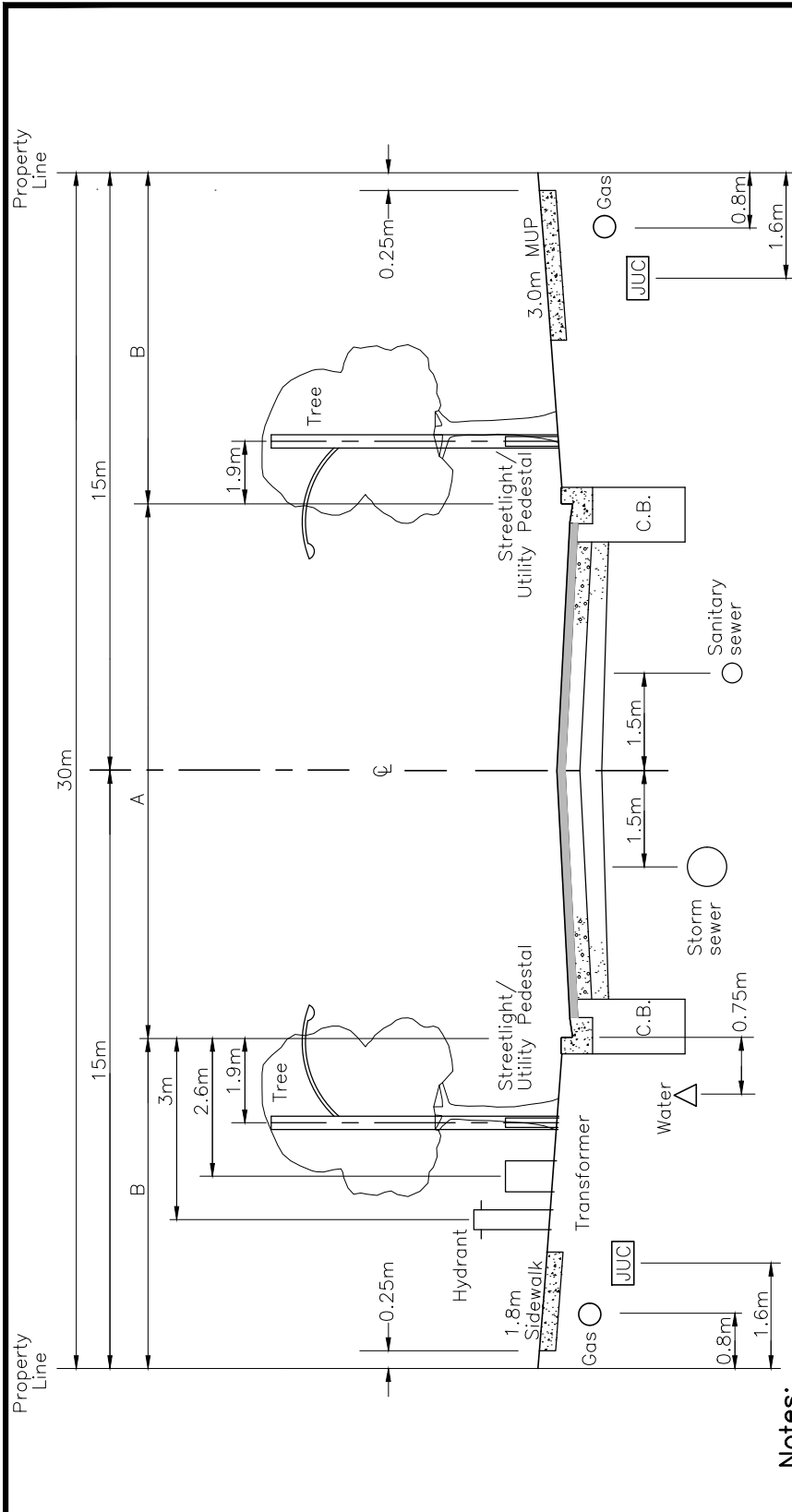
Notes:

1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
2. Transformer shall be installed on the 1.8m sidewalk side of the right-of-way (ROW) where feasible.
3. Traffic calming measures such as area specific 40km/h speed limits, speed humps, raised intersections, bump outs and pedestrian crossovers etc. may be required.
4. For any cross section proposed that deviates from the standard cross section table, the proposed cross section will be subject to detailed design and review by the Town of Whitby.

Pavement Widths		
	8.5m	10m
A	8.5m	10m
B	8.75m	8m
		7.5m

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	Collector/Arterial C Roadway 26.0m R.O.W.	DWG. Date: June 2022
Approved:		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 401.10



Notes:

1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
2. Transformer shall be installed on the 1.8m sidewalk side of the right-of-way (ROW) where feasible.
3. Traffic calming measures such as area specific 40km/h speed limits, speed humps, raised intersections, bump outs and pedestrian crossovers etc. may be required on Type C Arterial.
4. All setbacks and widths will be subject to review, detailed design and approval by the Town of Whitby.

	Minimum	Maximum
A	8.5m	17m
B	6.5m	10.75m

All dimensions in millimetres except where noted

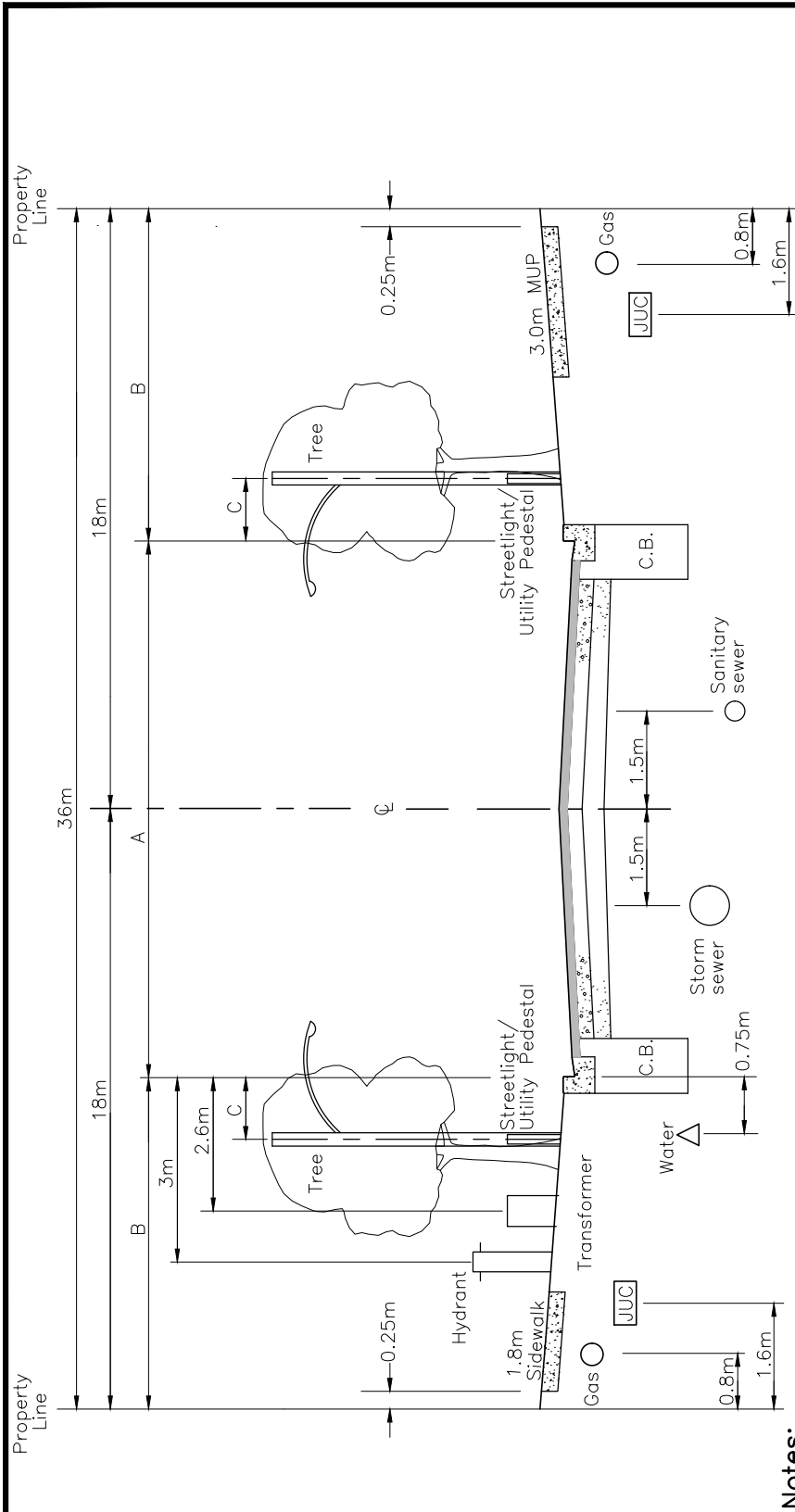
The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	
Scale:	N.T.S

**Collector/Arterial B Roadway
30.0m R.O.W.**

DWG. Date:	June 2022
Revision No.:	1
Revision Date:	May 2025
DWG No.	402



Notes:

1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
2. Transformer shall be installed on the 1.8m sidewalk side of the right-of-way (ROW) where feasible.
3. All setbacks and widths will be subject to review, detailed design and approval by the Town of Whitby.

All dimensions in millimetres except where noted

	Minimum	Maximum
A	8.5m	24m
B	6m	13.75m
C	1.4m	1.9m

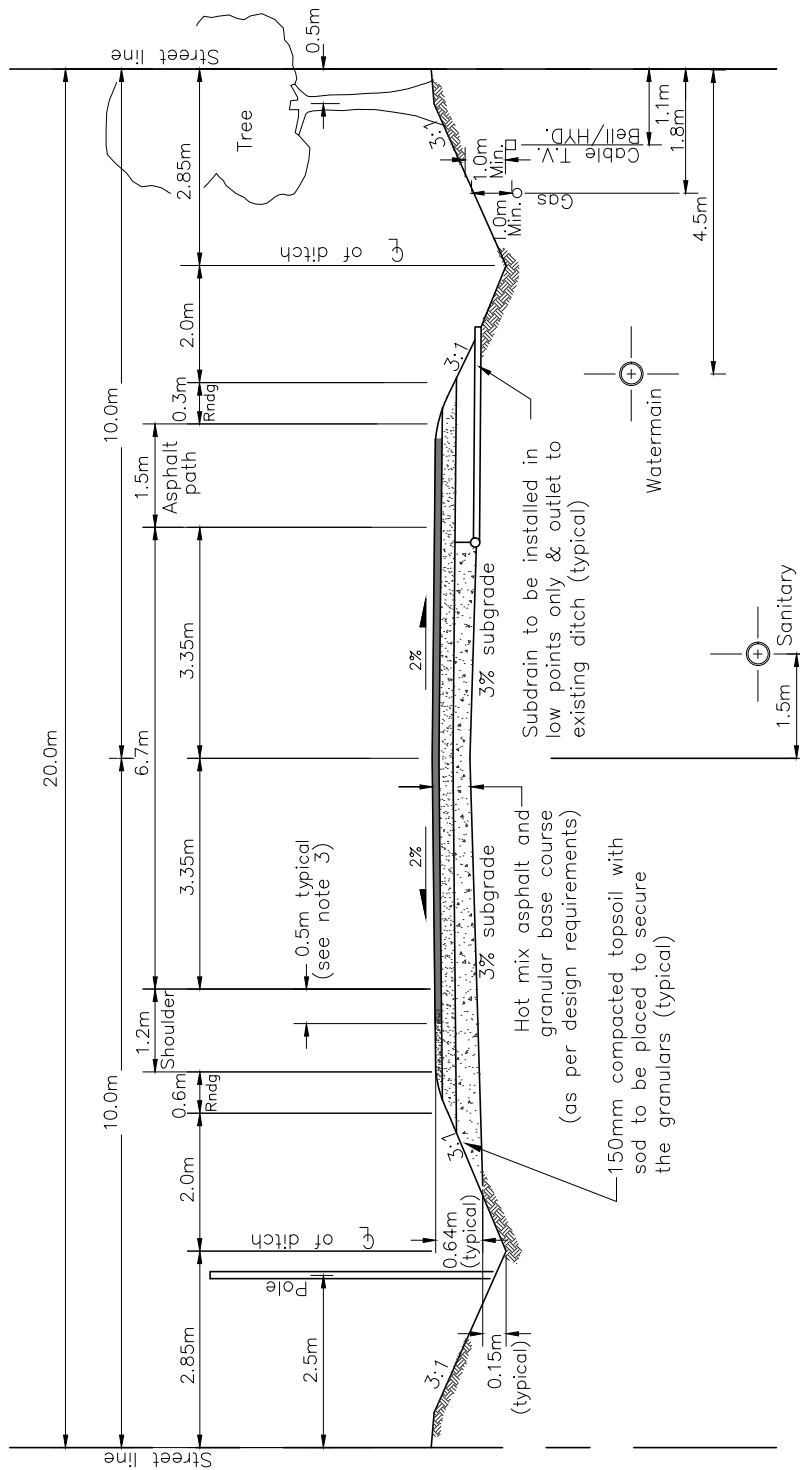
The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	
Scale:	N.T.S

**Arterial B Roadway
36.0m R.O.W.**

DWG. Date:	June 2022
Revision No.:	1
Revision Date:	May 2025
DWG No.	402.10



Notes:

1. Granular sealing shall be applied to all shoulders.
2. Pavement to extend 0.5m into shoulders.
3. All pedestals to be 0.5m offset from existing property line.

All dimensions in millimetres except where noted

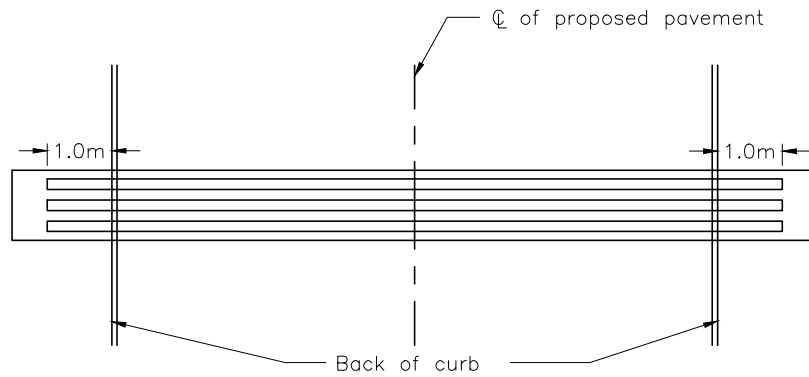
The Corporation of the Town of Whitby

Engineering Services

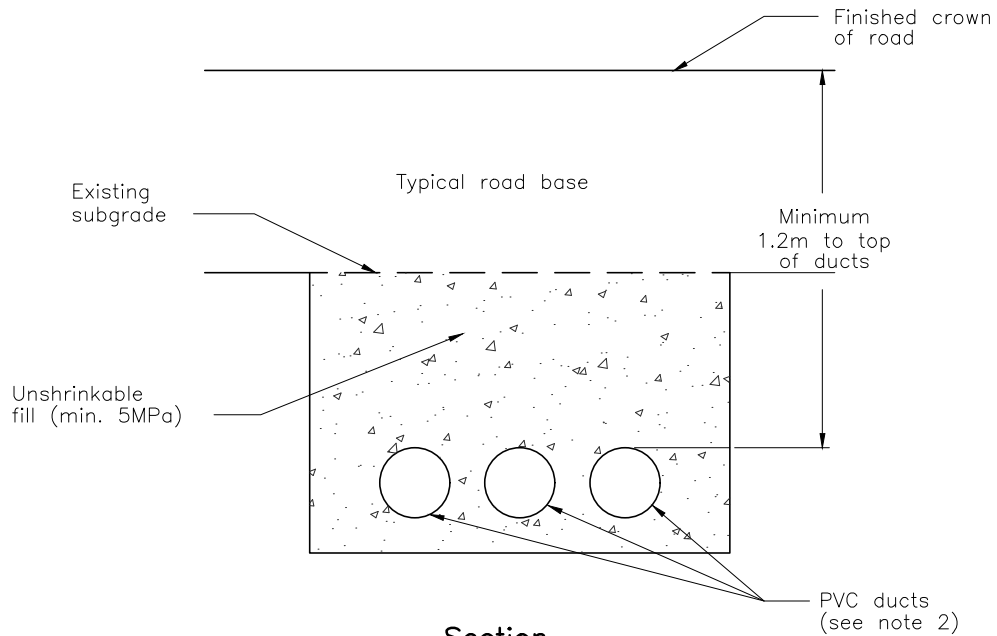
Checked: *AL*
 Approved: *CH*
 Scale: N.T.S

**Rural Road 20.0m R.O.W.
 6.7m Pavement**

DWG. Date: March 2004
 Revision No.: 3
 Revision Date: August 2015
 DWG No. 403



Plan



Section

Notes:

1. Crossing location and number of ducts to be stated on all construction drawings.
2. All ducts and spacing as per utility specifications.
3. All ducts to be installed prior to placement of road base.
4. End of ducts to be staked.
5. This is a minimum standard and shall be superseded by more stringent requirements if requested by utility companies.

All dimensions in millimetres except where noted

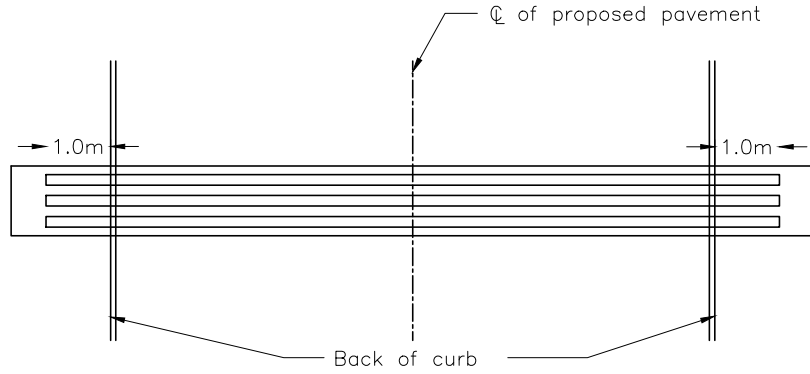
The Corporation of the Town of Whitby

Engineering Services

Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S

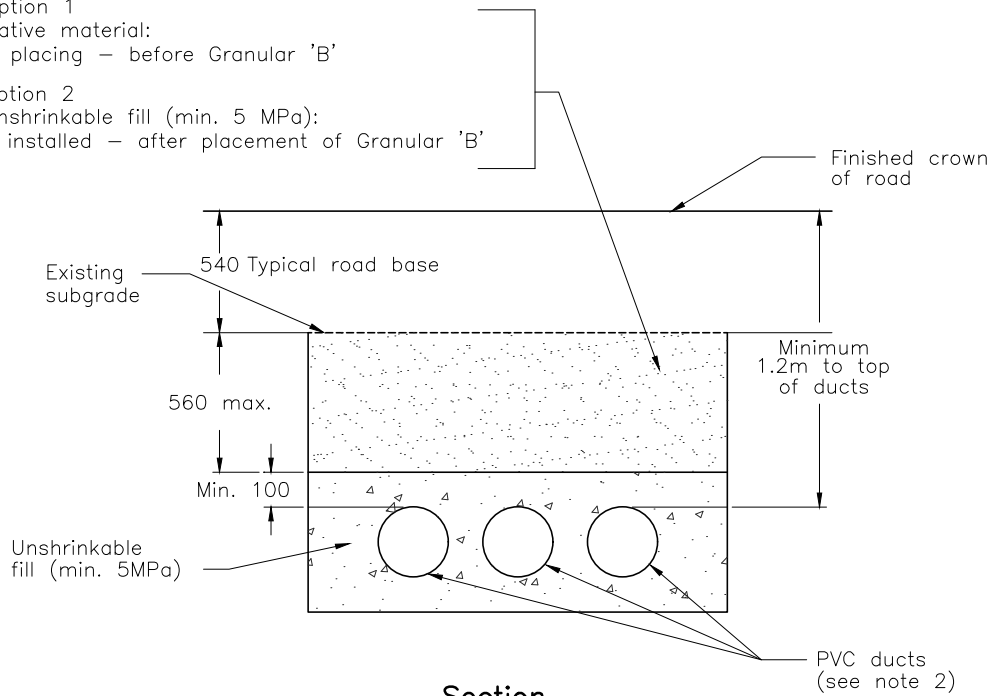
**Utility Duct Road Crossing Detail
 for Existing Roads**

DWG. Date: June 1999
 Revision No.: 2
 Revision Date: August 2015
 DWG No. 404



Plan

- Option 1
Native material:
If placing – before Granular 'B'
- Option 2
Unshrinkable fill (min. 5 MPa):
If installed – after placement of Granular 'B'



Section

Notes:

1. Crossing location and number of ducts to be stated on all construction drawings.
2. All ducts and spacing as per utility specifications.
3. All ducts to be installed prior to placement of road base.
4. End of ducts to be staked.
5. This is a minimum standard and shall be superseded by more stringent requirements if requested by utility companies.

All dimensions in millimetres except where noted

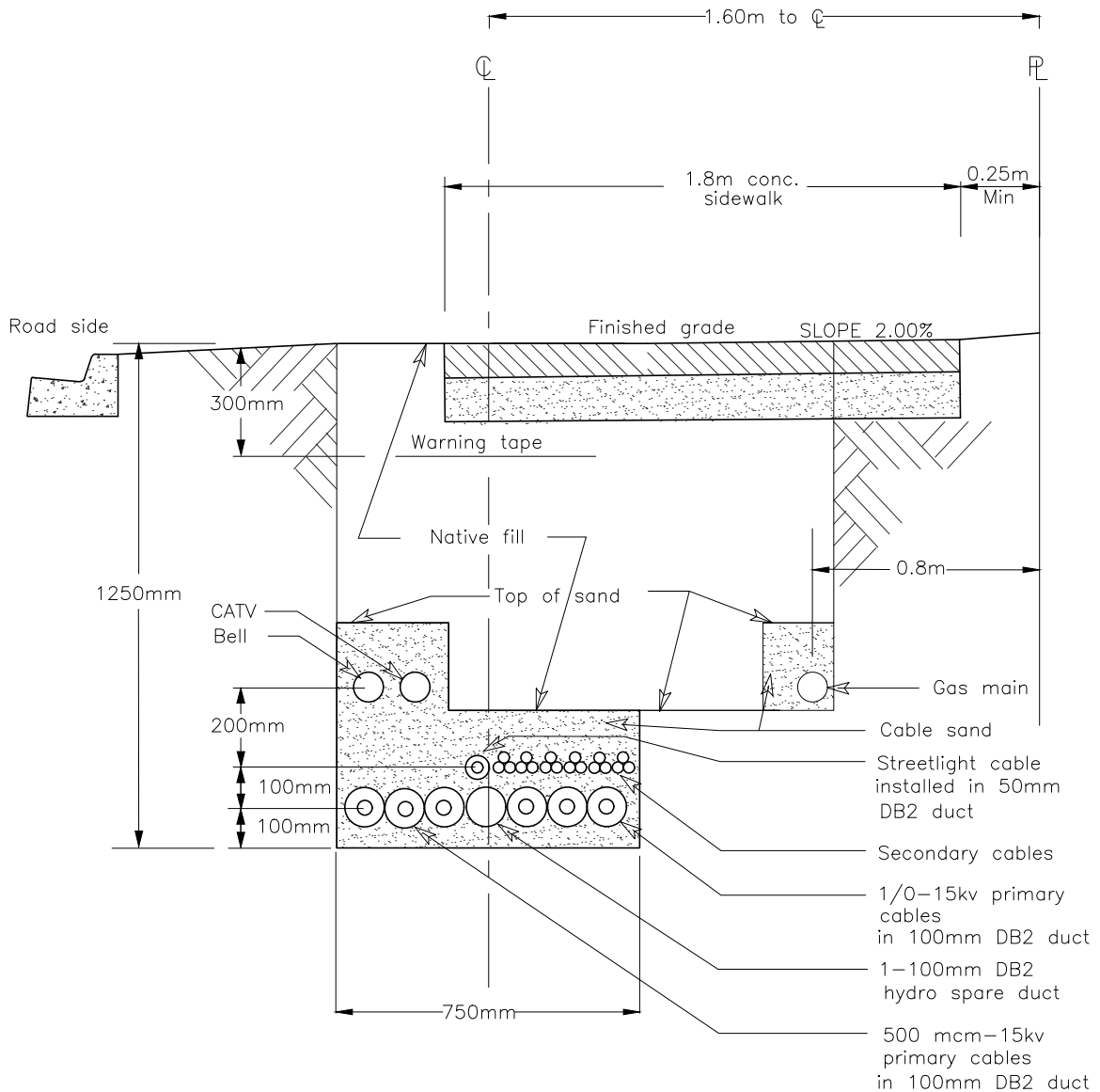
The Corporation of the Town of Whitby

Engineering Services

Checked:	<i>[Signature]</i>
Approved:	<i>[Signature]</i>
Scale:	N.T.S

Utility Duct Road Crossing Detail for New Subdivision

DWG. Date:	June 1999
Revision No.:	3
Revision Date:	July 2019
DWG No.	404.10



Notes:

1. Crossing location and number of ducts to be stated on all construction drawings.
2. All ducts and spacing as per utility specifications.
3. Backfill to be compacted and verified to 98% standard proctor.

All dimensions in millimetres except where noted

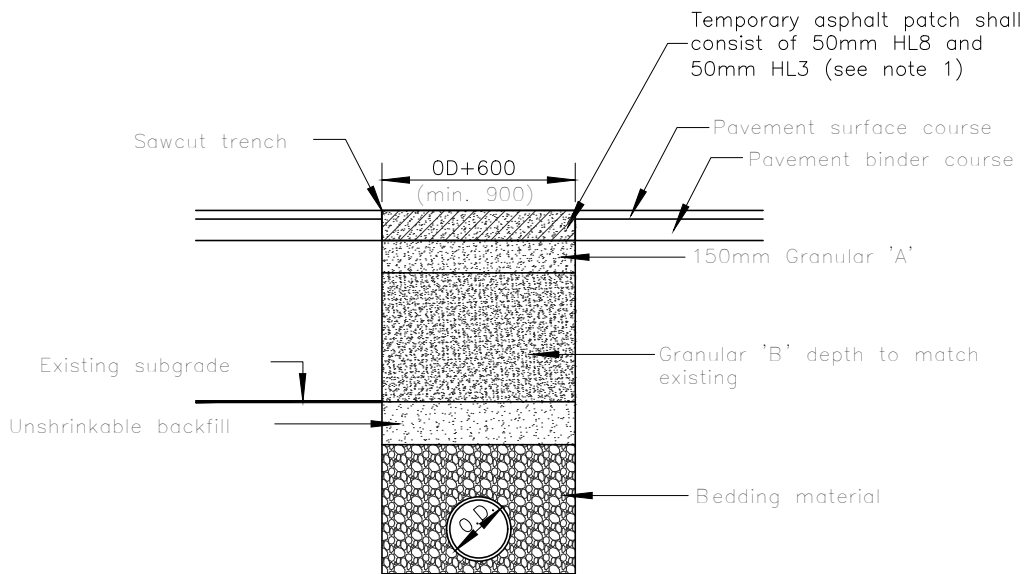
The Corporation of the Town of Whitby

Engineering Services

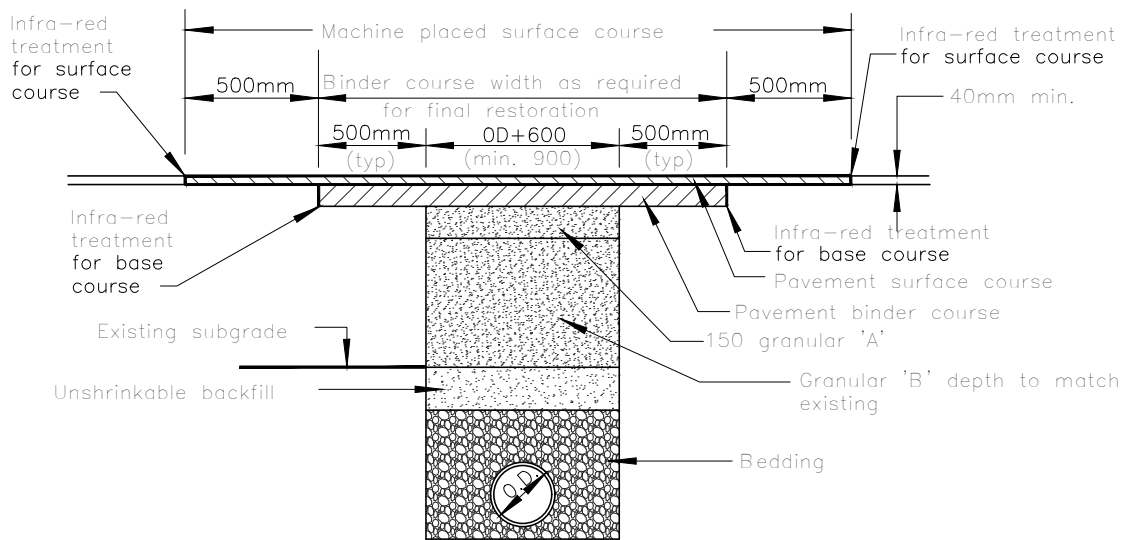
Checked:	
Approved:	<i>[Signature]</i>
Scale:	N.T.S

**Direct Buried-joint Use Trench
For Subdivisions Only-18.0m R.O.W.**

DWG. Date:	August 2002
Revision No.:	4
Revision Date:	June 2022
DWG No.	404.30



Trench Restoration For Roads Paved More Than 5 Years



Trench Restoration For Roads Paved Less Than 5 Years

Notes:

1. Temporary asphalt patch on dundas street and brock street shall consist of 150mm HD8C in 50mm lifts.
2. All permanent restoration shall be directed by the Town of Whitby.
3. Depths shall be as noted unless otherwise specified.
4. If settlement occurs, the top asphalt shall be removed and re-paved as directed by the Town.

All dimensions in millimetres except where noted

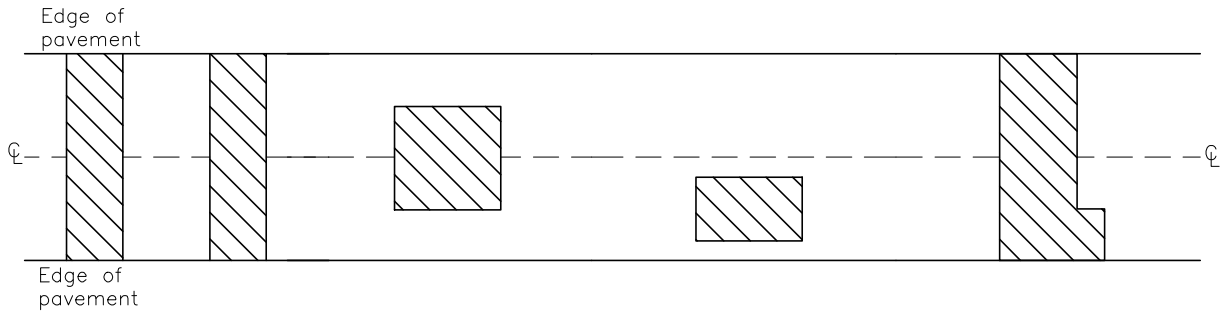
The Corporation of the Town of Whitby

Engineering Services

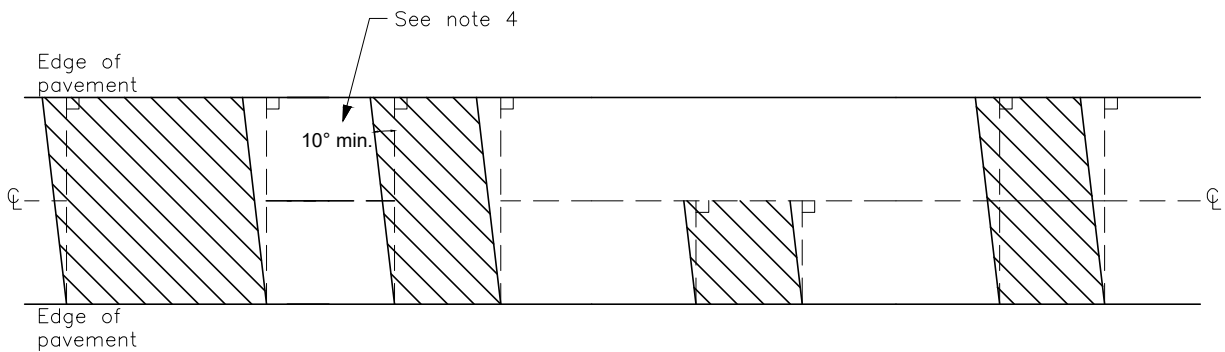
Checked:	<i>[Signature]</i>
Approved:	<i>[Signature]</i>
Scale:	N.T.S

Trench Restoration Detail

DWG. Date:	January 2009
Revision No.:	1
Revision Date:	October 2018
DWG No.	404.40



Not Acceptable



Acceptable

Notes:

1. This drawing shall be read in conjunction with TOW. Std. 404.40.
2. Existing asphalt roads shall be saw cut prior to excavation and a trench box shall be used to minimize the width of excavation.
3. Infrared joint repair shall be used if the road was paved within the past three(3) years.
4. Skewed edges to minimize damage by snow plow.
5. All vertical faces of end joints shall be swept clean and painted with bituminous emulsion prior to paving.

All dimensions in millimetres except where noted

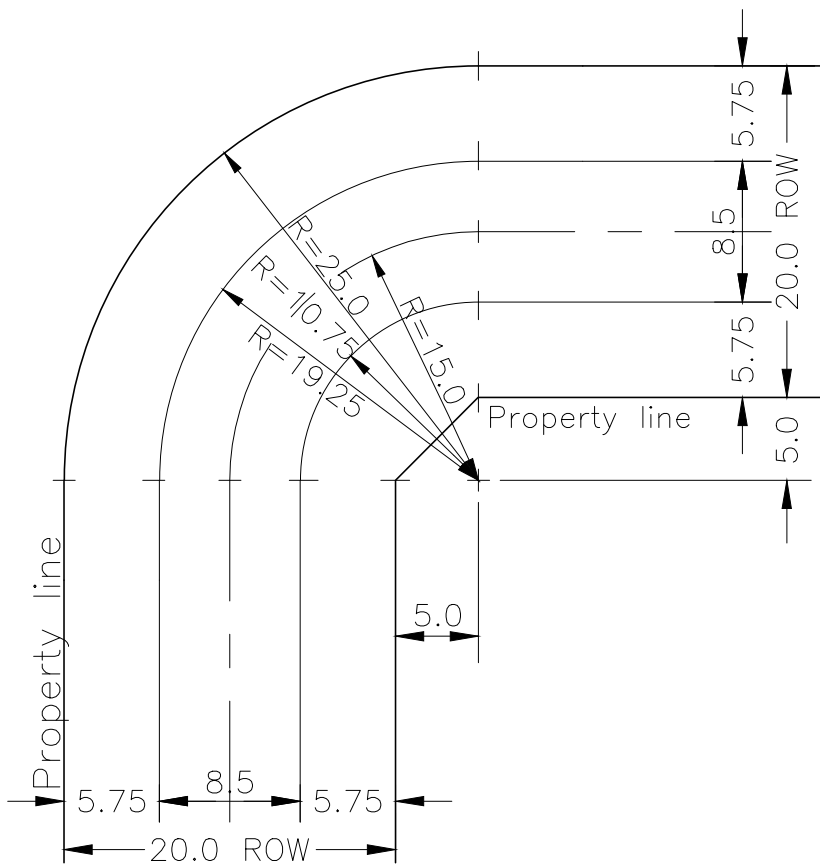
The Corporation of the Town of Whitby

Engineering Services

Checked:	
Approved:	
Scale:	N.T.S

Asphalt Restoration Area

DWG. Date:	August 2015
Revision No.:	.
Revision Date:	.
DWG No.	404.50



Notes:

1. Chainage to be computed using 15.0m radius at centreline.
2. Gutter grades to be specified on plans. Minimum gutter grade to be 1.00%.
3. Where 1.00% gutter grade is not possible, a catchbasin is to be installed near midpoint of outside curb bend.

All dimensions in millimetres except where noted

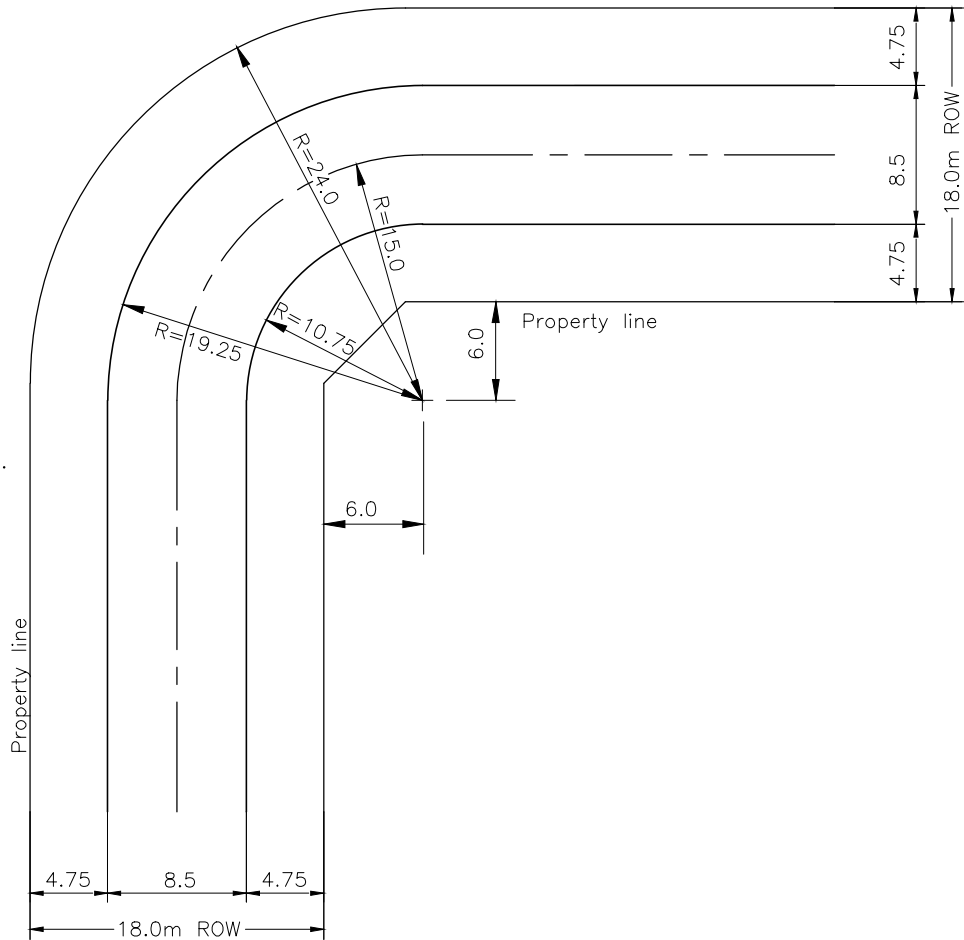
The Corporation of the Town of Whitby

Engineering Services

Checked: *M.*
 Approved: *CH*
 Scale: N.T.S

**Typical 90 ° Crescent
 20.0m R.O.W.**

DWG. Date: June 1999
 Revision No.: 2
 Revision Date: October 2018
 DWG No. 405



Notes:

1. Chainage to be computed using 15.0m radius at centreline.
2. Gutter grades to be specified on plans. Minimum gutter grade to be 1.00%.
3. Where 1.00% gutter grade is not possible, a catchbasin is to be installed near midpoint of outside curb bend.

All dimensions in millimetres except where noted

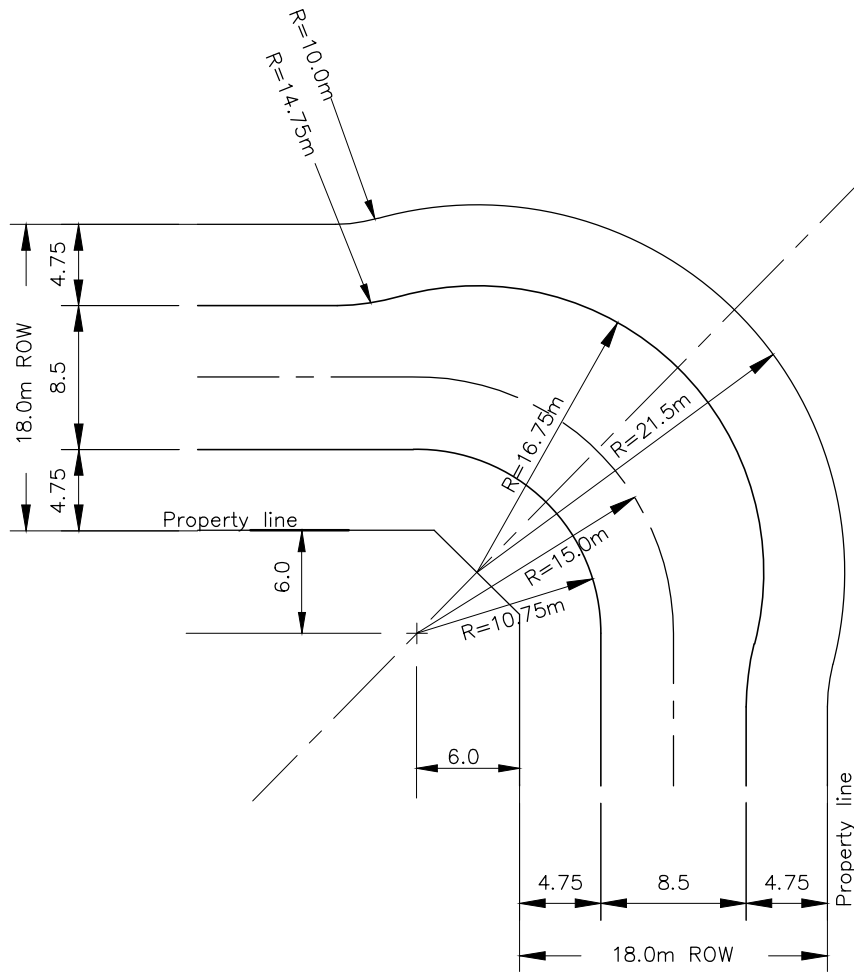
The Corporation of the Town of Whitby

Engineering Services

Checked	<i>[Signature]</i>
Approved	<i>[Signature]</i>
Scale:	N.T.S

**Typical 90° Crescent
18.0m R.O.W.**

DWG. Date:	June 1999
Revision No.:	2
Revision Date:	August 2015
DWG No.	406



Notes:

1. Chainage to be computed using 15.0m radius at centreline.
2. Gutter grades to be specified on plans. Minimum gutter grade to be 1.00%.
3. Where 1.00% gutter grade is not possible, a catchbasin is to be installed near midpoint of outside curb bend.
4. Eyebrow to be used to provide frontage for residential driveway.

All dimensions in millimetres except where noted

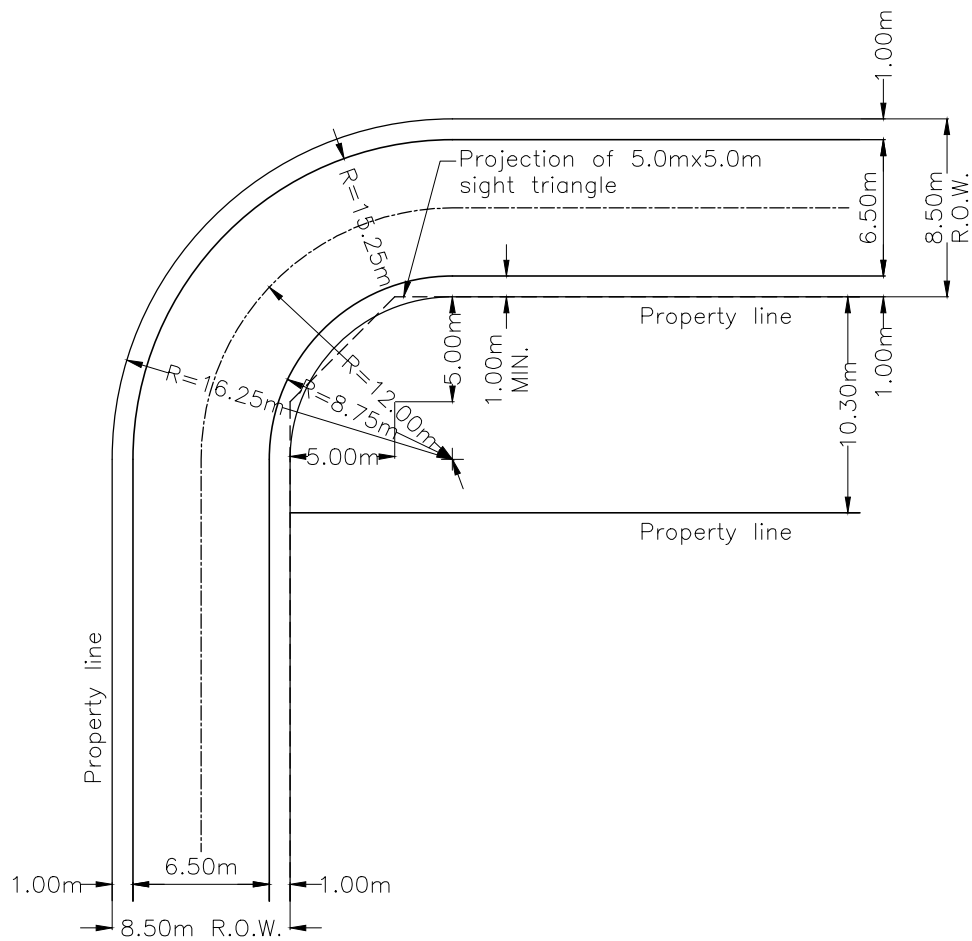
The Corporation of the Town of Whitby

Engineering Services

Checked: *[Signature]*
 Approved: *[Signature]*
 Scale: N.T.S

**Typical 90° Crescent With Eyebrow
 18.0m R.O.W.**

DWG. Date: July 2011
 Revision No.: 1
 Revision Date: August 2015
 DWG No. 406.10



Notes:

1. Chainage to be computed using 12.00m radius at centreline.
2. Gutter grades to be specified on plans. Minimum gutter grade to be 1.00%.
3. Where 1.00% gutter grade is not possible, a catchbasin is to be installed near midpoint of outside curb bend.
4. No building or structure which would obstruct the vision of drivers of motor vehicles shall be erected within the sight triangle as defined in the Zoning By-Law.

All dimensions in metres except where noted

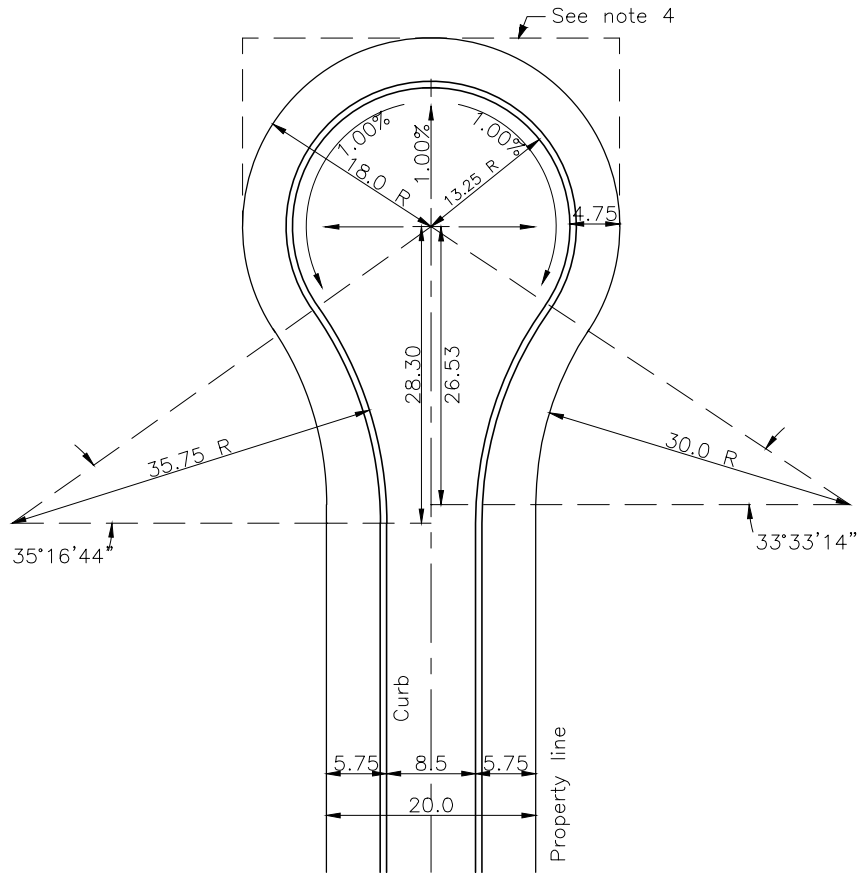
The Corporation of the Town of Whitby

Engineering Services

Checked:
 Approved: *[Signature]*
 Scale: N.T.S

**Typical 90 ° Bend
 Laneway - 8.5m R.O.W.**

DWG. Date: May 2025
 Revision No.:
 Revision Date:
 DWG No. 406.20



Notes:

1. Minimum gutter grade shall be 1.00%.
2. Grading around cul-de-sac shall be detailed on the engineering drawings.
3. Where 1.00% gutter grade is not possible, catchbasins are to be installed within cul-de-sac at an approved location.
4. Where cul-de-sacs abut another right of way or other municipal lands, the edge of right of way shall extend tangentially from the widest part of the bulb.

All dimensions in millimetres except where noted

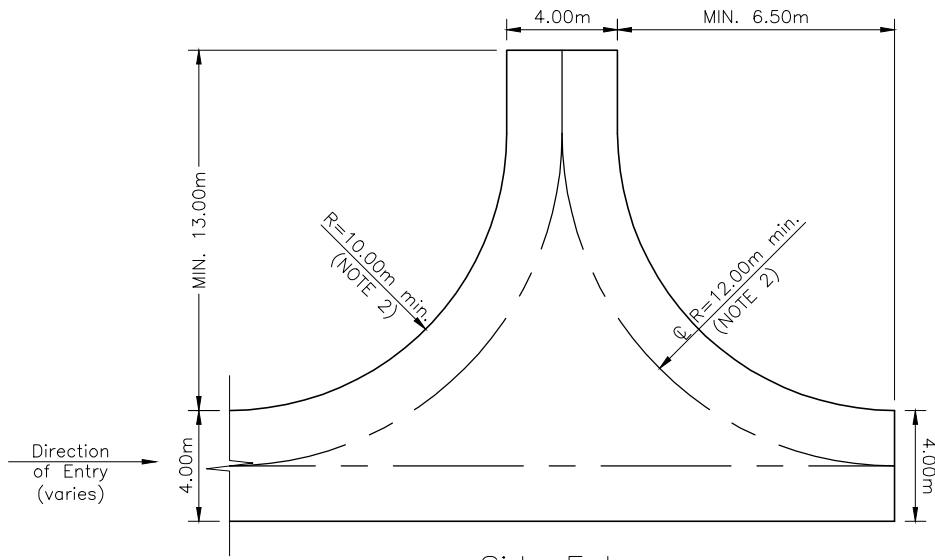
The Corporation of the Town of Whitby

Engineering Services

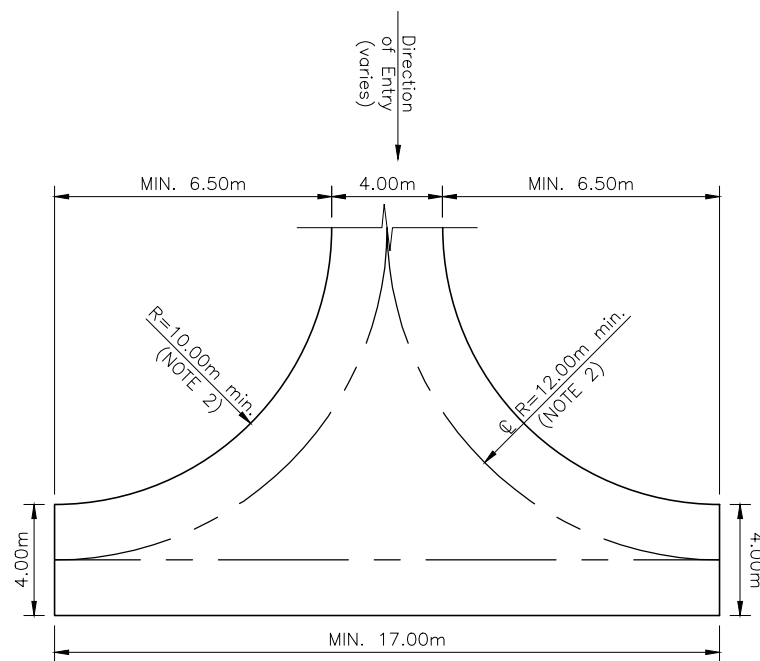
Checked	<i>[Signature]</i>
Approved	<i>[Signature]</i>
Scale:	N.T.S

**Typical Cul-De-Sac Terminating
20.0m R.O.W.**

DWG. Date:	June 1999
Revision No.:	2
Revision Date:	October 2018
DWG No.	407



Side Entry



Front Entry

Notes:

1. 4.0m wide maintenance road with a maximum 8.0% longitudinal slope and a maximum 2.0% crossfall shall be provided.
2. Radius to be approved by Engineering Services.
3. No pedestrian crossing or facility shall encroach on the path of a reversing vehicle.

All dimensions in metres except where noted

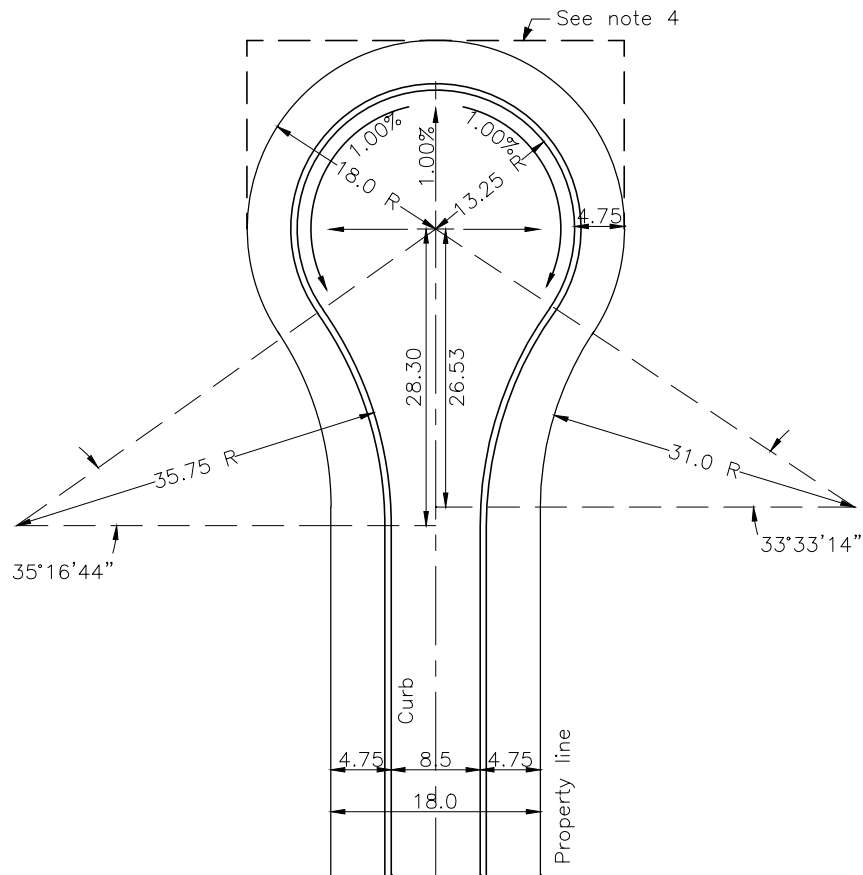
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

**Maintenance Road
Hammerhead Detail**

DWG. Date:	May 2025
Revision No.:	
Revision Date:	
DWG No.	408.10



Notes:

1. Minimum gutter grade shall be 1.00%.
2. Grading around cul-de-sac shall be detailed on the engineering drawings.
3. Where 1.00% gutter grade is not possible, catchbasins are to be installed within cul-de-sac at an approved location.
4. Where cul-de-sacs abut another right of way or other municipal lands, the edge of right of way shall extend tangentially from the widest part of the bulb.

All dimensions in millimetres except where noted

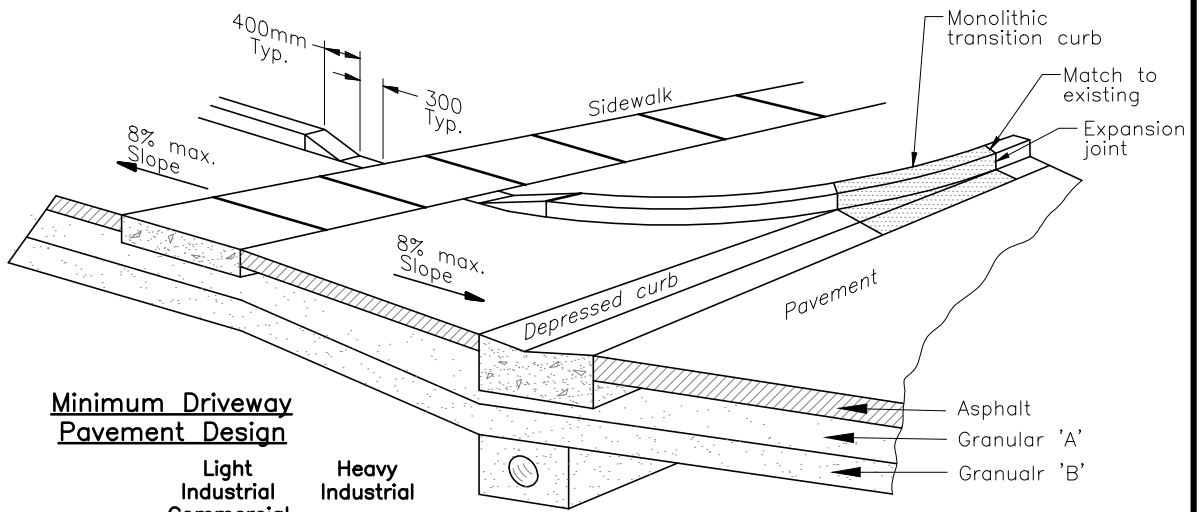
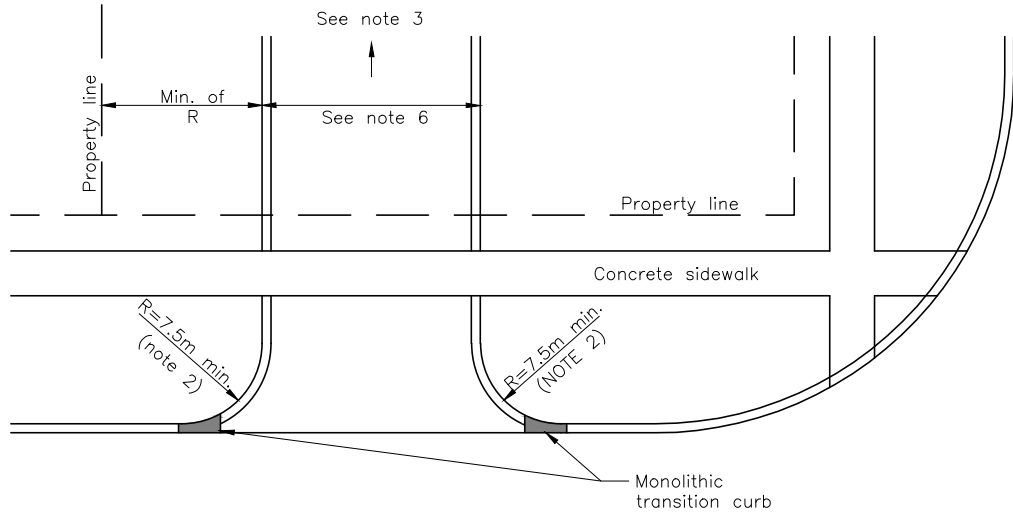
The Corporation of the Town of Whitby

Engineering Services

Checked	<i>AL</i>
Approved	<i>SA</i>
Scale:	N.T.S

**Typical Cul-De-Sac Terminating
18.0m R.O.W.**

DWG. Date:	June 1999
Revision No.:	1
Revision Date:	August 2015
DWG No.	408



Minimum Driveway Pavement Design

	Light Industrial Commercial	Heavy Industrial
Surface Course Asphalt HL3	50mm	50mm
Base Course Asphalt HL8	50mm	75mm
Granular 'A'	150mm	150mm
Granular 'B'	225mm	300mm

Notes:

1. The driveway shall intersect the roadway with an angle of not less than 60°
2. Radius to be approved by Engineering Services.
3. Drainage to be contained on site.
4. Refer to Town of Whitby Standard #208 for sidewalk detail.
5. Nowhere on the driveway shall the grade differential exceed 5.0%.
6. Driveway width as Town of Whitby Zoning By-law, as amended.

All dimensions in millimetres except where noted

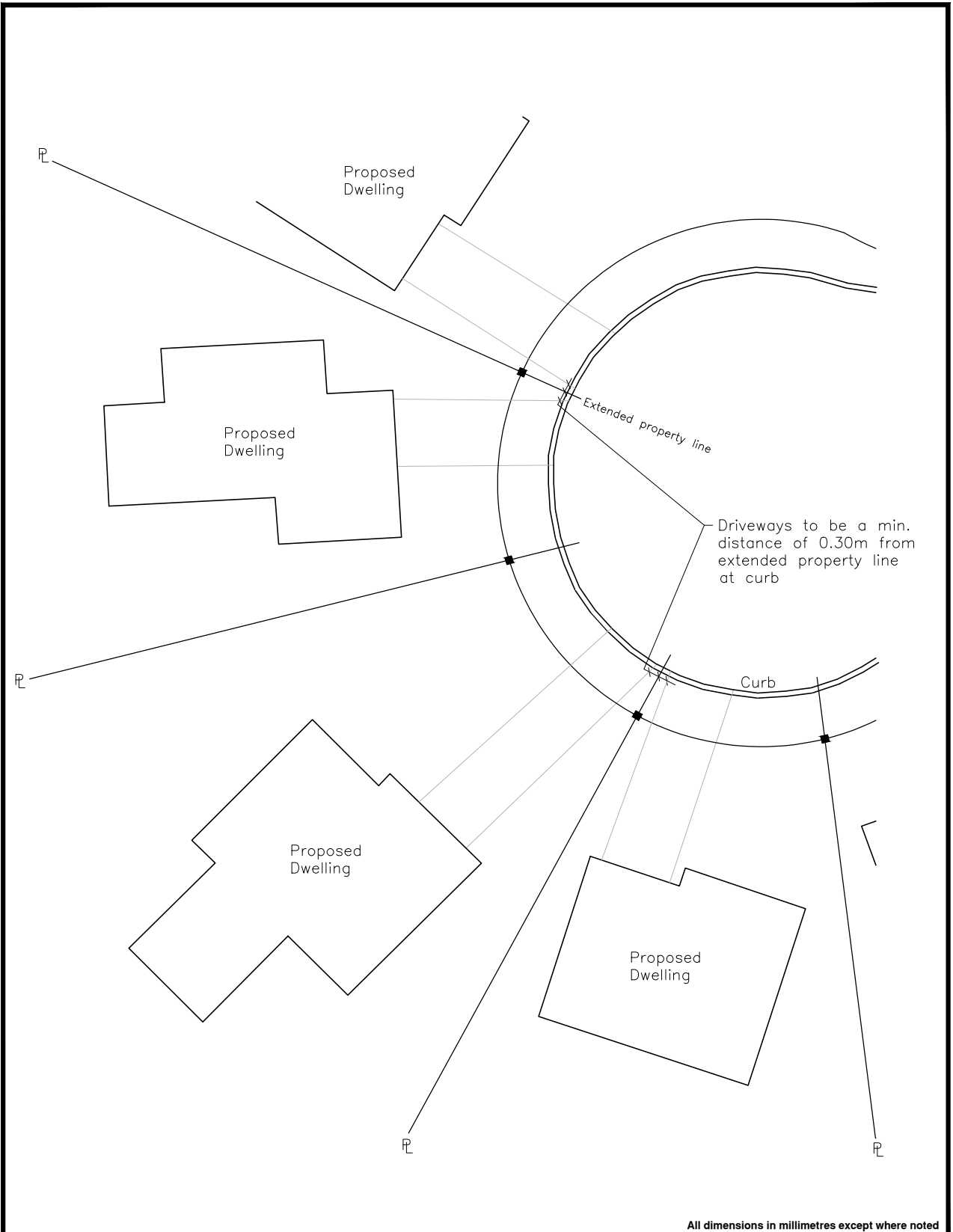
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

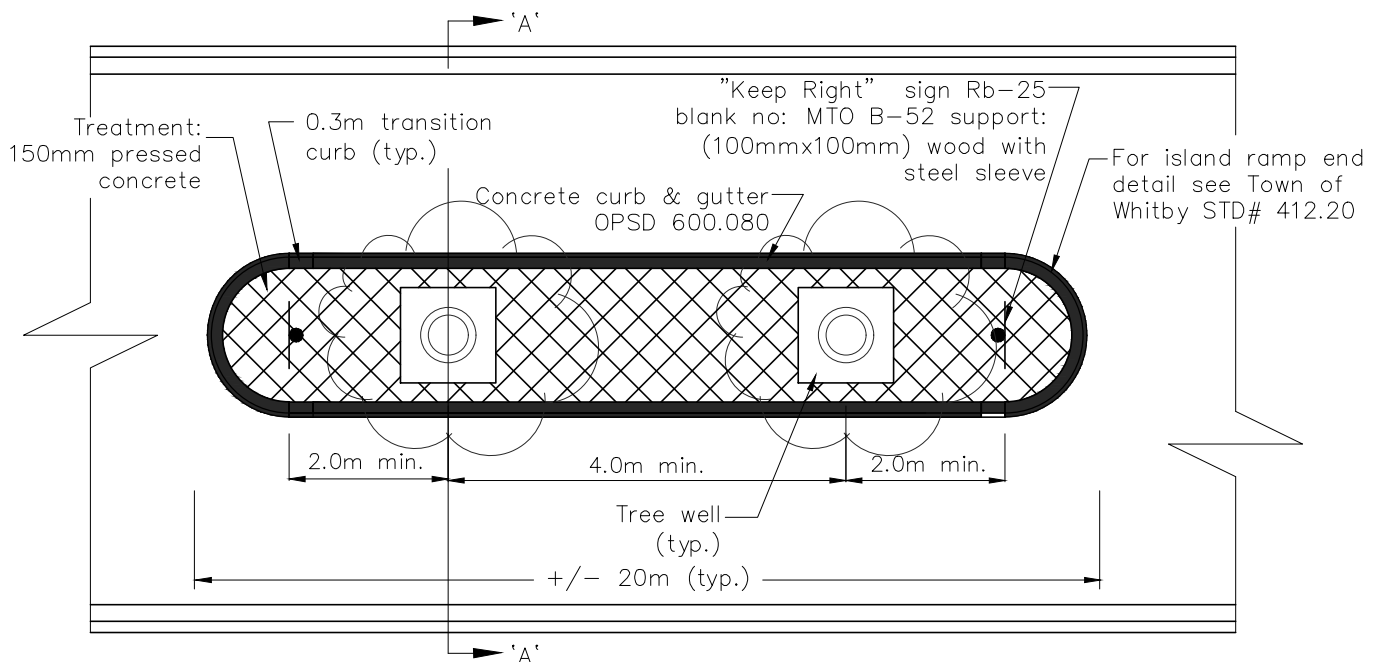
Non-Residential and Multi-family Entrance Detail

DWG. Date:	November 1994
Revision No.:	6
Revision Date:	May 2025
DWG No.	410

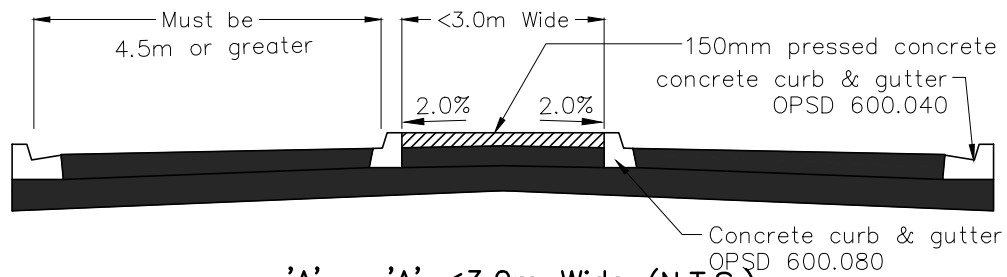


All dimensions in millimetres except where noted

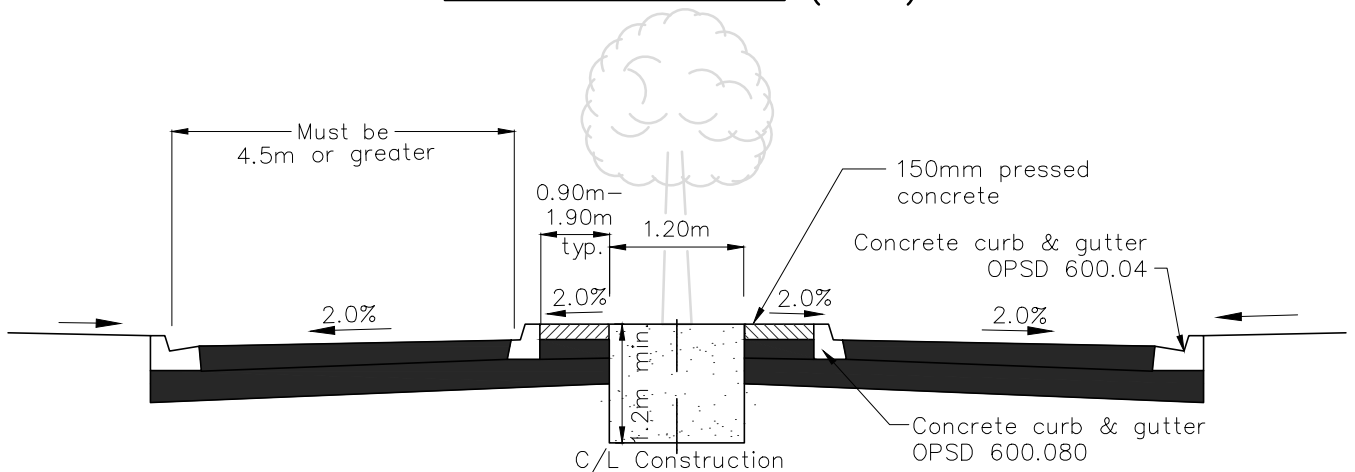
The Corporation of the Town of Whitby		Engineering Services	
Checked <i>AL</i>	Prop. Driveway Approaches Cul-De-Sac Area	DWG. Date: January 1993	Revision No.: 2
Approved <i>CH</i>		Revision Date: August 2015	DWG No. 411
Scale: N.T.S			



Plan (N.T.S.)



'A' - 'A' <3.0m Wide (N.T.S.)



'A' - 'A' 3.0m-5.0m Wide (N.T.S.)

Notes:

1. Tree type/species/number subject to approval from the Town of Whitby community and marketing services.
2. For planting bed 1.5m tree grate is optional
3. Pressed concrete colour to be georgia red or approved equivalent.
4. Pavement width must be 4.5m or greater for snow removal purposes.

All dimensions in millimetres except where noted

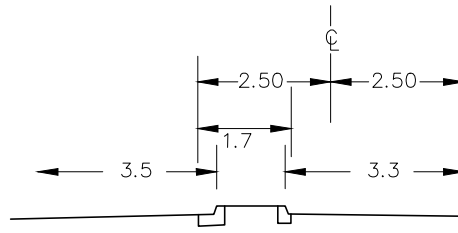
The Corporation of the Town of Whitby

Engineering Services

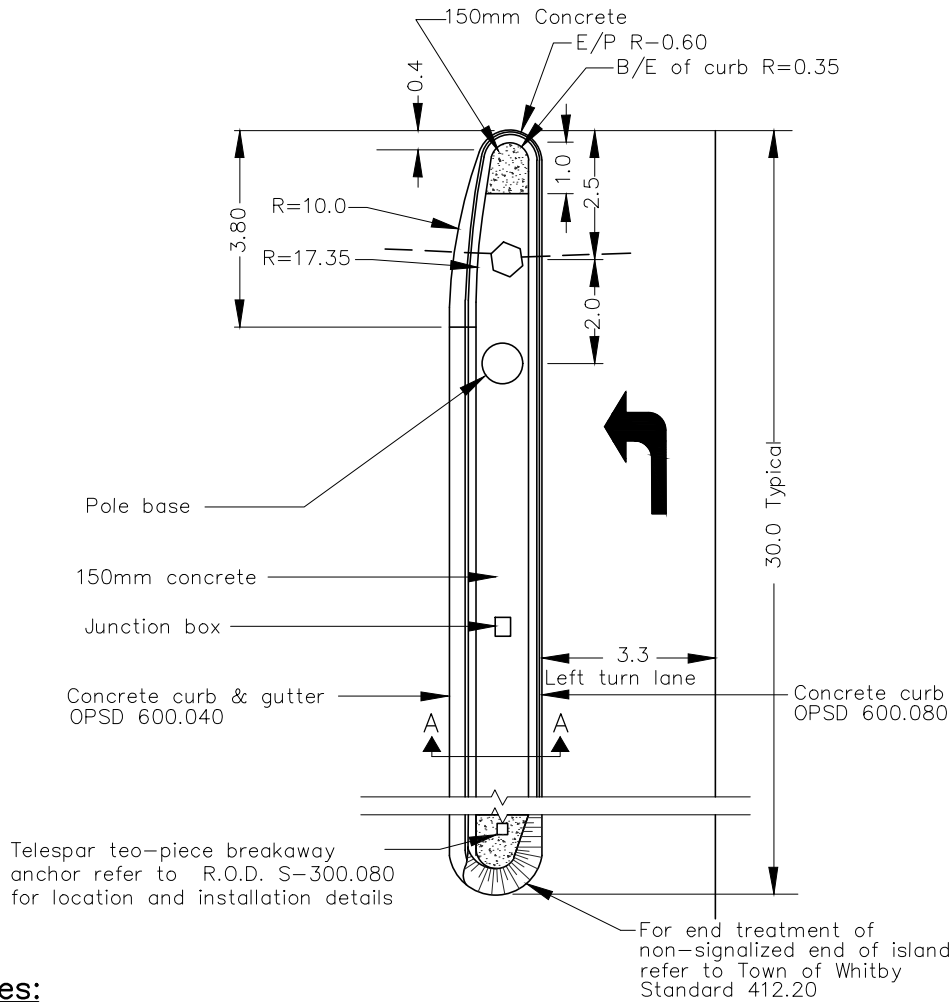
Checked	<i>M.</i>
Approved	<i>SA</i>
Scale:	N.T.S

Median Island

Dwg. Date:	May 2006
Revision No.:	3
Revision Date:	August 2015
DWG No.	412



Section A-A



Notes:

1. Do not ramp bullnose at signalized end of median island.
2. See Regional Standards S-300.070 for civil and electrical details pertaining to traffic signals.
3. Lane widths to be measured from face of curb.

All dimensions in millimetres except where noted

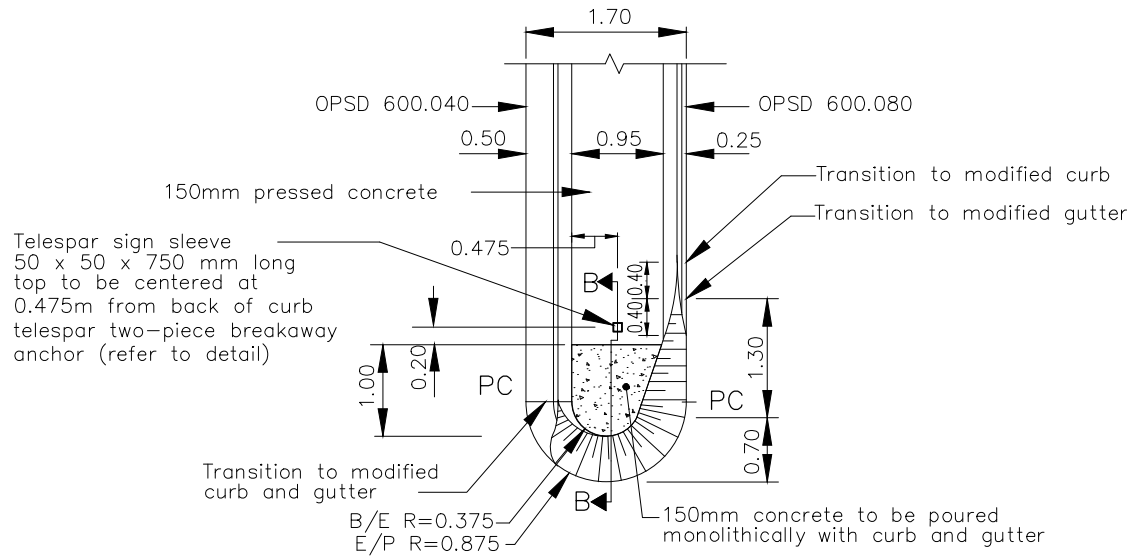
The Corporation of the Town of Whitby

Engineering Services

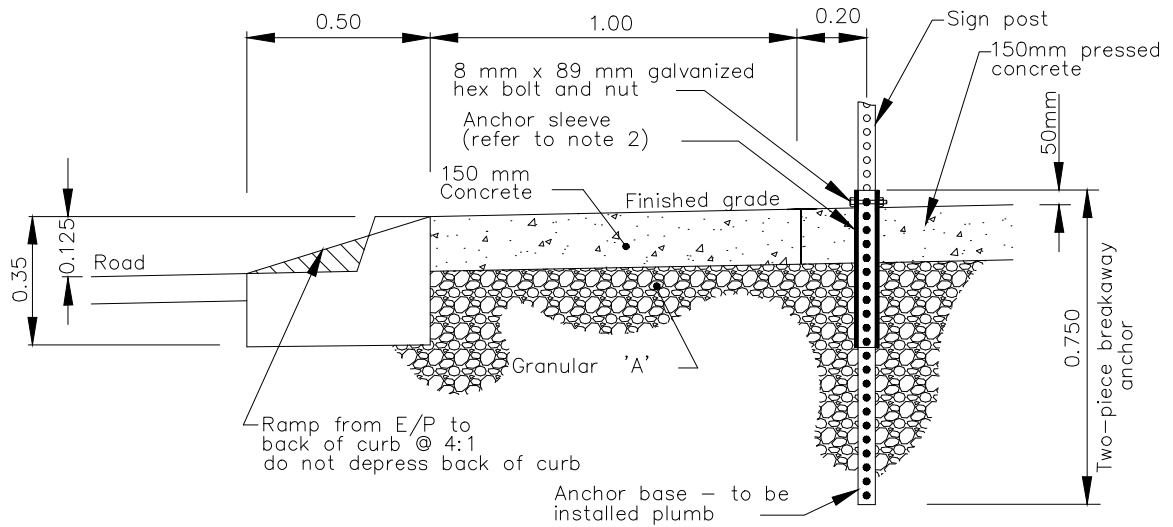
Checked	
Approved	
Scale:	N.T.S.

Island Detail

DWG. Date:	Jan. 2009
Revision No:	4
Revision Date:	October 2018
DWG No.	412.10



PLAN



Section B-B

Notes:

1. Do not ramp bullnose at signalized end of median island.
2. For poured concrete island, telespar anchor assembly to be installed using 56mm x 450mm solid anchor sleeve.
3. All permanent signage to be supplied by the Region of Durham.
4. Lane widths to be measured from face of curb.

All dimensions in millimetres except where noted

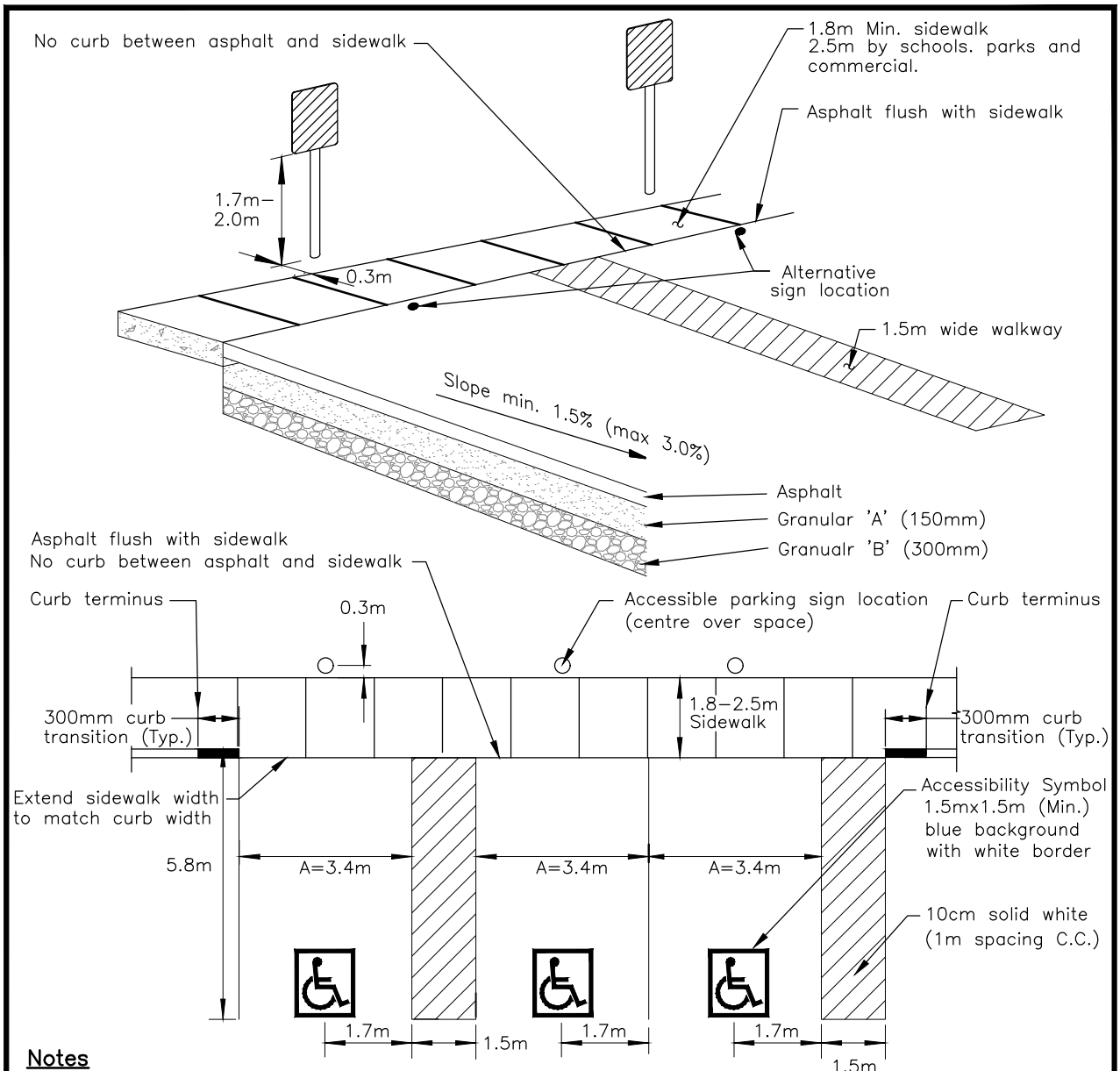
The Corporation of the Town of Whitby

Engineering Services

Checked	<i>M.</i>
Approved	<i>CH</i>
Scale:	N.T.S.

1.70m Wide Island Ramp End Detail

DWG. Date:	May 2006
Revision No:	4
Revision date:	October 2018
DWG No.	412.20



Notes

1. Asphalt to be flush with sidewalk.
2. Sidewalk to be barrier free.
3. Refer to Town of Whitby Standard #208 for sidewalk detail.
4. Accessible parking sign to be minimum of 0.3m offset from sidewalk. Preferred location behind sidewalk, alternate location front of sidewalk. Signs placed in front of sidewalk shall include a 0.5 impressed concrete strip and 1.8m unobstructed sidewalk (Min.)
5. Sign location will be site specific.
6. Access aisles must be provided for all parking spaces but may be shared by two spaces.
7. Signage shall satisfy the Highway Traffic Act and Accessibility for Ontarians with Disabilities Act (AODA)

All dimensions in millimetres except where noted

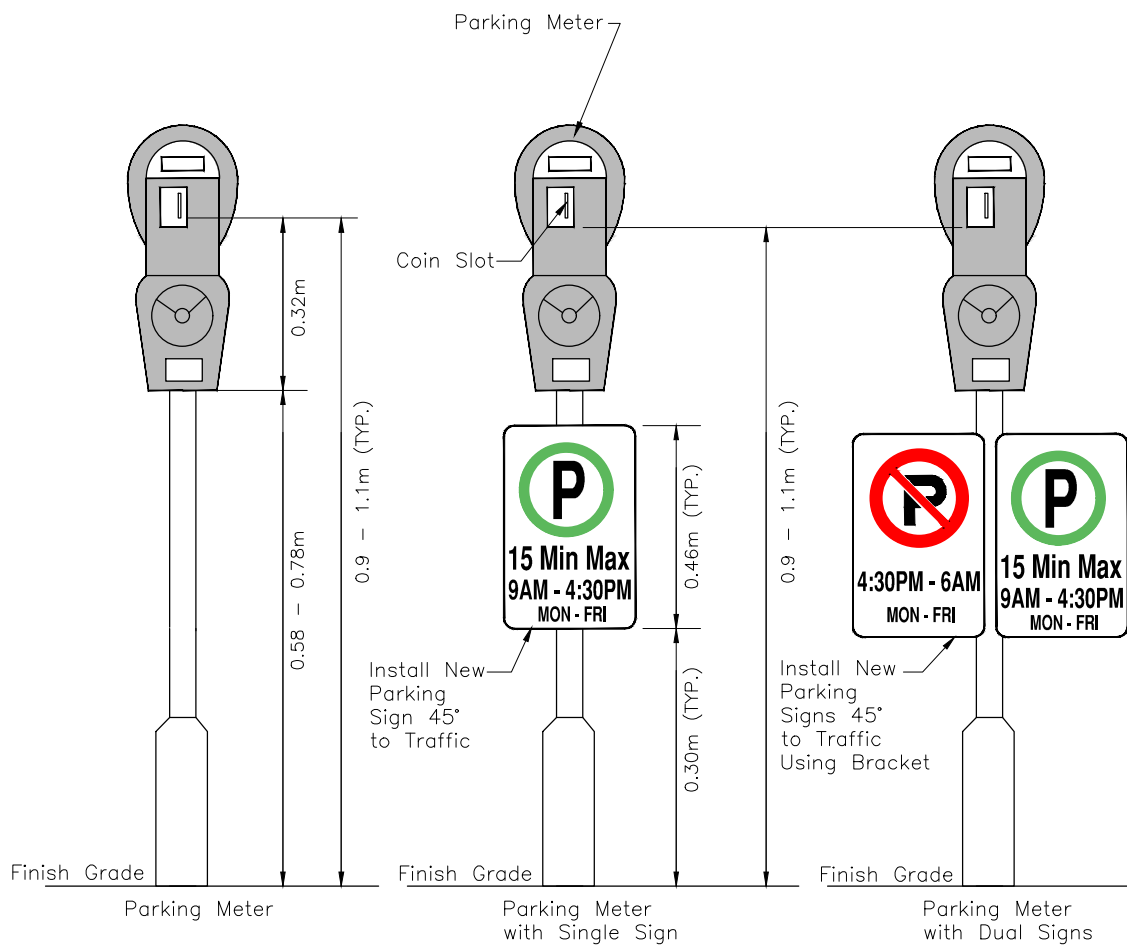
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

**Accessibility Parking
Proposed and Retrofit**

Dwg. Date:	January 2009
Revision No.:	4
Revision Date:	May 2025
DWG No.	413

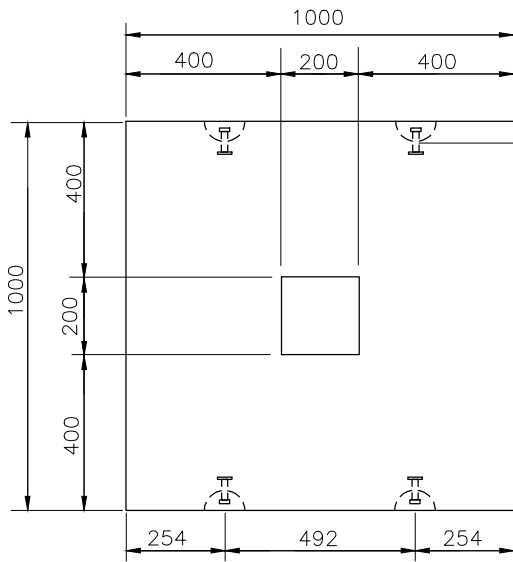


Note:

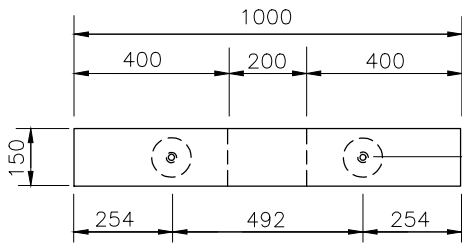
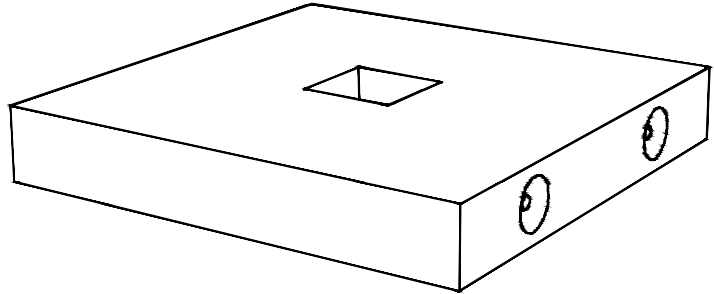
1. Parking meters are to be installed to a consistent height along each block.

All dimensions in millimetres except where noted

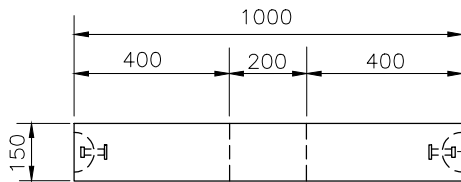
The Corporation of the Town of Whitby		Engineering Services	
Checked	Parking Meter Standard	DWG. Date: May 2025	Revision No.:
Approved <i>[Signature]</i>		Revision Date:	DWG No. 413.10
Scale: N.T.S			



3 ¾" lifting anchor 4 required (Typ.)



3 ¾" lifting anchor 4 required (Typ.)



3 ¾" lifting anchor 4 required (Typ.)

General Notes

1. Delivery is made by Crane-Equipped truck
2. Excavation must be ready, safe and accessible for for unloading from the rear of the truck.
3. Min. overhead clearance of 5.5 metres is required.
4. All units must be handled with proper letting equipment (I.E. spreader bar)
5. Modified as required.

All dimensions in millimetres except where noted

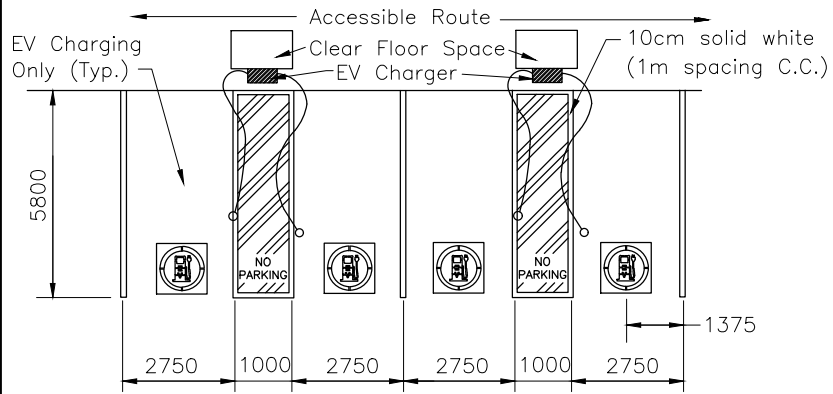
The Corporation of the Town of Whitby

Engineering Services

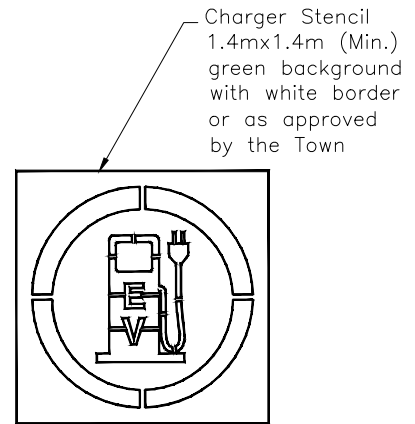
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Approved	
Scale:	N.T.S

EV Pad Details

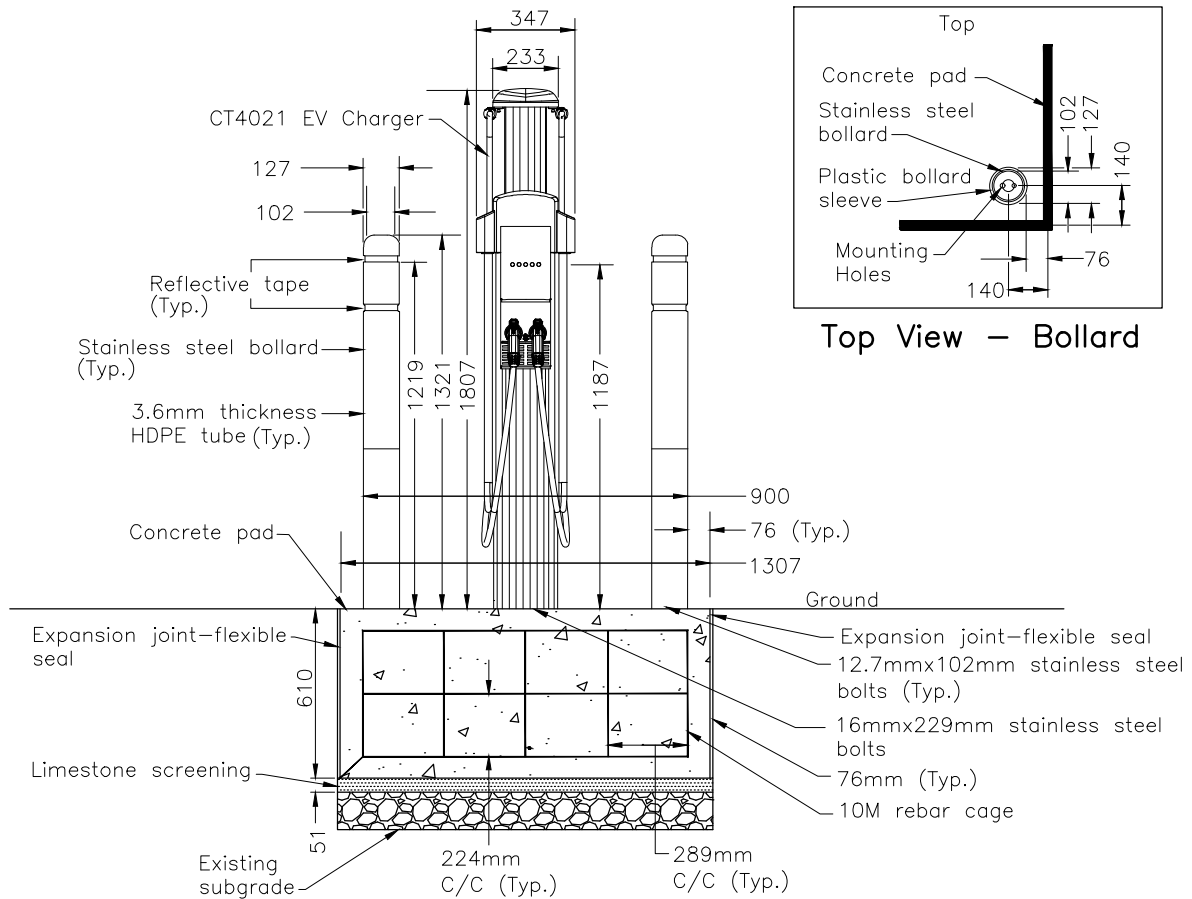
DWG. Date:	May 2025
Revision No.:	
Revision Date:	
DWG No.	413.20



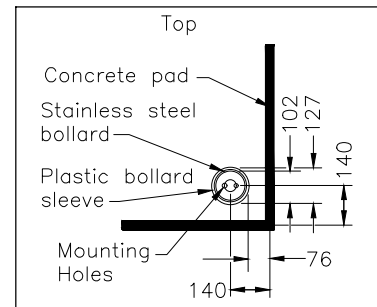
Typical EV Parking Space Design



EV Parking Stencil



Typical EV Installation Detail



Top View - Bollard

All dimensions in millimetres except where noted

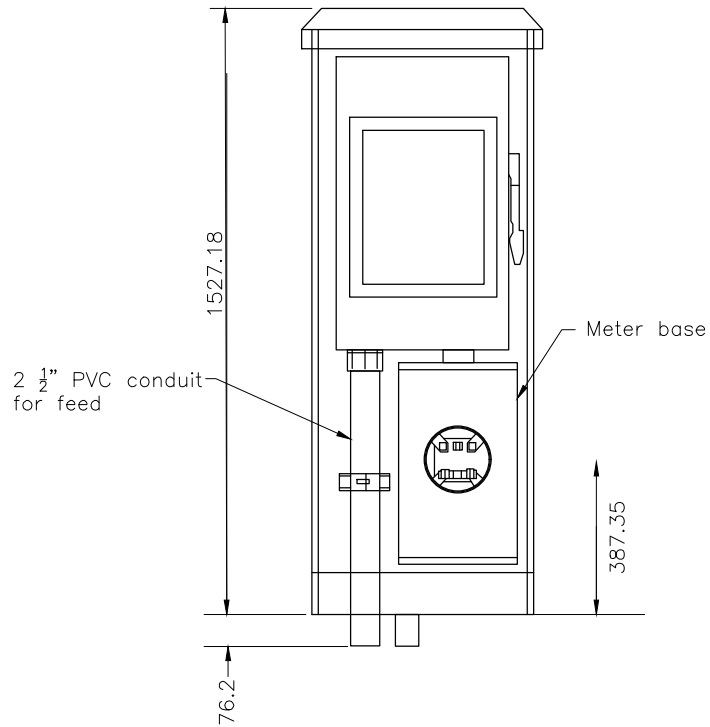
The Corporation of the Town of Whitby

Engineering Services

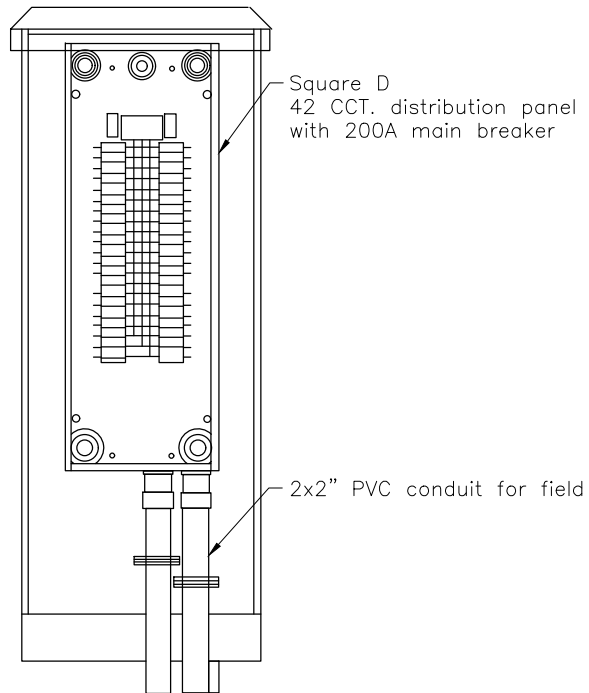
Checked
Approved
Scale: N.T.S

EV Pad Installation Details

DWG. Date: May 2025
Revision No.:
Revision Date:
DWG No. 413.30



Meterbase Compartment
Outside View with Panel Removed



Distribution Compartment
Outside View with Panel Removed

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

SLM60 Metered Pedestal Detail

DWG. Date:	May 2025
Revision No.:	
Revision Date:	
DWG No.	413.40

Pavement Marking Legend			
Identification	Type	Colour	Width (cm)
1	Solid	Yellow	10
2	Double solid	Yellow	10
3	3-6-3 broken	Yellow	10
4	Solid	Yellow	20
5	Solid	White	10
6	3-3-3 broken	White	10
7	3-6-3 broken	White	10
8	3-9-3 broken	White	10
9	Solid	White	20
10	1-1-1 broken	White	20
11	3-3-3 broken	White	20
12	3-3-3 broken	White	30
13	Solid	White	30
14	Solid	White	45
15	Solid	White	60
18	0.4-0.4-0.4 broken	White	40
20	1-1-1 broken	White	10
21	1-0.6-1 broken	White	45
22	0.6-0.6 strips	White	Crosswalk Width
23	Symbols	White	
] OR [Limits of markings	-	-

Pavement Marking Denotation:

- 3-3-3, 3-6-9, 3-9-3; Line-Gap-Line spacing in metres
- ① Permanent (water borne)
- ① Durable (thermoplastic or cold plastic)
- ① Existing marking to be removed

Notes:

1. All markings shall conform with the Ontario Traffic Manual (OTM), Book 11.
2. Proposed markings to match existing at all work and/or road reconstruction limits.
4. Transverse markings/ symbols – plastic on both base and top course.
3. Longitudinal markings – paint on base course. Paint or plastic on top course (to be determined by traffic group)

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	Pavement Marking Legend	Dwg. Date: October 2018
Approved 		Revision No.: 1
Scale: N.T.S		Revision Date: July 2019 DWG No. 414.10

Town council has approved the use of public laneways for use within new development applications provided the following criteria are met:

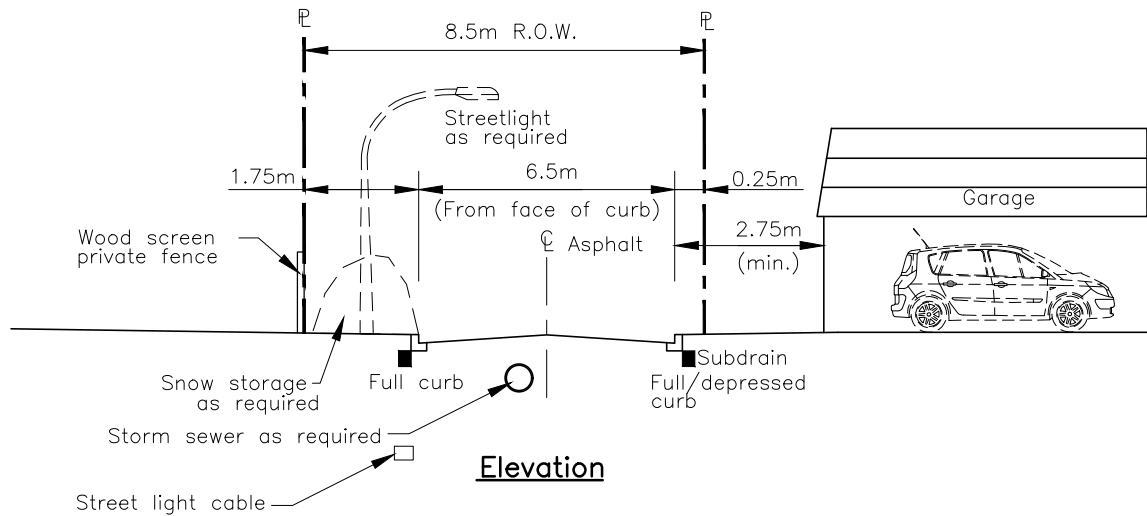
- A) The use of public laneway shall be limited to narrow lot (8 m or less) residential developments fronting collector and arterial roads only;
- B) The alignment of public laneways shall be straight or with large radius curvature to accommodate existing maintenance equipment;
- C) Public laneways shall be connected to public streets but not other public laneways; and,
- D) Adequate space for snow storage shall be considered as part of the overall development design where public laneways are included.

Where public laneways are permitted, the right-of-way shall be 8.5m utilizing one of three possible cross-sections depending on housing types. These cross-sections are shown on STD. 415.10, 415.20 & 415.30. The design of the laneway shall take into consideration the following:

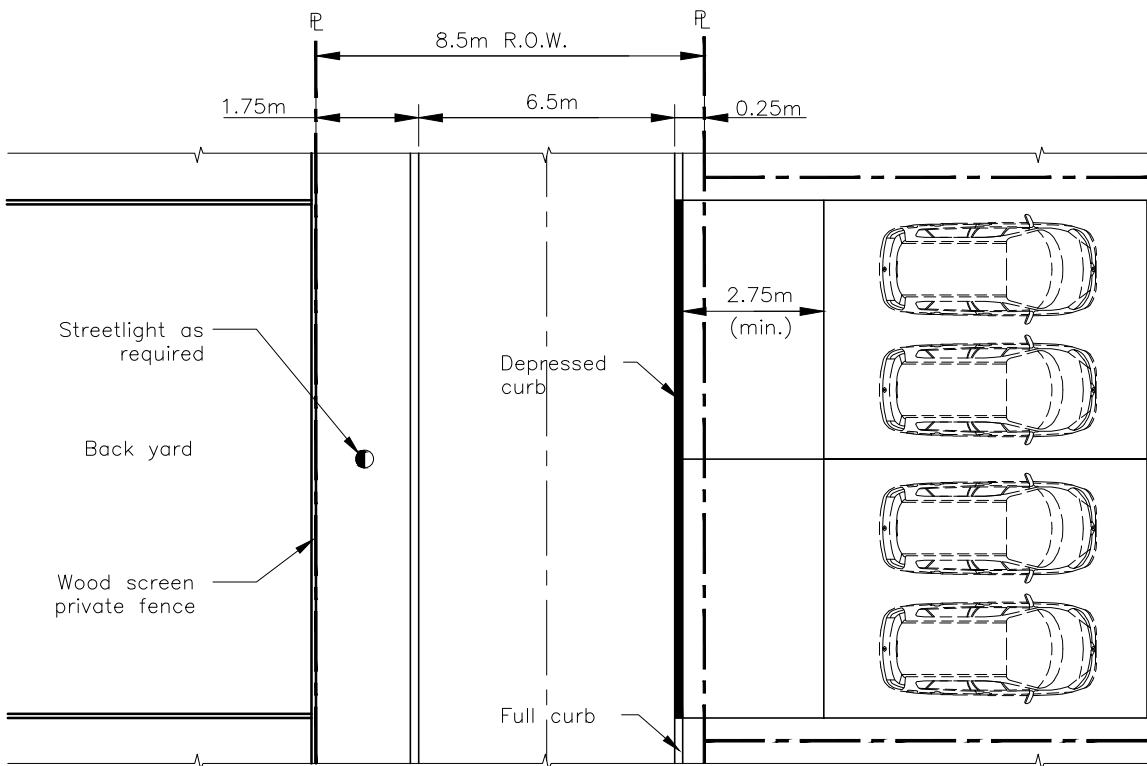
1. Laneways shall be designed to minimize the need for internal storm sewers by draining to catchbasins located at the ends of the laneway at the intersecting municipal street.
2. All roof leaders (front and rear) for any public laneway housing type, shall be directly connected to the municipal storm sewer within the fronting right-of-way, unless otherwise approved by Engineering Services.
3. All units with private driveway access to the public laneway shall have their municipal address clearly displayed on the laneway side of the unit, in addition to the portion of the dwelling fronting the municipal street.
4. Where the design of the laneway utilizes a tandem parking scenario, a 2.5 metre wide easement shall be granted to the municipality for the purposes of snow storage during winter months. These easements are to be kept free and clear of all encumbrances.
5. Laneways shall be illuminated to meet the requirements of the current day IESNA RP-8, Roadway Lighting Guideline.
6. Due to the limited right-of-way widths, above ground utilities will not be permitted within the public laneway, with the exception of streetlighting. Utilities may be located outside of the public laneway right-of-way, on private property, with the appropriate easement granted to the operating utility.
7. Street light poles in double loaded laneways shall be placed on private property with an easement in favor of the town. The street light cable shall remain within the boulevard.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked		Dwg. Date:	October 2018
Approved		Revision No.:	-
Scale:	N.T.S	Revision Date:	-
Public Laneway - Criteria & Notes		DWG No.	415



Elevation



Plan

Notes:

1. To be referenced in conjunction with Standard 415 Public Laneway – criteria and notes.
2. Any required above ground pedestals to be outside of 8.5m laneway on private property with easement to utility.

All dimensions in millimetres except where noted

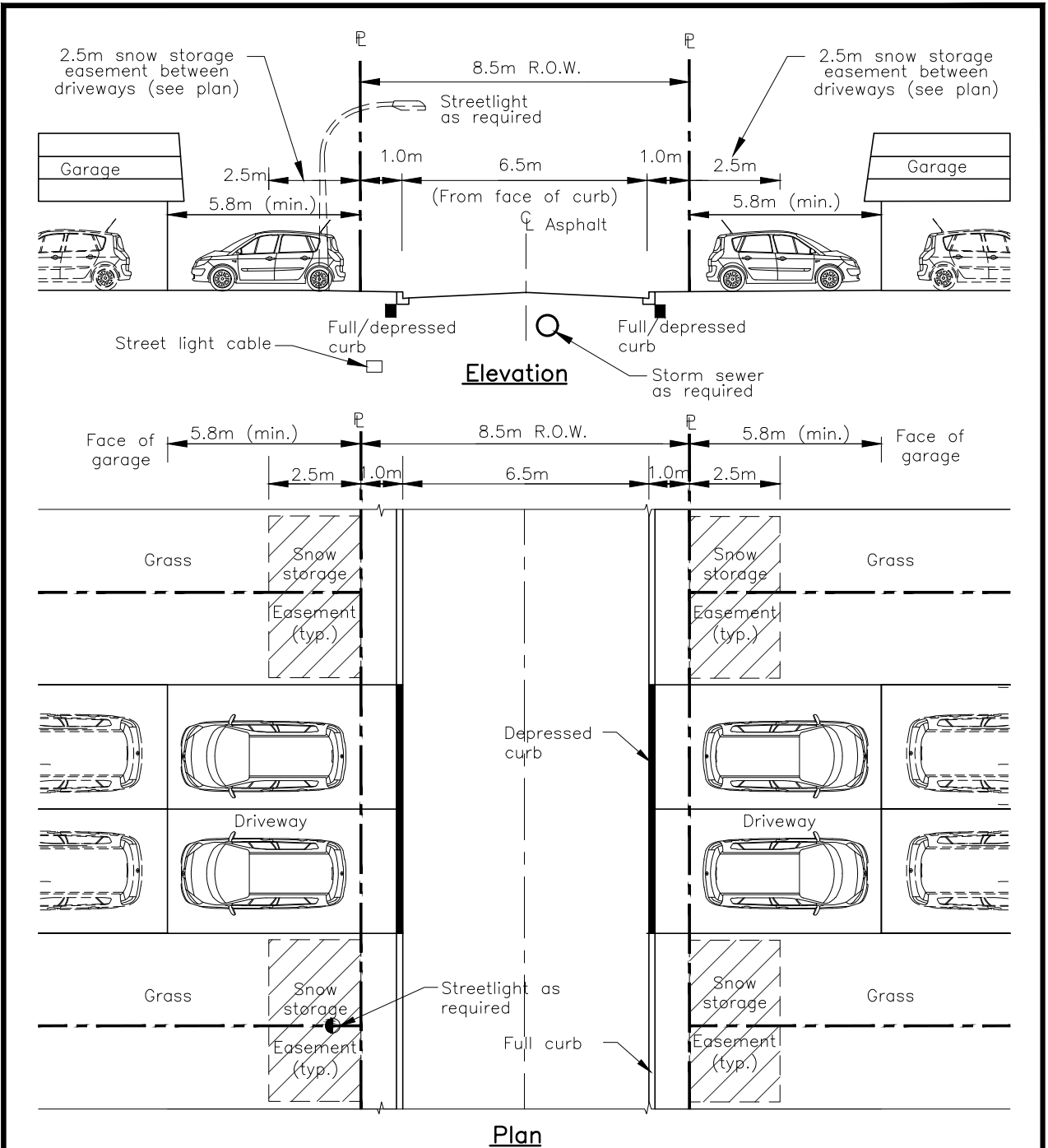
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

Single Loaded Public Laneway

Dwg. Date:	October 2018
Revision No.:	-
Revision Date:	-
Dwg No.	415.10

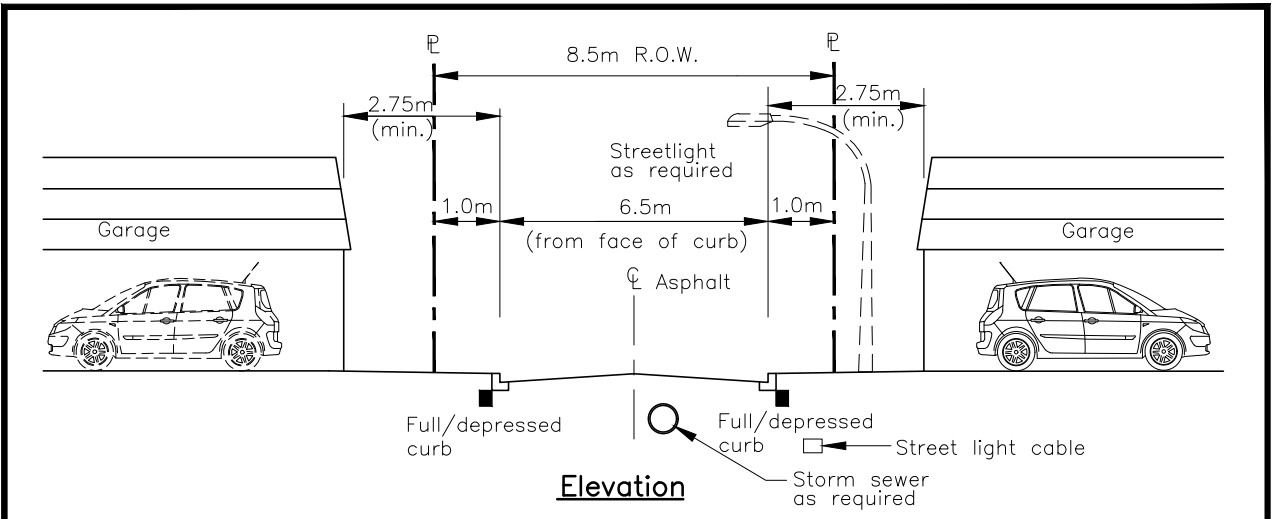


Notes:

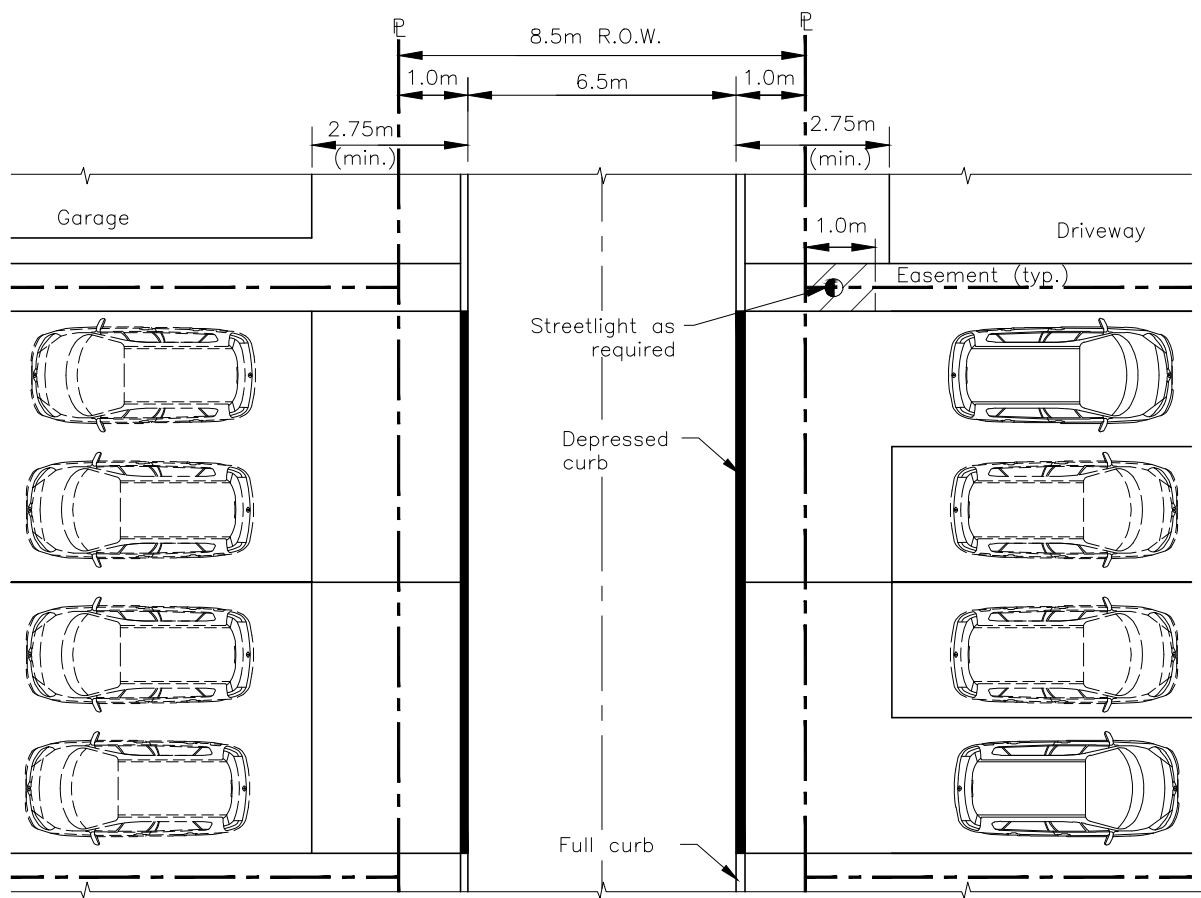
1. To be referenced in conjunction with Standard 415 Public Laneway – criteria and notes.
2. Streetlights may require easements.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked		Dwg. Date:	October 2018
Approved		Revision No.:	-
Scale:	N.T.S	Revision Date:	-
Double Loaded Public Laneway with Tandem Parking		DWG No.	415.20



Elevation



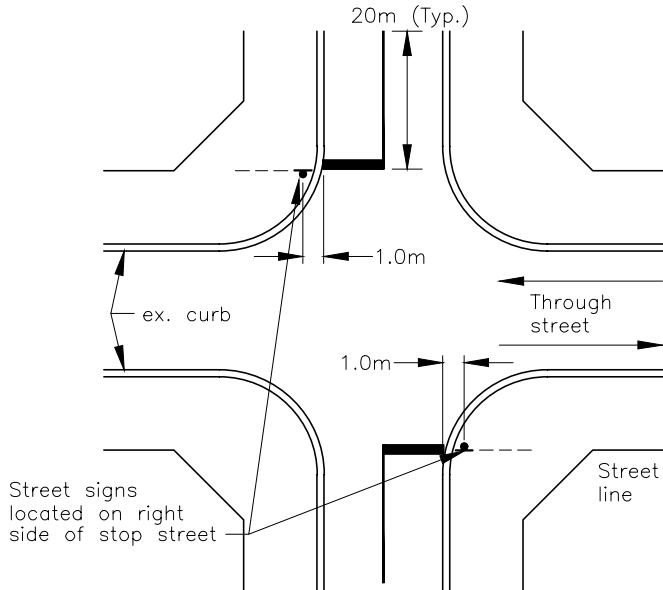
Plan

Notes:

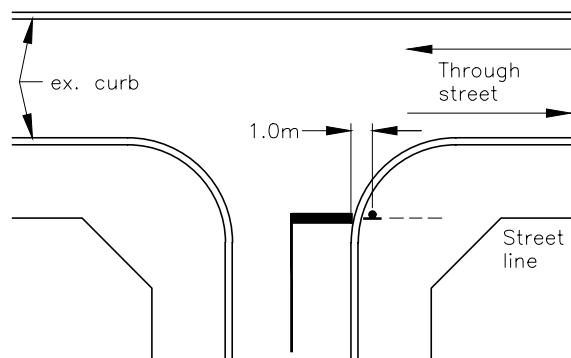
1. To be referenced in conjunction with Standard 415 Public Laneway – criteria and notes.
2. Streetlights may require easements.
3. Snow relocation is required.

All dimensions in millimetres except where noted

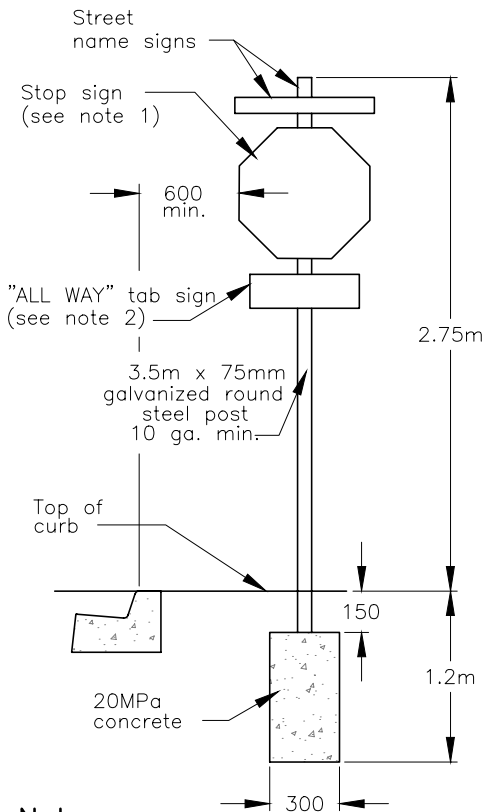
The Corporation of the Town of Whitby		Engineering Services
Checked:	Double Loaded Public Laneway with Side by Side Parking	
Approved:		
Scale: N.T.S		
		Dwg. Date: October 2018 Revision No.: - Revision Date: - DWG No. 415.30



**4 leg Intersection
or 3 leg With Stop Bar
and 20m Yellow Centreline**



**3 leg With Stop Bar
and 20m Yellow Centreline**



Notes:

1. All classes of regulatory signage in accordance with Ontario Traffic Manual Book 5.
2. Add "ALL WAY" tab sign for all way stop control intersections.
3. Increase stop sign size at all way stop control intersections.

All dimensions in millimetres except where noted

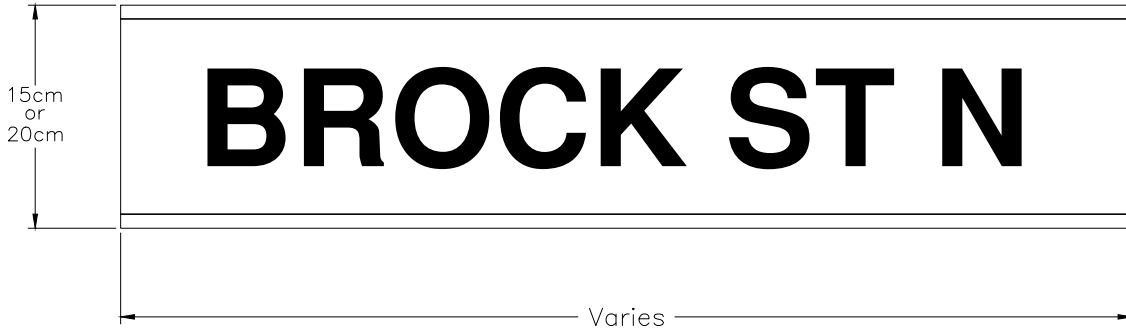
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	<i>[Signature]</i>
Scale:	N.T.S

Street Sign Location

DWG. Date:	May 1997
Revision No.:	3
Revision Date:	May 2025
DWG No.	500



Town Standard



War Veterans Standard

Notes:

1. Colour scheme to be reflective blue with white message.
2. Letter size : 10cm on 15cm sign
15cm on 20cm sign
3. For heritage street sign refer to Town of Whitby Standard #501.10.
4. 15 cm signs used where local roads intersect local roads and 20 cm signs used on all other locations.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

Street Name Sign

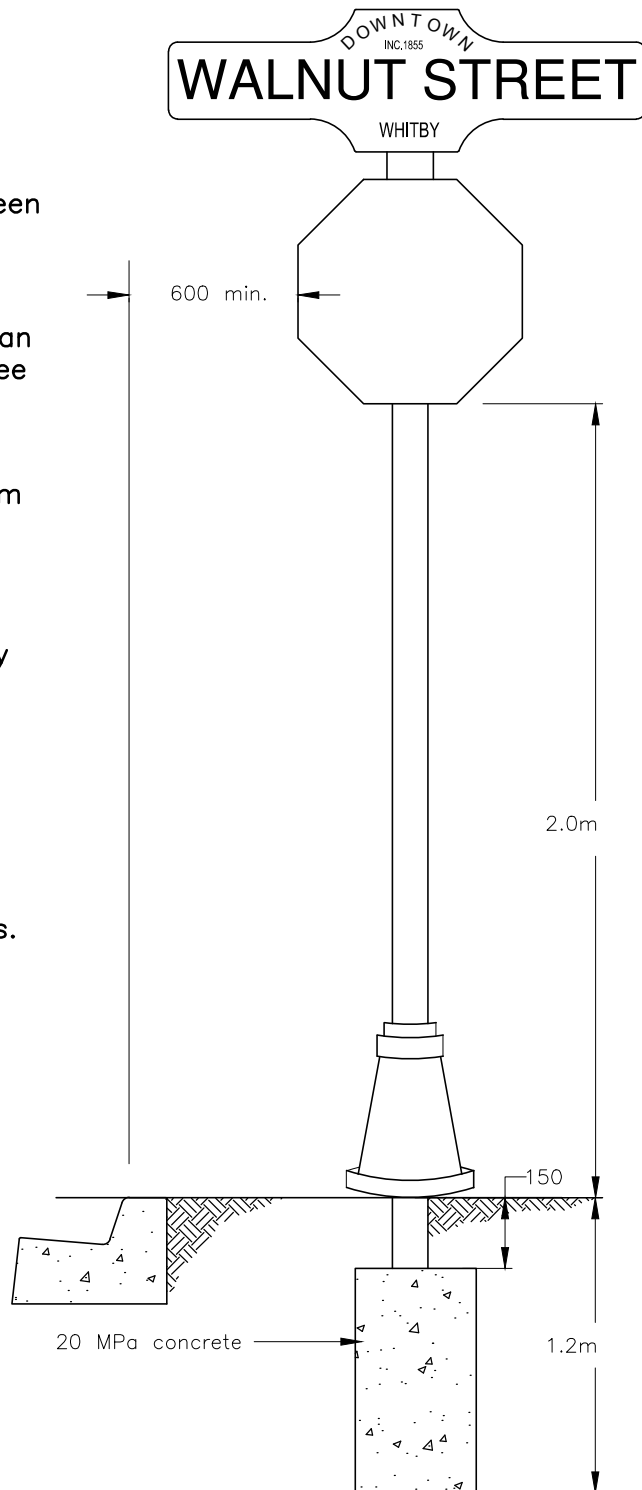
DWG. Date:	November 1994
Revision No.:	3
Revision Date:	May 2025
DWG No.	501

Notes:

1. Plates to be 0.125 52-H32 aluminum etched and allodine background reflective and texted white letters on dark emerald green standard pantone 3435c colour background.
2. Characters, symbols & backgrounds of signs shall have an eggshell, matte or other glare-free finish.
3. Font type: sans serif – verdana minimum character height – 10cm length of sign to vary: minimum length 91.4cm maximum length 101.6cm

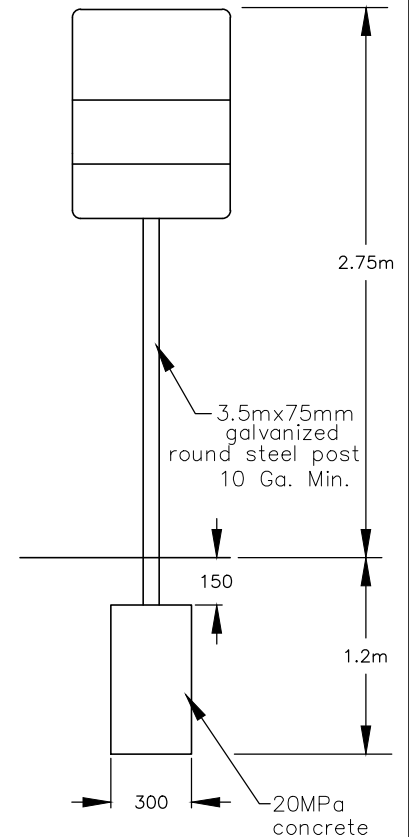
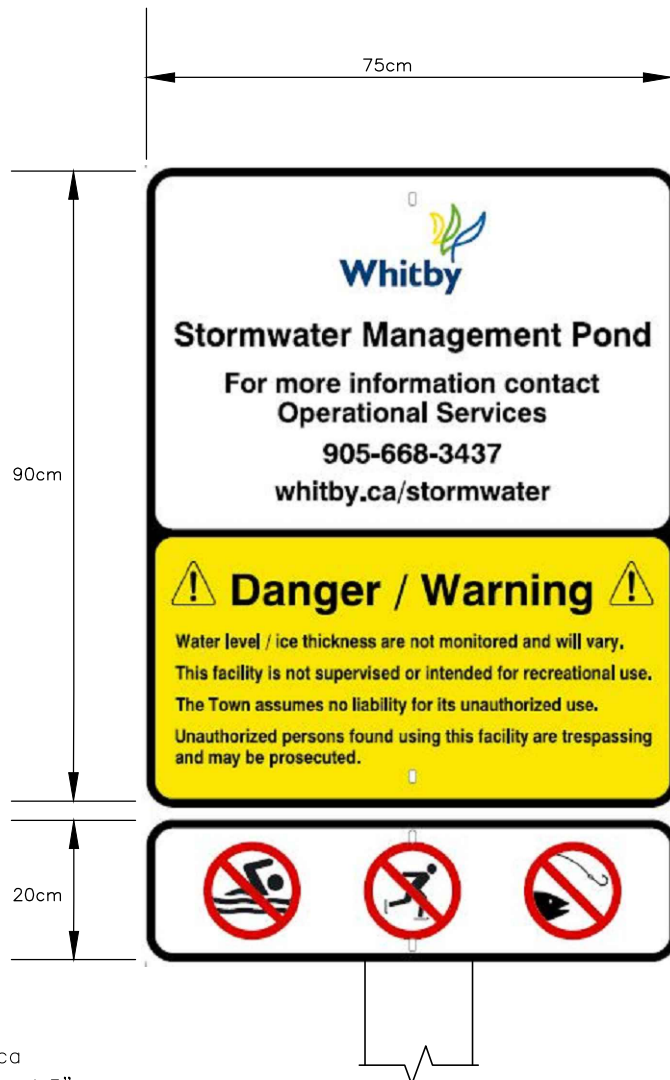
A sign pattern will be provided by the Town of Whitby Operations Department.

4. Town of Whitby logo or other suitable graphic and local area to be identified (ie: Villiage of Brooklin) to be approved by Engineering Services or through subdivision agreements.
5. All north/south street names shall be placed at the top location of the sign.
6. Sign post and foundation shall be constructed to hold signs rigidly in their proper and permanent postion; to prevent them from being turned or otherwise displaced.



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	<i>[Signature]</i>	DWG. Date:	January 2009
Approved	<i>[Signature]</i>	Revision No.:	3
Scale:	N.T.S.	Revision Date:	October 2018
Heritage Street Sign		DWG No.	501.10



Font: Helvetica
 Radius corner: 1.5"

Notes:

1. Stormwater Management Pond address will be assigned by the Town of Whitby.
2. Signs to be picked up at Town of Whitby Operations Department. (one (1) month's notice will be required).

All dimensions in millimetres except where noted

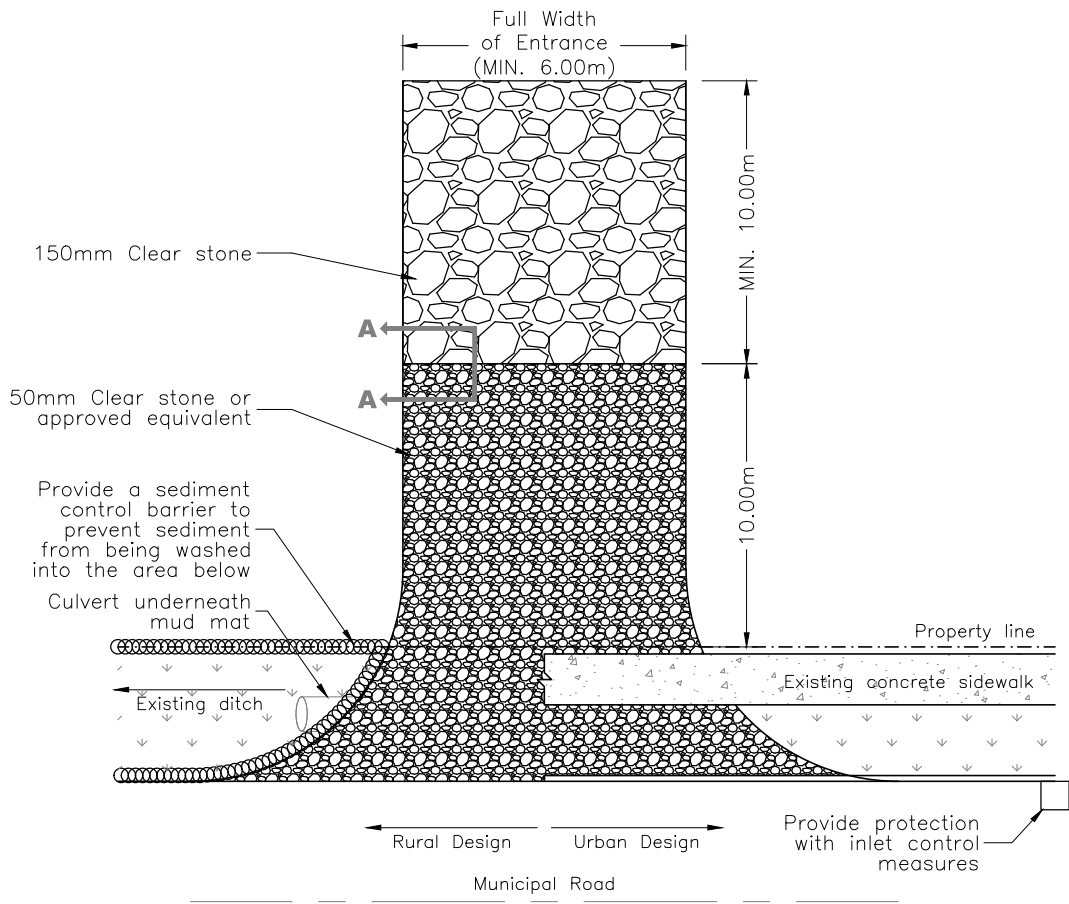
The Corporation of the Town of Whitby

Engineering Services

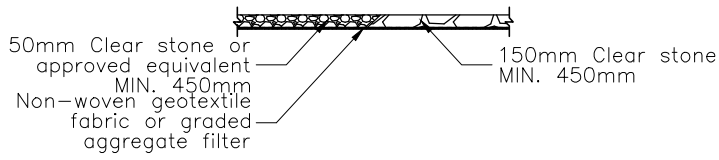
Checked	
Approved	
Scale:	N.T.S.

Stormwater Management Pond Sign Detail

DWG. Date:	August 2015
Revision No:	2
Revision Date:	May 2025
Dwg No.	501.20



SECTION A-A

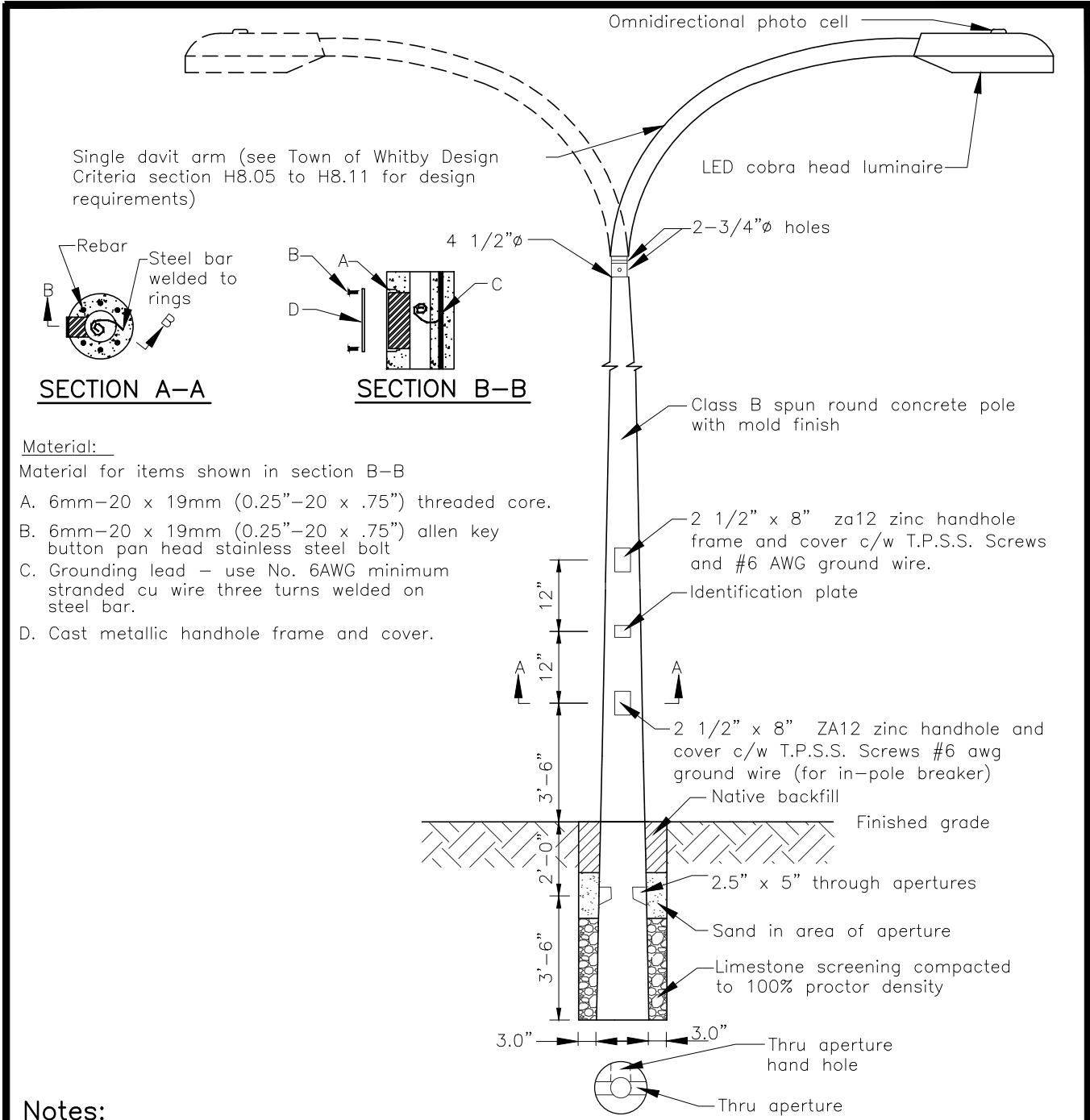


Notes:

1. Mud mat is to be installed, maintained and stone replaced when necessary at access to construction site.
2. Developer is responsible for ensuring sidewalks and cycling facilities are safe, in good condition and free of debris and mud at all time.
3. Any disturbance/damage to the boulevard shall be removed/repared to the satisfaction of The Town of Whitby.
4. Debris shall be cleaned from public right of ways as required.
5. Storm inlets in close vicinity to mud mat shall be protected with inlet control measures.
6. This STD can be modified on a case-by-case basis based on site conditions as directed by the Town representative.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	<h2>Mud Mat Detail</h2>	DWG. Date: May 2025
Approved		Revision No.:
Scale: N.T.S		Revision Date:
		DWG No. 501.30



Material:

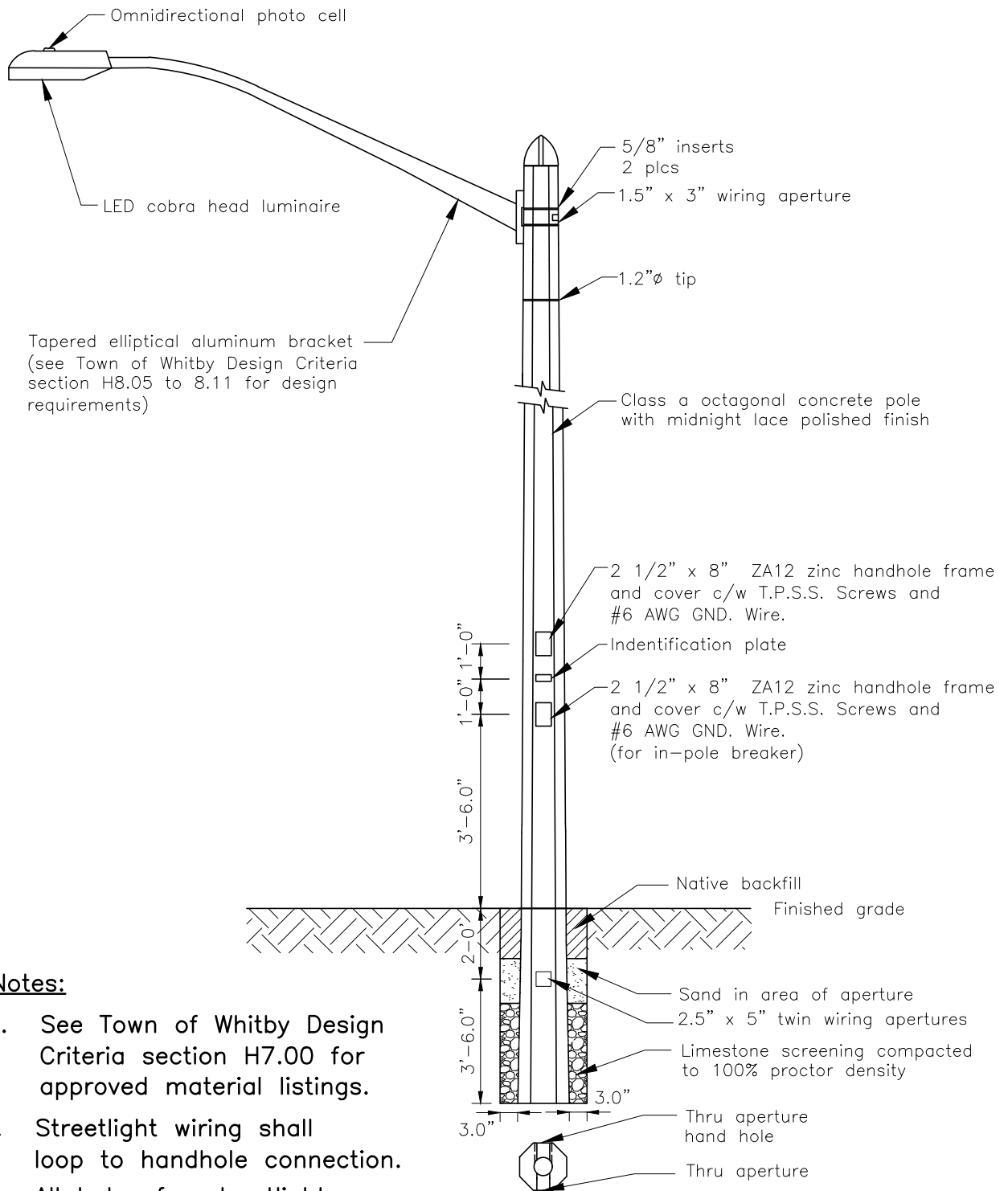
- Material for items shown in section B-B
- A. 6mm-20 x 19mm (0.25"-20 x .75") threaded core.
 - B. 6mm-20 x 19mm (0.25"-20 x .75") allen key button pan head stainless steel bolt
 - C. Grounding lead - use No. 6AWG minimum stranded cu wire three turns welded on steel bar.
 - D. Cast metallic handhole frame and cover.

Notes:

1. See Town of Whitby Design Criteria section H7.00 for approved material listings.
2. Streetlight wiring shall loop to handhole connection.
3. All holes for streetlight standards shall be augered or hydro-excavated.
4. All poles shall be 27'6" or 40' with mold finish.
5. All poles shall be manufactured in accordance with the latest revision of CSA A14 and CSA A23.4.

All dimensions in imperial except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	Standard Streetlight for Arterial and Non Residential Collector Roads	
Approved:	DWG. Date: March 2004	
Scale: N.T.S	Revision No.: 4	
	Revision Date: July 2019	
	DWG No. 502.10	



Notes:

1. See Town of Whitby Design Criteria section H7.00 for approved material listings.
2. Streetlight wiring shall loop to handhole connection.
3. All holes for streetlight standards shall be augered or hydro-excavated.
4. All poles shall be 25' or 30' with midnight lace polished finish.
5. All poles shall be manufactured in accordance with the latest revision of CSA A14 and CSA A23.4.

All dimensions in imperial except where noted

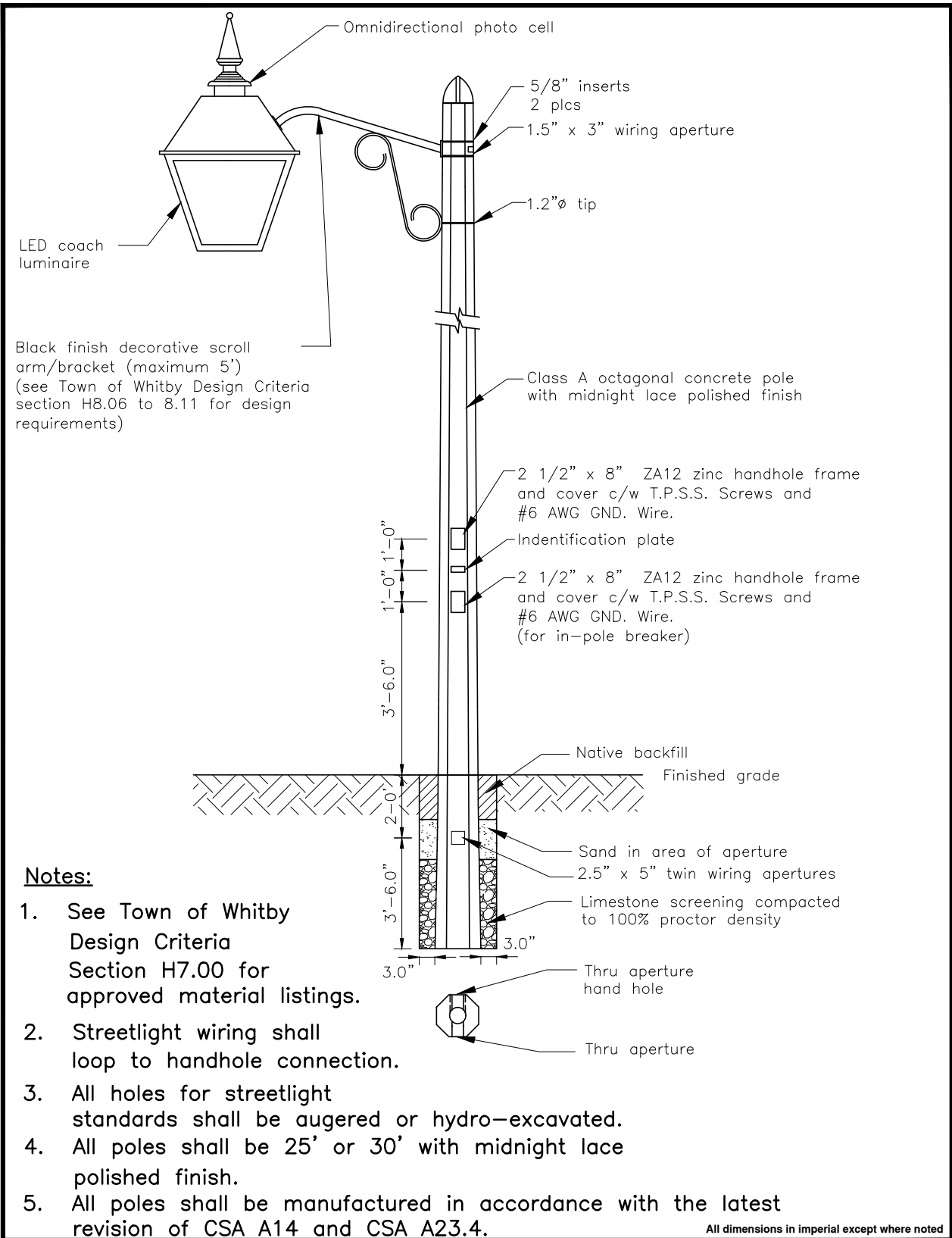
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

**Standard Streetlight for
Local and Residential
Collectors Roads**

DWG. Date:	August 2015
Revision No.:	2
Revision Date:	July 2019
Dwg No.	502.20

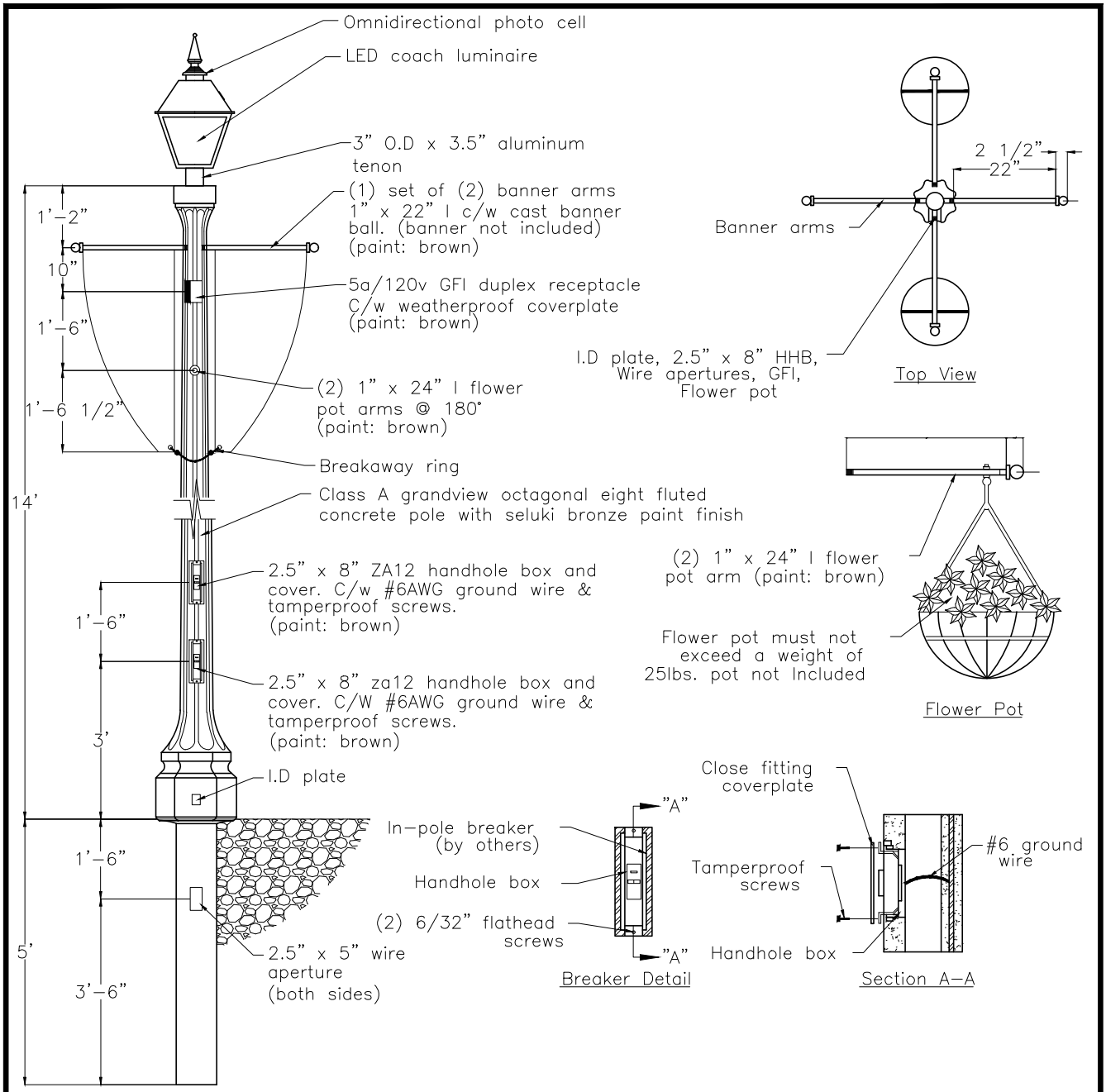


Notes:

1. See Town of Whitby Design Criteria Section H7.00 for approved material listings.
2. Streetlight wiring shall loop to handhole connection.
3. All holes for streetlight standards shall be augered or hydro-excavated.
4. All poles shall be 25' or 30' with midnight lace polished finish.
5. All poles shall be manufactured in accordance with the latest revision of CSA A14 and CSA A23.4.

All dimensions in imperial except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	Standard Streetlight for Designated Heritage Areas	DWG. Date: March 2004
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: July 2019
		Dwg No. 502.30

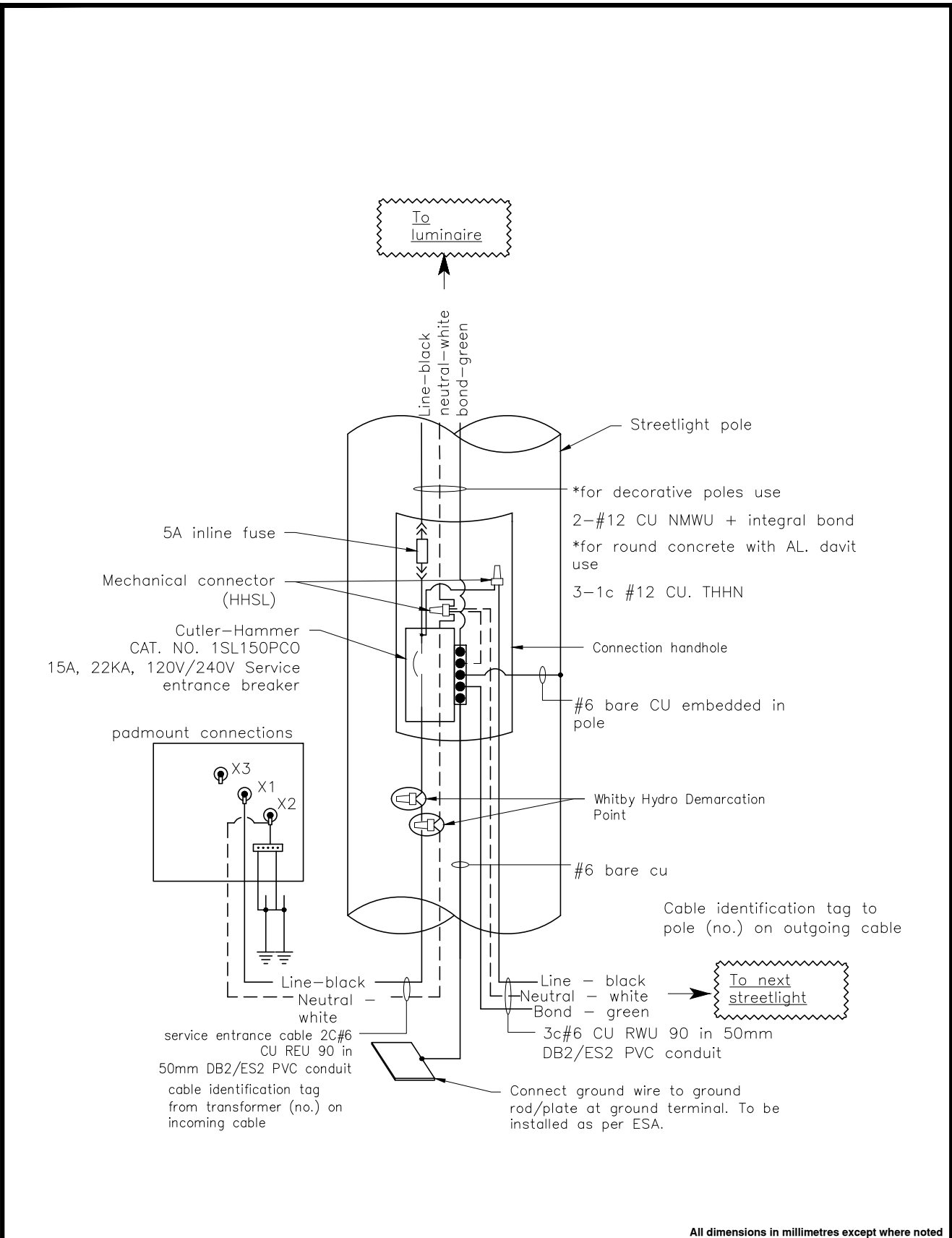


Notes:

1. Streetlight wiring shall loop to handhole connection.
2. All holes for streetlight standards shall be augered or hydro-excavated.
3. All poles shall be 14' above ground with Seluki Bronze paint finish.
4. All poles shall be manufactured in accordance with the latest revision of CSA A14 and CSA A23.4.
5. Finishwire shall be included for the entire length of pole.

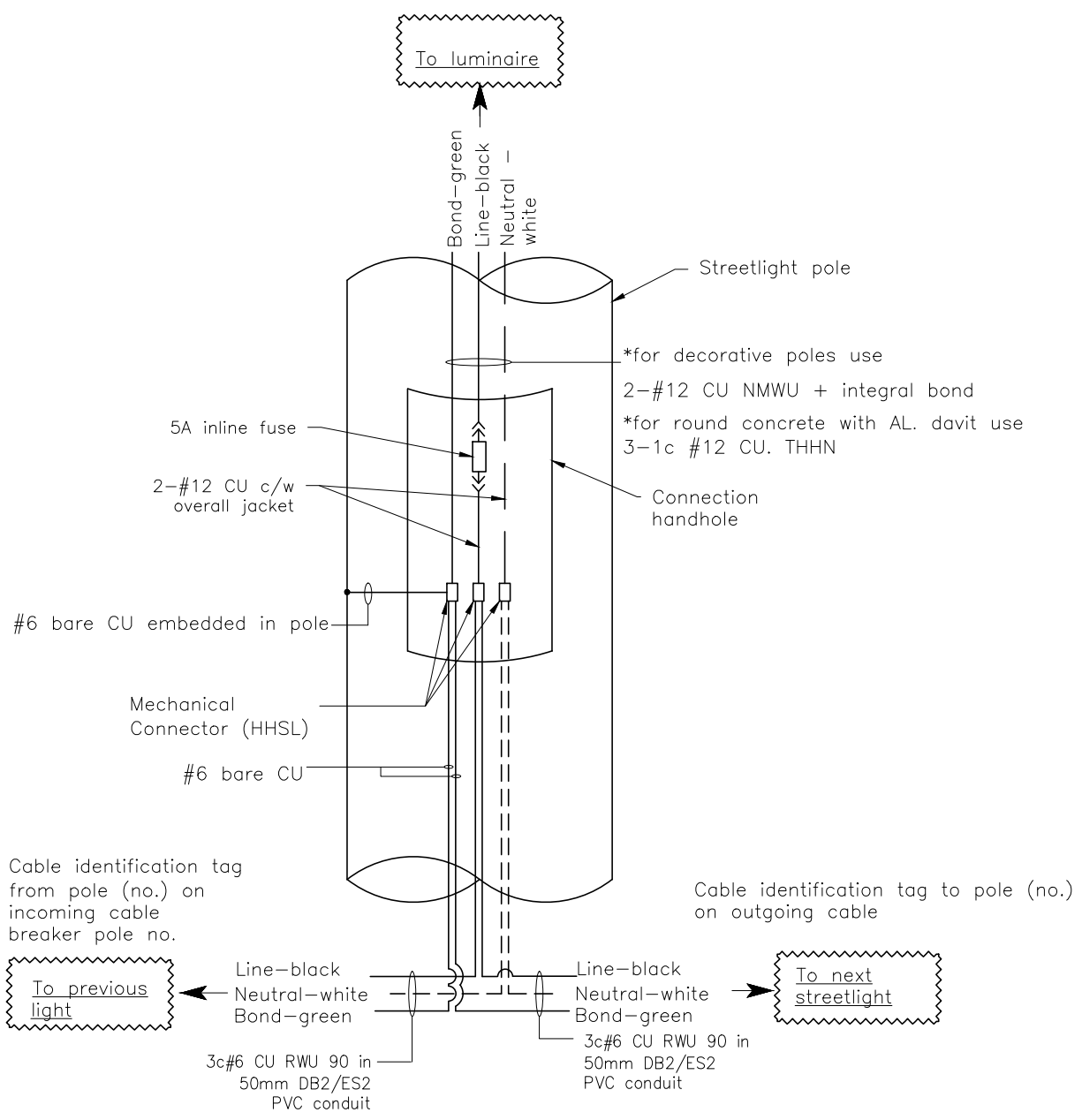
All dimensions in imperial except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	<i>M.</i>	DWG. Date:	August 2015
Approved	<i>GA</i>	Revision No.:	.
Scale:	N.T.S	Revision Date:	.
Standard Streetlight for Designated Downtown Areas			DWG No. 502.40



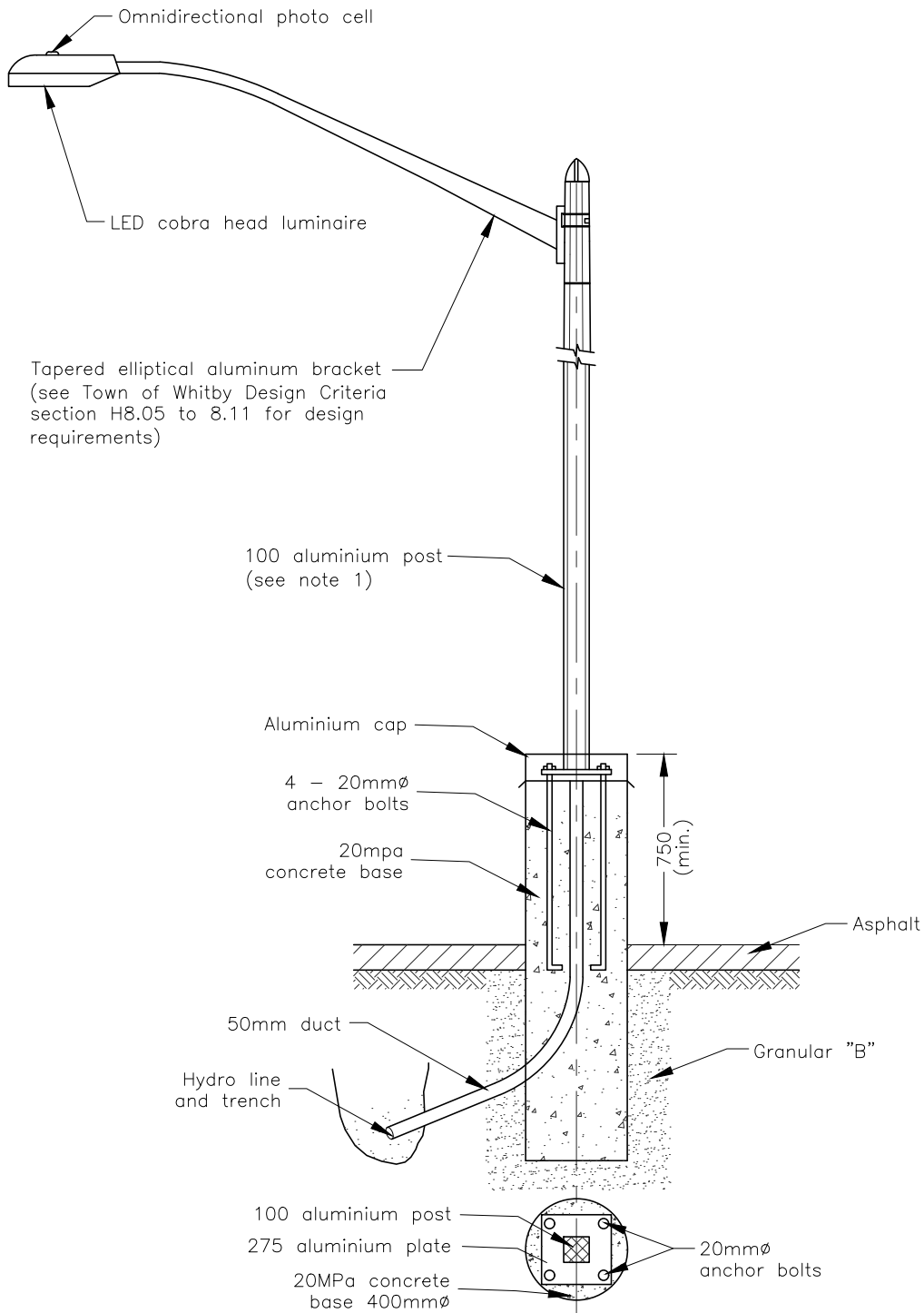
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked: <i>[Signature]</i>	Underground Distribution Standards Street Light Pole C/W Services Entrance Breaker Connection		DWG. Date: August 2015
Approved: <i>[Signature]</i>			Revision No.: .
Scale: N.T.S			Revision Date: .
		DWG No. 502.50	



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked <i>[Signature]</i>	Underground Distribution Standards Street Light Wire Diagram Non-service Entrance	DWG. Date: August 2015
Approved <i>[Signature]</i>		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 502.60



Notes:

1. Pole height to be determined based on photometric analysis.
2. Pole to be finished dark bronze color.
3. Hydro cable to be encased in a 50mm \varnothing PVC duct.

All Dimensions In Millimetres Except Where Noted

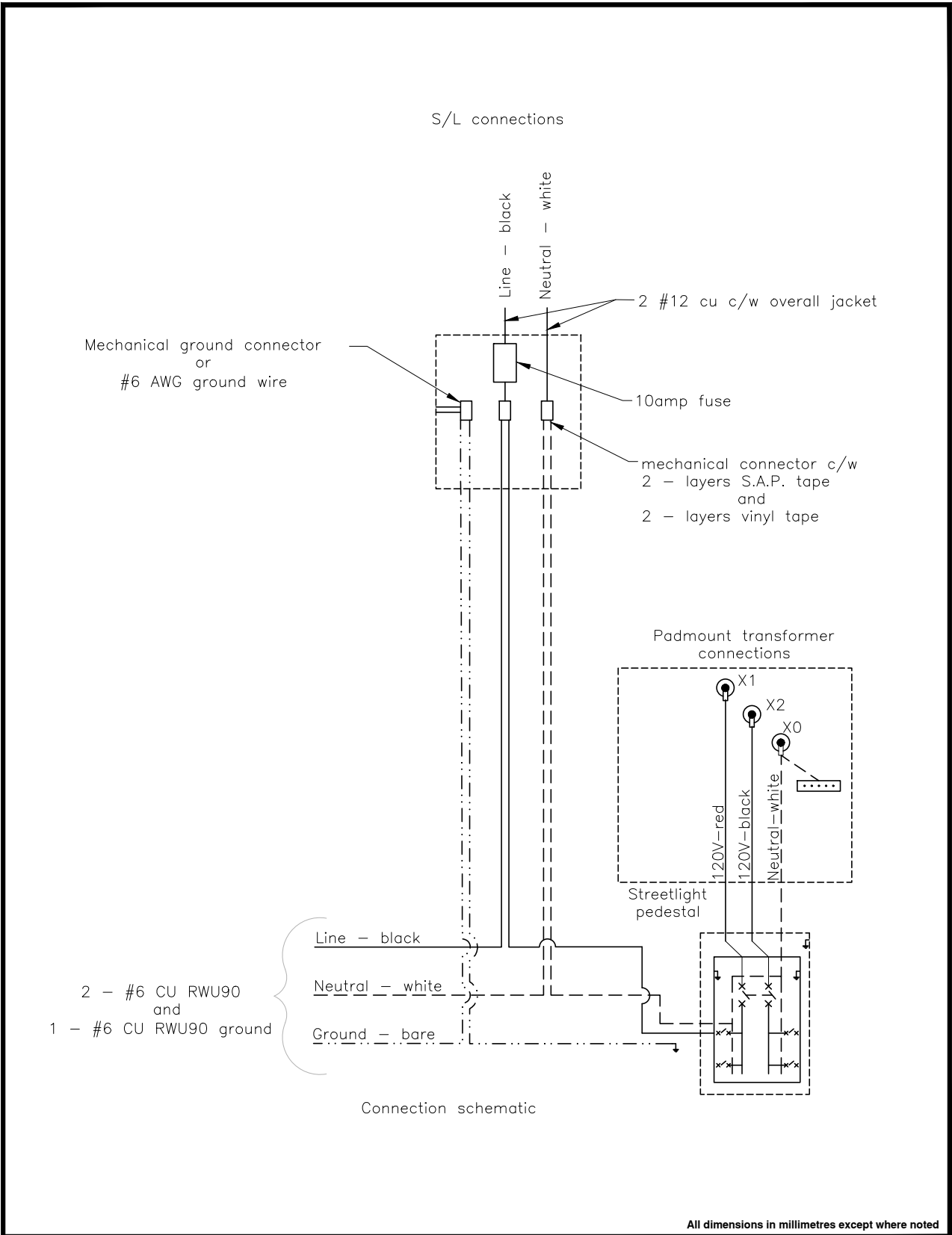
The Corporation of the Town of Whitby

Engineering Services

Checked	<i>M.</i>
Approved	<i>CH</i>
Scale:	N.T.S

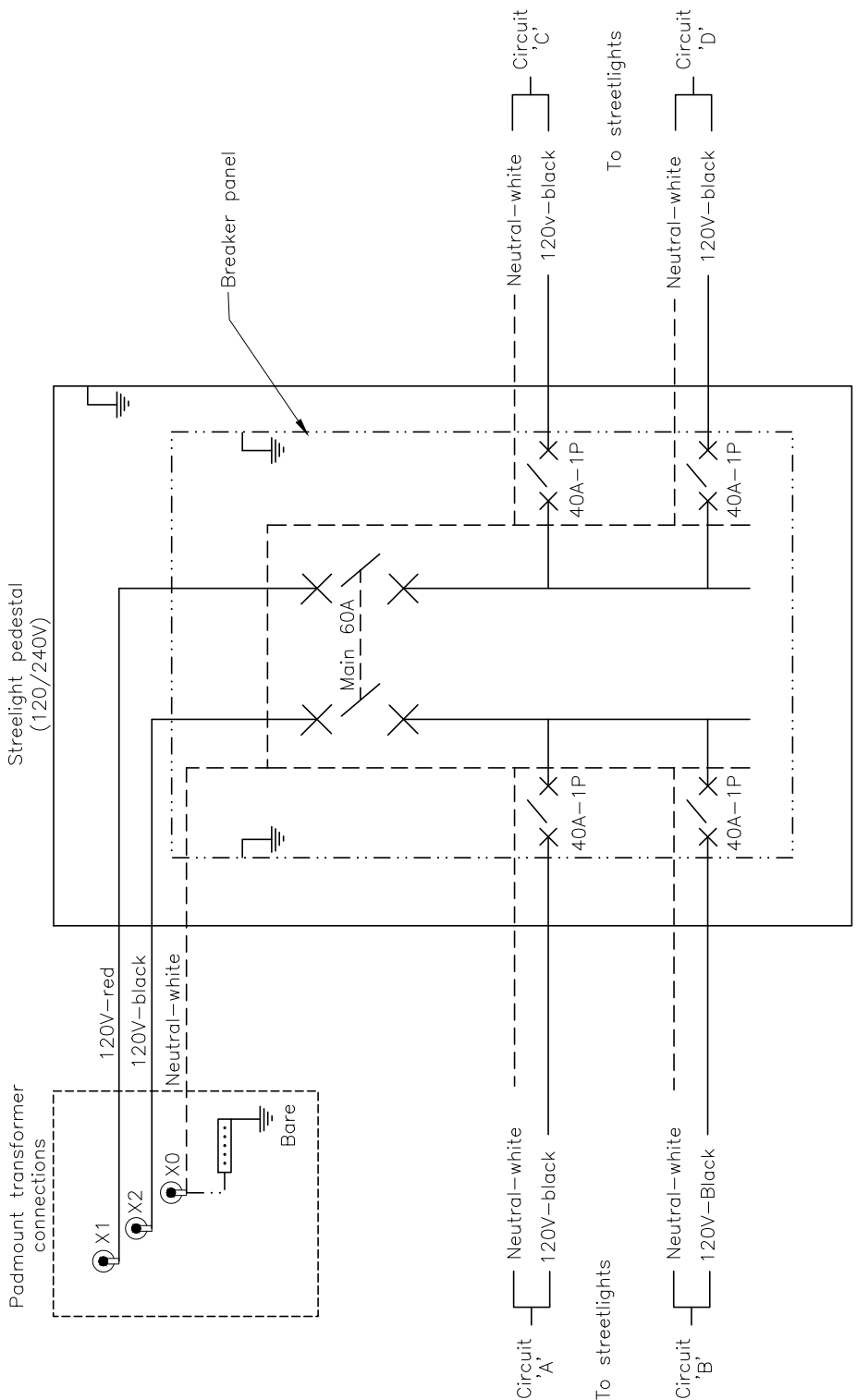
**Typical Municipal Parking Lot
Light Standard Detail**

DWG. Date:	March 2004
Revision No.:	2
Revision Date:	October 2018
DWG No.	503



All dimensions in millimetres except where noted

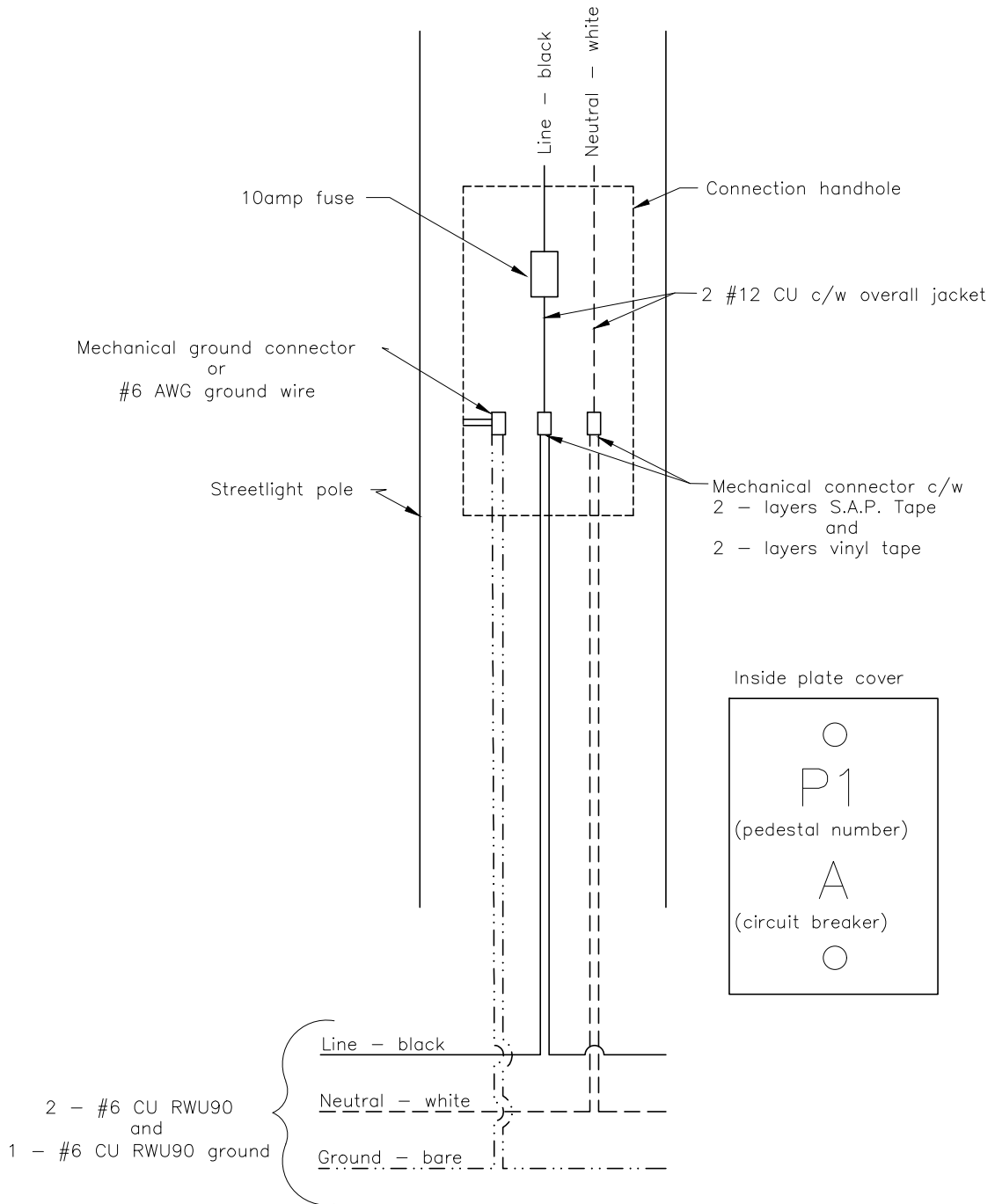
The Corporation of the Town of Whitby		Engineering Services
Checked <i>[Signature]</i>	Grounding Detail For Streetlight Pedestal and Poles	
Approved <i>[Signature]</i>	DWG. Date: March, 2004	
Scale: N.T.S	Revision No.: .	
	Revision Date: .	
	DWG No. 504	



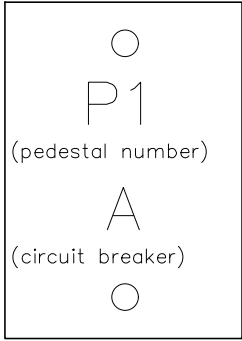
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	<h2 style="margin: 0;">Power Supply from Transformer to Pedestal to Streetlights</h2>	
Approved:		
Scale: N.T.S		
		DWG. Date: March, 2004 Revision No.: . Revision Date: . DWG No. 504.10

S/L Connection



Inside plate cover



All dimensions in millimetres except where noted

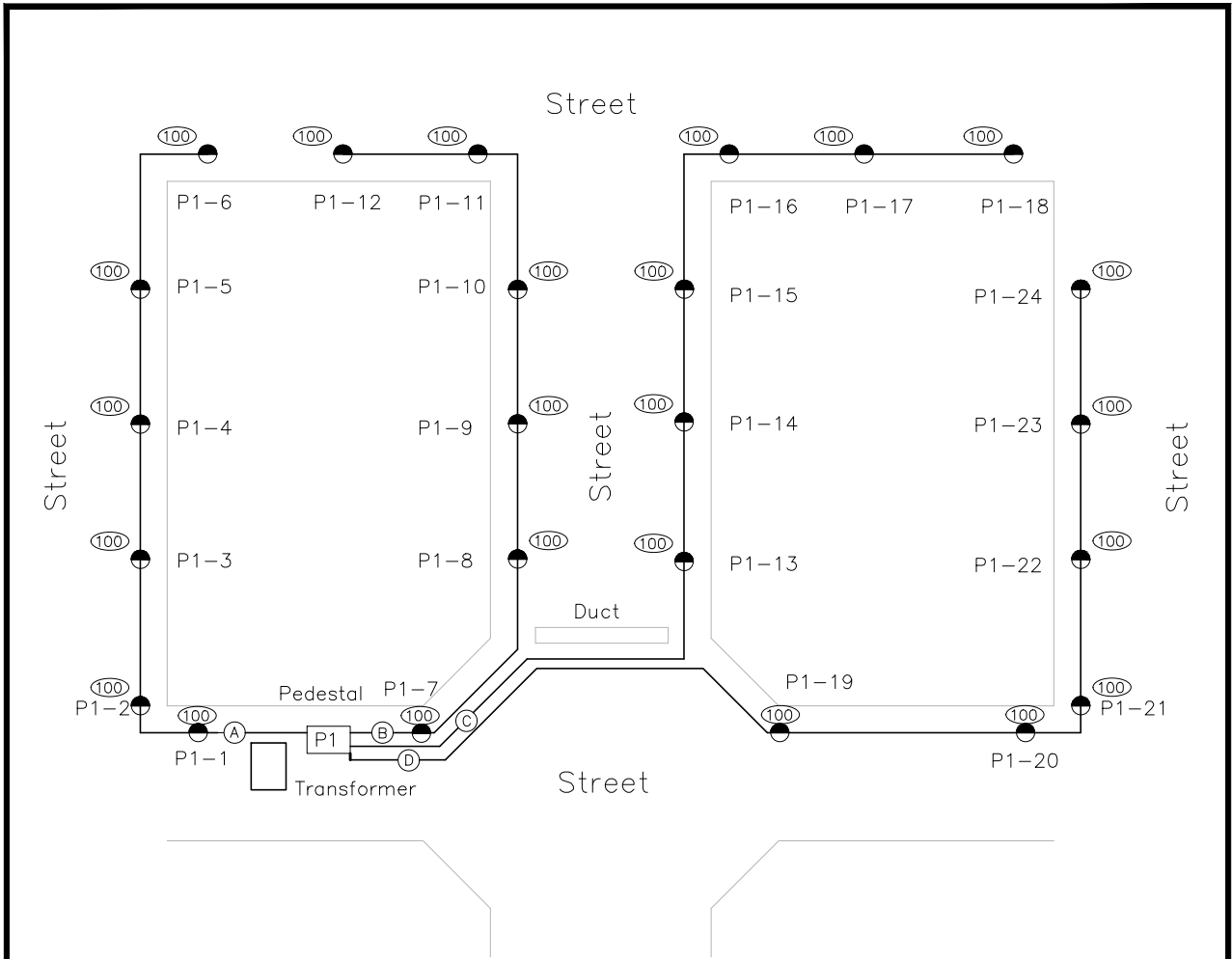
The Corporation of the Town of Whitby

Engineering Services

Checked	<i>M.</i>
Approved	<i>CH</i>
Scale:	N.T.S

Streetlight Wiring Diagram

DWG. Date:	March, 2004
Revision No.:	.
Revision Date:	.
DWG No.	504.20

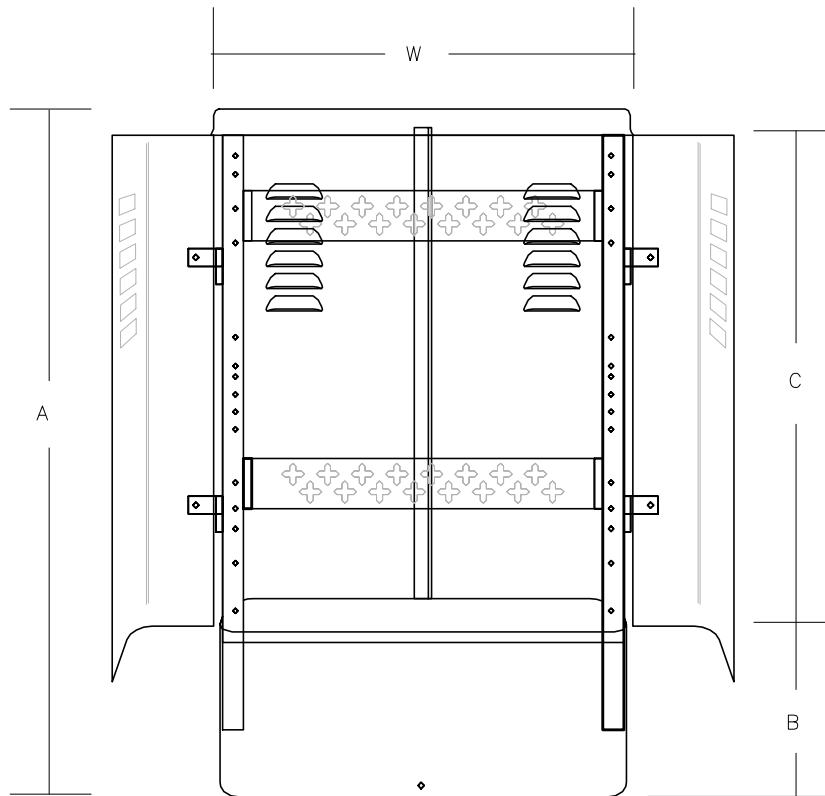


note:

- Each streetlight pedestal radially feeds up to 4 circuits of 6 streetlights each.
- Each streetlight pedestal has a 60amp-2P 120/240V main breaker complete with 4-1P,40amp 120V breakers.
- Maximum circuit length, 540m - 100W streetlight.
- Maximum circuit length, 240m - 250W streetlight.
- - Represents streetlight.
- ①①① - Represents streetlight wattage.
- Whitby Hydro's intergraph pole number must be identified in streetlight pedestal

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked <i>[Signature]</i>	Streetlight Pedestal Reference Numbering	DWG. Date: March, 2004	Revision No.: .
Approved <i>[Signature]</i>		Revision Date: .	DWG No. 504.30
Scale: N.T.S			



**TV1024 Closures
(for Manufacture Contact Elexicon)**

Dimensions & Ordering Information

Catalog Number	Part Number	Dimensions (inches)				
		A	B	C	Depth	W
TV1024	F602955	37	10	25	10-3/4	23-1/4

Note: units are equipped with two 32 inch mounting stakes and factory mounting brackets.


Accessories

Catalog Number	Part Number	Description
P36220	F536220	TV1024 Mounting Plate

All dimensions in millimetres except where noted

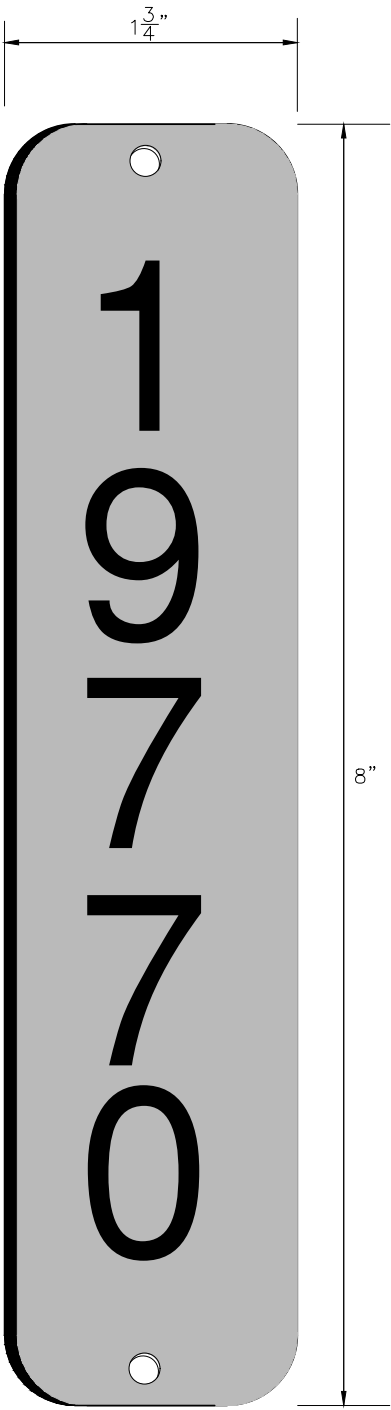
The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

**Streetlight Pedestal
Enclosure**

DWG. Date:	March, 2004
Revision No.:	1
Revision Date:	June, 2022
DWG No.	504.40

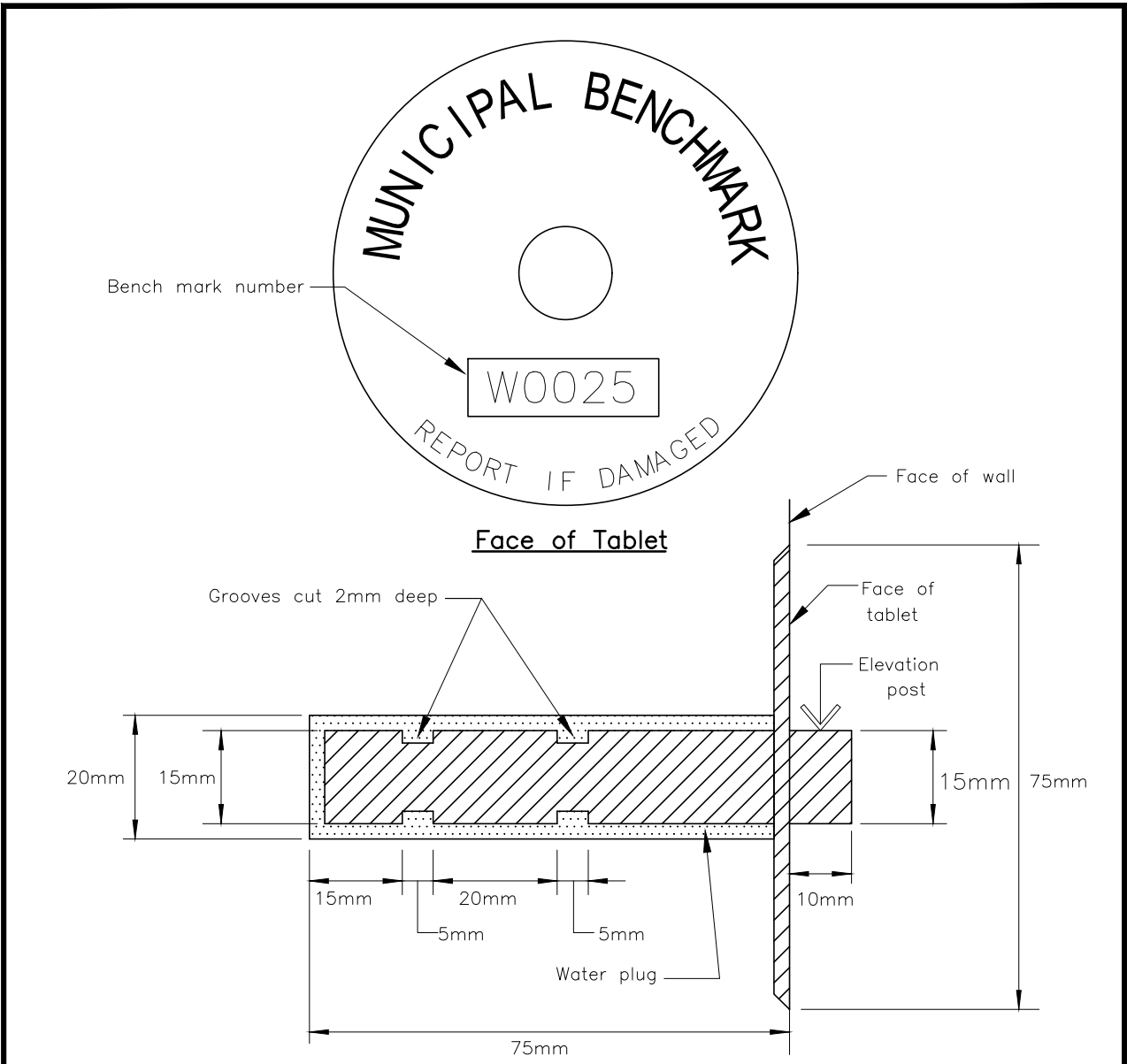


Notes:

1. Plate dimensions 1 3/4 by 8", with rounded edges, 1/16" thick 2 ply.
2. Font is a custom engraving font called (gothic) font size – 1 3/16" tall by 13/16" wide.
3. Yellow plate with black lettering.
4. Material: plastic acrylic blend rated for UV outdoor.
5. Pole number height – 9 feet from the ground to the bottom of the numbering plate. this height was determined based sign heights that the town of whitby may install on the poles (example, the top of a speed signs will reach a height of 8' to 8 1/2').
6. Pole number shall face the road.
7. Pole number plates shall be glued on.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked		DWG. Date:	October, 2018
Approved		Revision No.:	.
Scale:	N.T.S	Revision Date:	.
Pole Number Plate		DWG No.	504.50



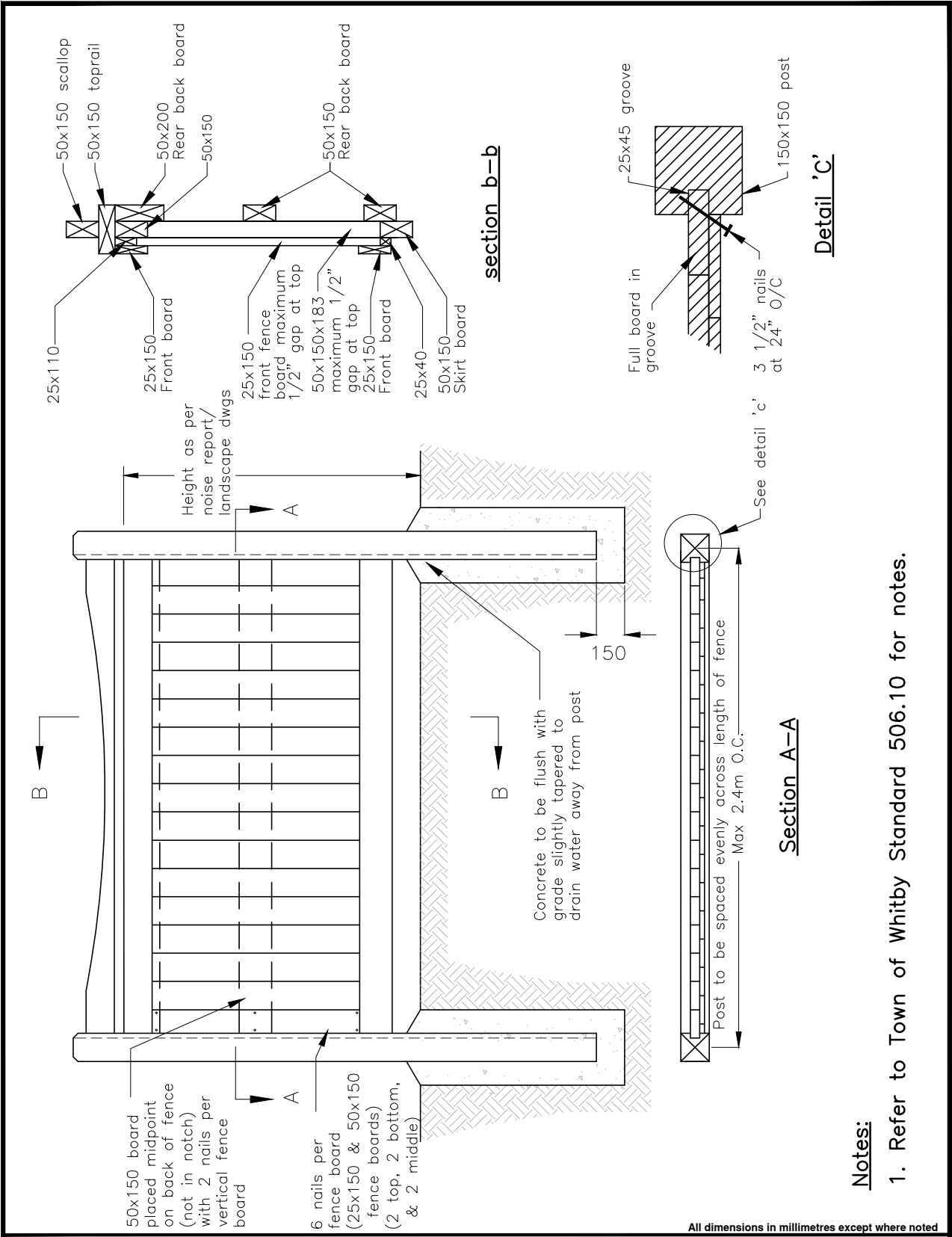
Cross Section

notes:

1. Tablet is cast in brass.
2. Tablet is to be mounted vertically in a concrete foundation wall of a building, bridge, or culvert with footings below the frost level, and has been in existence for at least two years.
3. Tablet to be numbered before installation by a town approved punch. the number to be approved by the Town of Whitby and be preceded by the letter W.
4. A 20mm \varnothing hole to be drilled into the concrete to accomodate the shank so that the tablet face is counter-sunk flush with wall face.
5. To be grouted in place with a water plug.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked		DWG. Date: January 1993	
Approved		Revision No.: 1	
Scale:	N.T.S	Revision Date: May 2006	
Bench Mark Tablet		DWG No.	505



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked		DWG. Date:	July 2002
Approved		Revision No.:	3
Scale:	N.T.S.	Revision Date:	August 2015
Wood Acoustic Fence		DWG No.	506

Notes:

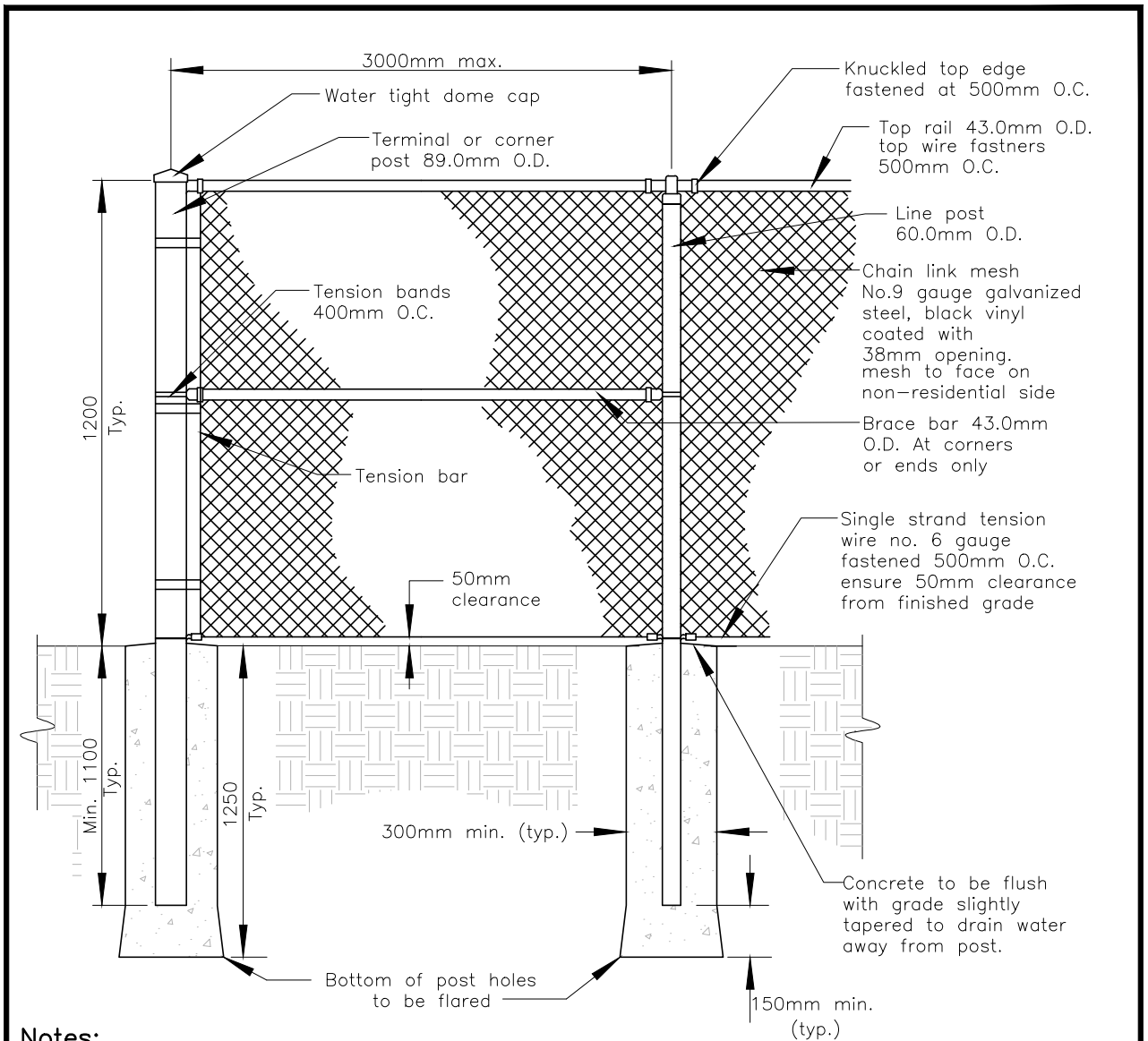
1. Refer to Town of Whitby Standard 506.10 for notes.

Notes:

1. All fence boards shall be pressure treated spf or cedar, as directed by the Town of Whitby.
2. Minimum fence density shall be 20 kg/sq.m.
3. All post material shall be pressure treated jack or red pine and shall be minimum 150 mm x 150 mm.
4. Posts length shall be sufficient to accommodate footing depth below ground and fence construction above ground, minimum 3.6 m (12ft).
5. All concrete shall be 20MPa.
6. All footings shall be minimum 1500 mm deep.
 -450mm in diameter if height is less than 2.0 m.
 -600mm in diameter if height is at or greater than 2.0 m.
7. Fence shall not exceed the height of 2.3 m.
8. All fasteners & metal components shall be compatible with the acq (alkaline copper quaternary) compound used in pressure treatment spruce or cedar.
9. All new fences to be stained with two (2) coats of Olympic #911 solid stain cape cod gray on the road side only at the time of road construction. One additional coat shall be apply before road assumption unless otherwise approved by the Town of Whitby.
10. Stain shall be applied outdoors in suitable weather conditions when the temperature is between 10 and 21 degrees celsius. Second coat to be applied following final fence inspection and engineering acceptance prior to assumption of subdivision.
11. Top of fence shall be horizontal (zero gradient), bottom of fence shall follow the grade unless otherwise approved by the Town of Whitby.
12. Prior to construction, all fences 2.0 m and above in height shall be designed and approved by a qualified structural engineer. Prior to acceptance of the completed fence a structural engineer certification shall be provided to the Town of Whitby.
13. Prior to construction, all fence construction along berms will require and all fences constructed on fill material may require: design and approval by a qualified geotechnical engineer. Prior to acceptance of the completed fence a geotechnical engineer certification shall be provided to the Town of Whitby.
14. All noise fence shall be constructed wholly within private property.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked 	Wood Acoustic Fence Notes	DWG. Date: July 2011	
Approved 		Revision No: 2	
Scale: N.T.S.		Revision Date: October 2018	
		DWG No. 506.10	

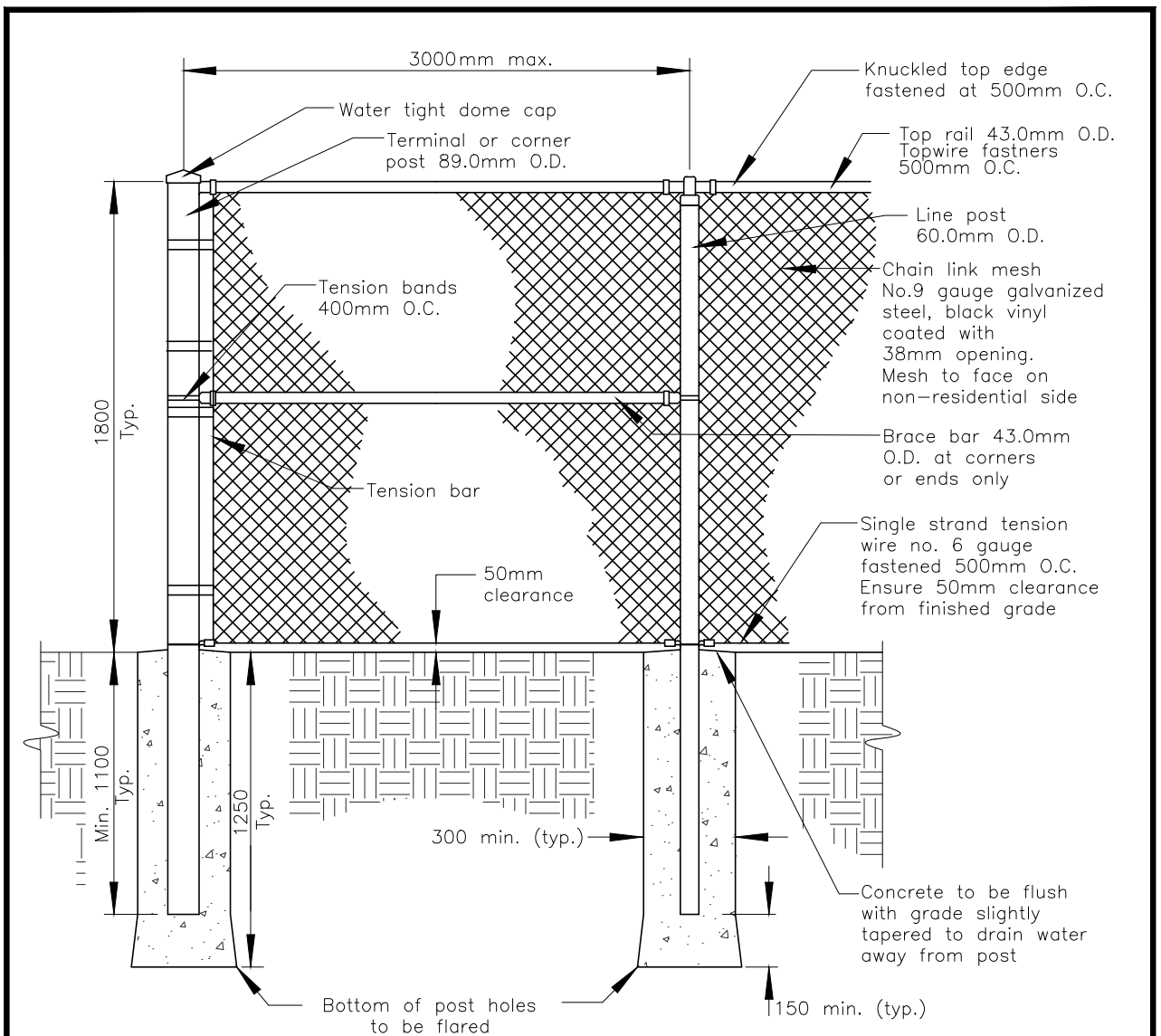


Notes:

1. All 9 gauge mesh wire shall have 59C.C. of zinc/.09m under black vinyl coating.
2. All concrete shall be 20MPa.
3. All fence posts are to be galvanized schedule 40 pipe, painted black as per manufacturer specifications.
4. All fasteners are to be black vinyl coated.
5. Corner posts shall be installed at horizontal deflections in the fence line of 10 degrees or more.
6. Terminal posts shall be installed at equal intervals not exceeding 150m. Additional terminal posts shall be installed where changes in vertical alignment of fence exceed 30 degrees.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	<i>[Signature]</i>	DWG. Date:	July 2011
Approved	<i>[Signature]</i>	Revision No.:	1
Scale:	N.T.S.	Revision Date:	August 2015
1200mm (4'-0") High Black Vinyl Coated Chain Link Fence		DWG No.:	506.30




Notes:

1. All 9 gauge mesh wire shall have 59C.C. of zinc/.09m under black vinyl coating.
2. All concrete shall be 20 MPa.
3. All fence posts are to be galvanized schedule 40 pipe, painted black as per manufacturer specifications.
4. All fasteners are to be black vinyl coated.
5. Corner posts shall be installed at horizontal deflections in the fence line of 10 degrees or more.
6. Terminal posts shall be installed at equal intervals not exceeding 150m. Additional terminal posts shall be installed where changes in vertical alignment of fence exceed 30 degrees.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked <i>[Signature]</i>	1800mm (6'-0") High Black Vinyl Coated Chain Link Fence	DWG. Date: July 2011
Approved <i>[Signature]</i>		Revision No.: 1
Scale: N.T.S		Revision Date: August 2015
		DWG No. 506.40

REVISIONS				
No.	REVISION	DATE	BY	APPROVED

THE CORPORATION OF THE
 **TOWN OF WHITBY**
 ENGINEERING SERVICES

Engineer's Stamp	Consultant's Name
------------------	-------------------

APPROVED _____ P. Eng. Engineering Services Town of Whitby Date: _____	Town of Whitby Engineer's Stamp
---	---------------------------------

XXXXXXXXXXXXXXXXXX
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

DESIGNED BY: X.X.	SCALES :	CONTRACT No. W200X-X
CHECKED BY: X.X.	HORIZONTAL: 1:XXX	SHEET No X OF X
DRAWN BY: X.X.	VERTICAL: .	<div style="font-size: 2em; font-weight: bold;">PX</div> DRAWING NUMBER
DATE: XXXXX 200X		

Date: XXXXXX, 2003 File: W2000X-X_PX.dwg


Note:

- The above title block must appear on Town of Whitby project drawings.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	<div style="font-size: 1.5em; font-weight: bold;">Drawing Title Block</div> <div style="font-size: 1.2em; font-weight: bold;">for Town of Whitby Projects</div>		DWG. Date: March 2004
Approved 			Revision No.: 1
Scale: N.T.S			Revision Date: June 2022
		DWG No. 508	

REVISIONS				
No.	REVISION	DATE	BY	APPROVED

THE CORPORATION OF THE
 **TOWN OF WHITBY**
 ENGINEERING SERVICES

Engineer's Stamp	Consultant's Name
------------------	-------------------

APPROVED _____ Engineering Services Town of Whitby Date: _____	APPROVED Approval for the Region Works Dept. for the purposes described in the applicable Regional Subdivision or Servicing Agreement. The Region is relying on the technical skill and ability of the P.Eng. sealing and signing this drawing. By: _____ Date: _____
---	---

SUBDIVISION NAME
SW-XXX-XX


PLAN/STREET NAME
STA. XXX+XX TO STA. XXX+XX

DESIGNED BY: X.X.	SCALES :	PROJECT No. XXXXXXXX
CHECKED BY: X.X.	HORIZONTAL: 1:XXX	SHEET No X OF X
DRAWN BY: X.X.	VERTICAL: .	XX
DATE: XXXXX 200X		DRAWING NUMBER

Date: XXXXXX, 2003 File: XXXXXXXX_XX.dwg
(PLOT DATE)

Note:
 Consultant may use their own title block provided all information is presented.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	Drawing Title Block for New Subdivisions	DWG. Date: March 2004	
Approved 		Revision No.: 2	
Scale: N.T.S		Revision Date: May 2025	DWG No. 509

TEMPLATE N.T.S.

Town Notes

The as-constructed survey shall be handwritten on this approved siting plan, then the original hand written as-constructed siting plan must be submitted to the Town's Lot Grading Inspector. The as-constructed grading may be different from the approved design plan. It is the Builder's responsibility to ensure the as-constructed grading is in conformance to minimum as-constructed requirements of the Municipality. Acceptance of the as-constructed certification will be based on the Municipality's as-constructed acceptance requirements. For minimum mandatory survey locations for as-constructed lot grading certification, refer to Town Std.'s 300, 301 & 302.

The builder shall ensure that the siting is consistent with the approved engineering plans and shall ensure that the siting conforms to the Town's Design Criteria and Standards.

The As-constructed service connection inverts are to be verified by the builder prior to pouring footings and foundations.

Roof Leaders are to be connected/outlet as per Town Design Criteria Section B3.13 and/or as specified on the Approved Engineering Plans.

For the Standard Lot Grading Notes refer to the Town Std.300's

**LOT GRADING PLANS APPROVED
SUBJECT TO REVISIONS NOTED
ENGINEERING SERVICES
TOWN OF WHITBY**

Date: _____

Framing not to begin prior to certification of foundation control elevation for:

[] TFW [] MAX.USF
[] MBE [] N/A



as per T.O.W. Standard No. 303.10

ARCHITECTURAL REVIEW & APPROVAL

It is the builder's complete responsibility to ensure that all plans submitted for approval fully comply with the Architectural Guidelines and all applicable regulations and requirements including zoning provisions and any provisions in the subdivision agreement. The Control Architect is not responsible in any way for examining or approving site (lotting) plans or working drawings with respect to any zoning or building code or permit matter or that any house can be properly built or located on its lot.

This is to certify that these plans comply with the applicable Architectural Design Guidelines approved by the:

**PLANNING & DEVELOPMENT DEPARTMENT
TOWN OF WHITBY**

SITE STATISTICS	
COVERAGE CALCULATION	
LOT AREA:	m ²
BUILDING FOOTPRINT AREA:	m ²
LOT COVERAGE:	%
ZONING:	
FRONTAGE	
FRONTAGE:	m
BUILDING HEIGHT	
MAX. PERMITTED BLDG. HEIGHT:	m
ESTABLISHED GRADE:	m
F.F.E. TO ESTABLISHED GRADE:	m
F.F.E. TO MEAN OF ROOF:	m
PROPOSED BLDG. HEIGHT:	m
BACKFILL HEIGHT:	m
LANDSCAPE AREA	
LOT AREA:	m ²
SOFT LANDSCAPE AREA:	m ²
LANDSCAPE COVERAGE:	%
FRONT YARD LANDSCAPE AREA	
FRONT YARD AREA:	m ²
DRIVEWAY AREA:	m ²
COVERED PORCH AREA:	m ²
SOFT LANDSCAPE AREA:	m ²
LANDSCAPE/OPEN SPACE:	%
ZONING OFFICER / PLANS EXAMINER ZONING APPROVAL, TOWN OF WHITBY	

LEGEND

- FFE - FINISHED FLOOR ELEVATION
- TFW - TOP OF FOUNDATION WALL
- FBS - FINISHED BASEMENT SLAB
- USF - UNDERSIDE OF FOOTING
- MBE - MINIMUM BASEMENT ELEVATION
- x100.00 - PROPOSED ELEVATION
- x100.00 - EXISTING ELEVATION
- 1.2m CHAIN LINK FENCE (STD.506.30)
- 1.8m CHAIN LINK FENCE (STD.506.40)
- WOOD ACOUSTIC FENCE (STD.506)
- STREET LIGHT POLE
- CATCH BASIN
- ##% - SWALE
- * - RETAINING WALL
- ▽ - ENGINEER FILL
- - DOOR / ENTRANCEWAYS
- - WINDOWS
- - SUMP PUMP
- - FIRE-RESISTANCE RATING

SUBDIVISION NAME
(SW-XXXX-XX)
40M-XXXX
HOUSE ## STREET NAME
TOWN OF WHITBY

LOT
XXX

***Download Template from Town of Whitby Website in Autocad Format**

*Siting Examples Are Also Provided on the Town's Website in PDF

The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S.

**Legal Drawing Title Block for
Individual Siting Plans**

DWG. Date:	October 2018
Revision No.:	1
Revision Date:	June 2022
DWG No.	509.10

TEMPLATE N.T.S.

Town Notes

The as-constructed survey shall be handwritten on this approved siting plan, then the original hand written as-constructed siting plan must be submitted to the Town's Lot Grading Inspector. The as-constructed grading may be different from the approved design plan. It is the Builder's responsibility to ensure the as-constructed grading is in conformance to minimum as-constructed requirements of the Municipality. Acceptance of the as-constructed certification will be based on the Municipality's as-constructed acceptance requirements. For minimum mandatory survey locations for as-constructed lot grading certification, refer to Town Std.'s 300, 301 & 302.

The builder shall ensure that the siting is consistent with the approved engineering plans and shall ensure that the siting conforms to the Town's Design Criteria and Standards.

The As-constructed service connection inverts are to be verified by the builder prior to pouring footings and foundations.

Roof Leaders are to be connected/outlet as per Town Design Criteria Section B3.13 and/or as specified on the Approved Engineering Plans.

For the Standard Lot Grading Notes refer to the Town Std.300's

**LOT GRADING PLANS APPROVED
SUBJECT TO REVISIONS NOTED
ENGINEERING SERVICES
TOWN OF WHITBY**

Date:

Framing not to begin prior to certification of foundation control elevation for:
 TFW MAX.USF
 MBE N/A

as per T.O.W. Standard No. 303.10

ARCHITECTURAL REVIEW & APPROVAL

It is the builder's complete responsibility to ensure that all plans submitted for approval fully comply with the Architectural Guidelines and all applicable regulations and requirements including zoning provisions and any provisions in the subdivision agreement. The Control Architect is not responsible in any way for examining or approving site (lotting) plans or working drawings with respect to any zoning or building code or permit matter or that any house can be properly built or located on its lot.

This is to certify that these plans comply with the applicable Architectural Design Guidelines approved by the:

**PLANNING & DEVELOPMENT DEPARTMENT
TOWN OF WHITBY**

SUBDIVISION NAME
(SW-XXXX-XX)
40M-XXXX
HOUSE, #/ STREET NAME
TOWN OF WHITBY

**LOT
XXX**

SITE STATISTICS	
COVERAGE CALCULATION	
LOT AREA:	m ²
BUILDING FOOTPRINT AREA:	m ²
LOT COVERAGE:	%
ZONING:	
FRONTAGE	
FRONTAGE:	m
BUILDING HEIGHT	
MAX. PERMITTED BLDG. HEIGHT:	m
ESTABLISHED GRADE:	m
F.F.E. TO ESTABLISHED GRADE:	m
F.F.E. TO MEAN OF ROOF:	m
PROPOSED BLDG. HEIGHT:	m
BACKFILL HEIGHT:	m
LANDSCAPE AREA	
LOT AREA:	m ²
SOFT LANDSCAPE AREA:	m ²
LANDSCAPE COVERAGE:	%
FRONT YARD LANDSCAPE AREA	
FRONT YARD AREA:	m ²
DRIVEWAY AREA:	m ²
COVERED PORCH AREA:	m ²
SOFT LANDSCAPE AREA:	m ²
LANDSCAPE/OPEN SPACE:	%
ZONING OFFICER / PLANS EXAMINER ZONING APPROVAL, TOWN OF WHITBY	

LEGEND

- FFE - FINISHED FLOOR ELEVATION
- TFW - TOP OF FOUNDATION WALL
- FBS - FINISHED BASEMENT SLAB
- USF - UNDERSIDE OF FOOTING
- MBE - MINIMUM BASEMENT ELEVATION
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- STREET LIGHT POLE
- CATCH BASIN
- - SWALE
- * - RETAINING WALL
- ▽ - ENGINEER FILL
- - DOOR / ENTRANCEWAYS
- - WINDOWS
- - SUMP PUMP
- - FIRE-RESISTANCE RATING

***Download Template from Town of Whitby Website in Autocad Format**

***Siting Examples Are Also Provided on the Town's Website in PDF**

The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S.

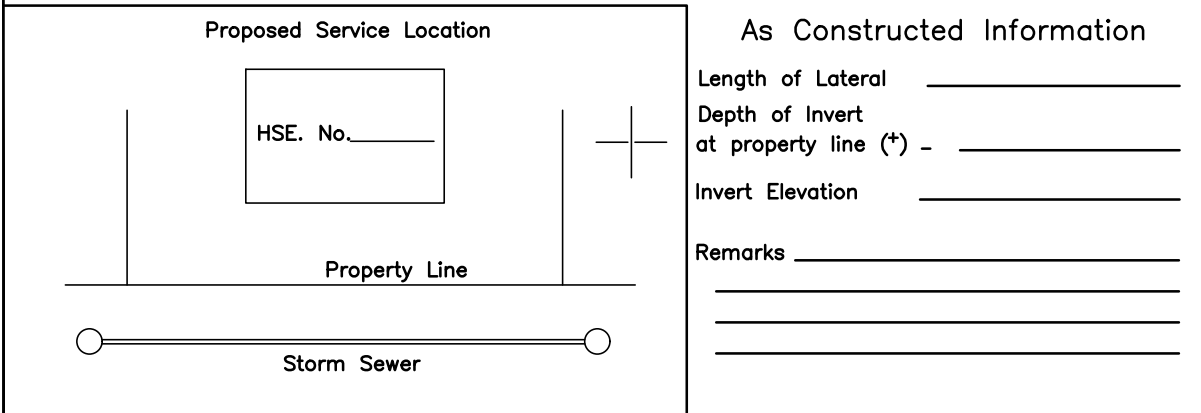
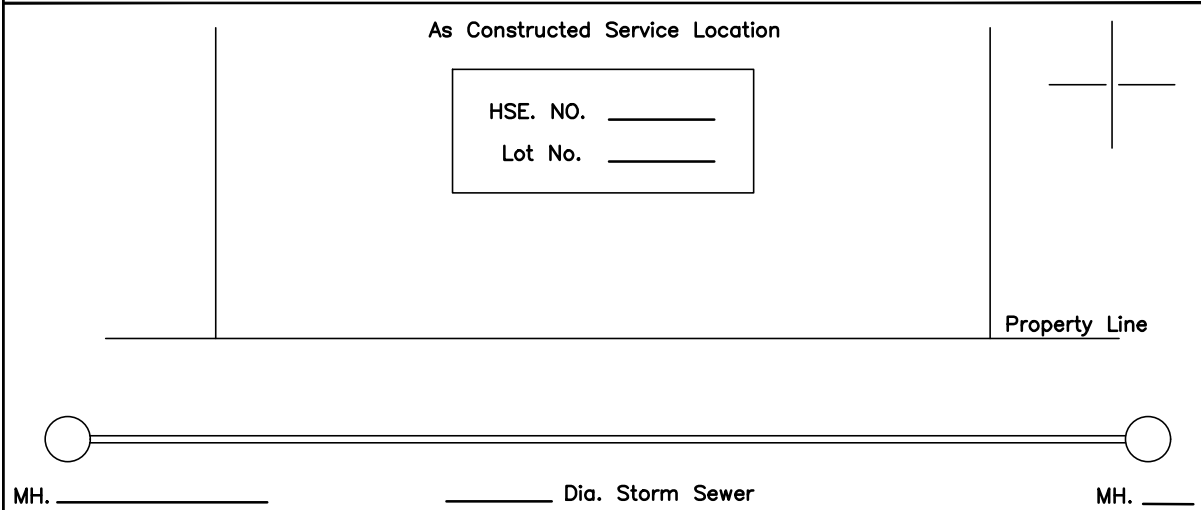
**Ledger Drawing Title Block for
Individual Siting Plans**

DWG. Date:	October 2018
Revision No.:	1
Revision Date:	June 2022
DWG No.	509.20



The Corporation of the Town of Whitby
Storm Sewer Lateral Location Sheet

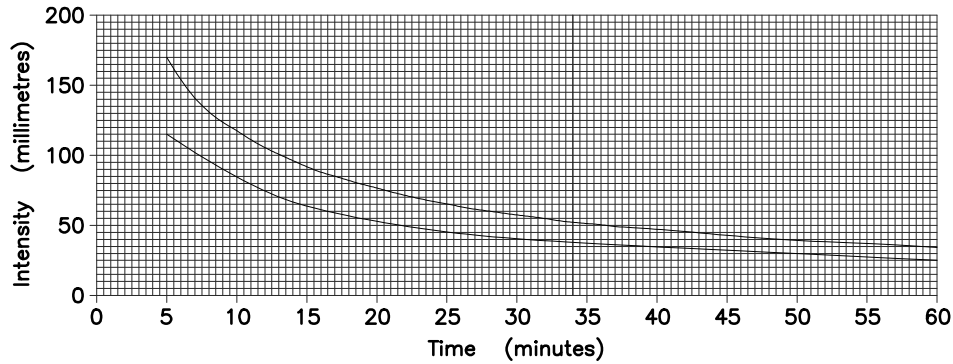
Street _____ Hse. No. _____ Lot No. _____
 Contract No. _____ Plan No. _____ Station _____
 Diameter of Pipe _____ Type of Pipe _____
 Installed By _____ Date: _____



I agree that the proposed service location should be as shown above	I certify that the information above is correct
_____ Owner / Tenant's Name	_____ Inspector's Signature
_____ Signature	_____ Date

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	Service Connection Record Town of Whitby Projects	DWG. Date: July 2002	Revision No.: 2
Approved		Revision Date: June 2022	DWG No. 511
Scale: N.T.S			



5 Year Values

Time	Intensity	Time	Intensity	Time	Intensity	Time	Intensity	Time	Intensity	Time	Intensity	Time	Intensity
10	117.6	17	85.1	24	67.6	32	55.2	46	42.3	60	34.6	130	19
10.5	114.3	17.5	83.6	24.5	66.6	33	54	47	41.6	65	32.6	135	18.4
11	111.3	18	82	25	65.7	34	52.8	48	41	70	30.8	140	17.9
11.5	108.5	18.5	80.6	25.5	64.8	35	51.7	49	40.4	75	29.2	145	17.4
12	105.8	19	79.2	26	63.9	36	50.7	50	39.7	80	27.8	150	16.9
12.5	103.2	19.5	77.8	26.5	63.1	37	49.7	51	39.2	85	26.5	155	16.5
13	100.8	20	76.5	27	62.3	38	48.7	52	38.6	90	25.3	160	16.1
13.5	98.5	20.5	75.2	27.5	61.5	39	47.8	53	38	95	24.3	165	15.7
14	96.3	21	74	28	60.7	40	46.9	54	37.5	100	23.3	170	15.3
14.5	94.2	21.5	72.9	28.5	59.9	41	46.1	55	37	105	22.4	175	15
15	92.2	22	71.7	29	59.2	42	45.3	56	36.5	110	21.6	180	14.6
15.5	90.3	22.5	70.7	29.5	58.5	43	44.5	57	36	115	20.9	190	14
16	88.5	23	69.6	30	57.8	44	43.7	58	35.5	120	20.2	200	13.5
16.5	86.8	23.5	68.6	31	56.5	45	43	59	35.1	125	19.6	210	12.9

Time	Intensity	Time	Intensity
220	12.5	360	8.4
230	12	400	7.7
240	11.6	440	7.1
250	11.2	480	6.6
260	10.9	520	6.2
270	10.6	560	5.9
280	10.3	600	5.5
290	10	640	5.3
300	9.7	680	5
310	9.5	720	4.8
320	9.2	760	4.6
330	9	800	4.4
340	8.8	840	4.2
350	8.6	880	4.1

5 year curve

2 year curve

$$I = \frac{1050.524}{(t_C + 4.5)^{0.819}}$$

$$I = \frac{677.333}{(t_C + 4.5)^{0.792}}$$

All dimensions in millimetres except where noted

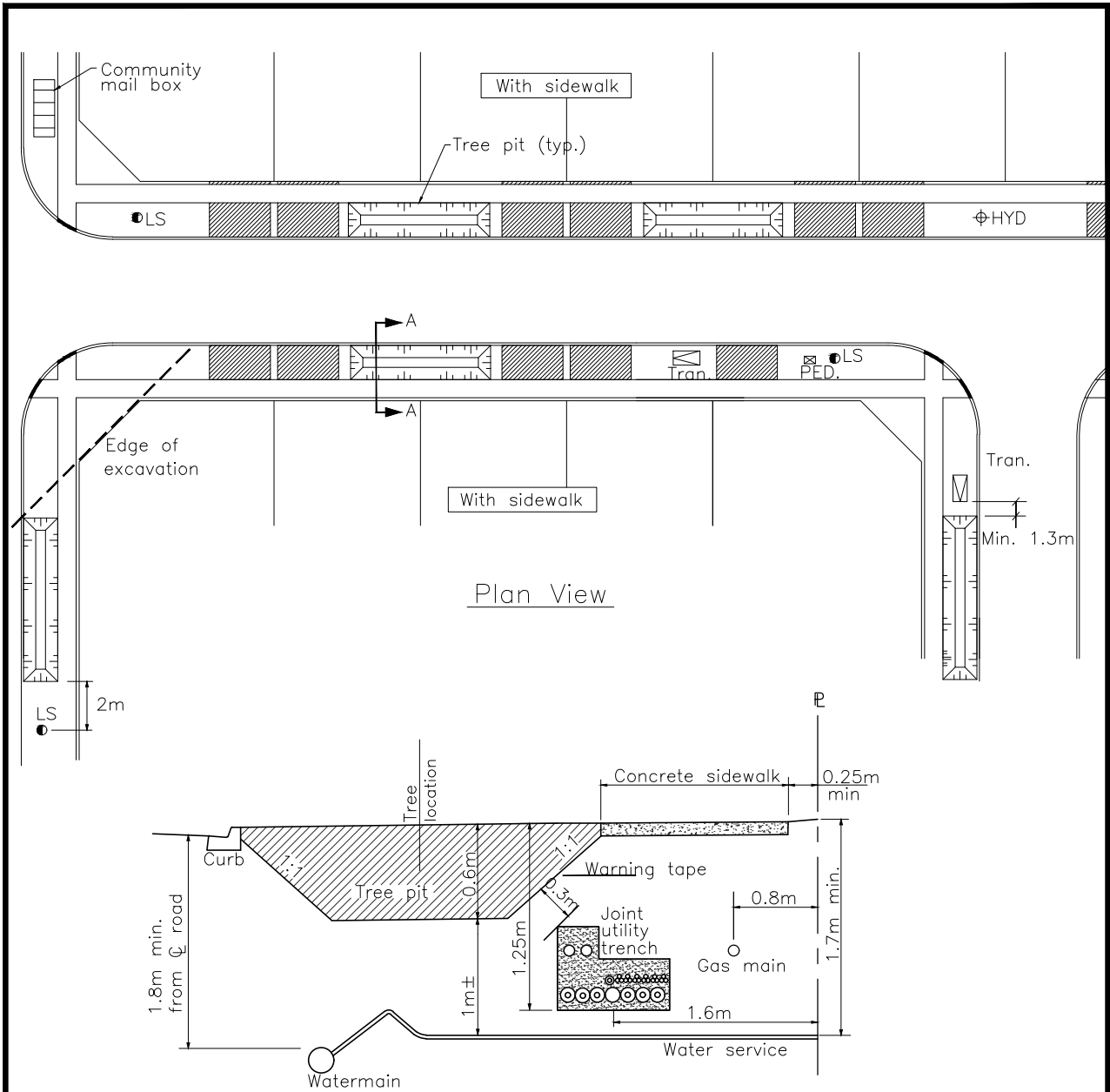
The Corporation of the Town of Whitby

Engineering Services

Checked	<i>[Signature]</i>
Approved	<i>[Signature]</i>
Scale:	N.T.S

Rainfall Intensity Curve and Values

DWG. Date:	July 2002
Revision No.:	5
Revision Date:	August 2015
DWG No.	512



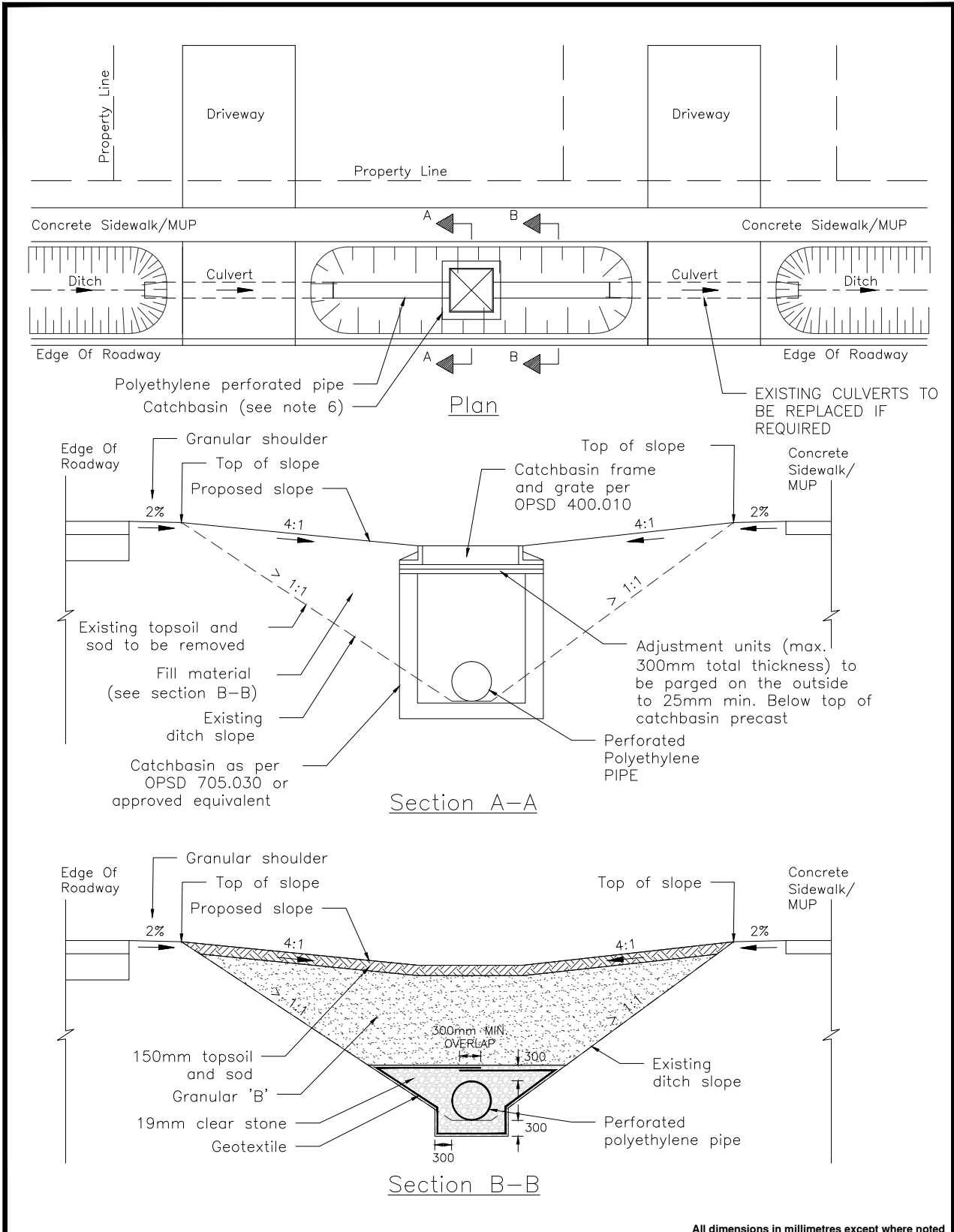
Section A-A (Boulevard)

Notes:

1. Tree pit excavation to be offset 0.3m from driveway.
2. Tree pit excavation to be offset a minimum of 1m from all other Above ground infrastructure.
3. Reference Design Criteria Section G and Town Standards for specific details on street tree planting locations, species, utility clearance and soil requirements.
4. Tree location will be centred within the boulevard between the end of sidewalk and back of curb.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	Tree Pit Rooting Zone	DWG. Date: October 2018	
Approved <i>[Signature]</i>		Revision No.: 1	
Scale: N.T.S		Revision Date: June 2022	DWG No. 514



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services	
Checked	Ditch Infill - Details	DWG. Date: May 2025	Revision No.:
Approved <i>[Signature]</i>		Revision Date:	DWG No. 515
Scale: N.T.S			

Notes:

1. It is noted that culvert extension and/ or ditch re-grading may eliminate portions of the steep side-slope and should be considered before applying for a ditch infill permit.
2. If the ditch to be infilled is fronting two properties, the applicant shall obtain a written consent from the adjacent property owner for infilling the ditch.
3. The applicant will be responsible for the cost of any utility locates and relocations caused by the ditch infill. The utility relocation work shall be completed by the respective utility companies and the cost shall be borne by the applicant.
4. The property owner shall be responsible for the replacement of the current driveway culvert as deemed necessary by the town.
5. The diameter of new culvert/perforated pipe should be equal to or larger than the existing culvert diameter.
6. As part of the permit application, the applicant shall provide a drawing set showing the details of the ditch infill including existing ditch configuration, proposed diameter, type and invert elevations of the culvert and/or perforated pipe, proposed location, size and type of catch basin and grate, proposed ditch grade and elevations, types and depths of infill material and compaction requirement, type and depth of topsoil and sodding to be used.
7. Prior to infilling and driveway paving, the owner shall arrange a site meeting with town staff to inspect the items in note 8 and to obtain approval from the town prior to ditch infilling and driveway paving.
8. Ditch infill will not be approved if the ditch is less than 1m deep and the side-slope is not steeper than 1:1.
9. An inlet catchbasin should be provided if the total culvert length is more than 40m long after ditch infill.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Checked	
Approved	
Scale:	N.T.S

Ditch Infill - Notes

DWG. Date:	May 2025
Revision No.:	
Revision Date:	
DWG No.	515.10