The Corporation of the

Town of Whitby

Engineering Services

Design Criteria and Engineering Standards

Revision June 2022

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. General Revisions- “Public Works Department”, “the Commissioner of Public Works” has been replaced by “Engineering Services”.

2. General Revisions- “Town of Whitby Logo” has been replaced by the “new logo”.

3. General Revisions- “Whitby Hydro” has been replaced by “Elexicon”.

4. A3.02 First Submission– note 12 has been deleted and replaced by slope stability assessment requirements.

5. A3.03 Second and Subsequent Submissions– the following required documents to be submitted: Traffic Calming and Construction Report/Plan(s) has been added.

6. A6.04– Tree and Plant Protection- section has been removed.

7. A6.08 - Erosion and Sediment Control Plan/Construction Management Plan – section title has been revised to “Erosion and Sediment Control Plan”.

8. A6.09 Construction Management Report/Plan(s) – new section has been added.

9. B2.00 Watershed Planning/Storm Water Management - CLOCA has released a new endorsed “Technical Guidelines for Storm Water Management Submissions” dated October 2020.

10. B2.04 Storm Water Quality Treatment Facility Requirements– note n has been revised.

11. B2.04 Storm Water Quality Treatment Facility Requirements– note q (fencing) and r (algae control) has been removed

12. B2.04 Storm Water Quality Treatment Facility Requirements– pond outlet (new note q) has been added to the notes

13. B3.15 Materials– note (b) has been revised.

14. B6.00 Water Course Protection- Master Drainage Plans have been prepared for Pringle Creek (2018), Corbett Creek (2021) and Lynde Creek (2019, updated in 2022 with climate change impact).

15. B7.00 Groundwater Pumping – new section has been added.

16. Table “C3.01 Design Criteria”- Minimum boulevard and sidewalk width has been

revised.

17. Table “C3.03 Minimum Curb Radius Requirements”- has been revised.
18. C3.04 Temporary Turning Circle- section title has been revised to “Temporary Cul-de-Sac”.
19. C3.07 Subdivision Emergency Access- note 3 has been revised.
20. C4.01 Sidewalks- section has been revised.
21. C7.00 Traffic Calming- new section has been added.
22. Section Number (C7.00 to C11.00) has been revised.
23. C8.00 Active Transportation Facilities – section has been revised.
24. C8.01 In-Boulevard Multi-Use Paths- section has been revised.
25. C8.04 Bike Lane (Conventional)- lane width has been revised to 1.8m.
26. C8.03 Paved Shoulder Routes-bike width has been revised from 1.5m to 1.8m
27. C10.00 Roundabout-whole section has been revised.
28. G1.00 General- section has been revised.
29. G2.00 to G5.00- sections have been deleted
30. J2.02 Grading and Servicing Plan(s) - A new paragraph has been added.
31. J4.01 Driveways and Parking Areas – The design of underground parking paragraph has been revised.
32. J5.00 Construction- Section has been revised.
33. Appendix ‘A’ AutoCAD layering Guide table – 3 layers (PR-STREETLIGHTCONDUIT, PR-FDCSTM and PR-FDCMH) have been added.
34. Appendix ‘A’ Object data list has been updated.

Major Revisions on Standard Drawings:

1. Town of Whitby Standard Drawing #208 – concrete Sidewalk –Sidewalk width and offset has been revised.

2. Town of Whitby Standard Drawing #208.10 – Typical Stop Bar Locations and Sidewalk Deflections at Intersections – Standard has been revised.

3. Town of Whitby Standard Drawing #208.20 – Typical Stop Bar Locations and MUP Deflections at Intersections – new standard has been added.

4. Town of Whitby Standard Drawing #210 – Temporary Asphalt Sidewalk – sidewalk width and offset has been revised.

5. Town of Whitby Standard Drawing #215 – Temporary Sidewalk Barricade – Barricade width has been revised.

6. Town of Whitby Standard Drawing #304 – Driveway Profiles – standard has been revised.

7. Town of Whitby Standard Drawing #400, 400.10, 401, 401.10 and 402 – standards have been replaced by other standards.

8. Town of Whitby Standard Drawing #400 – Local Roadway, 15.0m R.O.W. – new standard has been added.

9. Town of Whitby Standard Drawing #400.10 – Local Roadway, 18.0m R.O.W. – new standard has been added.

10. Town of Whitby Standard Drawing #400.20 – Local Roadway, 20.0m R.O.W. – new standard has been added.

11. Town of Whitby Standard Drawing #401 – Collector Roadway, 23.0m R.O.W. – new standard has been added.

12. Town of Whitby Standard Drawing #401.10 – Collector/Arterial C Roadway, 23.0m R.O.W. – new standard has been added.

13. Town of Whitby Standard Drawing #402 – Collector/Arterial B Roadway, 30.0m R.O.W. – new standard has been added.

14. Town of Whitby Standard Drawing #402.10 – Arterial B Roadway, 36.0m R.O.W. – new standard has been added.

15. Town of Whitby Standard Drawing #404.30 – Direct Buried-Joint Use Trench for Subdivisions Only -18.0m R.O.W. – standard has been revised.

16. Town of Whitby Standard Drawing #501.20 – Storm Pond Sign Detail – contact information and Town of Whitby logo has been revised.

17. Town of Whitby Standard Drawing #508, 509, 509.10, 509.20, 511 and 513 – department name and Town of Whitby log has been revised.

18. Town of Whitby Standard Drawing #514 – Tree Pit Rooting Zone – Standard has been revised.

Table of Contents

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 make reference 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

A CD with 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 with Metric Scales will normally include the following drawings:

1. Cover Sheet with Key Plan and Index of Drawings
2. General Notes
3. General Plan of Services (1:1000)
4. Utility Coordination Plan(s) and Potential Tree Locations (1:500)
5. Photometric Plan (s) of new lighting levels in rights of way (1:500)
6. Plan and Profile Drawings of all proposed roads
   and sewers on easements (H 1:500, V 1:50)
7. Typical Cross-Sections (H 1:100)
8. Detail Drawing(s) (Min. 1:50)
9. Grading Plan(s) (1:500)
10. Erosion and Sedimentation Control Plans (1:500)
11. Storm Drainage Plan(s) with Detailed Overland Flow Routing (1:1000)
12. Storm Water Management Facilities Plan(s) (if applicable) (1:500)
13. Sanitary Drainage Plan(s) (for submission to the Region of Durham) (1:1000)
14. Subdivision Phasing Plan (if phasing of development is proposed) (1:1000)
15. Traffic Management Implementation Plan(s) (1:1000)
16. Storm Sewer Design Sheets (minor system)(in 12 pt text) (N.T.S.)
    Hydraulic Grade Line Calculations (in 12 pt text)
    Overland Flow Calculations (major systems) (in 12 pt text)

Drawings to be Submitted Separately

1. Parking Management Plan, as required through Draft Plan Comments,
   Showing all available parking within private property and public road allowance.
   (Scale: As Required)

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 bench mark which shall be noted on the plans. Site bench marks 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) The original material used for “record” engineering drawings shall be diazo mylar mat surface on working side or equivalent.

(g) 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.

(h) 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.

(i) Information to be included on plan and profile drawings is as outlined in Appendix B.

(j) The Town of Whitby will provide maintenance hole, catchbasin and ditch inlet 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.

(k) Traffic Management Implementation Plans shall include, but not limited to, the following: locations of Streetlights and 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.

(l) Coordinated Utility Plans shall show all proposed above ground and below grade utility infrastructure. Typical structure size will be shown in the drawing legend. Any deviations from the typical size for larger structures (switchgears, OPI cabinets etc…) 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: 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

Three (3) copies each of the following plans and documents shall be submitted to Engineering Services:

1. Plan Proposed for Registration.
2. General Plan of Services which shows all services to be constructed.
3. Lot Grading Plan(s).
4. Plan and Profile Drawing(s) of all streets and easements.
5. Storm Drainage Plan(s) with detailed Overland Flow Routing (See Section B).
6. Detail Drawing(s).
7. Storm Water Management Facilities Plans (if applicable).
8. Storm water Management Report, Operation and Maintenance Manual, and digital files for any modelling.
9. Erosion and Sedimentation Control Plan(s).
10. Storm Sewer Design Sheet(s) (5 and 100 year) and 100 year Hydraulic Grade Line calculation.
11. A Soils Consultant Report including the design of the road pavement structure, underground service bedding design, construction recommendations and house foundation recommendations including any engineered fill requirements.
12. Slope Stability Assessment (if applicable). Refer to the Slope Stability Assessment Requirements Document at www.whitby.ca for more information.
13. 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.

A3.03 Second and Subsequent Submissions

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

1. Three (3) copies each 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.

2. One (1) loose copy of the General plan of Services (second submission only).

3. A formal submission letter including the Town's previous written comments and a point by point response by the Consultant.

4. Marked-up Previous Submission drawings and storm sewer design sheets as marked up by the Town of Whitby Staff.

5. Three copies of the Ministry of the Environment Application for Storm Sewers, and Storm Water Management Facilities (if required).

6. One additional set of the General Plan of Services and all plans and profiles to accompany the Ministry of the Environment Form (where applicable).

7. Streetlight Layout and Photometric Design Plans, including base plan information.

8. Utility Coordination Plan.

9. Parking Management Plan(s) all available parking within private property and public road allowance. (Separate Plan)

10. Traffic Calming Plan

11. Construction Management Report/Plan(s)

12. Subdivision Phasing Plan (If applicable).

13. Traffic Management Implementation Plan.

14. Engineer's Cost Estimate. In a form acceptable to Engineering Services including .xls/.xlsx file. Utilizing the following categories:

    1. Year One:
        - Erosion Control and Earthworks
        - Servicing
        - Stormwater Management
        - Roads (Base works)
        - Structures
        - Streetlights

    2. Year two:
        - Roads (Top works)

- Fencing

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 (stamped and signed 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.

1. Three (3) complete sets of the approved engineering drawings including a fully coordinated Utility Coordination Plan.

2. Two (2) reduced format (half scale) sets of the approved engineering drawings.

3. One (1) loose copy each of the General Plan of Service and Storm Drainage Plan.

4. CD/DVD containing high quality scanned electronic files (.PDF) of all Town signed “Issued for Construction” drawings, or CAD generated .PDFs with the Town signature information typed in, and “Issued for Construction” indicated within the title block.

5. Digital format of the approved engineering drawings shall be an AutoCAD format and provided in physical storage medium (CD/DVD).
    a. 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”.
    b. 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.

6. Two (2) copies of all final revised reports (i.e.: Stormwater Management Report and Operation & Maintenance Manuals), including digital copies.

7. Three (3) prints of the R-Plan proposed for the registration of easements.

8. Deeds for all grants of easement and for all properties to be conveyed to the Town of Whitby, all properly signed and executed by the Owner and Mortgagees, if applicable.

After the Subdivision Agreement has been signed, but prior to commencement of construction of the municipal services, the developer shall provide one complete set of contract documents to the Town of Whitby.

A4.00 Engineering Drawings – Capital Projects

A4.01 General

A CD with colour and line tables, sample drawings, symbols and template drawings is available upon request for the creation of all engineering drawing sets for Capital Projects. An engineering drawing set will normally include the following drawings:

Typical drawing set with metric scales

1. Cover Sheet with Key Plan, Index of Drawings and Project Description
2. General Notes and Legend
3. Horizontal Control Plan (1:1000)
4. Plan and Profile Drawings of all proposed roads and sewers (H 1:250, V 1:50)
5. Typical Cross-Sections and Details (H 1:100)
6. Design Cross Sections and Entrance Profiles (1:100)
7. Erosion and Sedimentation Control Plans (1:1000)
8. Line Marking (1:1000)
9. Other Drawings as Required (Traffic, Staging and Landscaping) (1:50)
10. Regional Drawings (Sanitary, Watermain and Traffic Signals) (1:250)
11. 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 datum’s shall be referred to the closest Town of Whitby geodetic bench mark 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, Zone17N 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) The original material used for engineering drawings shall be diazo mylar mat surface on working side or equivalent.

(f) 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.

(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) Information to be included on plan and profile drawings is as outlined in Appendix B.

A5.00 Submissions and Approvals - Municipal Projects

A5.01 General

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.

A6.00 Construction

A6.01 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 municipal works, 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 the Town of Whitby and Ontario Provincial Standard Drawings, 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 - latest edition. Note that other specifications and standards may apply in specific contracts as outlined in the contract documents.

A6.02 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.

A6.03 Construction Layout

For both new development and municipal 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.

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 A7.00.

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.

A6.04 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);

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.

A6.05 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 a 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 mega pixels or better of storm sewer defects and service connections shall be taken. The photographs shall be co-ordinated 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.

A6.06 Approved Materials

All construction in the Town of Whitby shall be done with materials which are on the Town of Whitby's Approved Products List, the Region of Durham's Approved Products List or Elexicon's Approved Products List. Each list is available upon request from the appropriate agency. The Town of Whitby Approved Products List is available at www.roadauthority.com . 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.

A6.07 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 municipal project must implement a site control and management 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 wind blown dust and mud tracking onto adjacent roads.

Details of this plan/drawings shall be prepared by the consulting engineer for the development and be included with the engineering submission(s) for approval by Engineering Services. For municipal projects similar plans are required (where applicable) with erosion and sediment control drawings required as part of the contract document.

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 roads shall be kept clean and free of debris which will include at a minimum of daily sweeping and once weekly flushing (Fridays), or as required by 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 plan must address specific requirements for each stage of the construction as follows:

- clearing and grubbing
- rough grading and servicing
- street and building construction

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 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.

The phasing of the subdivision development or municipal 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.

A6.08 Construction Management Report/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 at www.whitby.ca for more information.

A7.00 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. These drawings shall also be submitted in digital format in a current version of AutoCAD used by the Town of Whitby, and greyscale CAD generated PDF files for each drawing in addition to CAD provided at IFC. Any other files and/or specifications required for plotting should be included with submission. "Record" storm sewer design sheets should also be provided in digital spreadsheet format.

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 plan 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 elevations of all sewers, maintenance holes, catchbasins, and rear yard catchbasins. In the case of maintenance holes in easements, ditch inlet catchbasins and rear yard catchbasins and all sodded areas the rim elevation is also required.

(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 "as-built" 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.

A8.00 Development with Private Services

A8.01 General

As mentioned in Section A1.00 - General, these engineering design criteria specifically relate to issues under the jurisdiction of Engineering Services. 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.

A8.02 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.

A8.03 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.

A8.04 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 and shall implement the design requirements for the sewage disposal system.

Lot grading certification shall be provided by the developer's Consulting Engineer and/or sewage system consultant who shall certify that the "as-constructed" grading is in conformity with the approved site plan and that the sewage disposal system has been installed properly and in accordance with the approved design. 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 requirements for 'Infill' lots are detailed in Section D5.0.

Section B - Storm 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 4 different watersheds. Sub-watershed plans have been prepared for the Lynde Creek and Oshawa Creek and a master drainage plan has been prepared for Pringle Creek. Storm drainage facilities within these watersheds must conform to these plans.

Since no Sub-Watershed Plans have yet been prepared for the Corbett Creek, specific attention and prior consultation with Engineering Services and Central Lake Ontario Conservation Authority (CLOCA) must be arranged when designing storm drainage systems tributary to this watercourse.

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 submissions to the Town of Whitby.

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

(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 SWM plan must address the issues outlined in Sections B2.01 to B2.04.

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 rain water can be used for irrigation purposes. Refer to Section B3.13.1 – General, for roof leader requirements.

(c) Roof top and parking lot storage shall be provided on non-residential developments so that post-development flows do not exceed pre-development flows up to the 5 year storm. 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.

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.

(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:

Sites ≤ 5ha – Modified Rational Method.
Sites ≥ 5ha – Visual OTTHYMO, SWMHYMO, DDSWMM, INFOSWMM or PCSWMM.

(d) 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. Turnaround areas shall be provided as required and a minimum centerline radius of 12.0m. Removable bollards are to be placed at the maintenance access point 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). Furthermore, in order to facilitate pond clean out, a larger turn around

provision for a triaxle vehicle (with minimal reverse manoevering) is required within the block.

(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 2.0 m 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 0.3 m 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 1.0 m 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 0.5 m 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 1.0 m off the facility bottom.

(h) Shut off capability - shall be provided to stop the extended detention portion of the flow out of the facility (if feasible) 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 d), g) and h) 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 2.0 m 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 3.0 m 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 0.15 m freeboard 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) 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, etc.. 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 of off site 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 two parts as follows:

- Immediately following facility construction, prior to facility operation; 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:
    1) Frequency of Inspection;
    2) Check inlet and outlet structures;
    3) Check for unusually long extended detention drawdown time that could indicate a blockage in the outlet structure;
    4) Check for sediment accumulation in the forebay and downstream of the facility;
    5) Check for vandalism including illegal access (e.g., gates) or encroachment about the perimeter of the facility;
    6) Confirm that safety and security measures are in good working order;
    7) Check for the presence of any unusual erosion around berms and inlet or outlet structures;
    8) Complete visual inspection to confirm that vegetation is healthy;
    9) Complete visual inspection to confirm no oil sheen present on water surface or the presence of other visible contaminants or odours;
    10) Check drawdown valve for proper operation; and,
    11) 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;
    1) 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.
    2) Provide a sediment handling, removal and disposal plan including any permit requirements.
    3) Identifying maintenance works and duration.

4) 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,
5) The required chemical analyses to be completed in accordance with Ontario Regulation 558/00 prior to disposal.

f) Anticipated annual maintenance costs:
   1) 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):
   1) SWM facility location plan
   2) Post-development drainage area plan tributary to the SWM facility,
   3) SWM facility stage-storage-discharge relationship and curve,
   4) General plan for the SWM facility ; and,
   5) Detailed drawings of key elements (e.g., inlet, outlet control structure, maintenance valve, spillway etc.).

A final approved O&M Manual shall be provided to Engineering Services prior to the facility becoming operational.

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 15 mm 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 1:5 year storm and the major or overland system designed to convey the 100 year storm. 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, the factor shall be 1.25 times the calculated peak flow using the peak intensity factor of the 100 year storm. 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(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: 0.20 m
- Collector Roads: 0.15 m
- Arterial Roads: 0.10 m

Under no circumstances shall the maximum centre line depth of an overland flow exceed 0.30 m 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 0.05 m. 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 in 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 1:100 year design flow shall be compared to the maximum 1:5 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 1:100 year design flow, the inlets shall be protected against surcharge by inlet control devices wherever the unrestricted inlet capacity exceeds the 1:5 year design flow for the inlet.

The allowable 1:5 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 1:5 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 1:5 year design flow shall be tamper proof.

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

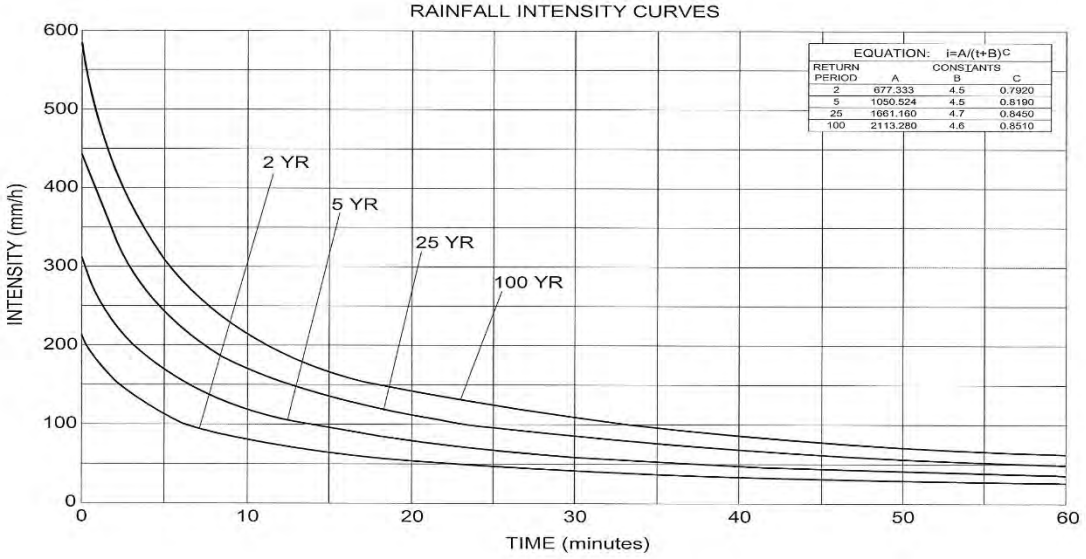
B3.03 Runoff Quantity

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.)

TABLE B3.03
RAINFALL INTENSITY CURVES



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

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

Time of Concentration shall be shown as the following;

- Urbanized residential areas, a 15 minute entry time shall be used at the upstream end of the system.
- Urbanized commercial and industrial areas, a 5 minutes entry time shall be used.
- In the existing downtown core area, a 10 minutes entry time shall be used.

If another entry time is more appropriate, this may be proposed Engineering Services, who shall make a final determination. Refer to Table B3.04 for Discharge and Velocity Pipe Capacity Charts.

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

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

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

100 Year Hydraulic Grade Line calculations shall be performed and adjustments to the five (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 0.50 m 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 event. Dual drainage analysis computer models (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 minutes 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 (downstream SWM facility, floodplain, etc.) 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).

The **minimum design slopes** for storm sewers shall be as follows:

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

Slopes less than the minimum must be approved by Engineering Services.

B3.05 Roughness Coefficients

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

(a) Concrete pipe: n = 0.013 for all sizes of pipes.
(b) Vitrified Tile: n = 0.013 for all sizes of pipes.
(c) Polyvinyl Chloride (PVC) pipe: n = 0.013 for all sizes of pipe.
(d) Corrugated Metal: According to manufacturers specifications.

B3.06 Velocity

The velocity in storm sewers shall be limited to:

- minimum value of 0.75 m/s; and,
- maximum value of 4.5m/s.

B3.07 Minimum Sizes of Pipe

Sewer Mains	-	300 mm
Catchbasin Connections		
- Single Catchbasin	-	250 mm
- Double Catchbasin	-	300 mm
- Rear Yard Catchbasin Leads	-	300 mm

B3.08 Minimum Depth

The depth as measured from the final centerline road elevation to the sewer invert shall be a minimum of 1.8 m 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 0.5 m below basement floor elevations (see Section B4.00 Minimum Basement Elevation). The minimum cover to the pipe obvert shall be 1.2 m.

TABLE B3.04
SEWER CAPACITY

Slope (%)	Sewer Diameter (mm)																												Slope (%)
	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											0.133	0.81	0.200	0.90	0.287	0.98	0.392	1.06	0.519	1.14	0.669	1.21	0.844	1.29	1.047	1.36	1.275	1.43	0.20
0.25									0.091	0.80	0.149	0.91	0.224	1.00	0.321	1.10	0.439	1.19	0.581	1.27	0.748	1.36	0.943	1.44	1.170	1.52	1.425	1.59	0.25
0.30							0.055	0.76	0.100	0.88	0.163	0.99	0.245	1.10	0.351	1.20	0.481	1.30	0.636	1.39	0.820	1.49	1.033	1.57	1.282	1.66	1.561	1.75	0.30
0.35							0.060	0.82	0.108	0.95	0.176	1.07	0.265	1.19	0.380	1.30	0.519	1.40	0.687	1.51	0.885	1.61	1.116	1.70	1.385	1.80	1.686	1.89	0.35
0.40					0.039	0.77	0.064	0.87	0.116	1.01	0.188	1.15	0.283	1.27	0.406	1.39	0.555	1.50	0.735	1.61	0.946	1.72	1.193	1.82	1.480	1.92	1.803	2.02	0.40
0.45					0.042	0.82	0.068	0.93	0.123	1.08	0.199	1.21	0.300	1.35	0.430	1.47	0.589	1.59	0.779	1.71	1.004	1.82	1.265	1.93	1.570	2.04	1.912	2.14	0.45
0.50			0.024	0.75	0.044	0.87	0.071	0.98	0.129	1.13	0.210	1.28	0.317	1.42	0.454	1.55	0.621	1.68	0.821	1.80	1.058	1.92	1.334	2.03	1.655	2.15	2.015	2.25	0.50
0.55			0.025	0.78	0.046	0.91	0.075	1.03	0.136	1.19	0.220	1.34	0.332	1.49	0.476	1.63	0.651	1.76	0.861	1.89	1.110	2.01	1.399	2.13	1.736	2.25	2.114	2.36	0.55
0.60			0.026	0.82	0.048	0.95	0.078	1.07	0.142	1.24	0.230	1.40	0.347	1.55	0.497	1.70	0.680	1.84	0.900	1.97	1.159	2.10	1.461	2.23	1.813	2.35	2.208	2.47	0.60
0.65			0.028	0.85	0.050	0.99	0.081	1.12	0.147	1.29	0.240	1.46	0.361	1.62	0.517	1.77	0.708	1.91	0.936	2.05	1.206	2.19	1.521	2.32	1.887	2.45	2.298	2.57	0.65
0.70			0.029	0.88	0.052	1.02	0.085	1.16	0.153	1.34	0.249	1.52	0.375	1.68	0.537	1.84	0.734	1.99	0.972	2.13	1.252	2.27	1.578	2.41	1.958	2.54	2.385	2.67	0.70
0.75	0.014	0.75	0.030	0.91	0.054	1.06	0.088	1.20	0.158	1.39	0.257	1.57	0.388	1.74	0.556	1.90	0.760	2.06	1.006	2.21	1.296	2.35	1.634	2.49	2.027	2.63	2.468	2.76	0.75
0.80	0.014	0.78	0.031	0.94	0.055	1.09	0.090	1.24	0.164	1.43	0.266	1.62	0.400	1.79	0.574	1.96	0.785	2.12	1.039	2.28	1.338	2.43	1.687	2.57	2.093	2.71	2.549	2.85	0.80
0.85	0.015	0.80	0.031	0.97	0.057	1.13	0.093	1.28	0.169	1.48	0.274	1.67	0.413	1.85	0.592	2.02	0.809	2.19	1.071	2.35	1.380	2.50	1.739	2.65	2.158	2.80	2.628	2.94	0.85
0.90	0.015	0.82	0.032	1.00	0.059	1.16	0.096	1.31	0.174	1.52	0.282	1.72	0.425	1.90	0.609	2.08	0.833	2.25	1.102	2.42	1.420	2.57	1.789	2.73	2.220	2.88	2.704	3.02	0.90
0.95	0.015	0.85	0.033	1.03	0.060	1.19	0.098	1.35	0.178	1.56	0.290	1.77	0.436	1.96	0.625	2.14	0.855	2.31	1.132	2.48	1.459	2.64	1.839	2.80	2.281	2.96	2.778	3.11	0.95
1.00	0.016	0.87	0.034	1.05	0.062	1.22	0.101	1.38	0.183	1.60	0.297	1.81	0.448	2.01	0.642	2.20	0.878	2.37	1.161	2.55	1.496	2.71	1.886	2.87	2.340	3.03	2.850	3.19	1.00
1.10	0.017	0.91	0.036	1.11	0.065	1.28	0.106	1.45	0.192	1.68	0.312	1.90	0.470	2.10	0.673	2.30	0.920	2.49	1.218	2.67	1.570	2.85	1.978	3.02	2.455	3.18	2.989	3.34	1.10
1.20	0.017	0.95	0.037	1.15	0.068	1.34	0.111	1.52	0.200	1.76	0.325	1.98	0.490	2.20	0.703	2.41	0.961	2.60	1.272	2.79	1.639	2.97	2.066	3.15	2.564	3.32	3.122	3.49	1.20
1.30	0.018	0.99	0.039	1.20	0.071	1.40	0.115	1.58	0.209	1.83	0.339	2.06	0.510	2.29	0.732	2.50	1.001	2.71	1.324	2.90	1.706	3.09	2.151	3.28	2.668	3.46	3.250	3.63	1.30
1.40	0.019	1.03	0.040	1.25	0.073	1.45	0.120	1.64	0.216	1.90	0.351	2.14	0.530	2.37	0.759	2.60	1.038	2.81	1.374	3.01	1.771	3.21	2.232	3.40	2.769	3.59	3.372	3.77	1.40
1.50	0.019	1.06	0.042	1.29	0.076	1.50	0.124	1.69	0.224	1.96	0.364	2.22	0.548	2.46	0.786	2.69	1.075	2.91	1.422	3.12	1.833	3.32	2.310	3.52	2.866	3.72	3.491	3.90	1.50
1.60	0.020	1.10	0.043	1.33	0.078	1.55	0.128	1.75	0.231	2.03	0.376	2.29	0.566	2.54	0.812	2.78	1.110	3.00	1.469	3.22	1.893	3.43	2.386	3.64	2.960	3.84	3.605	4.03	1.60
1.70	0.021	1.13	0.044	1.37	0.081	1.60	0.132	1.80	0.238	2.09	0.387	2.36	0.584	2.62	0.837	2.86	1.144	3.10	1.514	3.32	1.951	3.54	2.459	3.75	3.051	3.96	3.716	4.16	1.70
1.80	0.021	1.17	0.046	1.41	0.083	1.64	0.136	1.86	0.245	2.15	0.399	2.43	0.601	2.69	0.861	2.95	1.177	3.19	1.558	3.42	2.008	3.64	2.531	3.86	3.140	4.07	3.824	4.28	1.80
1.90	0.022	1.20	0.047	1.45	0.086	1.69	0.139	1.91	0.252	2.21	0.409	2.50	0.617	2.77	0.884	3.03	1.210	3.27	1.601	3.51	2.063	3.74	2.600	3.96	3.226	4.18	3.929	4.39	1.90
2.00	0.022	1.23	0.048	1.49	0.088	1.73	0.143	1.96	0.259	2.27	0.420	2.56	0.633	2.84	0.907	3.10	1.241	3.36	1.642	3.60	2.116	3.84	2.668	4.07	3.310	4.29			2.00
2.50	0.025	1.37	0.054	1.67	0.098	1.94	0.160	2.19	0.289	2.54	0.470	2.86	0.708	3.17	1.015	3.47	1.388	3.75	1.836	4.03	2.366	4.29							2.50
3.00	0.027	1.51	0.059	1.83	0.107	2.12	0.175	2.40	0.317	2.78	0.515	3.14	0.775	3.48	1.111	3.80	1.520	4.11	2.012	4.41									3.00
3.50	0.030	1.63	0.064	1.97	0.116	2.29	0.189	2.59	0.342	3.00	0.556	3.39	0.838	3.75	1.200	4.11	1.642	4.44											3.50
4.00	0.032	1.74	0.068	2.11	0.124	2.45	0.202	2.77	0.366	3.21	0.594	3.62	0.895	4.01	1.283	4.39													4.00
4.50	0.033	1.84	0.072	2.24	0.132	2.60	0.214	2.93	0.388	3.40	0.630	3.84	0.950	4.26															4.50
5.00	0.035	1.94	0.076	2.36	0.139	2.74	0.226	3.09	0.409	3.59	0.664	4.05	1.001	4.49															5.00

Slope (%)	Sewer Diameter (mm)																												Slope (%)
	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				
0.20	1.818	1.56	2.492	1.69	3.298	1.81	4.250	1.93	5.364	2.04	6.637	2.15	8.093	2.26	9.723	2.37	11.544	2.47	13.579	2.58	15.808	2.68	20.941	2.87	34.062	3.24			0.20
0.25	2.033	1.74	2.786	1.88	3.687	2.02	4.751	2.15	5.997	2.28	7.420	2.41	9.049	2.53	10.871	2.65	12.907	2.76	15.182	2.88	17.674	2.99	23.412	3.21	38.082	3.62			0.25
0.30	2.227	1.91	3.052	2.06	4.039	2.21	5.205	2.36	6.570	2.50	8.129	2.64	9.912	2.77	11.909	2.90	14.139	3.03	16.631	3.15	19.361	3.28	25.647	3.51	41.717	3.97			0.30
0.35	2.405	2.06	3.297	2.23	4.363	2.39	5.622	2.55	7.096	2.70	8.780	2.85	10.707	2.99	12.863	3.13	15.272	3.27	17.963	3.41	20.912	3.54	27.702	3.80	45.060	4.29			0.35
0.40	2.571	2.20	3.524	2.38	4.664	2.56	6.010	2.72	7.586	2.89	9.386	3.05	11.446	3.20	13.751	3.35	16.326	3.50	19.203	3.64	22.356	3.78	29.615	4.06					0.40
0.45	2.727	2.34	3.738	2.53	4.947	2.71	6.374	2.89	8.046	3.06	9.955	3.23	12.140	3.39	14.585	3.55	17.317	3.71	20.368	3.86	23.712	4.01	31.411	4.30					0.45
0.50	2.875	2.46	3.940	2.67	5.214	2.86	6.719	3.05	8.482	3.23	10.494	3.40	12.797	3.58	15.374	3.75	18.253	3.91	21.470	4.07	24.995	4.23							0.50
0.55	3.015	2.58	4.133	2.80	5.469	3.00	7.047	3.19	8.896	3.39	11.006	3.57	13.421	3.75	16.124	3.93	19.144	4.10	22.518	4.27	26.215	4.44							0.55
0.60	3.149	2.70	4.316	2.92	5.712	3.13	7.360	3.34	9.291	3.54	11.496	3.73	14.018	3.92	16.841	4.10	19.995	4.28	23.519	4.46									0.60
0.65	3.278	2.81	4.493	3.04	5.945	3.26	7.661	3.47	9.671	3.68	11.965	3.88	14.591	4.08	17.529	4.27	20.812	4.46											0.65
0.70	3.401	2.91	4.662	3.15	6.170	3.38	7.950	3.60	10.036	3.82	12.417	4.03	15.141	4.23	18.191	4.43													0.70
0.75	3.521	3.02	4.826	3.26	6.386	3.50	8.229	3.73	10.388	3.95	12.852	4.17	15.673	4.38															0.75
0.80	3.636	3.12	4.984	3.37	6.596	3.62	8.499	3.85	10.729	4.08	13.274	4.31																	0.80
0.85	3.748	3.21	5.137	3.47	6.799	3.73	8.761	3.97	11.059	4.21	13.682	4.44																	0.85
0.90	3.857	3.30	5.286	3.58	6.996	3.84	9.015	4.09	11.379	4.33																			0.90
0.95	3.962	3.40	5.431	3.67	7.188	3.94	9.262	4.20	11.691	4.45																			0.95
1.00	4.065	3.48	5.572	3.77	7.374	4.04	9.502	4.31																					1.00
1.10	4.264	3.65	5.844	3.95	7.734	4.24																							1.10
1.20	4.453	3.82	6.104	4.13	8.078	4.43																							1.20
1.30	4.635	3.97	6.353	4.30																									1.30
1.40	4.810	4.12	6.593	4.46																									1.40
1.50	4.979	4.27																											1.50
1.60	5.142	4.41																											1.60
1.70																													1.70
1.80																													1.80
1.90																													1.90
2.00																													2.00

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 un-painted/ un-coated maintenance hole covers.

(b) Maintenance holes shall be spaced at a maximum of 100 m; for sewers 1200 mm diameter and greater the spacing may be increased to 150 m.

(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 2400 mm 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 1.5 m from any curb face or other utility to outside of barrel of 1200 mm diameter chimney portion 2m 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 3.6 m, the maintenance hole must be individually designed and sufficiently detailed to permit poured in place construction.

(p) A minimum clearance of 0.2 m 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 5.0 m. Maximum spacing between safety grates is 5.0 m as per OPSD 404.020. Platforms to be installed at the half way 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).

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:

Maximum Spacing Pavement Width	Maximum Spacing 4% Grade or Less	Greater than 4%
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. Where possible, catchbasins shall not be located in driveway curb depressions.

(f) Catchbasin grate and connection shall provide for the expected maximum minor system (5 year return period storm) flow.

(g) For Single Catchbasins - the connection shall not be less than 250 mm diameter pipe laid at 1.0% minimum grade.

(h) For Double Catchbasins - the connection shall not be less than 300 mm diameter

pipe laid at 1.0% minimum grade.

(i) 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.

(j) Road subdrain as per Town of Whitby Standard Drawings No. 108 and No. 109 shall be connected to catchbasins as outlined in these drawings.

(k) Not withstanding 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 Pipe

(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) Service connections shall not, in general, 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 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.

(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.

(b) On private property (subject to the Ontario Building Code):

1. A maintenance hole shall be required at either a location within 1.5m of the property line on private property or on the sewer main.

2. Maximum maintenance hole spacing shall be 100 m.

3. No change in grade or direction of pipe shall be permitted between maintenance holes or catchbasins.

4. Catchbasin type maintenance holes will be permitted.

5. 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

B3.14 Construction

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

(b) Service connections shall not, in general, be made to existing trunk sewers.

B3.15 Materials

(a) Materials shall be obtained from the Approved Suppliers list located on The Road Authority's website at www.roadauthority.com .

(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) Pipe size, classification and bedding type shall be clearly indicated on all the profile drawings for each sewer length.

(d) 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.

(e) 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.

(f) 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 the used. For pipe greater than 1200 mm, Polymer Laminated Steel with 2.8 mm wall thickness to be used.

(g) Maintenance holes shall be constructed of poured or precast concrete according to Ontario Provincial Standard Drawings or approved specific design drawings.

(h) Maintenance hole covers and frames shall be as detailed in Ontario Provincial Standard Drawings. Bolt down covers are to be used in all park and open space areas.

(i) Catchbasin covers and frames shall be as detailed in Ontario Provincial Standard Drawings. Roadway and walkway catchbasin grates shall be "bicycle proof".

(j) Pipes shall be jointed by means of approved rubber gaskets, conforming to A.S.T.M. Specification C-443-60T or latest amendment.

(k) 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:

- 1.0m above San obvert;
- 0.5m above 100-yr HGL (see Sect. B3.04);
- 0.7m above STM obvert; or,

- 1.2m above STM obvert if SAN service lateral is required to cross over the storm sewer.

B5.00 As-Constructed Storm Sewer Requirements

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:

1. Peak flow is less than 90% of as-constructed capacity of pipe flowing full;

2. 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,

3. 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:

1. The storm sewer system is to be re-laid accordingly if:

    i. Peak flow is greater than 120% of as-constructed capacity of pipe flowing full; or,

    ii. Velocities are less than the minimum allowable as per the Town of Whitby Design Criteria B3.06.

Otherwise:

2. a) 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.

    i. 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.

    ii. 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.

    iii. In cases where the as-constructed H.G.L. does not conform to the above noted criteria i. or ii., the storm sewer system is to be re-laid accordingly.

and

b) 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.

   i. 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.

   ii. 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.

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.

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 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.

B7.00 Groundwater Pumping

The below criteria shall apply for any development proposal that impacts groundwater tables:

1. Permanent groundwater pumping into municipal storm sewers is prohibited. During the construction phase, temporary dewatering may be permitted at an

approved release rate.

2. A Hydrological Report shall be submitted in support of any proposed groundwater pumping. The Hydrogeological Report shall identify the following in addition to all other requirements:

    i. Anticipated dewatering volumes and release rates;

    ii. Groundwater treatment requirements and criteria.

3. A Well Interference Report (separately or as a part of a Hydrogeological Report) shall be provided, to the satisfaction of the Director of Engineering Services. The Report shall review the potential impacts of development activities on existing water wells, within the zone of influence, as determined by the Qualified Person, with a minimum distance of 250m from development limits. The Water Well Interference Report shall include, but is not limited to, a pre-construction survey of the existing water wells, a potential impact analysis through the construction phase and recommendations/remediation plans to address any concerns that may arise as a result of construction stage works.

4. A Geotechnical report shall be provided and shall identify the following in addition to all other requirements:

    i. Anticipated ground settlement, as a result of proposed dewatering and, mitigation measures including monitoring program;

    ii. Analysis of soil infiltration capacities for any potential water recharge proposals.

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

C2.03 Geotechnical Report

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:

(a) Mechanical analysis of the sub-grade soil;
(b) Drainage;
(c) Frost susceptibility;
(d) Future volume and class of traffic expected to use the pavement and,
(e) Construction loading considerations.

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.

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)	8.5m	(Note 5)		
	Design speed (km/hr)	50	50 / 60	70 / 80	70 / 80
	Minimum K values for sag curves on illuminated roads	6 (Note 6)	6 / 9	12 / 16	12 / 16
	Minimum K values for sag curves on unilluminated roads	12	12 / 18	25 / 32	25 / 32
	Minimum K values for crest curves	7	7 / 13	23 / 36	23 / 36
	Maximum grade for through roads at intersection	3.0%	3.0%	3.0%	2.5%
	Maximum grade for stop roads at intersection	2.5%	2.0%	1.5%	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)	Varies	Varies	Varies	
	Typical lane width (m)	4.25	3.25 – 3.5	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			
	Minimum width of bike lane exclude gutter (m)	1.5			
	Minimum width of multi-use path (m)	3.0			
	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 buffer between on-road bike lane and travel lane (m)	1.0			
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 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.

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.

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.

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
20	23	8x8
23	23	8x8
23	23	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

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.
Vertical curve designs shall consider/show the following:

- K Value to be rounded to a whole number wherever possible;
- At intersections, sags should be designed to minimize ponding/flooding limits;
- Intermediate grade points shall be calculated every 10.0 m and shown on the profile;
- 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
- 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 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
- R.O.W. radius as dictated by temporary grading requirements
- Curb radius 13.25 m

Permanent sidewalk shall terminate short of the temporary cul-de-sac with a temporary asphalt ramp connecting the sidewalk to the bulb.

Where Appropriate, permanent stage 1 of 2-stage 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

Minimum Curb radii requirements for intersecting pavements are shown on Town of Whitby Engineering Design Criteria section C3.01.2. At the intersection of two roads, the transition of the minor classification road shall not interfere with the normal cross-fall of the major road, unless otherwise required by the overland flow route design.

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.

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

- 3:1 front slope and minimum 2:1 backslope (3:1 desirable).
- Inverts shall be minimum 150 mm below the granular/sub-grade interface where it daylights into the ditch unless an invert subdrain is designed to pick up subgrade drainage.

- Desirable minimum longitudinal ditch grade shall be 1.0% with absolute minimum being 0.3%.

- Ditch grades greater than 3.0% shall have staked sod protection; and;

- Ditches greater than 5.0% shall have hand laid rip rap protection.

C3.07 Subdivision Emergency Access

1. The following criteria shall be used for the approval of urban subdivision developments:

   (a) Cul-de-sacs shall not exceed 230 metres in length;

   (b) The entrance portion to P-Loops and B-Loops shall not exceed 90 metres;

   (c) Where the circumference of a P-Loop (or one half of a B-Loop) exceeds 490 metres, the entrance portion shall have a minimum road width of 12 metres, exclusive of any median required or incorporated;

   (d) 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,

   (e) For the purpose of the Subdivision Emergency Access policy it is assumed that in the case of items (b), (c) and (d) 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.

2. Where the limits of the items in C3.07, Item 1 are exceeded, a second means of access shall be provided.

3. Where an emergency access or a temporary access is to be installed then the following design criteria shall be used:

   - Minimum width of 4.0 metres;
   - Maximum slope of 5.0%;
   - 12.0 metres minimum centerline turning radius;
   - 5.0 metre minimum overhead clearance from grade;
   - Asphalt or other permanent surface;
   - For emergency access, barrier consisting of bollards and chain or other acceptable measures; and,
   - Adherence to the Ontario Building Code.

4. 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.
2. Road width – face of curb to face of curb.

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.

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

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 if possible or with other utilities. 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 mail box 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. The required width of the curb depressions shall be dimensioned on both the UCP and the appropriate Plan and Profile drawings.

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. The minimum depth for residential driveway shall be:

(a) Residential Driveways

- 50 mm hot-mix, hot-laid asphalt HL3A to be placed in one lift only.
- 150 mm crusher run limestone or Granular "A".

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.

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. The final design driveway width will be determined at the time of the house sitting.

	D/W width	D/W width plus tapers
Single	3.5m	4.1m
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 Apartment Driveways

- 50 mm hot mix, hot laid HL3 to be placed in one lift.
- 50 mm hot mix, hot laid HL8 to be placed in one lift.
- 200 mm crusher run limestone; or 150 mm Granular "A"; and 225 mm Granular ‘B’.

(b) Heavy Industrial Driveways

- 50 mm hot mix, hot laid HL3 to be placed in one lift.
- 75 mm hot mix, hot laid HL8.
- 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.

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:

- Residential driveways shall be as detailed on Town of Whitby Standard Drawing No. 305;
- Residential driveways on cul-de-sacs shall be in accordance with Town of Whitby Standard Drawing No. 411;
- Mutual driveways between two adjoining properties shall have continuous curb depression; and,
- Apartment, commercial and industrial driveways shall take into account the basic width of the driveway and radius of curvature as further outlined below.

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;

1. 7.5m for apartment and residential block developments,

2. 15.2 m for heavy industrial and commercial entrances off 2-lane roads and 4-lane roads.

3. Or as approved by Engineering Services.

Details for apartment, commercial and industrial entrances shall be shown on the plans.

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 – Development

The following curb standards shall be used:

- 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;

- 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;

- For 15.0 m window streets, full height curb and gutter shall be utilized on the side of the roadway adjacent to the higher order road;

- For temporary turning circles where a gutter is not required, barrier curb as per OPSD Drawing No. 600.110 may be used for the bulb portion, and for site plans associated with building permits as outlined in Section J, and,

- 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 Capital 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.

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 accessibility 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 0.5m - 1.2m 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 1.5 m to 1.8 m wide and are separated by a 0.5m - 1.8m 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 and 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 Roundabout

A roundabout is an intersection at which all traffic circulates counter-clockwise, 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:

- At any new intersection.
- At an existing intersection where an all-way stop or traffic signals are warranted or projected to be warranted within 10 years.
- 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.

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).

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.

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:

- 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.
- Property impacts. Roundabout tend to require more property at an intersection.
- Safety for all users. Roundabouts are statistically safer for motorists and pedestrians, but results are mixed for cyclists.
- 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.
- Cyclist accommodation. Cyclists can navigate a roundabout by claiming the lane and using 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.
- 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.
- Peak period traffic operations. Roundabouts are usually more efficient for the same number of lanes, especially if there are heavy left-turn flows.
- Off-peak traffic operations. Roundabouts are more efficient.
- Speed control. Roundabouts control traffic speeds within a certain distance upstream and downstream.
- 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.
- 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.
- Streetscaping/gateway potential. Roundabout central islands provide an opportunity 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:

1. Determine which of the criteria apply to the subject intersection or study area, and eliminate the irrelevant rows in the Decision Matrix.
2. 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”.
3. 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.
4. Document the rationales and assumptions used for the assigned weights and scores.

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:

1. Is the current collision frequency high at the intersection? (Annual Review or based on per 1 million vehicles entering.)
2. 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)?
3. Is an all-way stop or traffic signals warranted, projected to be warranted within 10 years or being requested?

4. Does the intersection have more than 4-legs?
5. Does the intersection have unusual geometry?
6. Will planned modifications to the intersection require that nearby structures be widened (i.e. to accommodate turning lanes)?
7. Is the intersection located at a transition between rural and urban environments such that a roundabout could act as a means of speed transition?
8. Is the location a gateway to a neighbourhood or community destination?
9. 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.

Detailed Design and Submission Requirements

Roundabouts in new developments shall conform to the Town of Whitby Standard Drawings for 36 m diameter Gateway and 27 m diameter Neighbourhood 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:

1. Roundabout designs shall be based on Transportation Association of Canada (TAC) Canadian Roundabout Design Guide (January 2017) and good engineering design principles.
2. 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.
3. All pedestrian crosswalks shall be impressed asphalt with a minimum width of 3.0 m, grey colour in a diagonal herringbone pattern, as per Traffic Patterns XD by Pavement Impressions Inc. or equivalent unless approved otherwise.

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:

- The use of public laneway shall be limited to narrow lot (8 m or less) residential developments fronting collector and arterial roads only;
- The alignment of public laneways shall be straight or with large radius curvature to accommodate existing maintenance equipment;
- Public laneways shall be connected to public streets but not other public laneways; and
- Adequate space for snow storage shall be considered as part of the overall development design where public laneways are included.
- Hydrants are to be located at the end of laneways.

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 a 8.5 m right-of-way with 6.5 m wide pavement) can be considered which provides Developers/Home Builders with multiple housing design options.

- Alternative 1: Single Loaded Public Laneway
- Alternative 2: Double Loaded Public Laneway – Tandem Parking
- Alternative 3: Double Loaded Public Laneway – Side-by-Side Parking

See Standard Drawing Nos. 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.

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 Municipal project. Lot grading requirements for infill housing 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 150 mm minimum 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:

1) 2.0% minimum lot grade;

2) 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);

3) Embankments shall be designed with the following criteria:

    a) Where possible, embankment should be placed on the lower lot;

    b) Slope shall be designed to 3:1 maximum, unless otherwise approved by Engineering Services;

    c) Height shall be designed to 1.0m maximum;

    d) Where multiple tiers of embankments are required, a 1.0m wide platform graded to between 2.0% to 5.0% shall be used to separate each embankment tier;

    e) The height of the uppermost tier of any embankment may be increased to

1.5m to avoid additional platforms for partial slopes; and,

f) The maximum embankment height criteria is exempt for sloping between building envelopes.

4) 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:

a) Retaining wall 0.6m or higher shall require a minimum 1.2m high fence at the top of the wall;

b) The maximum height of any wall/fence combination shall be 3.0m;

c) 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;

d) 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:

i. On the property line with the fence cored into the retaining wall;

ii. The retaining wall located on the lower lot with the fence placed behind the wall, on the property line;

e) 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;

f) Where the retaining wall is located adjacent to hazard lands, open spaces storm water management blocks, parks or other municipally owned property:

i. The wall, including footing and drainage backfill, shall be placed wholly on private property;

ii. The height of the wall shall not exceed 0.6m; and,

iii. 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,

g) Refer to Section E2.00 for retaining Wall Structure requirements.

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.

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.

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:

1. Longitudinal slope to be 2.0% minimum;
2. Side slopes 3:1 maximum;
3. Depth 150mm minimum and 450 mm maximum;
4. 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;
5. 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;
6. Driveways shall not be used as outlet for any swales; and,
7. 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 along with 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;

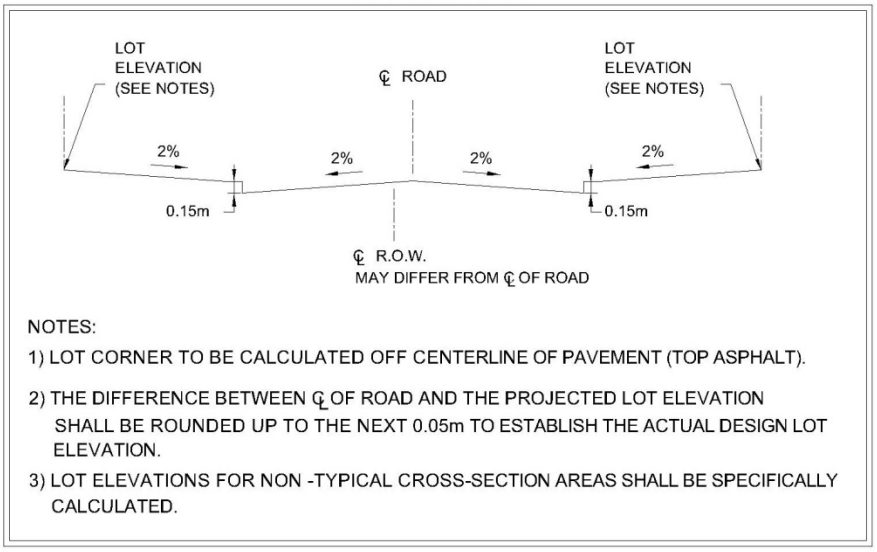
(b) Existing contours shall be shown at a maximum of 0.5m interval within and outside the subdivision limits as required to demonstrate the prevailing drainage pattern;

(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 required 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 by means of an asterisk (*) 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 appropriated 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.

Siting's 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 can not 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 can not 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 Housing

D5.01 Introduction

A lot grading plan indicating the means by which the builder will ensure each lot is to be properly drained is required for all lots 1.0 ha or less, prior to the issuance of a building permit. All lots larger than 1.0 ha shall be at the discretion of Engineering Services.

The following is an outline of the Town of Whitby's policy regarding grading and drainage of infill lots for new Single Family and Semi-Detached Dwellings.

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

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 grading plan for inclusion with the building permit application,

(b) Provide field review to ensure compliance with the site grading 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 problem 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, not improve it as a requirement, unless noted otherwise at the discretion of Engineering Services.

Please be advised that 3 copies of the site plan must be included with all submissions for building permit.

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

- A Professional Engineer registered in Ontario;
- An Architect registered in Ontario; or,
- An Ontario Land Surveyor.

For lots requiring specific stormwater controls, the Town recommends hiring a consultant with relevant expertise in grading and stormwater management.

D5.02 Responsibility of the Grading Consultant

The following concerns must be addressed and included by the grading consultant, as a minimum, in preparing the grading plan:

(a) A north arrow shall be shown. If available, the Municipal Address shall be shown. All drawings received shall be to scale, 1:250 or 1:200 and drawn in ink. **Freehand drawings are not acceptable.**

(b) 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.

(c) Note any concerns with respect to the overall performance of the existing drainage system in the neighbourhood.

(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.

(e) Show the location of hard surfaces such as driveways, walkways, porches, retaining walls, etc.

(f) 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.

(g) Provide the elevations of the crown of the road at the centre line of the lot, 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. Invert elevations of Municipal service connections are required.

(h) Indicate all existing and proposed work in the Town of Whitby road allowance, such as existing/proposed driveway, curbs, sidewalks, culverts, all utilities, etc., on the Site Grading Plan.

(i) Show the location and dimensions of all structures on the lot, including their setbacks to all lot lines. The lot area and building length for irregular shaped lots must be provided.

(j) 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.

(k) 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, page D-13 or may be obtained in the Building Department, or equivalent.

D5.03 Lot Grading Criteria for Infill Housing

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

1) The intent of the existing drainage pattern in the area of the site should be maintained.

2) 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.

3) Rear yard slope should not exceed 5.0% except where existing grades are not being altered.

4) During construction, siltation control methods should be used around the lot perimeter or construction area for larger lots, in order to prevent erosion or siltation on adjacent properties.

5) Where a storm sewer is not available to which downspouts may be connected, provisions shall be made to prevent soil erosion. ie: splash pads to a side yard swale.

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 treed 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 Consulting Engineer 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:

☐ TFW

☐ MBE

☐ 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 elevations and shall be interpreted to mean the control elevation of the placement of foundation drains; 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, either a partial building permit, a conditional building permit or a separate foundation building permit only shall be permitted to be issued and subject to the approval of the Chief Building Official, construction shall not continue until a satisfactory Foundation Control Certification (FCC) has been received. For this purpose the FCC shall indicate that the required elevations are within permitted tolerances.

Foundation Control Certification shall be done only by a Professional Engineer Ontario, an Ontario Land Surveyor or recognized equivalent acceptable to the Chief Building Official. The format of the Foundation Control Certificate shall be as shown in Section D7.02.

Prior to proceeding with framing of structures over registered lots, builders must provide the Town of Whitby Engineering Services and Developers Consulting Engineer 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 Consulting Engineer shall provide details of the variance from the approved plans and shall include his recommendations for rectification of the problem, if required.

The special FCC shall be provided prior to framing, all other as-built elevations shall be provided as part of the final lot grading certification.

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, Ontario Land Surveyor or Architect licensed to practice in Ontario.
2.Initial the control elevations listed above that 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 Consulting Engineer 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 Consulting Engineer 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 Consulting Engineer shall be preceded by a pre-sodding site inspection by the Consulting Engineer and builder who will jointly determine which lots are certifiable and ready for sodding based on visual inspection, which lots the Consulting Engineer 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 Consulting Engineer. 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.

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 and Energy and 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 the review under this standard.

1) 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.

2) 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 direction for another sizing has been given 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.

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 schedule of signs 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.'s 500 and 501.10 for the location of the street name sign.

For signalized intersections, refer to Durham Region ROD 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 in uppercase and shall be 10 cm on a 15 cm sign and 15 cm of 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 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 (Traffic Management Implementation Plan – TMIP), 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 TMIP plan(s) required for subdivision developments or Municipal works 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) Highway fencing shall be constructed in accordance with OPSD 971.101.

(d) All fences designed to enclose private swimming pools shall be in accordance with the relevant Town of Whitby By-laws.

(e) 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.

(f) All required fences shall be located using SIB’s/property bars installed by an Ontario Land Surveyor (OLS).

(g) 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.

The Engineering Services is responsible for tree planting on Municipal projects. 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.

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. H

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, 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 Photo Cell

Manufacturer	Catalogue Number
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 H8.11for 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 Lace Polished	E250-APO-G-S10 S/F 170 & 132A
Utility Structures	25'	Midnight Lace Polished	MA-250-A-2-ML-XX-F-D
Utility Structures	30'	Midnight Lace Polished	MA-300-A-2-ML-XX-F-D
Stress Crete	30'	Midnight Lace Polished	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 deposed 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 H8.11for 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 ESA (Electrical Safety Authority) 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 accommodation 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 trade mark
- 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 form 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 trade mark
- 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 if 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 0.21m^2 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 if five (5) years on all replacement brackets from the date of installation.

Section J - General Conditions of Site Plans Approval

J1.00 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;
- Traffic Management Implementation 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

J2.00 Engineering Drawings

J2.01 Site Plan

The site plan shall show the following;

- north arrow;
- key plan;

- legal boundary dimensions and bearings;
- easements and their details;
- existing public services such as sidewalk, curbing, sewers, watermain;
- all existing above ground street furniture (ex. Street trees, street lights and utilities); and,
- site parking statistics.

J2.02 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 maintenances 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 rear yard 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).

J2.03 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.

J3.00 Submissions and Approvals

J3.01 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.

J3.02 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.

J3.03 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 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.

J3.03.1 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.

In addition to Engineering Services engineering financial security, the Planning Department requires financial securities for all landscaping works. Security will be returned by the Town after final inspection, and satisfactory completion of the secured works.

J3.03.2 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.

J3.03.3 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.

J3.04 Building Section Requirements

Any proposed structure and/or addition to an existing structure shall comply with the requirements of the Ontario Building Code. A soils report regarding footing and foundation design shall be provided in accordance with the Ontario Building Code or when requested by the Chief Building Official for the Town of Whitby.

The site servicing plan showing sanitary drainage, domestic water supply and fire protection services external to the proposed structure shall be prepared by a consultant who is a Registered Professional Engineer with P.E.O. This plan shall be prepared in accordance with the Ministry of the Environment guidelines for private sewer systems. Under other conditions, this plan shall conform to the Ontario Building Code, Part 7 - Plumbing. This plan shall include pipe sizes, pipe slope, invert and surface elevations to indicate depth of cover. Those works on private property shall also be inspected and accepted by Town of Whitby plumbing inspectors. Please note these works are to be installed under separate plumbing and drain permit(s). The consultant shall verify fixture loads and water supply requirements for the proposed development.

J4.00 Design Guidelines

J4.01 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 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 have a minimum 1m setback from the property line.

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

J4.02 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% (cross fall 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.

J4.03 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.

J4.04 Urban Standard for Private Internal Street

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

Road Width:

- 6.5 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.
- Garage aprons shall not be continuous along the length of the laneway.
- 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 visibility triangle shall be provided at all intersections. A sightline analysis shall be provided to confirm visibility triangle requirements.
- 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 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 cul-de-sac be unavoidable, the maximum length of cul-de-sac shall be 180 m.
- Hammerhead turnaround on a cul-de -sac for emergency vehicles shall be designed with a 9.0 m radius and 18.0 m turning area, refer to Figure 4.1.

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.

J4.05 Private Rear 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 (F/C to F/C) 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.

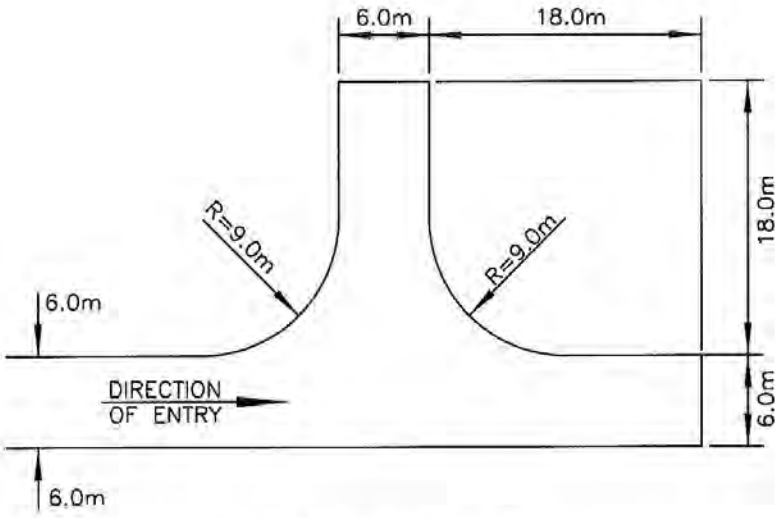
Parking:

- No Parking is permitted within the 6.0m road width of the laneway.
- 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.

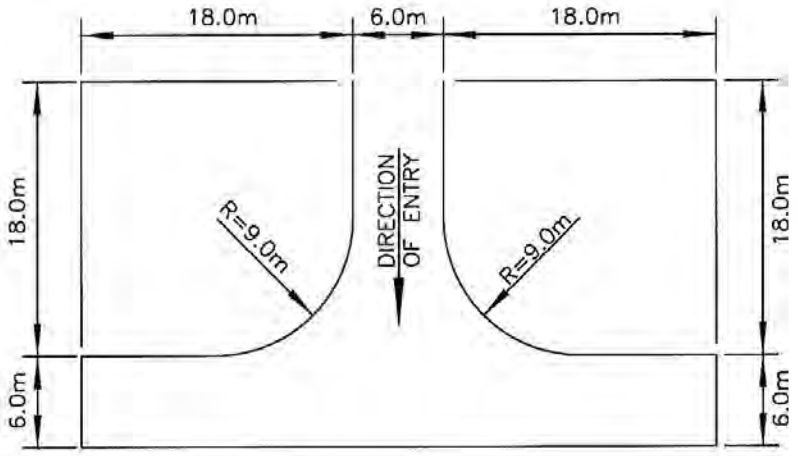
J4.06 Private Fire Hydrant(s)

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.



SIDE ENTRY



FRONT ENTRY

FIGURE 4.1 SIDE AND FRONT ENTRY TURNAROUNDS

J5.00 Construction

J5.01 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:

1. A Geotechnical Report shall be submitted detailing tieback and shoring Methodology.

2. An assessment letter/report signed and sealed by a qualified Professional Engineer to ensure there will be no anticipated negatives impacts to either Municipal or third party utilities within the right-of-way.

3. Tieback and shoring design drawings stamped by a qualified Professional Engineer.

4. 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.

5. No tiebacks shown where the Town has planned future works which might conflict with proposed tiebacks (i.e. below grade transportation infrastructure, transit subway extension, or Direct Energy geothermal piping, or other).

6. Letters of Consent from impacted property owners.

7. 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.

J5.02 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 to 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.

J5.03 Groundwater Pumping

See Section B7.00 for groundwater pumping requirements

J6.00 Record Drawings

Where works are required within the Municipal right of way (beyond simple service connection), 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 (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).

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, in writing, to explain the discrepancy 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:

- All documents submitted with each/every engineering submission shall be placed on a CD, containing .PDF's of all documents and drawings, as well as the drawings in AutoCAD format.
- 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. 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** (ie: 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 (ie: SW-2010-0X) for all subdivision drawing submissions or the Town of Whitby Project Number (ie: 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.

- 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)

- 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 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:

- On compact disk.

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 (breaklines) 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	Exisitng 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	Exisitng 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	Exisitng 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	Exisitng 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	Exisitng 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	Exisitng 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	Exisitng Toe (start) of Slope Line
EX-SLOPE_TOP-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Exisitng Toe (start) of Slope Line
EX-STEPS-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Exisitng 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	Exisitng Toe (start) of Slope Line
EX-SLOPE_TOP-LIN	7 (white)	0.25	0.50 (L80)	Dot2	Exisitng Toe (start) of Slope Line
EX-STEPS-LIN	7 (white)	0.25	0.50 (L80)	Continuous	Exisitng 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 Contruction
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

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

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 Sotrm 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.

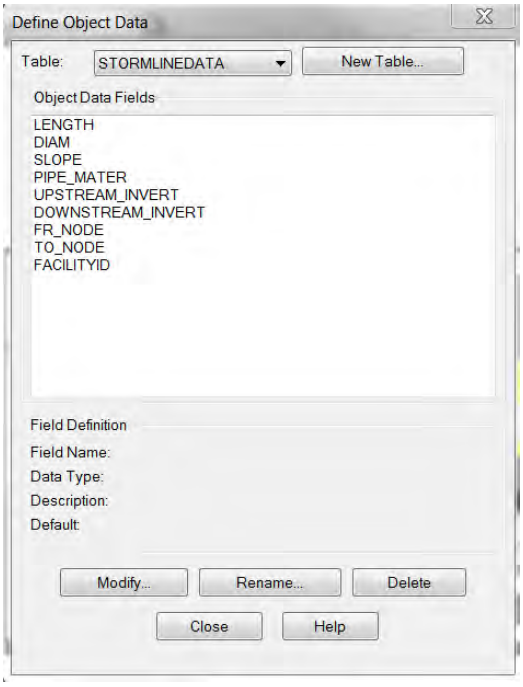
Symbols

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

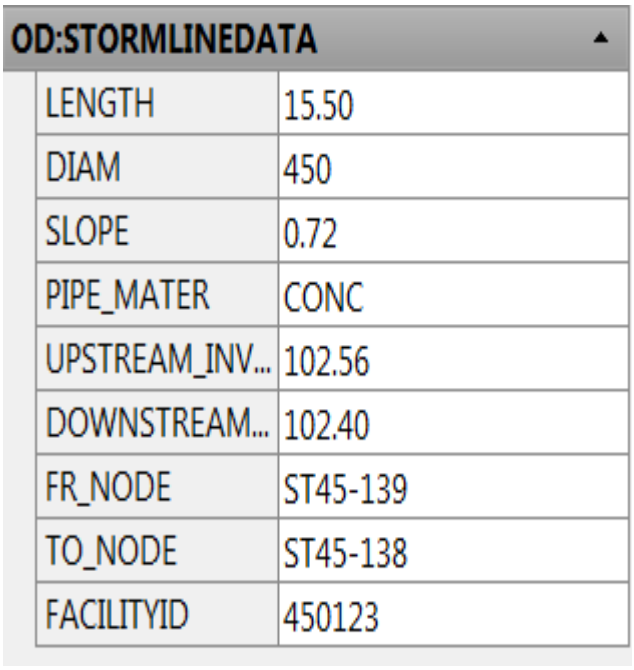
AutoCAD Object Data

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

APPENDIX A – Continued



Completed Object Data Table



Defined Object Data

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 Pan
- 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 bench mark information
- Sidewalks, driveways, fencing, street lights and hydrants
- Community mailbox locations including required curb depressions
- 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

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 control

Grading Plans

(Not applicable to Municipal 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

- 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 Municipal 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, street lights, 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 locations and the required curb depressions
- Signature/approval block for each utility, Town of Whitby and Region of Durham
- Standard # 400 to 404.30 – Utility Locations
- Potential tree locations

Streetlight Layout and Photometric Design Plans

(Not applicable to Municipal 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.

Appendix C

The Corporation of the Town of Whitby

Capital Projects - Design Check List and Forms

Index

Town of Whitby
Roadway Design Criteria

Project Name and Location: _____

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

Criteria	Reference/Notes	Design Standards	Proposed Standards
Classification	Town of Whitby Official Plan		
	TAC Page 1.3.2.2		
	Table 1.3.2.1		
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 Page 1.2.5.4 Table 1.2.5.3		
Minimum Decision Sight Distance	TAC Page 1.2.5.8 Table 1.2.5.6		
Minimum 'K' Value	**CREST** TAC Page 2.1.3.6 Table 2.1.3.2		
	SAG TAC Page 2.1.3.9 Table 2.1.34 **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			

Other Information to be Submitted:

	N/A	Attached	Future Submissions
• **Geotechnical Report**	☐	☐	☐
• **Traffic Report**	☐	☐	☐
• **Drainage Report**	☐	☐	☐
• **Other (Specify)** _____	☐	☐	☐

Prepared by:_____ **Date:** _____
(Consultant)

Checked by:_____ **Date:** _____
(Consultant)

Approved by:_____ **Date:** _____
(Town of Whitby)

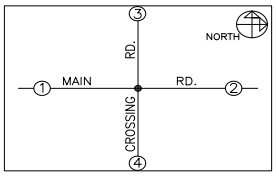
Notes:

_____

_____

_____

_____



Town of Whitby
Roadway/Intersection Design Criteria

Criterial	Reference/Notes	Detail			
		Main Road (Arterial)		Side Roads (Collectors)	
		Leg 1	Leg 2	Leg 3	Leg 4
Classification					
Design Speed					
Stopping Sight Distance	TAC Pg 1.2.5.4 Table 1.2.5.3.				
Road Turning Radius					
Design Vehicle					
Lane Width – Thru Lanes					
Left Turn					
Right Turn					
Shoulder Width					
Boulevard Width					
Left Turn Lane	TAC Pg 1.2.5.4 Table 1.2.5.3				
Set Back					
Storage					
Parallel					
Taper	TAC Pg 2.3.8.2 Table 2.3.8.1				
Right Turn Lanes	TAC Pg 2.3.5.5 Figure 2.3.5.3				
	TAC Pg 2.3.5.2				
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 Project Manager: _____ **Consultant Project Manager** _____

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

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

	Yes	No	N/A	Comments
Horizontal & Vertical Alignment Design	☐	☐	☐	_____
- Preliminary Design Sections	☐	☐	☐	_____
Plan Design	☐	☐	☐	_____

	Yes	No	N/A	Comments
Entrance Designs	☐	☐	☐	_____
Property Impacts/Alternative Designs	☐	☐	☐	_____
Storm Water Management Concept	☐	☐	☐	_____
- Preliminary SWM Design	☐	☐	☐	_____
Submit Preliminary Roll Plan & Profile	☐	☐	☐	3 copies required
- Preliminary Design Section	☐	☐	☐	2 copies required
- Entrance Profiles	☐	☐	☐	2 copies required
Operation Centre Review & Comment	☐	☐	☐	_____
Field Review - Design	☐	☐	☐	_____
Preliminary Cost Estimate	☐	☐	☐	_____
- Construction	☐	☐	☐	_____
- Utilities	☐	☐	☐	_____
- Regional Work	☐	☐	☐	_____
Other Items (Specify) _____	☐	☐	☐	_____

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

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

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

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

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'

Project Name and Location: _____

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

Design:	**Yes**	**No**	**N/A**	**Comments**
Field Review Base of Plan	☐	☐	☐	_____
Base Plan C.A.D. Update	☐	☐	☐	_____
Approved Design Criteria	☐	☐	☐	_____
Approved Preliminary Design				
- Plan and Profile	☐	☐	☐	_____
- Typical Section(s)	☐	☐	☐	_____
Submit Preliminary Design to Region				
- Sanitary Design	☐	☐	☐	_____
- Watermain Design	☐	☐	☐	_____
- Traffic Signal Design	☐	☐	☐	_____
Incorporate Other Reports				
- Geotechnical	☐	☐	☐	_____
- Traffic	☐	☐	☐	_____
- Vegetation	☐	☐	☐	_____
- Fish / Wildlife	☐	☐	☐	_____
- Storm Water Management	☐	☐	☐	_____
Prepare Contract Drawings (See list in Town Design Criteria and Standards-Section A)	☐	☐	☐	_____
Contract Drawings by Region of Durham:				
- Sanitary	☐	☐	☐	_____
- Watermain	☐	☐	☐	_____
- Traffic Signals	☐	☐	☐	_____

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

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

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

Utilities

	Yes	No	N/A	Comments
Bell				
- Relocation Requirements	☐	☐	☐	_____
- Cost Estimate	☐	☐	☐	_____
- Schedule	☐	☐	☐	_____
Cable TV				
- Relocation Requirements	☐	☐	☐	_____
- Cost Estimate	☐	☐	☐	_____
- Schedule	☐	☐	☐	_____
Hydro (Whitby)				
- Relocation Requirements	☐	☐	☐	_____
- Cost Estimate	☐	☐	☐	_____
- Schedule	☐	☐	☐	_____
Gas				
- Relocation Requirements	☐	☐	☐	_____
- Cost Estimate	☐	☐	☐	_____
- Schedule	☐	☐	☐	_____
Other (Specify) _____				
- Relocation & Requirements	☐	☐	☐	_____
- Cost Estimate	☐	☐	☐	_____
- Schedule	☐	☐	☐	_____
Utility Relocation Meeting(s)	☐	☐	☐	_____

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'

Project Name and Location: _____

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

	Yes	No	N/A	Comments
Design:				
Provide Contract Number (By Town)	☐	☐	☐	_____
Finalize Contract Drawing Package	☐	☐	☐	_____
Incorporate Region of Durham Drawings				
- Sanitary	☐	☐	☐	_____
- Watermain	☐	☐	☐	_____
- Traffic Signals	☐	☐	☐	_____
Finalize Contract Documents	☐	☐	☐	_____
Incorporate Region of Durham Documents	☐	☐	☐	_____
Permits & Approvals				
MOE	☐	☐	☐	_____
CLOCA	☐	☐	☐	_____
MNR	☐	☐	☐	_____
DFO	☐	☐	☐	_____
Other (Specify)				
_____	☐	☐	☐	_____
Submit Contract Drawing Package	☐	☐	☐	2 Copies
Submit Contract Documents	☐	☐	☐	2 Copies
Submit Final Cost Estimates	☐	☐	☐	_____
Submit Contract Administration Proposal	☐	☐	☐	_____
Construction Review				
- By Town	☐	☐	☐	_____
- By Consultant	☐	☐	☐	_____

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

Utilities

	Yes	No	N/A	Comments
Bell				
-Purchase Order (By Town)	☐	☐	☐	_____
- Approved Relocation & Schedule	☐	☐	☐	_____
Cable TV				
- Purchase Order (By Town)	☐	☐	☐	_____
- Approved Relocation & Schedule	☐	☐	☐	_____
Hydro (Whitby)				
- Purchase Order (By Town)	☐	☐	☐	_____
- Approved Relocation & Schedule	☐	☐	☐	_____
Gas				
- Purchase Order (By Town)	☐	☐	☐	_____
- Approved Relocation & Schedule	☐	☐	☐	_____
Other (Specify) _____				
- Purchase Order (By Town)	☐	☐	☐	_____
- Approved Relocation & Schedule	☐	☐	☐	_____

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

Pre-Tender Approval:

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

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

Comments:

_____

_____

_____

_____

Town Of Whitby

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

Comments:

_____

_____

_____

_____

☐ Prepare Tender Package

☐ Address Comments and Resubmit

Town of Whitby – Capital Projects
Tender Package Check List
Form 'D'

Contract No. _____ Project Name and Location: _____

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

Consultant Activities

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

	Date	N/A	Comments
Town Of Whitby Activities			
Town of Whitby Final Comments			
- Contract Drawings - Engineering	☐	☐	
- Contract Documents - Engineering	☐	☐	
- Purchasing	☐	☐	
Prepare/Mail Project Letters/Notices	☐	☐	
Sign Contract Drawings	☐	☐	
Approve Tender Ad	☐	☐	
Receive Drawings & Documents for Tender	☐	☐	
Approve Contract Administration by Consultant	☐	☐	
Set Public Information Centre Date	☐	☐	
Review Public Information Centre Information	☐	☐	
Review Low Tender/Prepare Cost Sharing/ Tender Report	☐	☐	
Prepare Sundry Items / Costs	☐	☐	
Approve Construction Material Testing	☐	☐	
Review / Resolve Property Issues	☐	☐	

Post Tender

Prepare / Approve Region Cost Sharing	☐
Region of Durham Approvals	☐
Prepare Contractor Documentation	☐
Contract Documents Executed	☐
Construction Start Date	☐
Pre-Construction Meeting	☐

Appendix D

Typical Roundabout Layouts

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.

All dimensions in millimetres except where noted

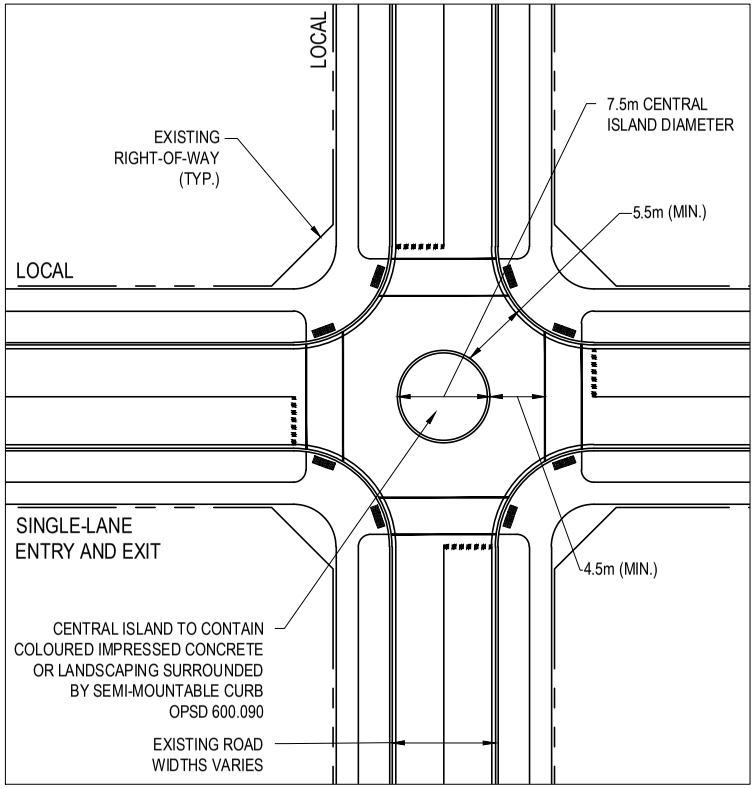
The Corporation of the Town of Whitby		Engineering Services
Checked	**Typical - 36m Gateway Roundabout**	DWG. Date: .
Approved		Revision No.:
Scale: N.T.S		Revision Date: .
		DWG No. Fig. D1

NOTES:

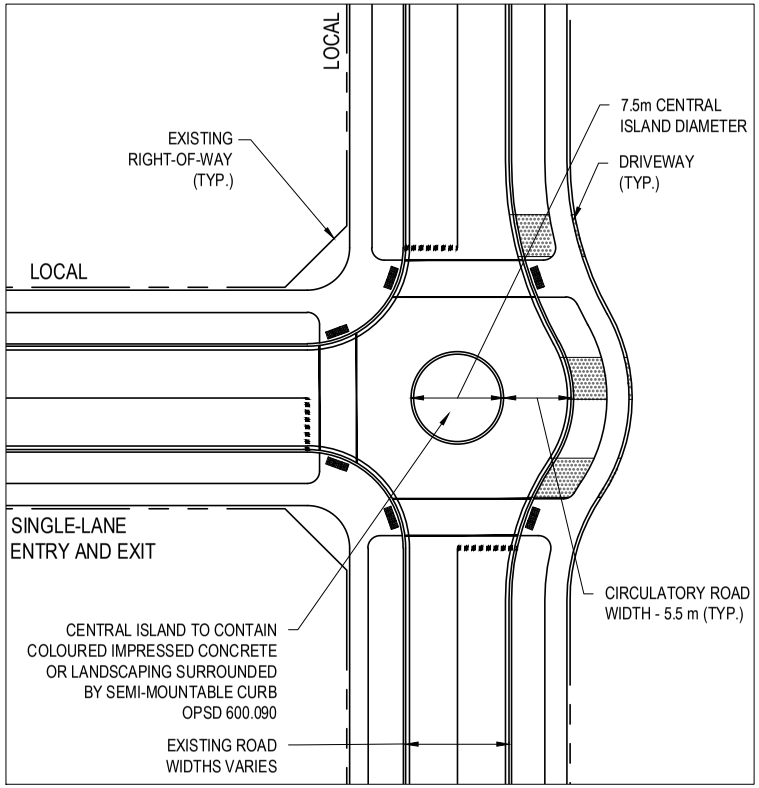
1. THIS LAYOUT IS A GUIDE TO CREATE A FUNCTIONAL ROUNDABOUT DESIGN TO INCORPORATE DESIGN CRITERIA AND FURTHER REFINEMENTS THROUGHOUT THE GEOMETRIC DESIGN PROCESS.
2. REFER TO FIG. D9 FOR ROUNDABOUT SIGNS AND PAVEMENT MARKINGS.
3. THROAT WIDENING WILL BE REQUIRED FOR SMALLER RIGHT-OF-WAY(S) WITH APPROXIMATE 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	**Typical - 27m Gateway Roundabout**	DWG. Date: .
Approved		Revision No.:
Scale: N.T.S		Revision Date: .
		DWG No. Fig. D2



4-LEG INTERSECTION



3-LEG INTERSECTION

NOTES:

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

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Typical - Traffic Calming Circle

DWG. Date:	.
Revision No.:	
Revision Date:	.
DWG No.	Fig. D3
Checked	
Approved	
Scale:	N.T.S

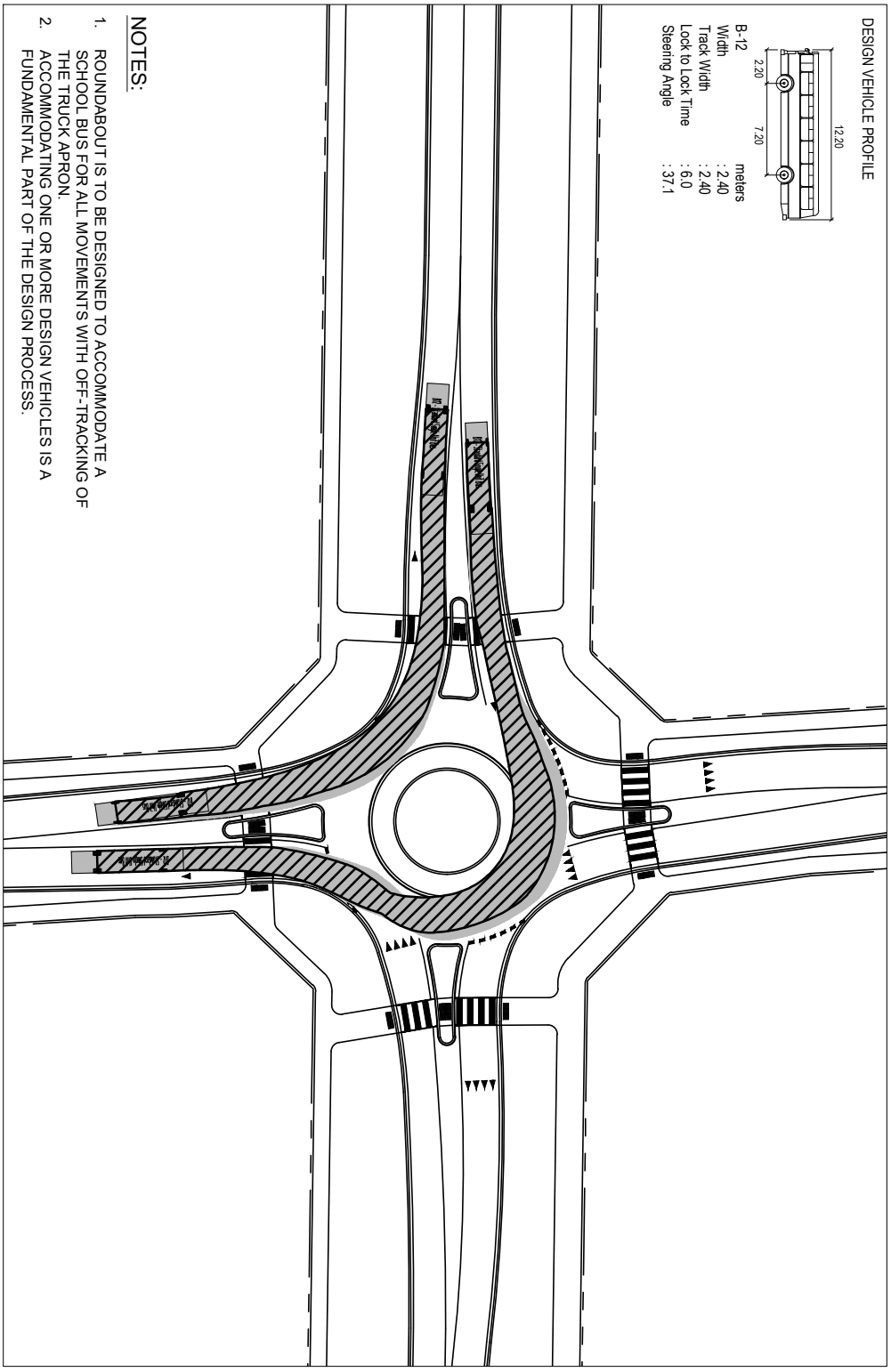
NOTES:

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.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby — **Engineering Services**

Checked	**Design Vehicle - 36m Roundabout**	DWG. Date: .
Approved		Revision No.:
Scale: N.T.S		Revision Date: .
		DWG No. Fig. D4



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Design Vehicle - 27m Roundabout**	DWG. Date: .
Approved		Revision No.:
Scale: N.T.S		Revision Date: .
		DWG No. Fig. D5

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby — **Engineering Services**

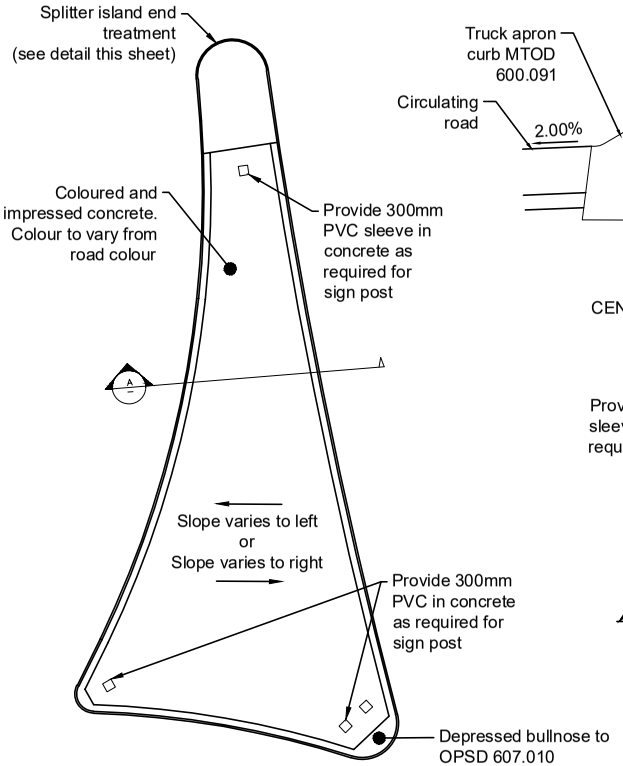
Checked	**Design Vehicle - Traffic Calming Circle**	DWG. Date: .
Approved		Revision No.:
Scale: N.T.S		Revision Date: .
		DWG No. Fig. D6

NOTES:

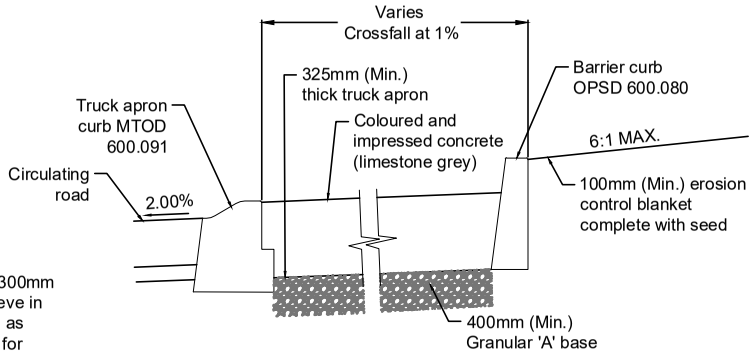
1. DETERMINING FASTEST-PATH SPEEDS IS A FUNDAMENTAL PART OF THE ROUNDABOUT DESIGN PROCESS.
2. FASTEST PATHS MUST BE DRAWN FOR ALL DIRECTIONS USING SPLINES.
3. SPLINES MUST BE DRAWN WITH 1.5 m OFFSETS FROM FACE OF CURB AND 1.0 m OFFSETS FROM ROADWAY CENTRELINES. NO OFFSETS SHOULD BE ASSUMED FROM ANY OTHER PAVEMENT MARKINGS.
4. CONVERT RADIUS TO FASTEST-PATH SPEED ASSUMING 2% OUTWARD CROSSFALL USING EQUATION 3.2.1 AND TABLE 3.2.2 OF THE TAC GEOMETRIC DESIGN GUIDE FOR CANADIAN ROADS.
5. FASTEST-PATH ENTRY SPEEDS SHOULD BE BETWEEN 35 AND 40 km/h, DEPENDING ON TRAFFIC DISTRIBUTION AND SITE CONTEXT.

All dimensions in millimetres except where noted

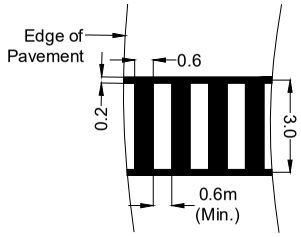
The Corporation of the Town of Whitby		Engineering Services
Checked	**Roundabout Entry Path Radii**	DWG. Date: .
Approved		Revision No.:
Scale: N.T.S		Revision Date: .
		DWG No. Fig. D7



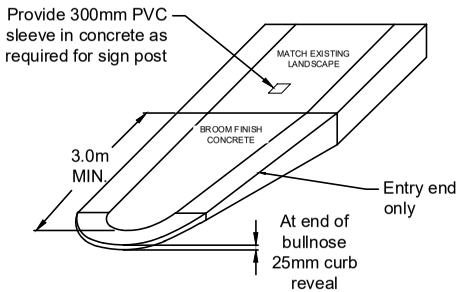
ROUNDABOUT SPLITTER ISLAND DETAIL (TYPICAL)
N.T.S.



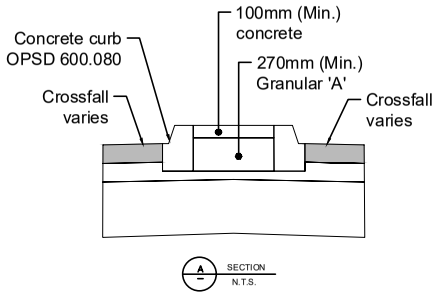
CENTRAL ISLAND TRUCK APRON AND CURBS DETAIL (TYPICAL)
N.T.S.



PAVEMENT MARKINGS FOR LADDER CROSSWALK



SPLITTER ISLAND END TREATMENT (TYPICAL)
N.T.S.



SPLITTER ISLAND SECTION (TYPICAL)
N.T.S.

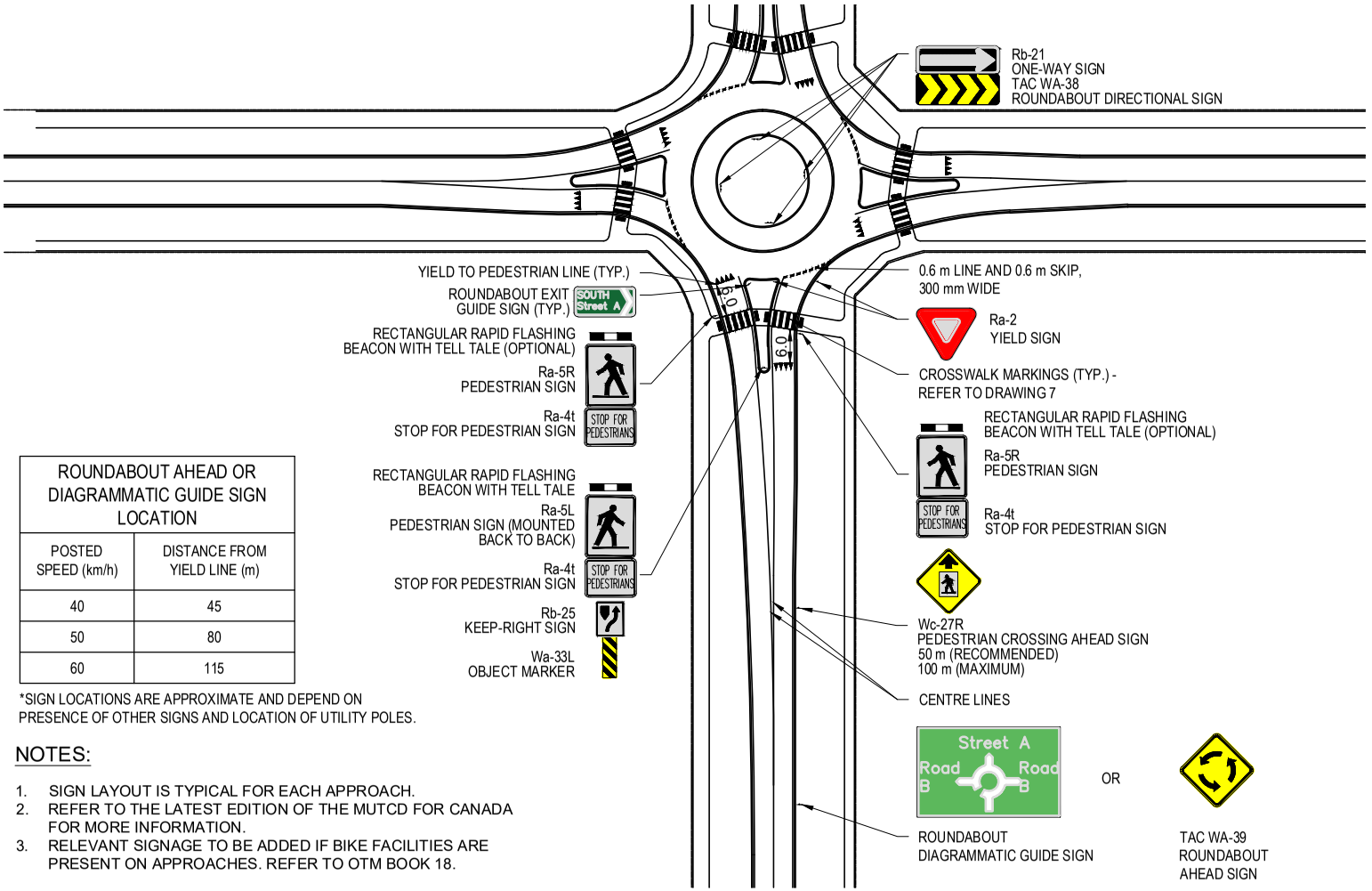
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Roundabout Design Details

DWG. Date:	.
Revision No.:	
Revision Date:	.
DWG No.	Fig. D8
Checked	
Approved	
Scale:	N.T.S



ROUNDABOUT AHEAD OR DIAGRAMMATIC GUIDE SIGN LOCATION	
POSTED SPEED (km/h)	DISTANCE FROM YIELD LINE (m)
40	45
50	80
60	115

*SIGN LOCATIONS ARE APPROXIMATE AND DEPEND ON PRESENCE OF OTHER SIGNS AND LOCATION OF UTILITY POLES.

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.

All dimensions in millimetres except where noted

Engineering Services

The Corporation of the Town of Whitby

Roundabout Signs and Markings

DWG. Date: .
Revision No.: .
Revision Date: .
DWG No. Fig. D9

Checked
Approved
Scale: N.T.S

NOTES:

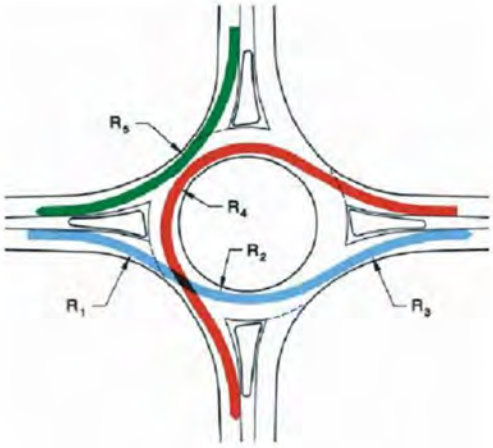
1. SIGN LAYOUT IS TYPICAL FOR EACH APPROACH.
2. REFER TO THE LATEST EDITION OF THE MUTCD FOR CANADA FOR MORE INFORMATION.
3. RELEVANT SIGNAGE TO BE ADDED IF BIKE FACILITIES ARE PRESENT ON APPROACHES. REFER TO OTM BOOK 18.
4. LAYOUT MAY NOT ACCOMMODATE ALL VEHICLES.
5. ADDITIONAL LINE MARKINGS OR SIGNAGE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

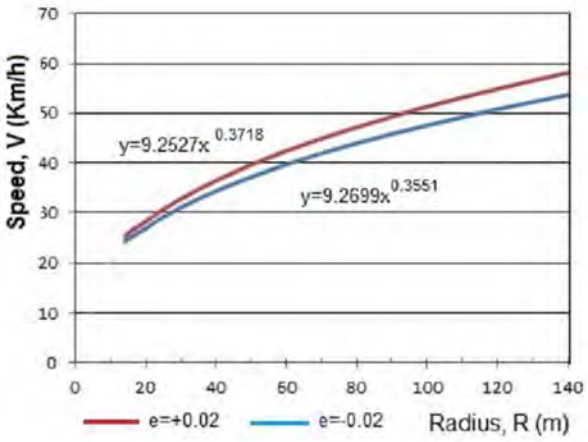
All dimensions in millimetres except where noted

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	**Speed-Radius Calculation & Geometric Design Parameters**	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	**Speed-Radius Calculation & Geometric Design Parameters**	DWG. Date: .
Approved		Revision No.:
Scale: N.T.S		Revision Date: .
		Dwg No. Fig. E2

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

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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	
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	Oct. 2018
214.10	Typical Rest Area Along MUP and Sidewalk	June 2022	
214.20	MUP Signage and Pavement Markings	June 2022	
214.30	MUP Signage and Pavement Markings Notes	June 2022	
215	Temporary Sidewalk Barricade	Aug. 2015	June 2022
216	Speed Hump	June 2022	

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	June 2022
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	
402.10	Arterial B Roadway, 36.0m R.O.W.	June 2022	
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
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
410	Non-Residential and Multi-Family Entrance Detail	Nov. 1994	Oct. 2018
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	Oct. 2018
414.10	Pavement Marking Legend	Oct. 2018	July 2019
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

Index

Standard Number	Miscellaneous	Date Drawn	Date Revised
500	Street Sign Location	May 1997	May 2006
501	Street Name Sign	Nov. 1994	May 2006
501.10	Heritage Street Sign	Jan. 2009	Oct. 2018
501.20	Storm Pond Sign Detail	Aug. 2015	June 2022
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	June 2022
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

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 No 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/m^3**.**
OPSD Standard 350.010	-	Refer to Town of Whitby Standard No 305 and No 410
OPSD Standard 350.010		

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		**Curbs and Gutters**
OPSD Standard 600.040 - 600.110	-	Concrete to be 32MPa compressive strength at 28 days with 7.0 +/- 1.5% air entrainment and cement ratio to be 355 kg/m^3
	-	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
- 802.031
- 802.032
- 802.034

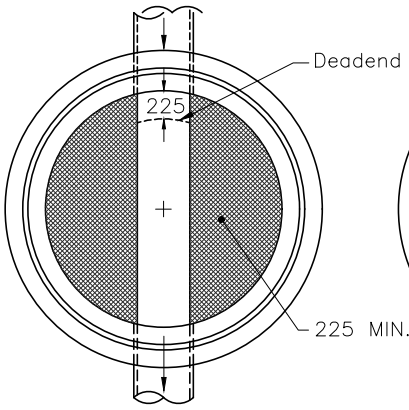
- Bedding for concrete pipe shall be Class B, using 19mm crusher run limestone placed to spring line, first pipe - length from manholes are to be encased in 15MPa concrete to spring line with a minimum 150mm clearance.

- 802.050
- 802.051
- 802.052
- 802.054
- 803.030
- 803.031

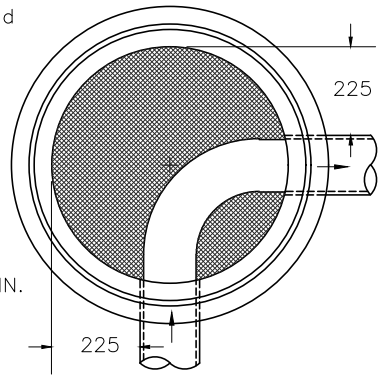
- If unstable ground conditions are encountered at the bottom of the sewer, then the material shall be removed and replaced with 50mm clear stone or 15MPa concrete to a depth as directed by the site engineer prior to the placing of normal bedding.
- 19mm clear limestone to be used if, ground water table 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**

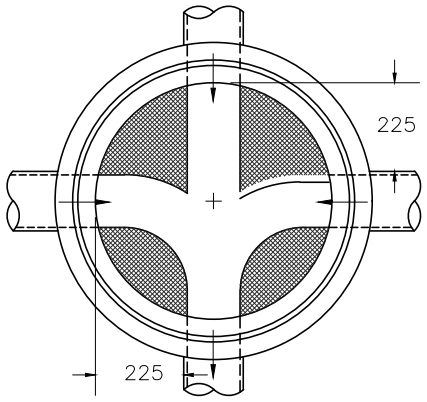
Refer to Town of Whitby Standard No 506, No 506.10, No 506.30 and No 506.40 for fence details.



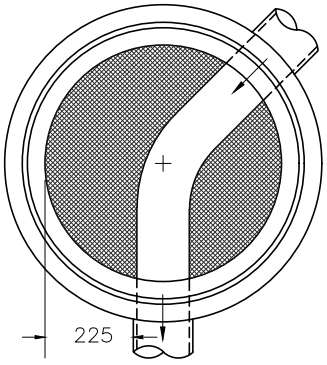
Straight Run



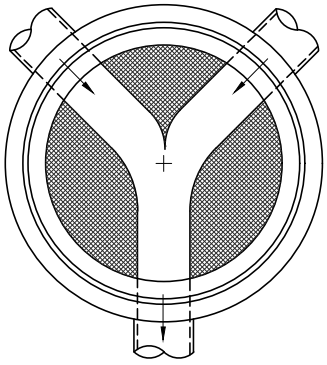
90° Bend



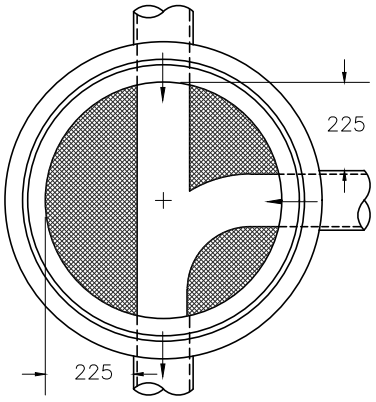
Double Branch



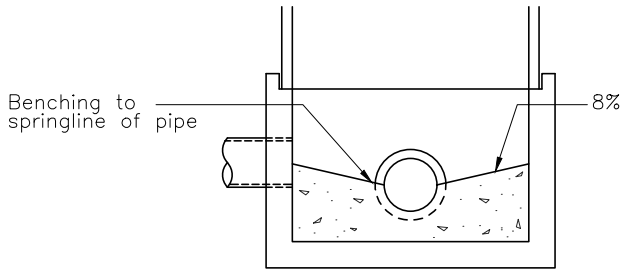
45° Bend

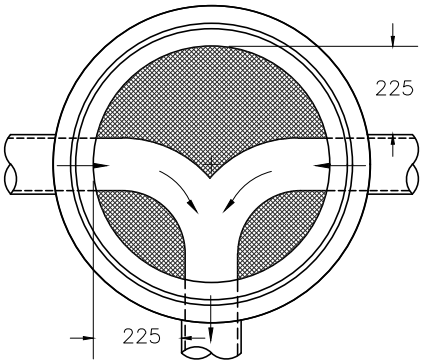


'Y' Connection



Single Branch





'T' Connection

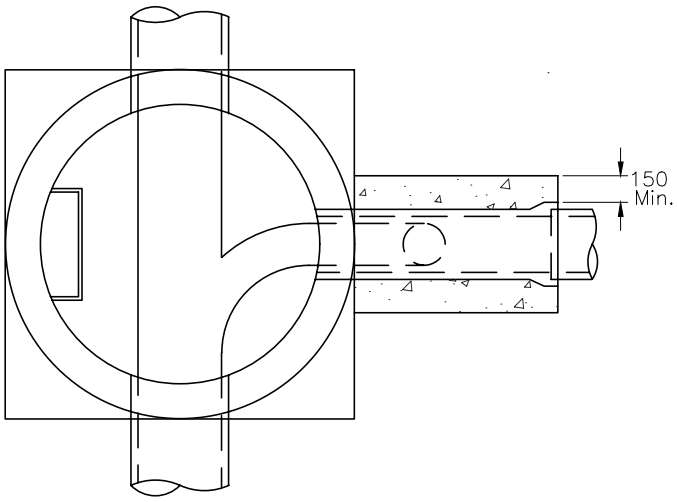
Maximum Pipe Sizes Allowable for Precast Manholes							
Manhole Dia.	1200		1500		1800		2400
	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	In/Out
Straight Run	600	600	825	825	1050	1050	1500
45° Bend	525	525	750	750	900	900	
90° Bend	450	450	600	600	825	825	1050

Notes:

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

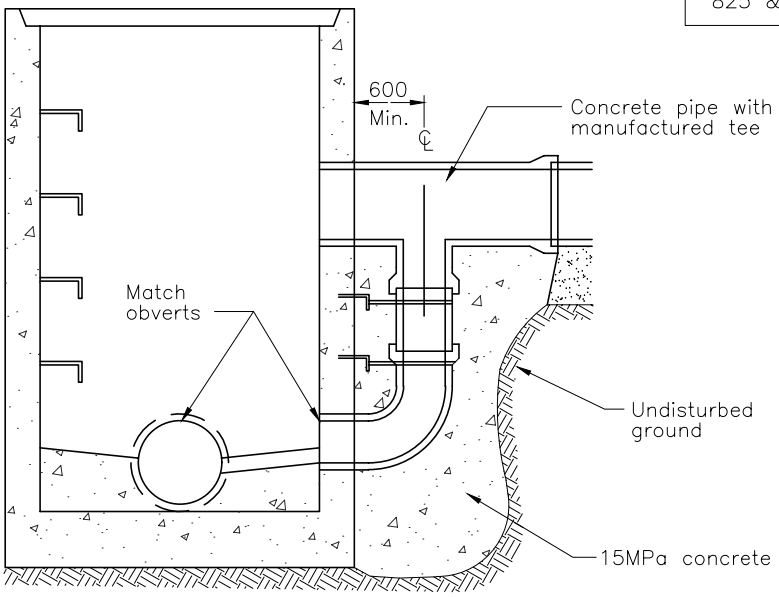
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Benching for Precast Maintenance Holes**	DWG. Date: January 1993
Approved:		Revision No.: 1
Scale: N.T.S		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



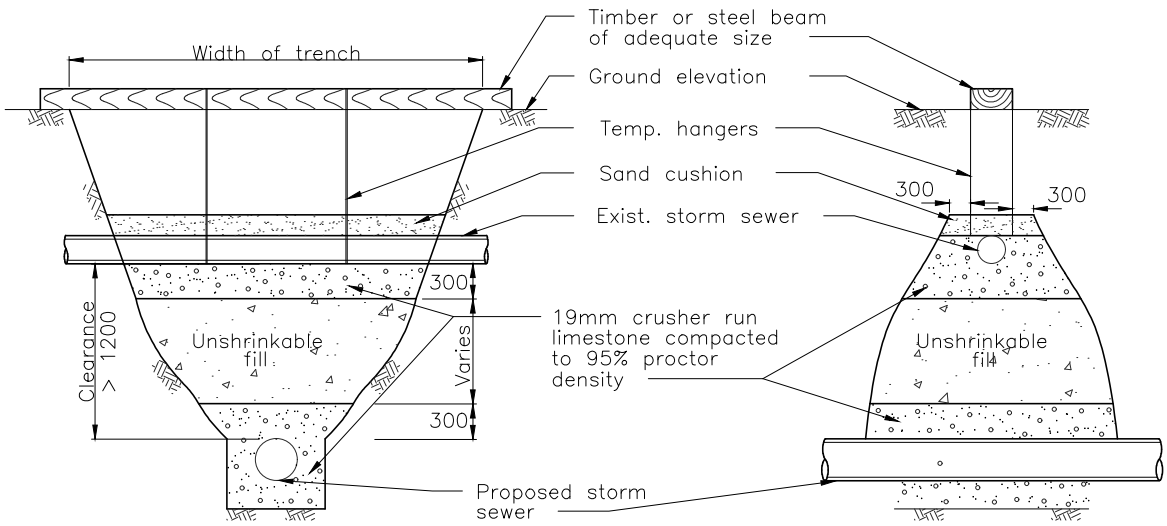
Section

Notes:

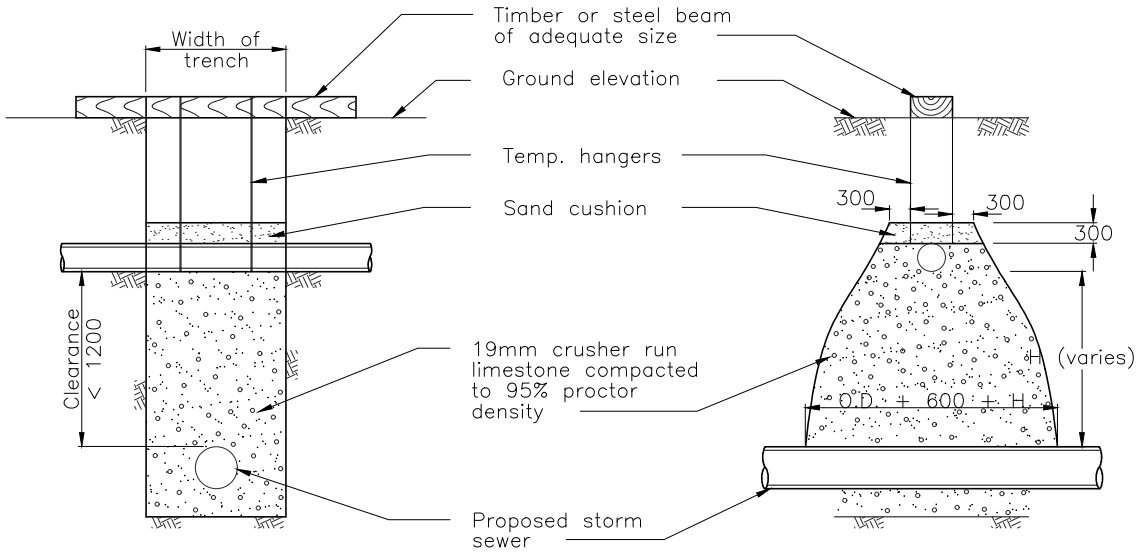
1. Drop structure to be encased in 15MPa concrete to springline of inlet sewer main.
2. Maintenance hole steps to be provided on outside face of maintenance hole with spacing of 300mm O.C. Drop structure to be strapped to steps with a minimum of two stainless steel bands.
3. All drop pipe and fittings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

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Drop Structures for Maintenance Holes**	DWG. Date: January 1993
Approved:		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 101



Clearance > 1200



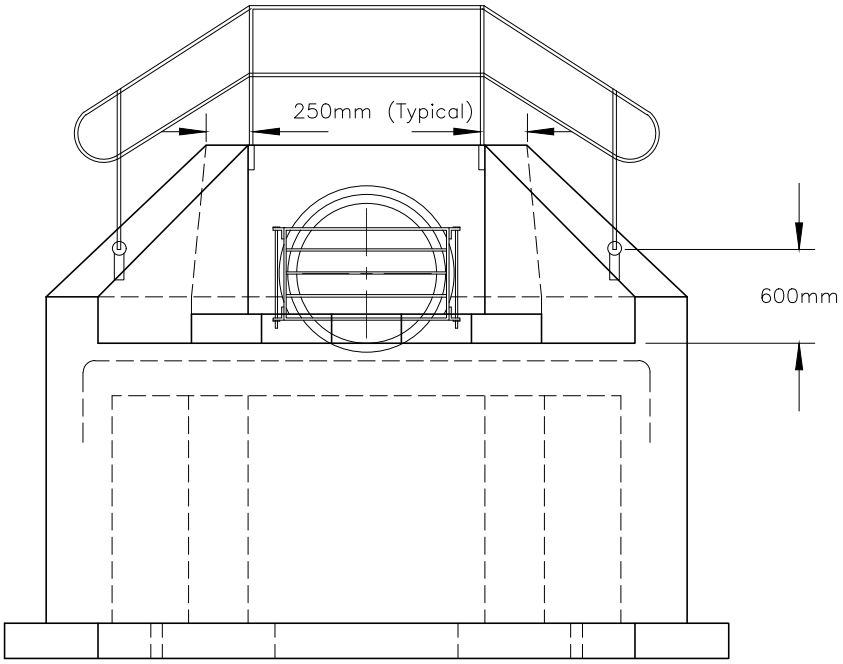
Clearance < 1200

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:	**Backfilling Support for Existing Storm Sewer**	DWG. Date: January 1993
Approved:		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 102

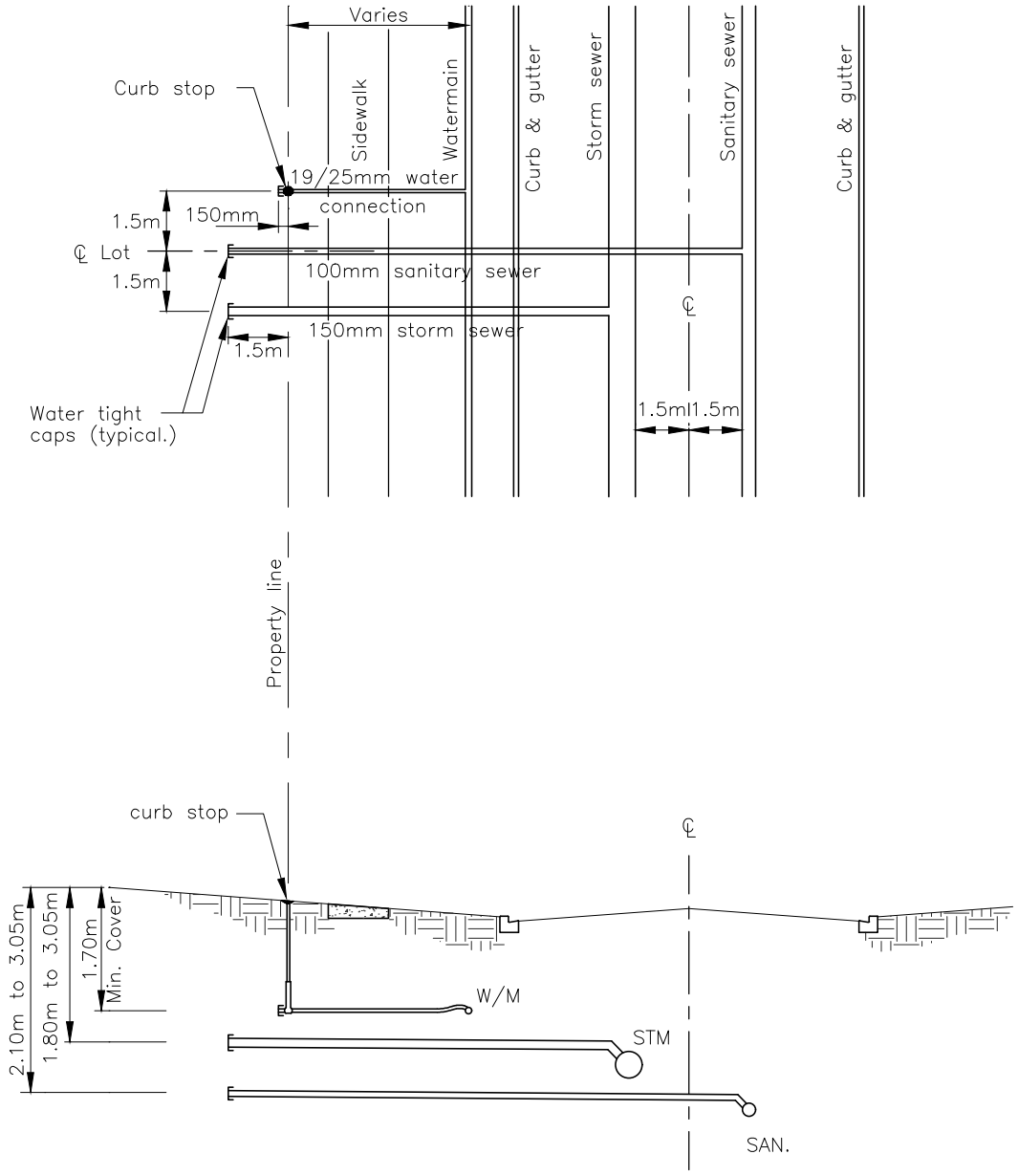


Notes:

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:	**Handrails for Sewers and Culvert Headwalls**	DWG. Date: January 1993
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: January 2009
		DWG No. 103

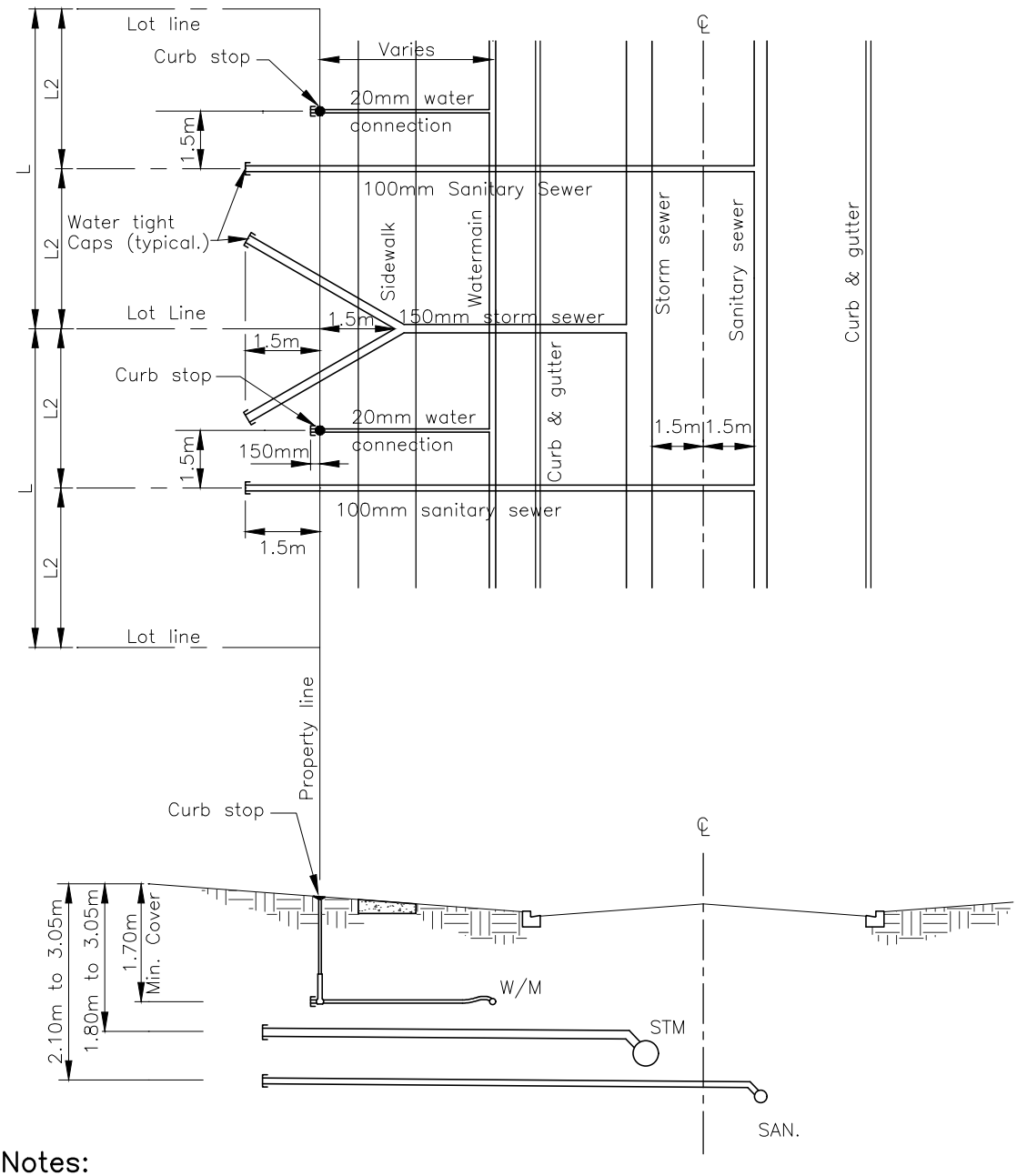


Notes:

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:	**Storm Sewer Residential Service Connection**	DWG. Date: January 1993
Approved:		Revision No.: 3
Scale: N.T.S		Revision Date: October 2018
		DWG No. 104

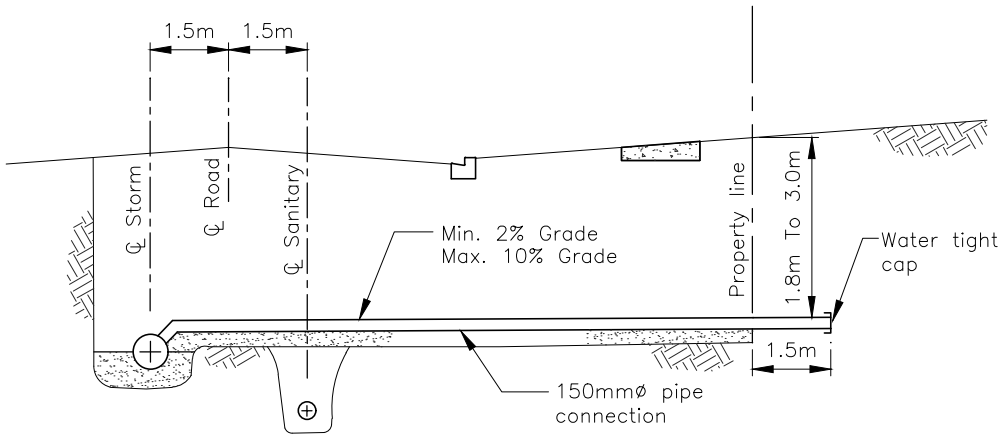


Notes:

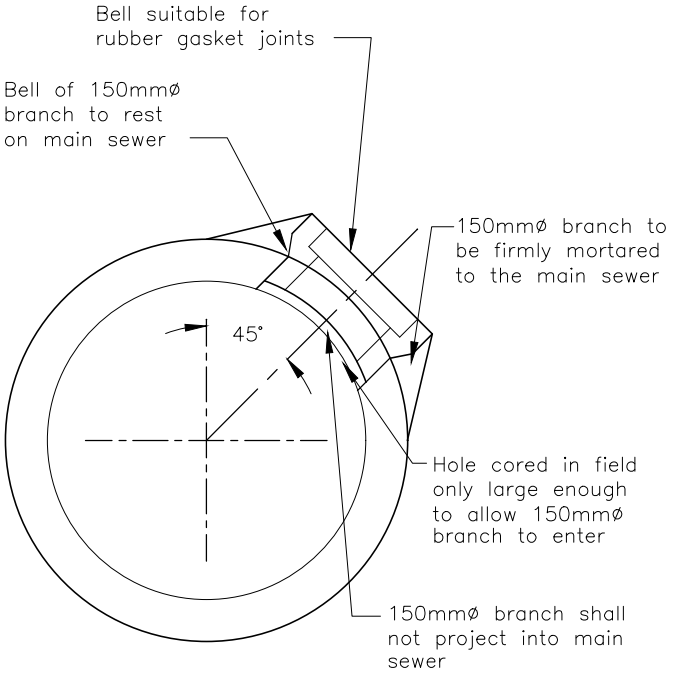
1. Watertight caps on all services.
2. All dimensions shown are centre to centre.
3. Storm pipe material is to be PVC SDR 28 and white in colour.
4. L = frontage of one unit.
5. 'Y' connections will only be permitted on street town houses

All dimensions in millimetres except where noted

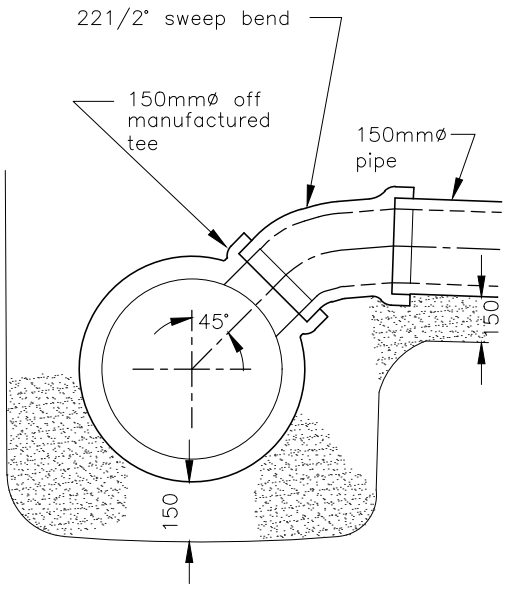
The Corporation of the Town of Whitby		Engineering Services
Checked: M.	**Storm Sewer Residential Service Connection**	DWG. Date: January 1993
Approved:		Revision No.: 3
Scale: N.T.S		Revision Date: October 2018
		DWG No. 105



Elevation



Detail Showing Method of Connection to Sewers 525mmø & Larger



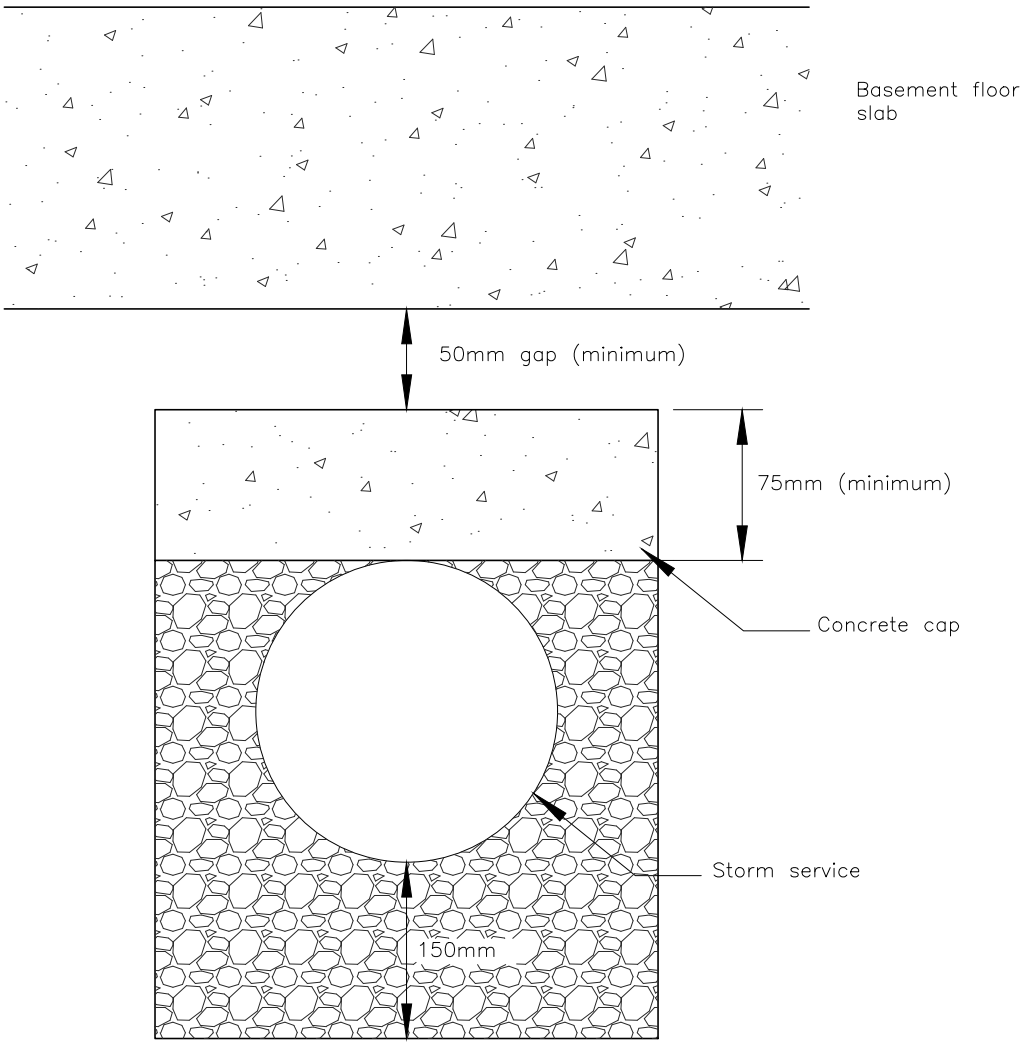
Detail of Connection at Main Sewer for Storm Sewer Sizes Up to & Including 450mmø

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–adapator" 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:	**Storm Sewer Residential Service Connection**	DWG. Date: January 1993
Approved:		Revision No.: 1
Scale: N.T.S		Revision Date: June 1999
		DWG No. 106

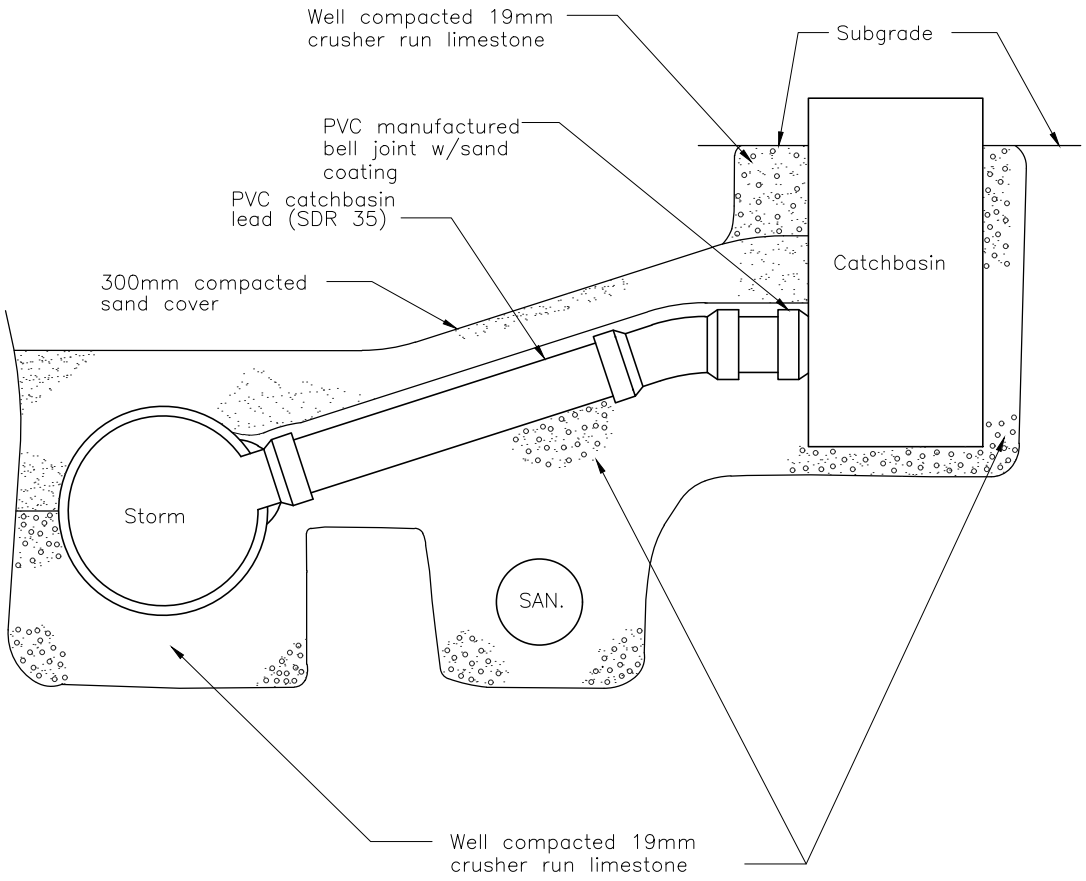


Notes:

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:	**Storm Service Connection Under Basement Floor Slab**	DWG. Date: January 2009
Approved:		Revision No: .
Scale: N.T.S.		Revision Date: .
		DWG No. 106.10

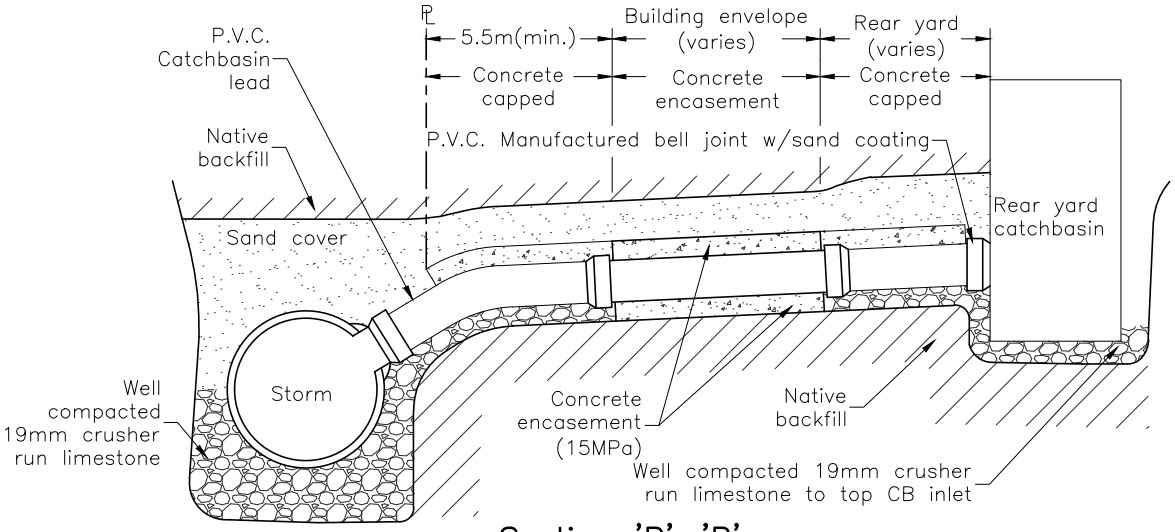


Notes:

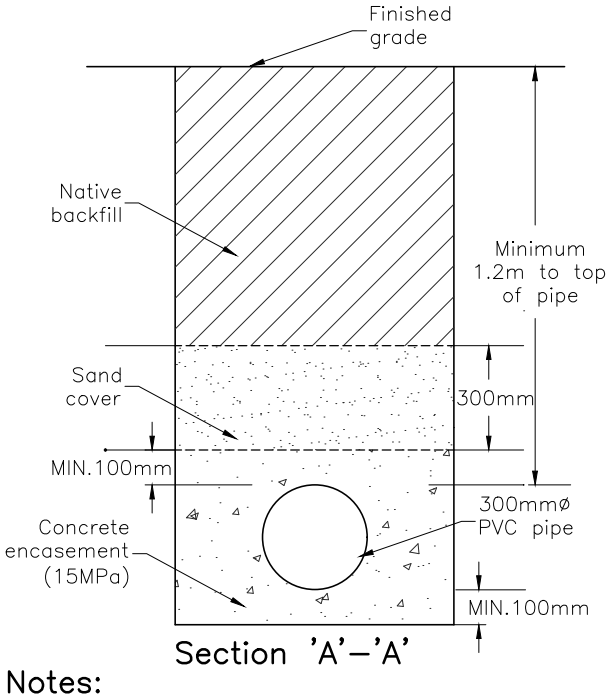
1. Pipe to enter catchbasin at right angle.
2. 250mmø PVC pipe to be used for single catchbasins.
3. 300mmø PVC pipe to be used for double catchbasins.
4. All PVC pipe shall be a minimum strength of SDR 35.
5. For bedding details see Town of Whitby specifications.
6. Connection to storm main shall be 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

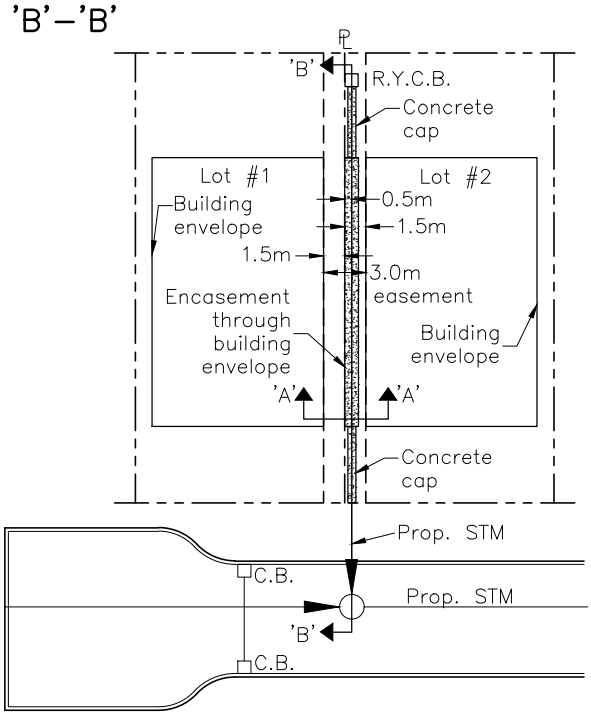
The Corporation of the Town of Whitby		Engineering Services
Checked:	**P.V.C. Catchbasin Connection**	DWG. Date: April 1994
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: May 2006
		DWG No. 107



Section 'B'–'B'



Section 'A'–'A'

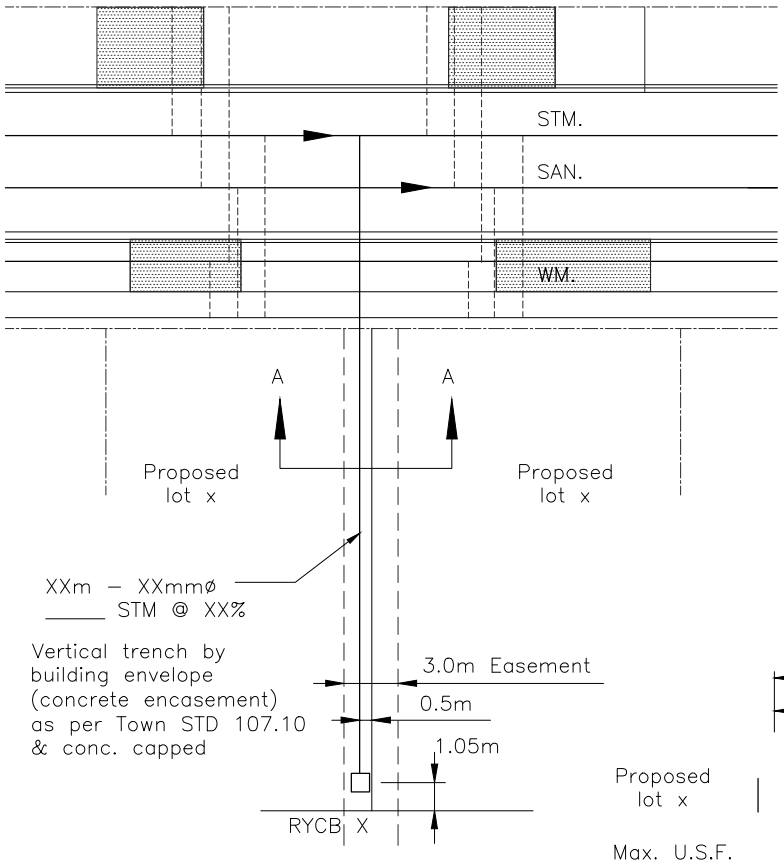


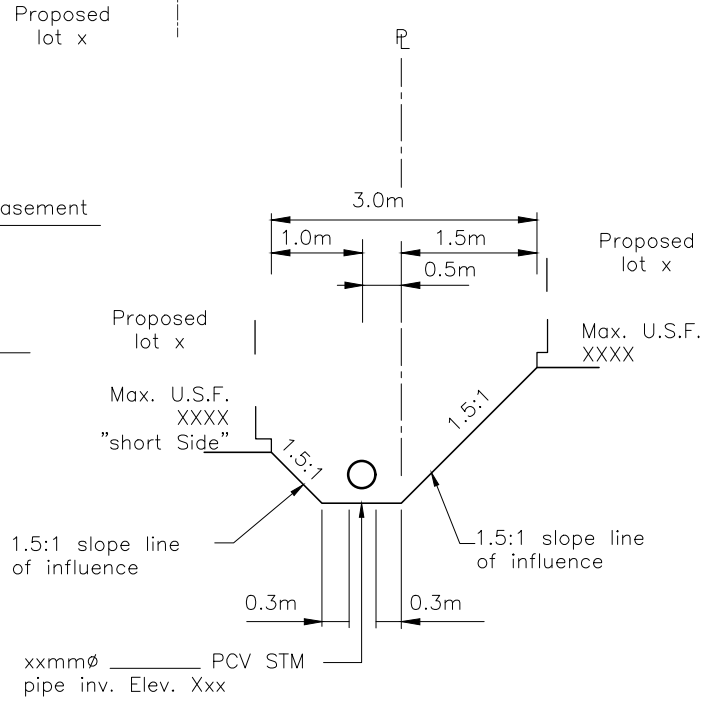
Notes:

1. Pipe to enter catchbasin at right angle.
2. 300mmø 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: M.	**Rear Yard Catchbasin Connection**	DWG. Date: July 2002
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: August 2015
		DWG No. 107.10





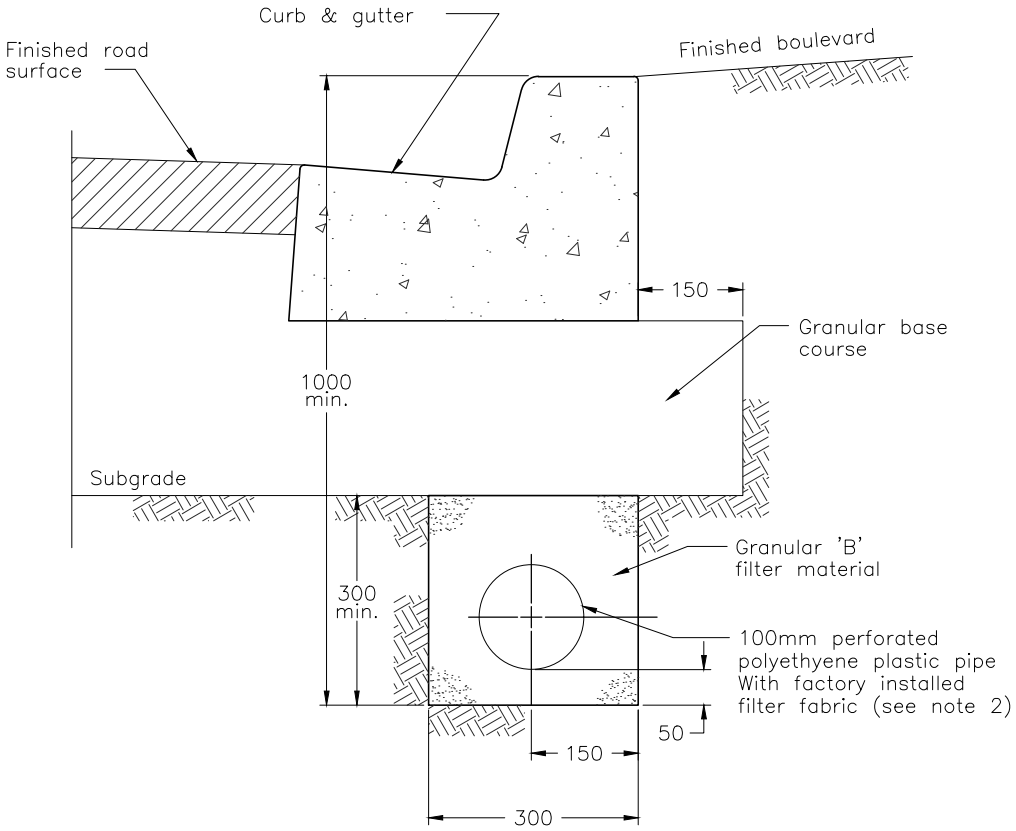
Section A–A

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: M.	**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

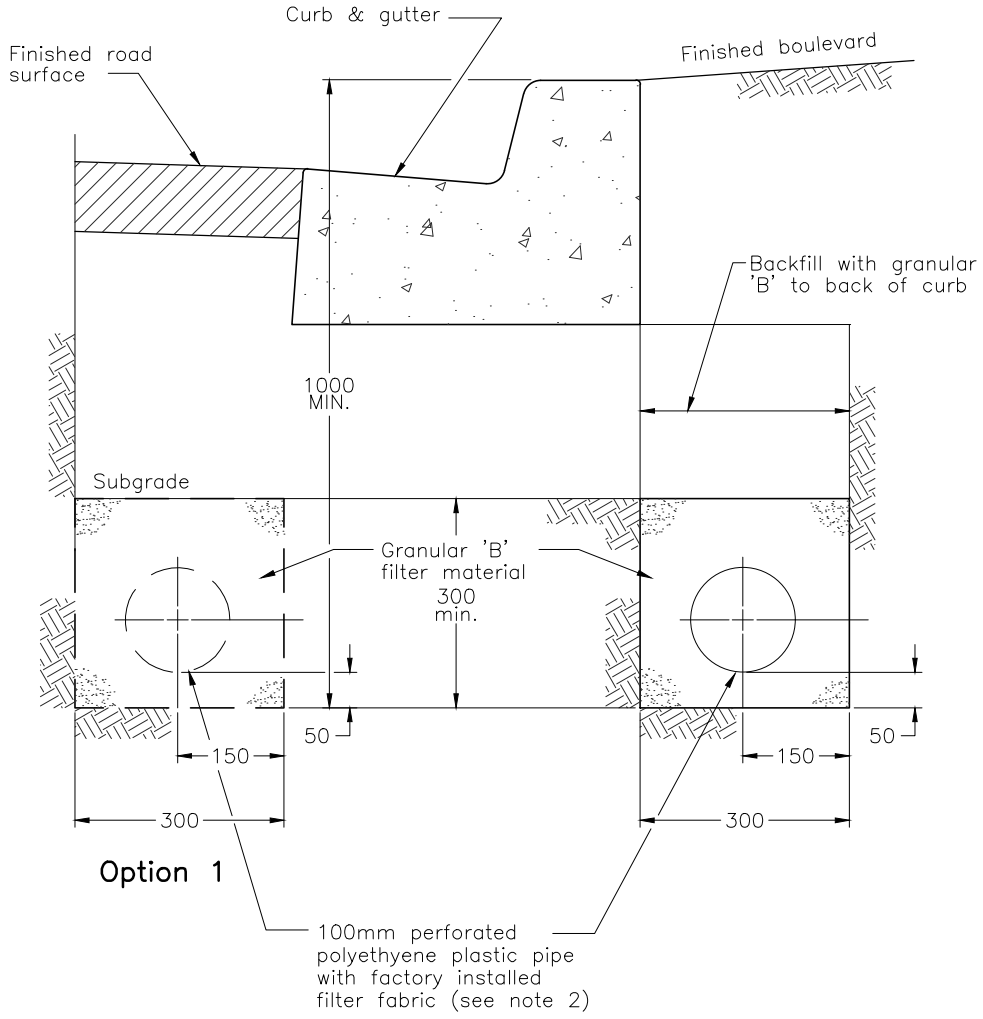


Notes:

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:	**Subdrains**	DWG. Date: January 1993
Approved:		Revision No.:
Scale: N.T.S		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:	**Subdrains for Installation Behind/Front of Existing Curb**	DWG. Date: January 1993
Approved:		Revision No: 3
Scale: N.T.S.		Revision Date: August 2015
		DWG No. 109

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".

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby			**Engineering Services**
Checked:		**IFC-MH Frame and Cover**	DWG. Date: October 2018
Approved:			Revision No.:
Scale: N.T.S			Revision Date:
			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

IFC Maintenance Hole Tapered Top Assembly

Checked:	
Approved:	
Scale:	N.T.S
DWG. Date:	October 2018
Revision No.:	
Revision Date:	
DWG No.	111

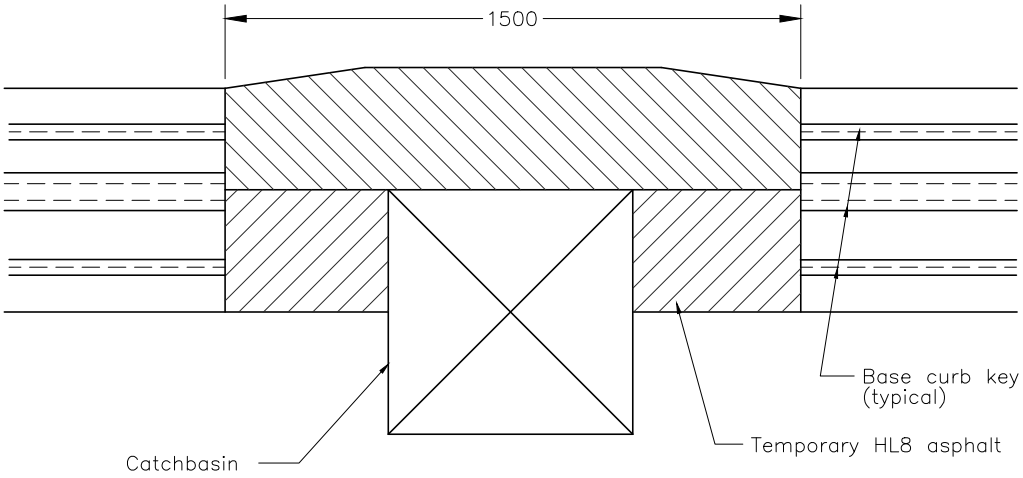
Dimension A	Mass (kg)
100	61
150	95
200	129
250	164
300	198
350	233
400	267
450	302
500	336
550	371

Notes:

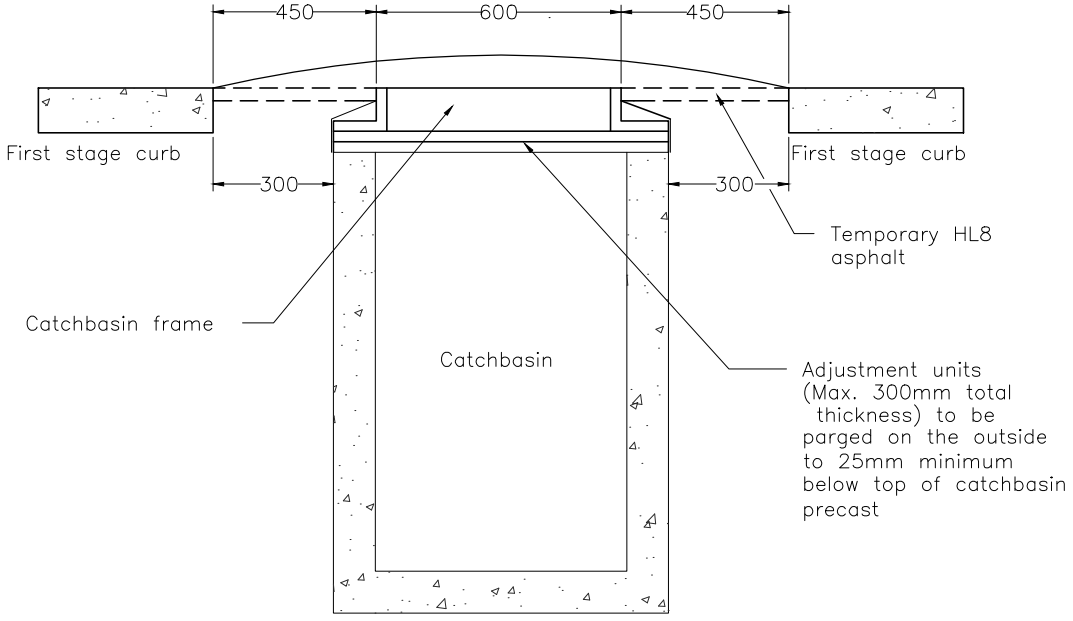
1. Designed and manufactured to C.S.A. A257.4–09.
2. Minimum concrete strength at 28 days: 35 MPa.
3. Reinforcement minimum yield strength: 500 MPa.
4. 25 mm minimum cover on all reinforcing steel.
5. Reinforcement centered in wall ±10mm.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**IFC Maintenance Hole Adjustment Top Assembly**	DWG. Date: October 2018
Approved:		Revision No.:
Scale: N.T.S		Revision Date:
		DWG No. 112



Top View



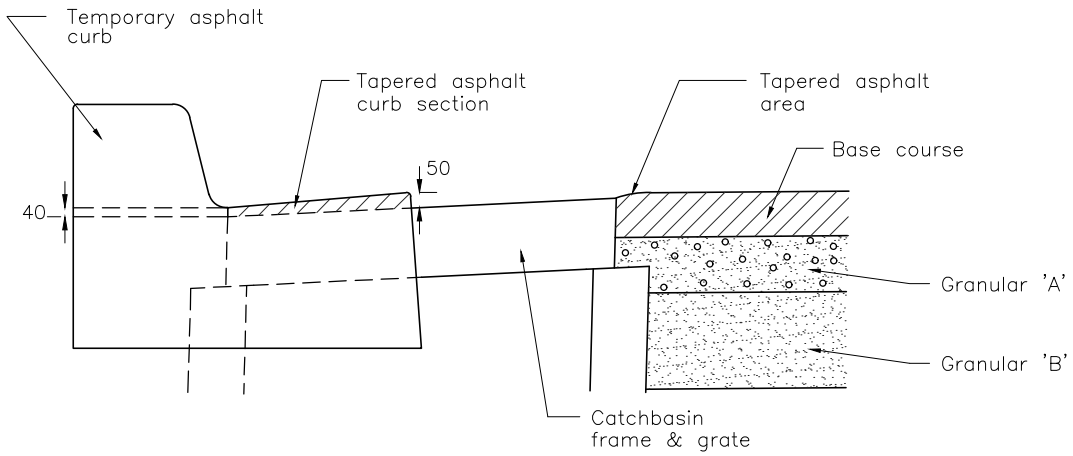
Front View

Notes:

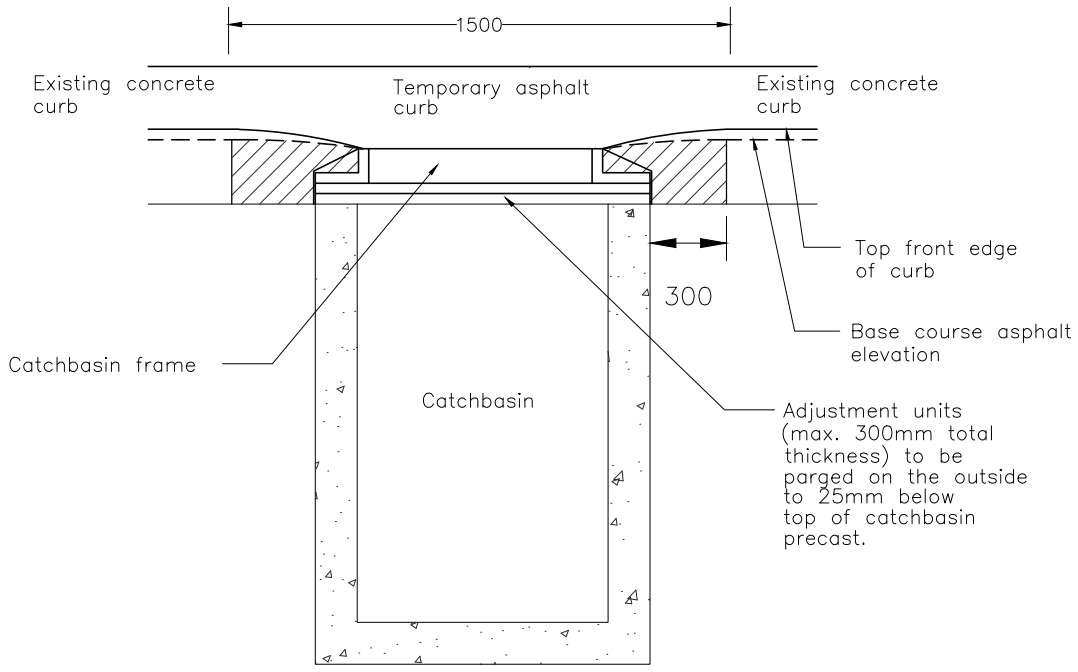
1. Temporary HL8 asphalt to be tapered to top of catchsasin frame.
2. Maximum corbelling when stepping adjustment units is 150mm. Each individual shift of adjustment units is not to exceed 50mm.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Catchbasin Grate Detail**	DWG. Date: November 1994
Approved:	At Base Course Asphalt Elevation	Revision No: 2
Scale: N.T.S.		Revision Date: May 2006
		DWG No. 200



Side View



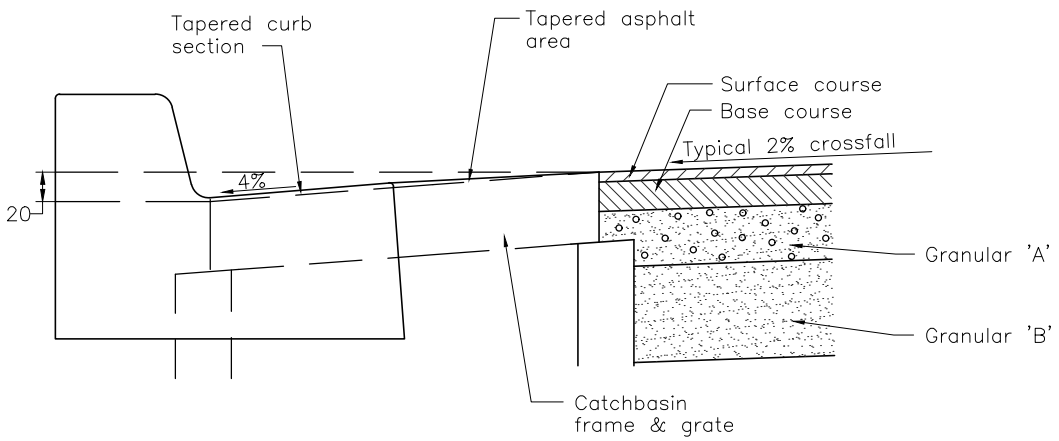
Front View

Notes:

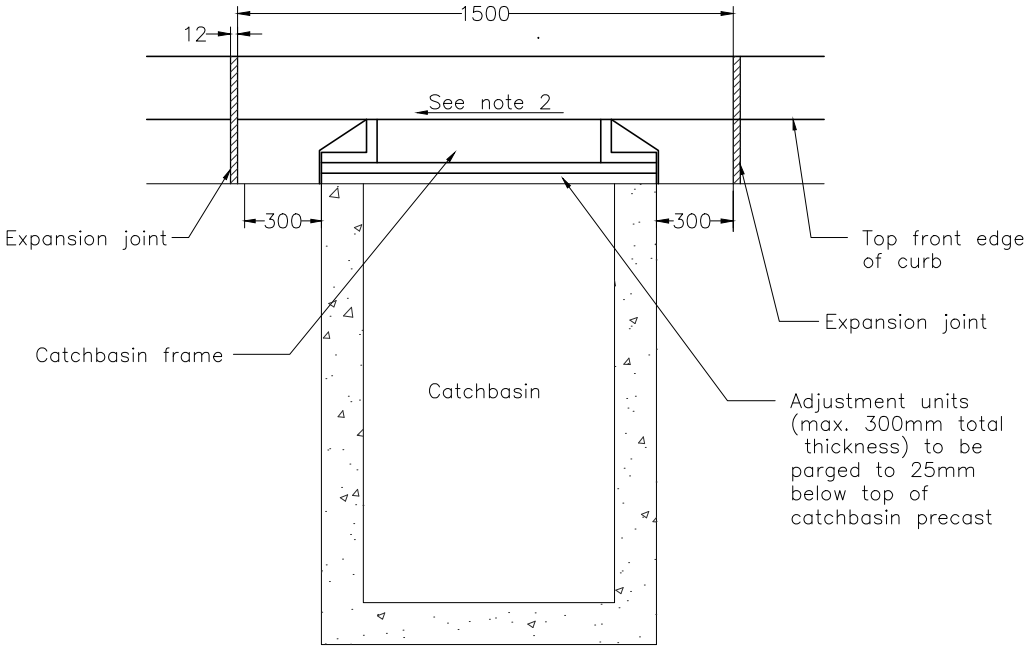
1. Temporary asphalt curb to be constructed to match existing concrete curb and gutter.
2. Temporary asphalt curb and gutter to be tapered to top of catchbasin frame.
3. Maximum corbelling when stepping adjustment untis is 150mm. Each individual shift of adjustment units is not to exceed 50mm.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked: M.	**Catchbasin Grate Detail**	DWG. Date: November 1994
Approved:	For Full Stage Curb & Gutter at Base Course Asphalt Elevation	Revision No.: 3
Scale: N.T.S		Revision Date: January 2009
		DWG No. 201



Side View



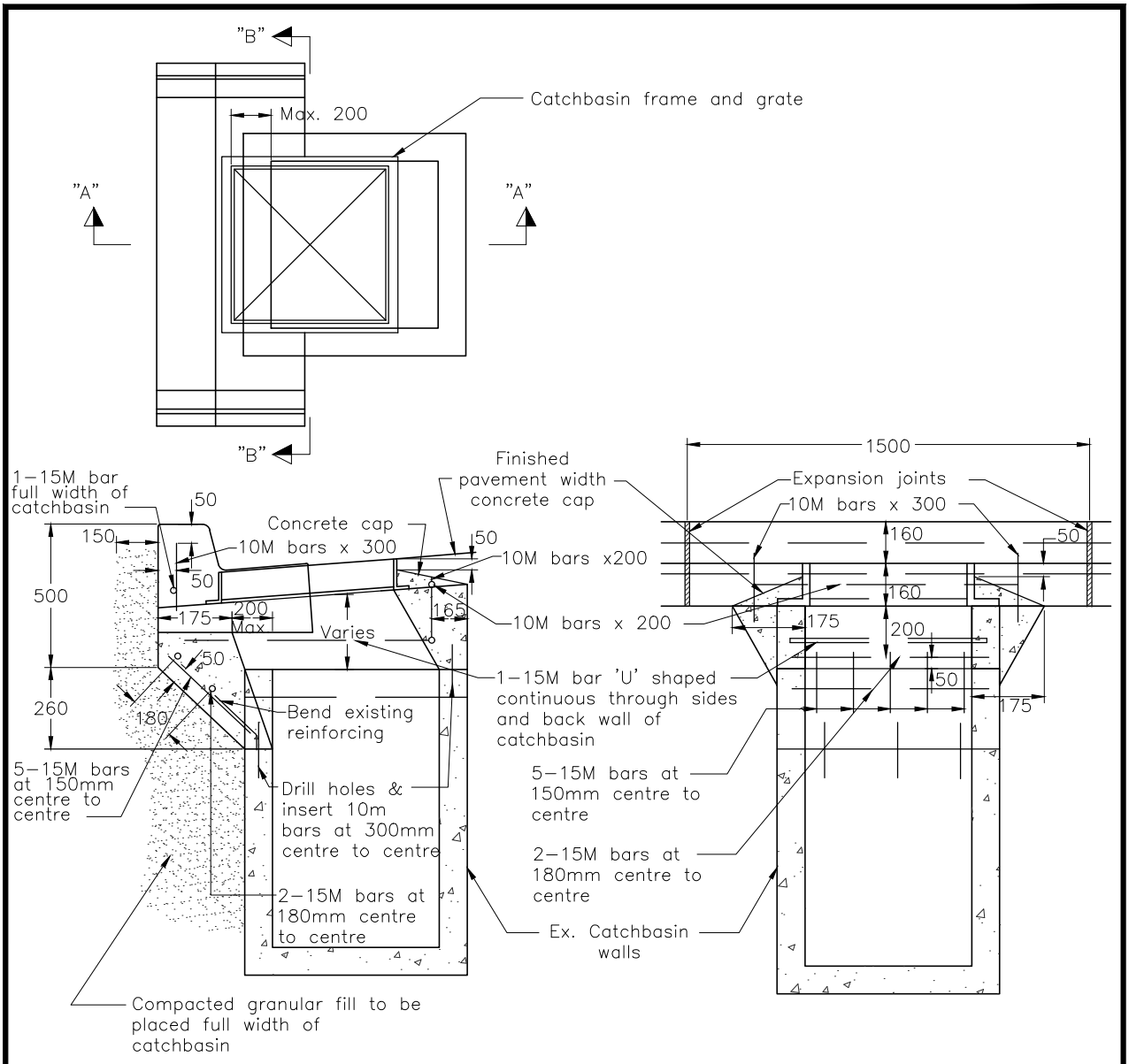
Front View

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: M.	**Catchbasin Grate Detail**	DWG. Date: November 1994
Approved:	Setting Grate at Surface Course Asphalt Elevation	Revision No.: 2
Scale: N.T.S		Revision Date: January 2009
		DWG No. 202



Section "A"–"A"

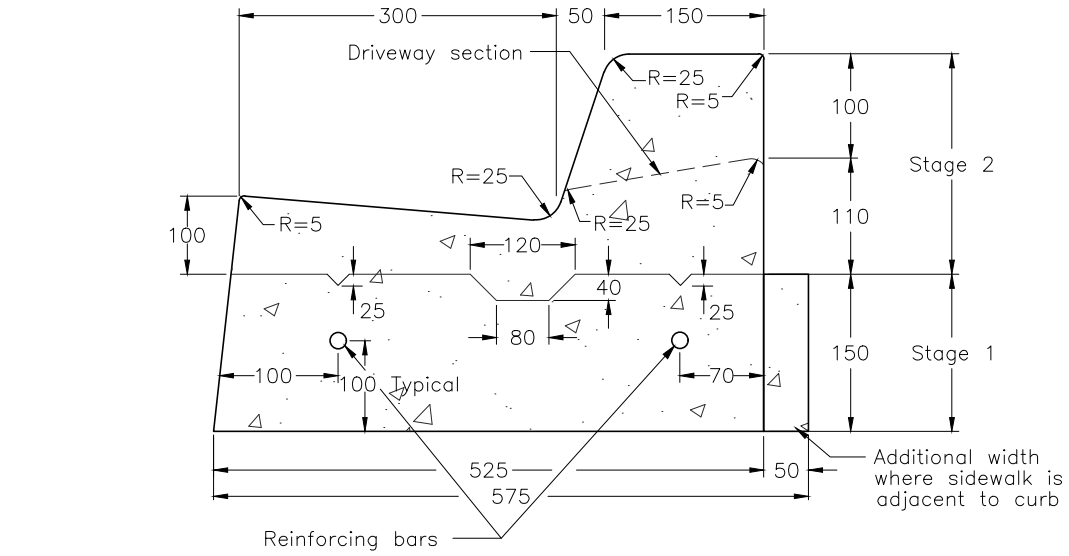
Section "B"–"B"

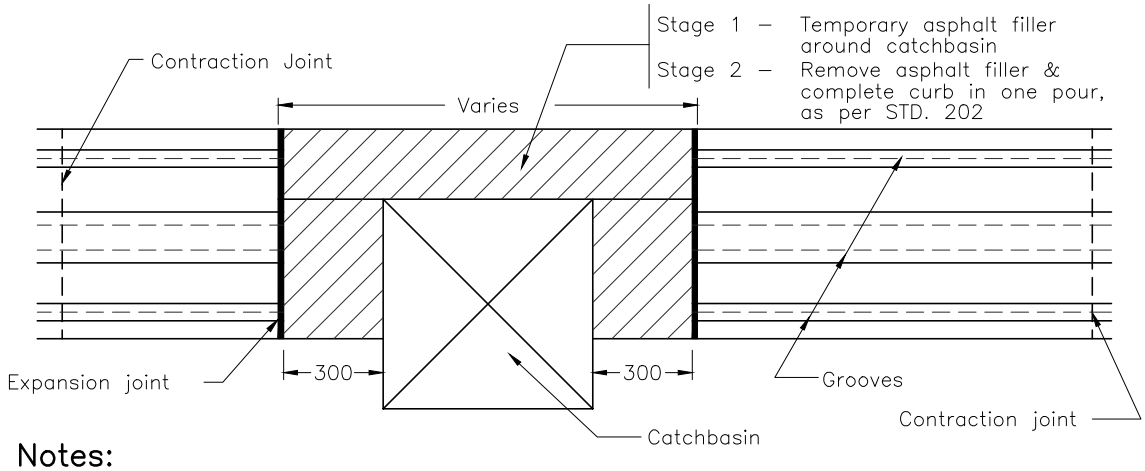
Notes:

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: M.	**Rebuilding Existing Catchbasins to Fit Curb and Gutter**	DWG. Date: January 1993
Approved:		Revision No.: 1
Scale: N.T.S		Revision Date: October 2018
		DWG No. 203



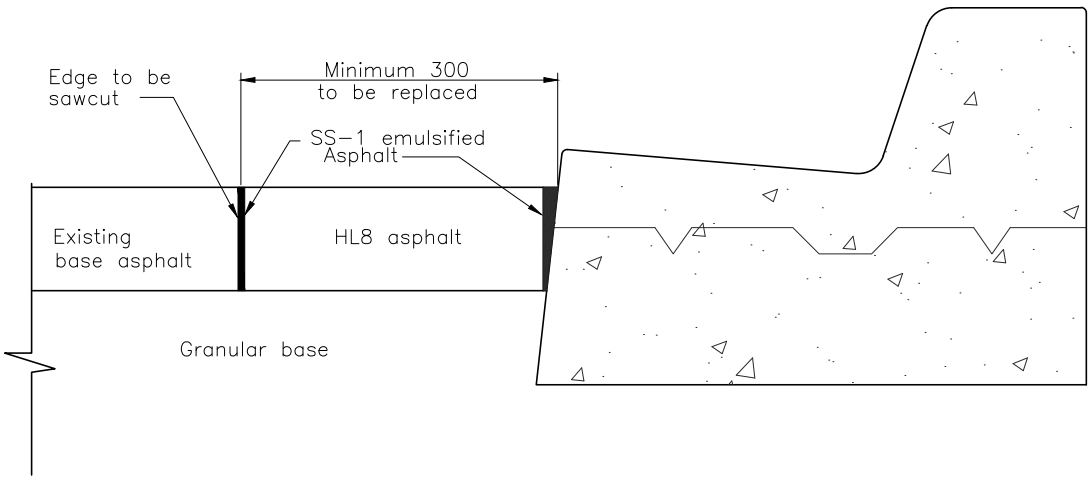


Notes:

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 ± 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± 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:	**Two-Stage Curb and Gutter**	DWG. Date: June 1999
Approved:		Revision No.: 6
Scale: N.T.S		Revision Date: October 2018
		DWG No. 206

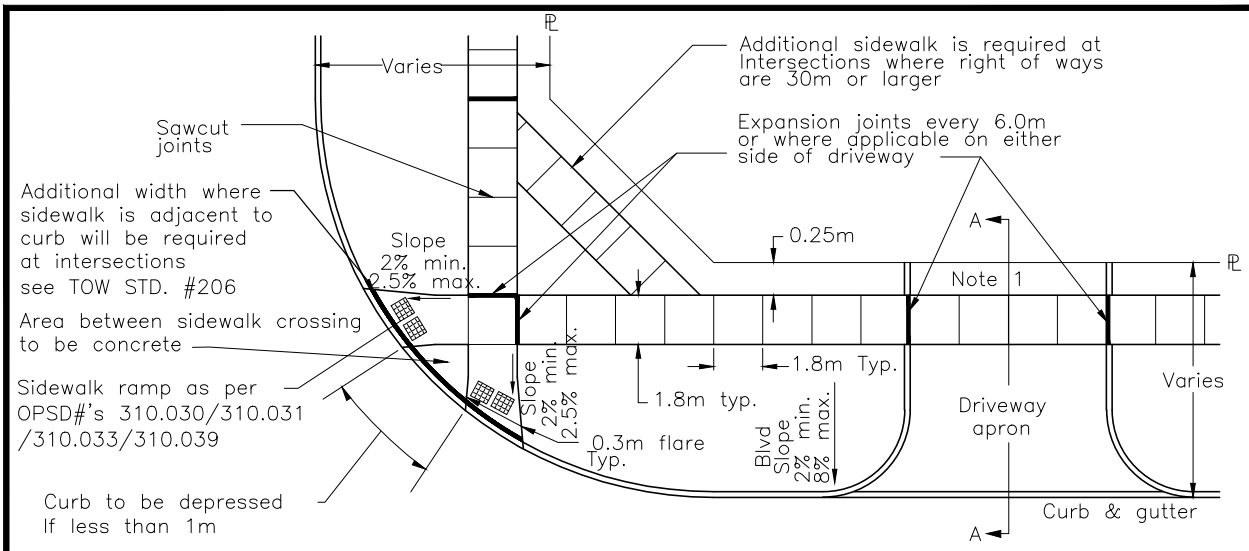


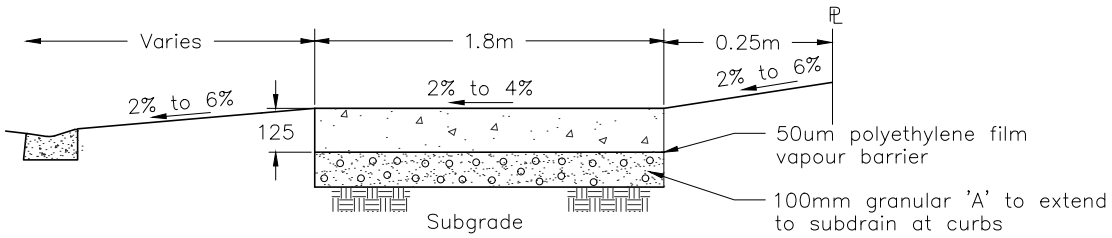
Notes:

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.

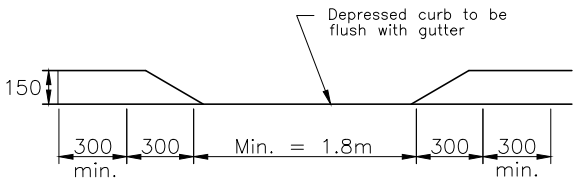
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Re-instatement of Base Asphalt for Two-Stage Curb & Gutter**	DWG. Date: April, 1997
Approved:		Revision No.: 3
Scale: N.T.S		Revision Date: May 2006
		DWG No. 207

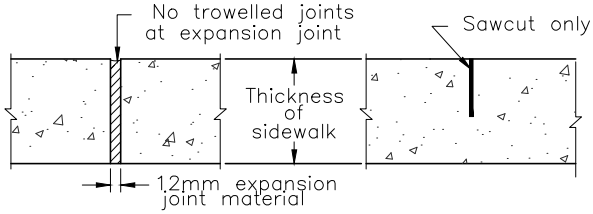




Typical Section 'A'



Depressed Curb Section



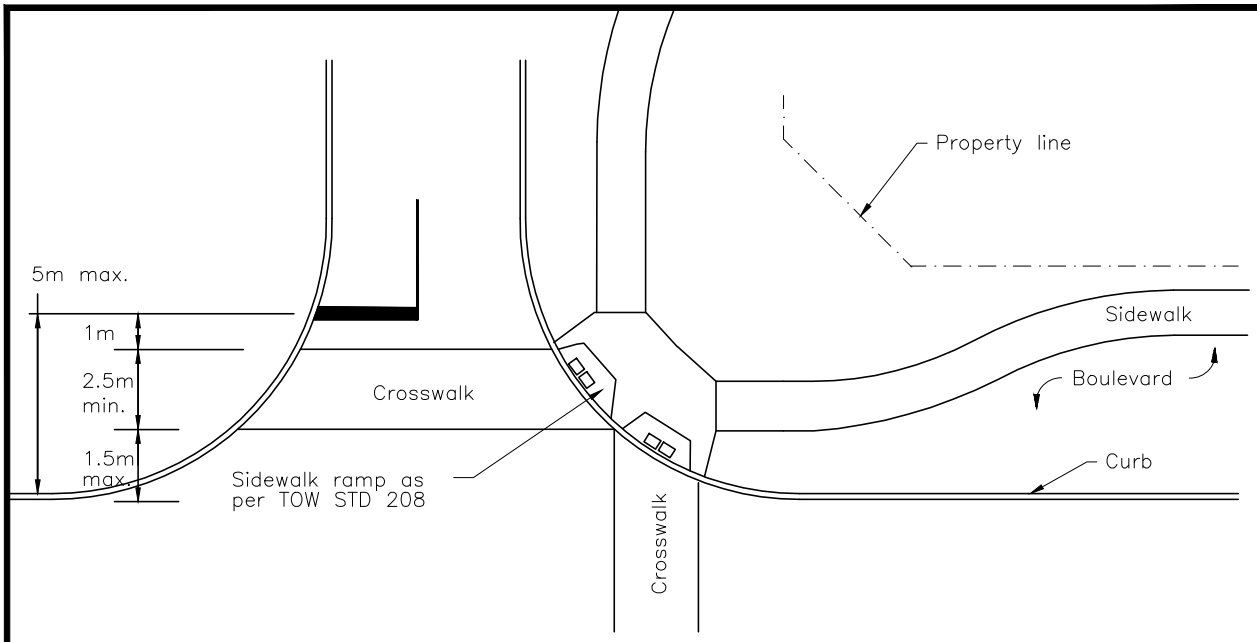
Expansion Joint Sawcut Joint

Notes:

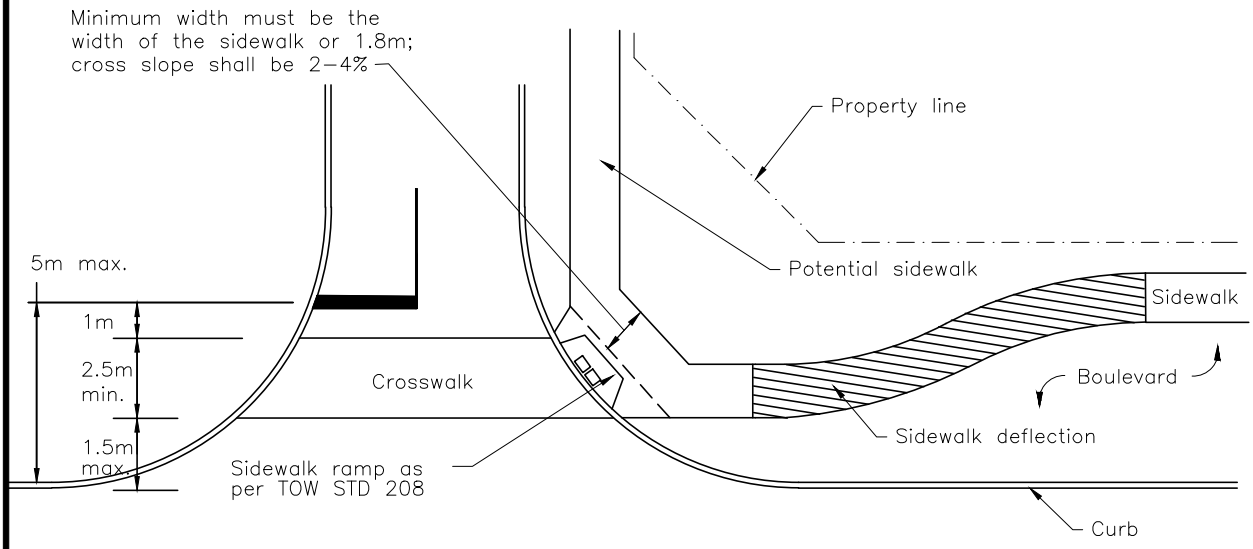
1. Sidewalk thickness to be 175mm through residential driveway entrances.
2. For commercial and industrial driveways, sidewalk thickness to be 175mm with 150x150 wire mesh mw 18*7 gauge to be placed 75mm from the bottom.
3. Refer to Town of Whitby Standard #304 for driveway profile and sidewalk crossfall.
4. Concrete to be 32mpa compressive strength at 28 days with 7.0 ± 1.5% air entrainment, cement ratio shall be 355kg/m3. Slump to be 70mm ± 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:	**Concrete Sidewalk**	Dwg. Date: May 1997
Approved:		Revision No.: 8
SCALE: N.T.S		Revision Date: June 2022
		DWG No. 208



Sidewalk Deflection to Angled Crosswalks



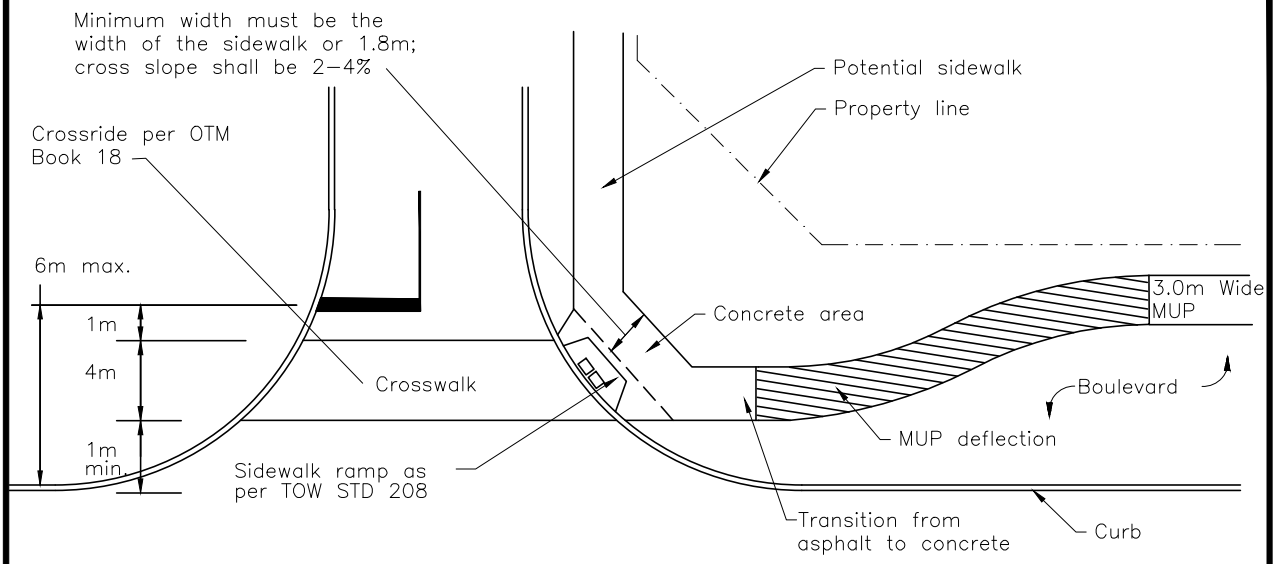
Sidewalk Deflection to Parallel Crosswalk

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:	**Typical Stop Bar Locations and Sidewalk Deflections at Intersections**	DWG. Date: August 2015
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: June 2022
		DWG No. 208.10



Multi–Use Path (MUP) Crossing and Deflection

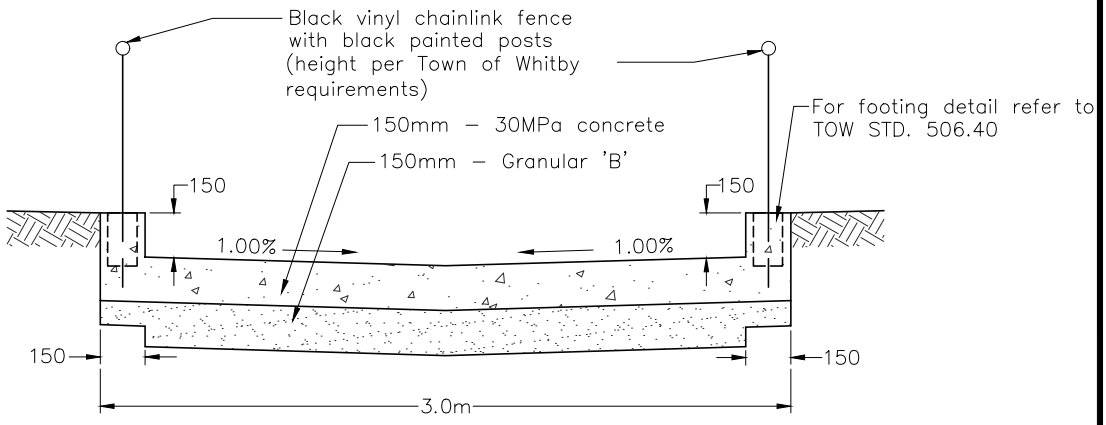
Notes:

1. MUP deflection shall be the same as Multi–Use–Pathway (TOW STD 214)

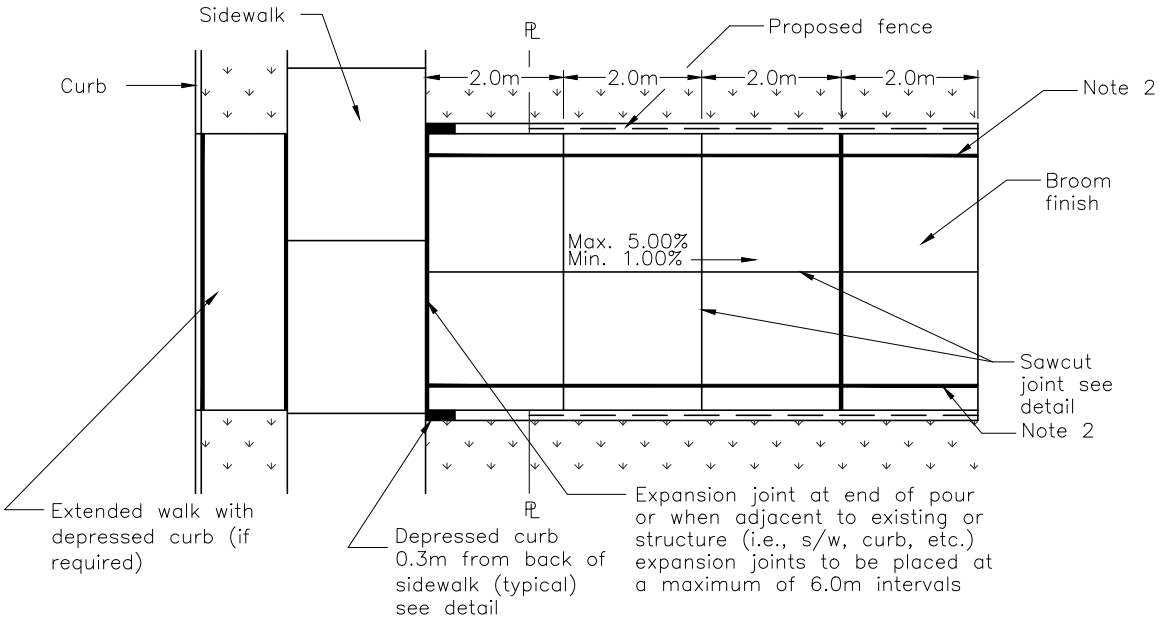
2. Signage required as per OTM Book 18.

All dimensions in millimetres except where noted

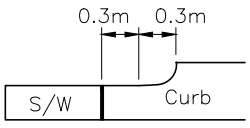
The Corporation of the Town of Whitby		Engineering Services
Checked:	**Typical Stop Bar Locations and MUP Deflections at Intersections**	DWG. Date: June 2022
Approved:		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 208.20



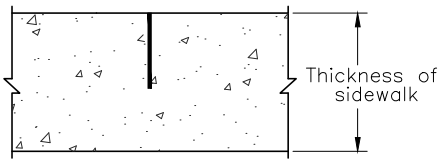
Section View



Plan View



Depressed Curb View



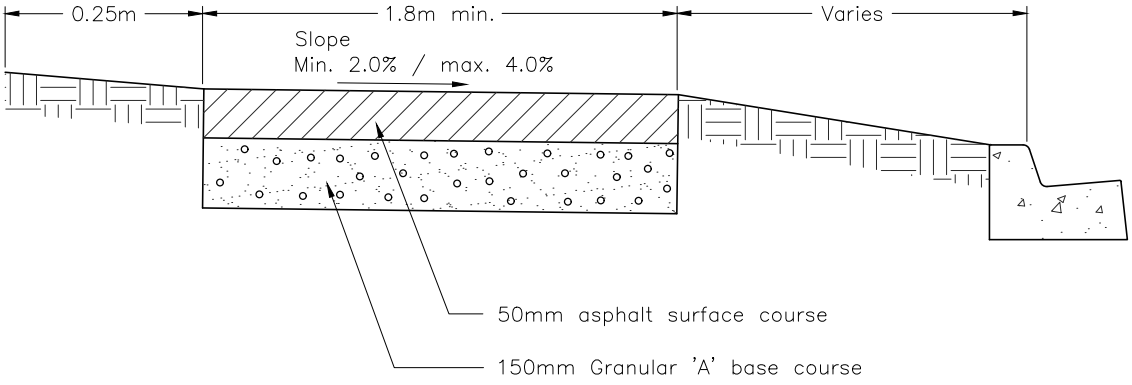
Sawcut Joint

Notes:

1. Concrete to be 32Mpa compressive strength at 28 days with 7.0 ± 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:	**Overland Flow Walkway**	DWG. Date: November 1994
Approved:		Revision No.: 5
Scale: N.T.S		Revision Date: October 2018
		DWG No. 209

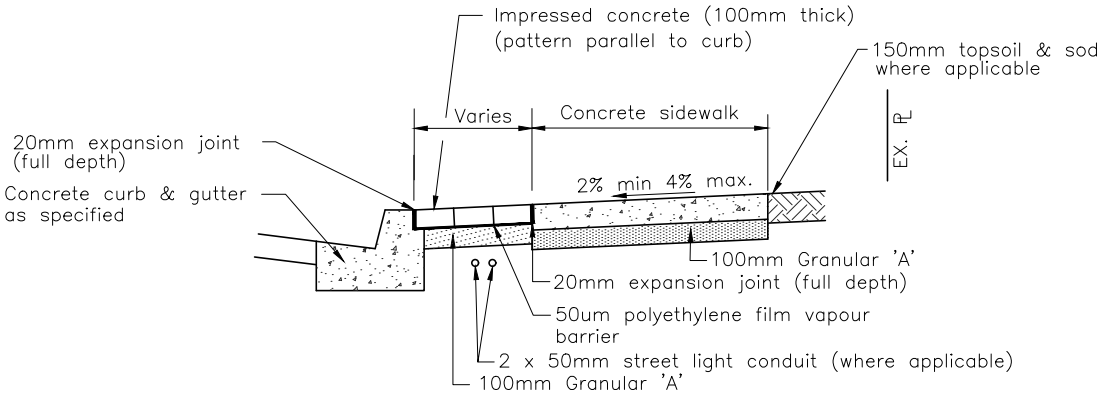


Note:

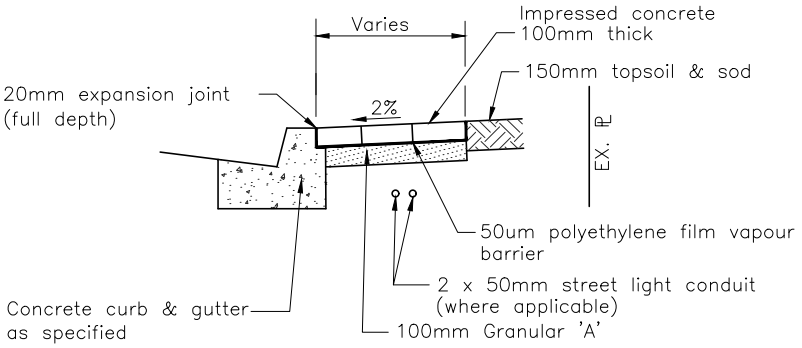
1. Asphalt type to be HL3.

All dimensions in millimetres except where noted

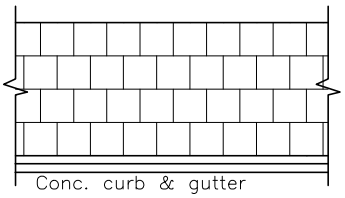
The Corporation of the Town of Whitby		Engineering Services
Checked:	**Temporary Asphalt Sidewalk**	DWG. Date: November 1994
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: June 2022
		DWG No. 210



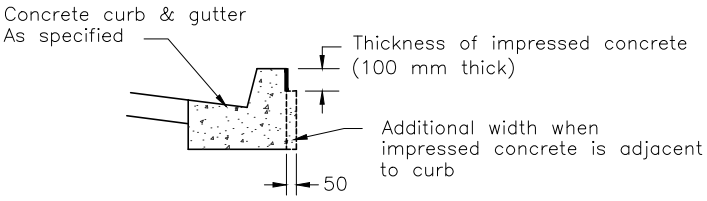
Section at Impressed Concrete Strip
Between Curb and Sidewalk



Section at Impressed Concrete Strip
without Abuting Sidewalk



Impressed Concrete Pattern
200mm X 200mm Square Running Bond



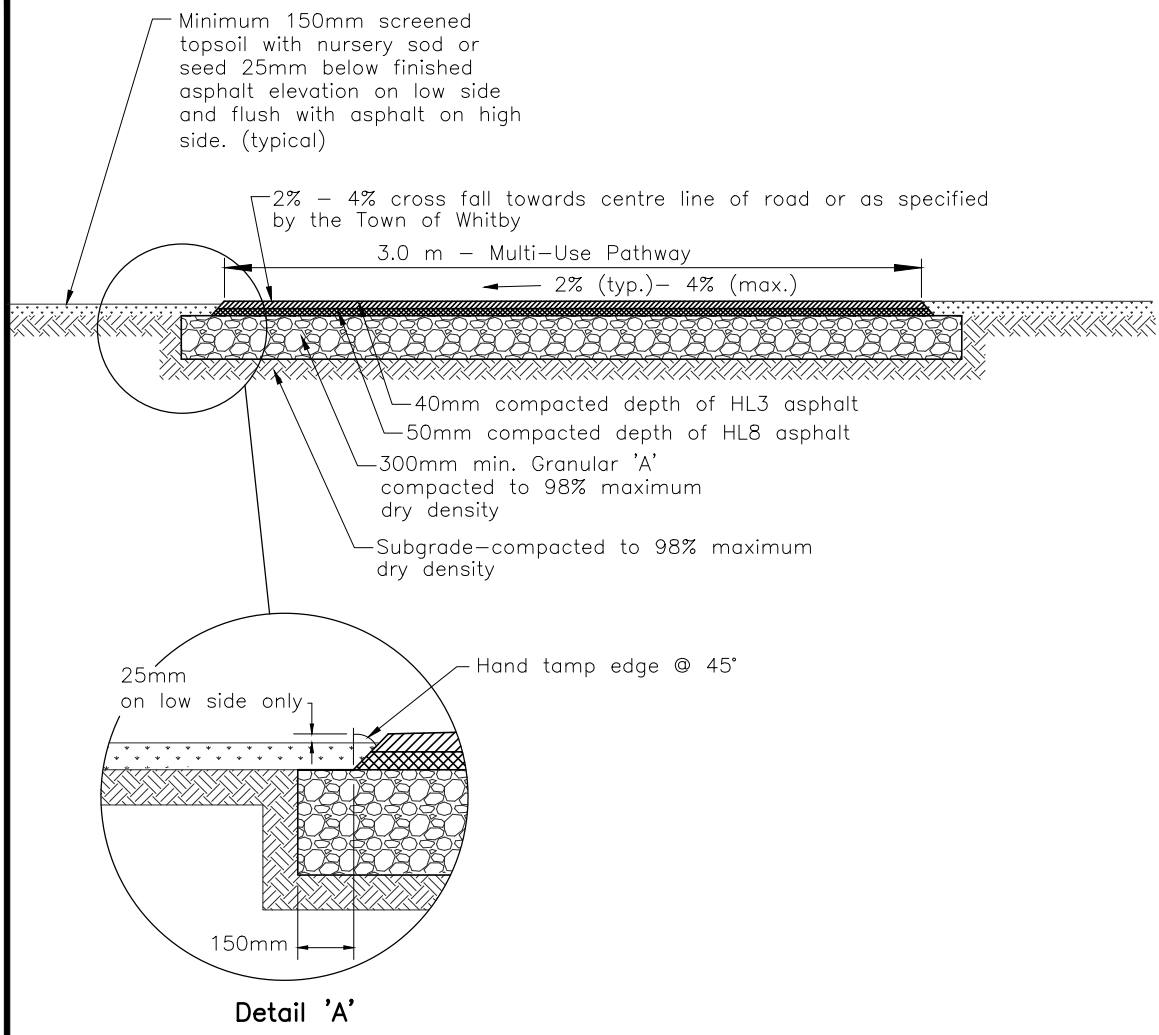
Concrete Curb & Gutter Extra Width
(where applicable)

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/m^3.
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:	**Coloured Impressed Concrete**	DWG. Date: August 2015
Approved:		Revision No: 1
Scale: N.T.S.		Revision Date: October 2018
		DWG No. 211

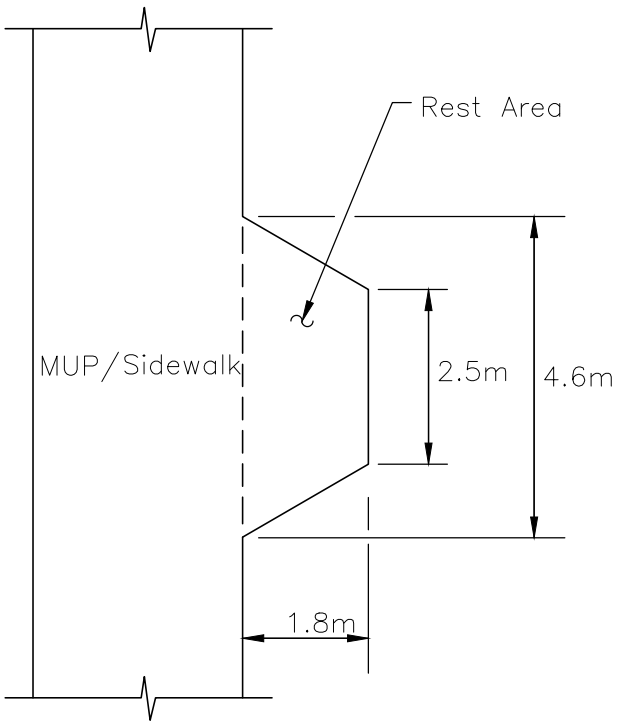


Notes:

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.
5. The standard 3.0m width may be reduced upon approval by the Town.

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: October 2018
		DWG No. 214



Notes:

1. Typical spacing of rest area is 300m.
2. Bus pads, driveways and enlarge sidewalk area at intersection may be considered as a rest area.
3. Rest areas to be provided on at least one side of a sidewalk and a multi–use path (MUP). Alternating sides, where space permits, is encouraged.
4. Material to match adjacent facility.
5. 2% (Typ.) – 4% (Max.) cross fall towards ℄ of road or as specified by the Town of Whitby

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Typical Rest Area Along MUP and Sidewalk**	DWG. Date: June 2022
Approved		Revision No.:
Scale: N.T.S		Revision Date: -
		Dwg No. 214.10

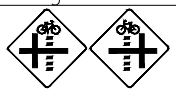
Note:
1. Refer to Town of Whitby Standard #214.30 for notes.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**MUP Signage and Pavement Markings**	DWG. Date: June 2022
Approved:		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 214.20

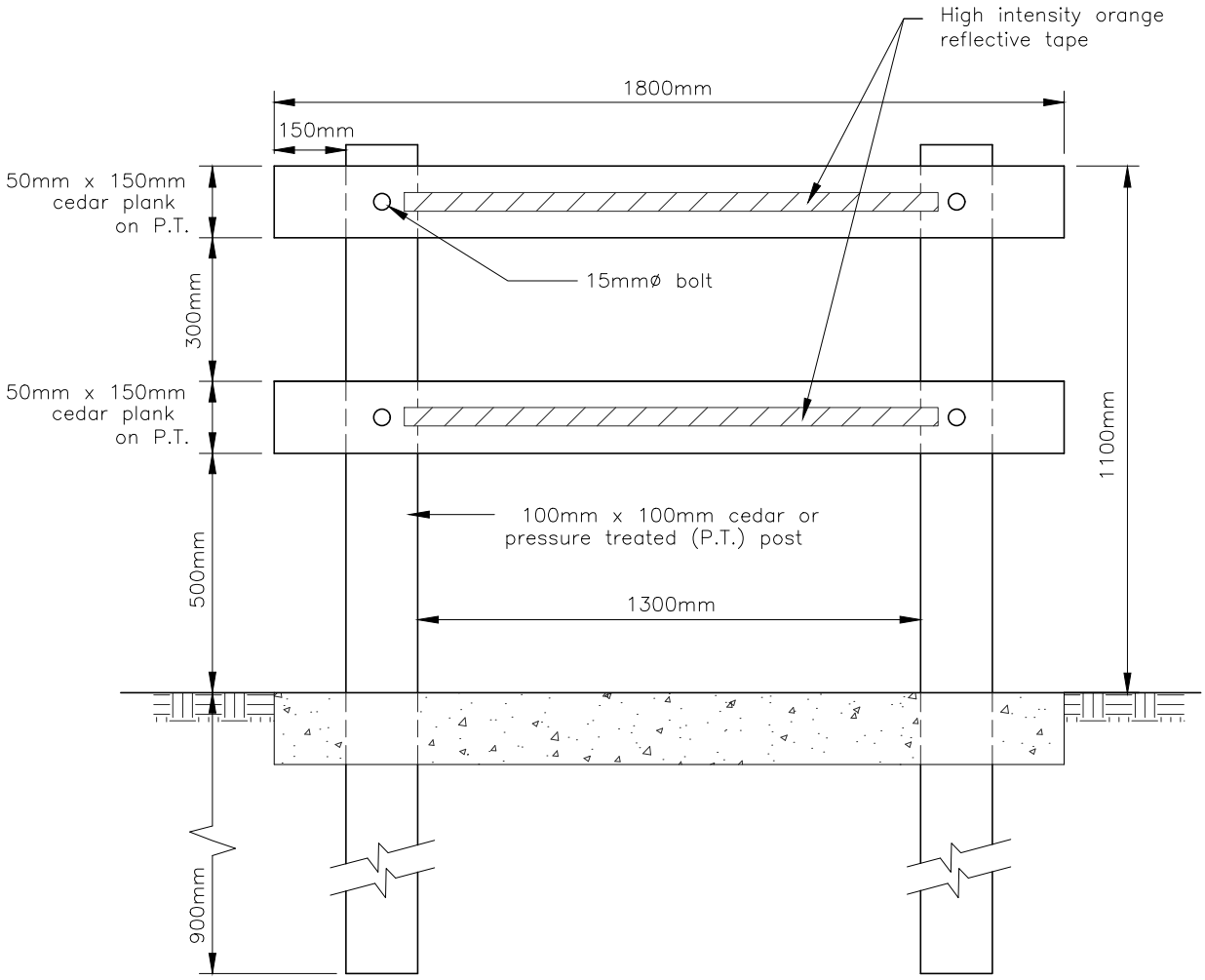
Notes:

1. Signage, pavement markings, including crossride layout as per OTM.
2. All signalized intersection crossing markings shall be the combined crossride crossing type.
3. All non–signalized intersections and major driveways shall be a mixed crossride.
4. MUP centrelines shall be a 100mm solid yellow line.
5. Green conflict paint shall be applied at high volume entrances.
6. User symbols, such as stylized bicycle and walking pedestrian stencil/icon, shall be applied at intersections and repeated as required.
7. Sign mounting heights and lateral offsets shall be in accordance with OTM Book 1B, Section 12.
8. Warning signs placed as per OTM Book 6, "Warning Signs".

Sign Code	Sign
Rb–71	 Shared Pathway
Rb–73	 Yield to Pedestrians
Wc–15	 Pedestrian and Bicycle Crossing Ahead
Wc–32t	 Crossing
Wc–38	 Slow, Watch for Turning Vehicles
Wc–44R Wc–44L	 Bicycle Crossing Side Right/Left

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**MUP Signage and Pavement Markings Notes**	DWG. Date: June 2022
Approved:		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 214.30

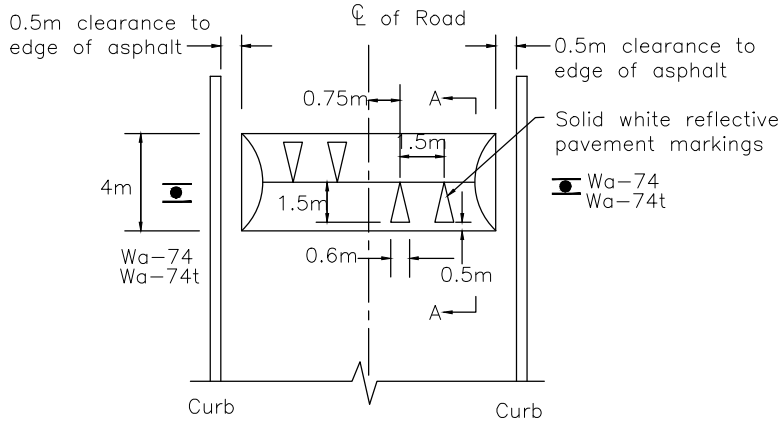


Notes:

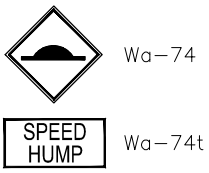
1. To be used at end or side of sidewalk where grade difference would cause a pedestrian hazard.
2. Orange high intensity reflective tape to be applied to cross planks.
3. Cross cedar planks to be painted white.

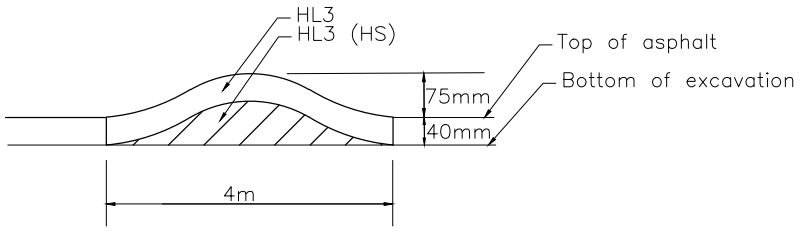
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Temporary Sidewalk Barricade**	DWG. Date: August 2015
Approved:		Revision No.: 1
Scale: N.T.S		Revision Date: June 2022
		DWG No. 215

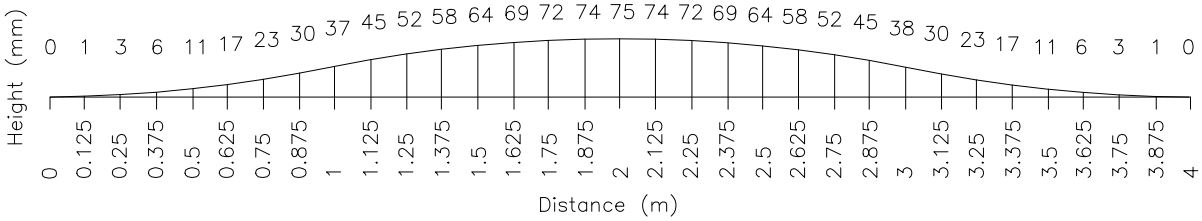


Plan





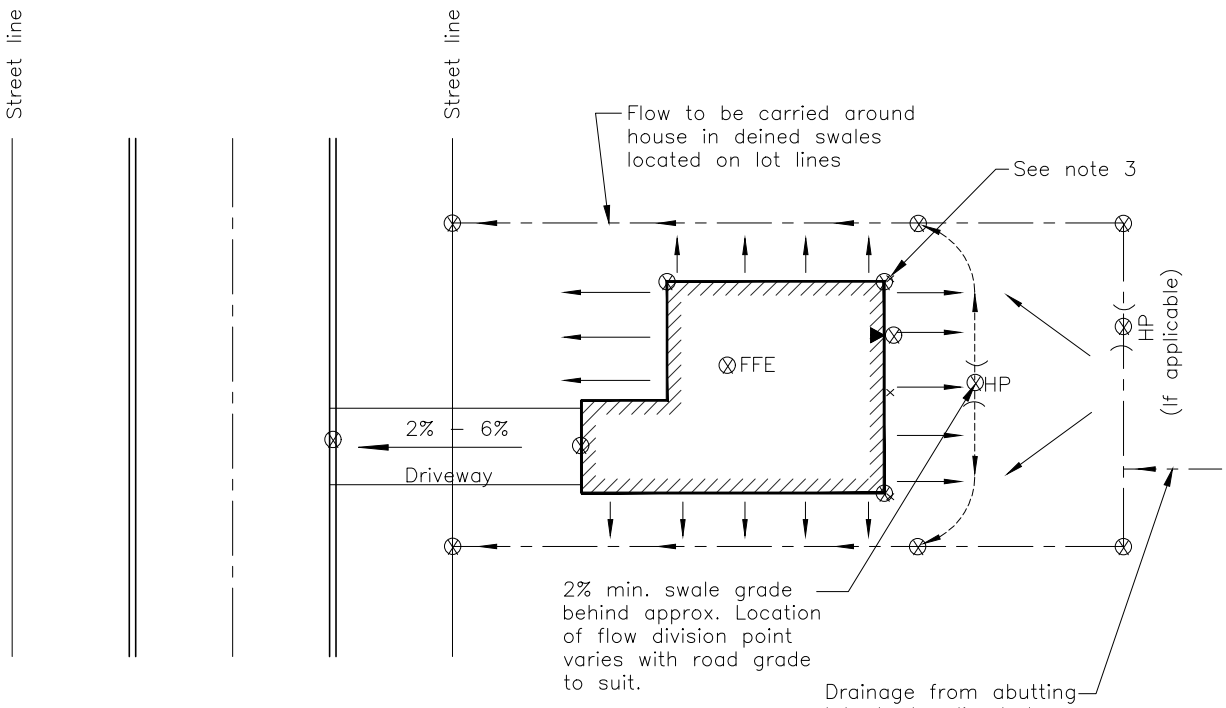
Section A–A



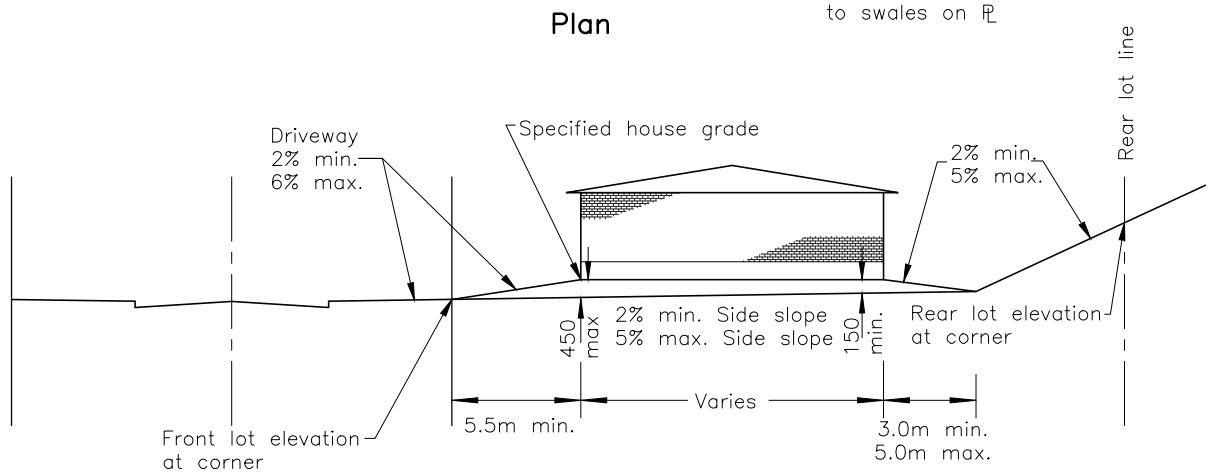
Sinusoidal Speed Hump

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Speed Hump**	DWG. Date: June 2022
Approved:		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 216



Plan



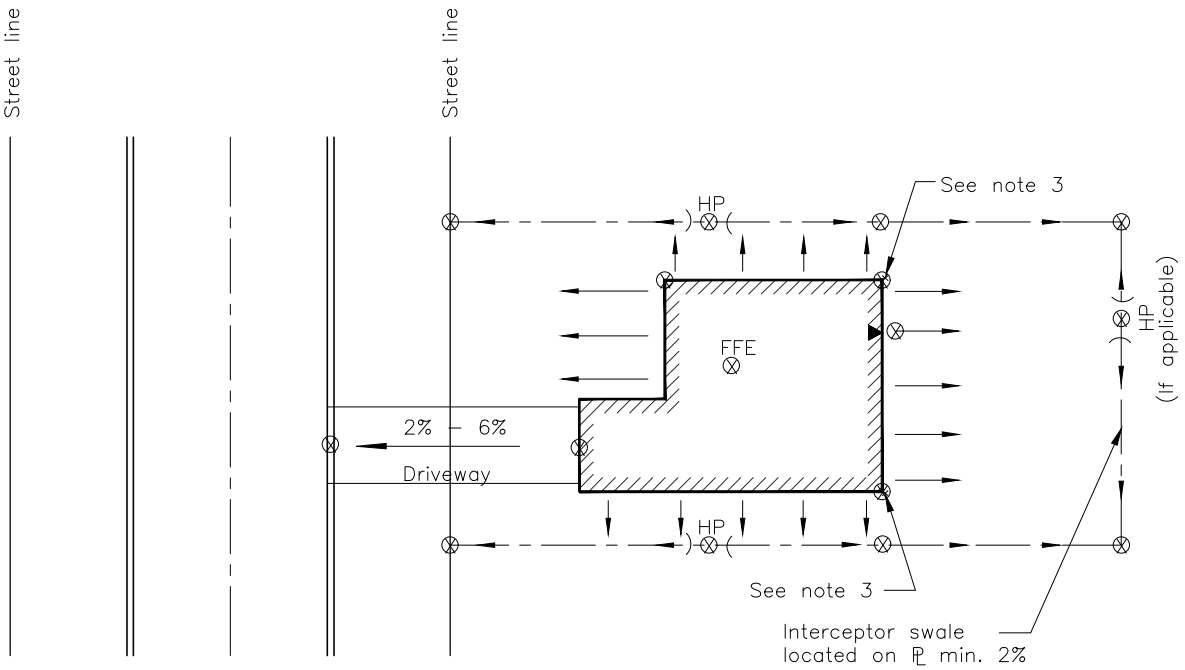
Elevation

Notes:

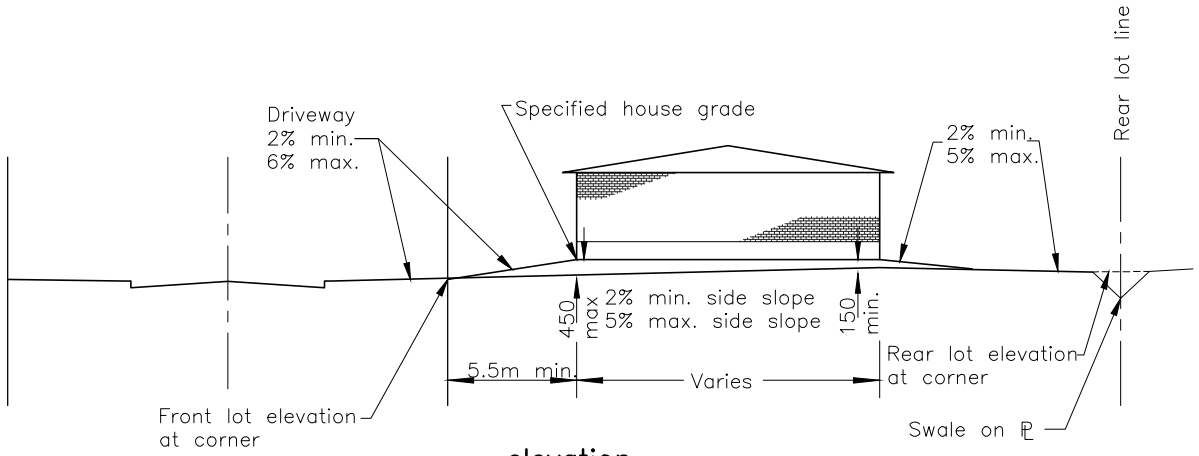
1. Specified house grade shall be a minimum of 300mm above the highest front lot corner or 450mm above the lowest front lot corner, whichever is higher.
2. Refer to Town of Whitby Standard #303 for lot grading notes.
3. Maximum grade differential from the center rear of the house to either rear corner 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:	**Typical Front Lot Drainage**	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: M.	**Rear Lot Drainage**	Dwg. Date: January 1993
Approved:		Revision No.: 5
Scale: N.T.S		Revision Date: October 2018
		DWG No. 301

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:	**Standard Notes for Lot Grading Plans**	DWG. Date: January 1993
Approved:		Revision No: 5
		Revision Date: June 2022
Scale: N.T.S.		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

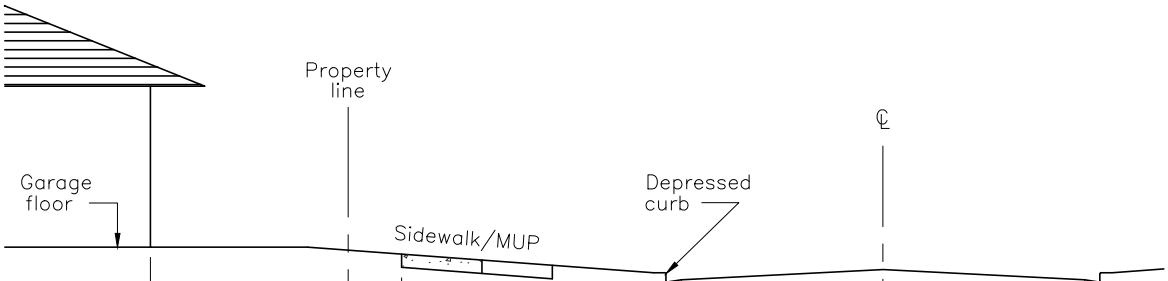
_____
Name of Person Signing for Firm

_____
Position of Person Signing for Firm

_____
Date

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Foundation Control Certificate**	DWG. Date: January 2009
Approved:		Revision No.: 1
Scale: N.T.S		Revision Date: June 2022
		DWG No. 303.10



2%	2%	4%	Minimum grade
5%	2%	5%	Desired grade
6%	4%	6%	* Maximum grade

If MUP 3.0m

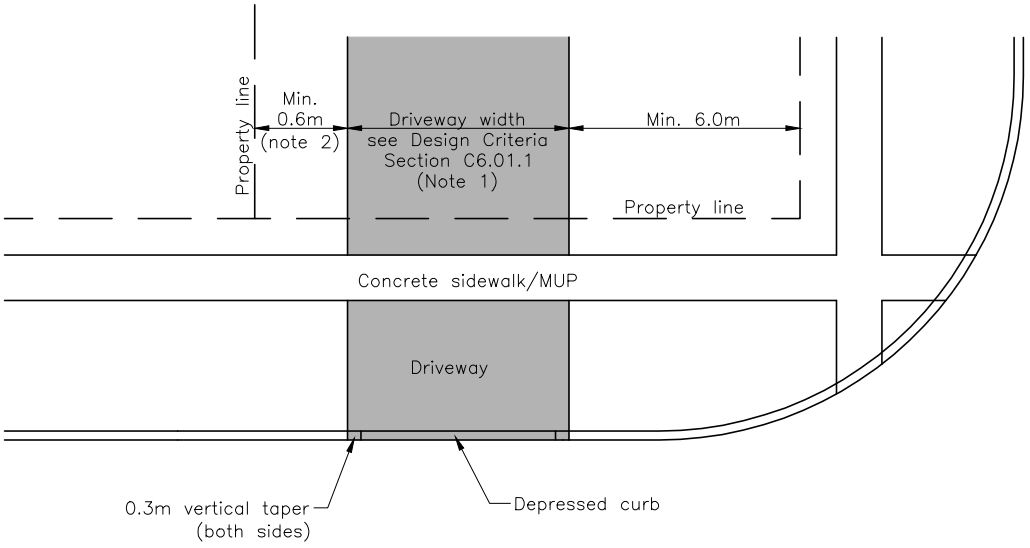
	2%		Minimum grade
	2%		Desired grade
	4%		* Maximum grade

Note:

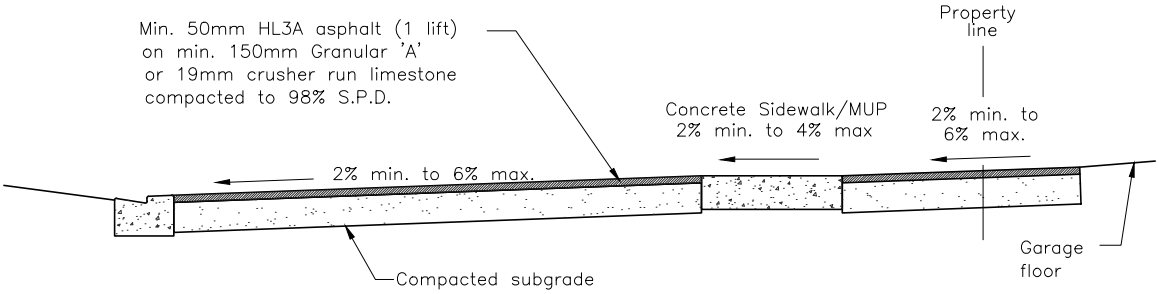
1. The maximum design grade for an access driveway shall be 6%. The maximum as–built grade for an access driveway Shall be 8%.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Driveway Profiles**	DWG. Date: January 1993
Approved:		Revision No.: 3
Scale: N.T.S		Revision Date: June 2022
		DWG No. 304



Plan



Typical Section

Notes:

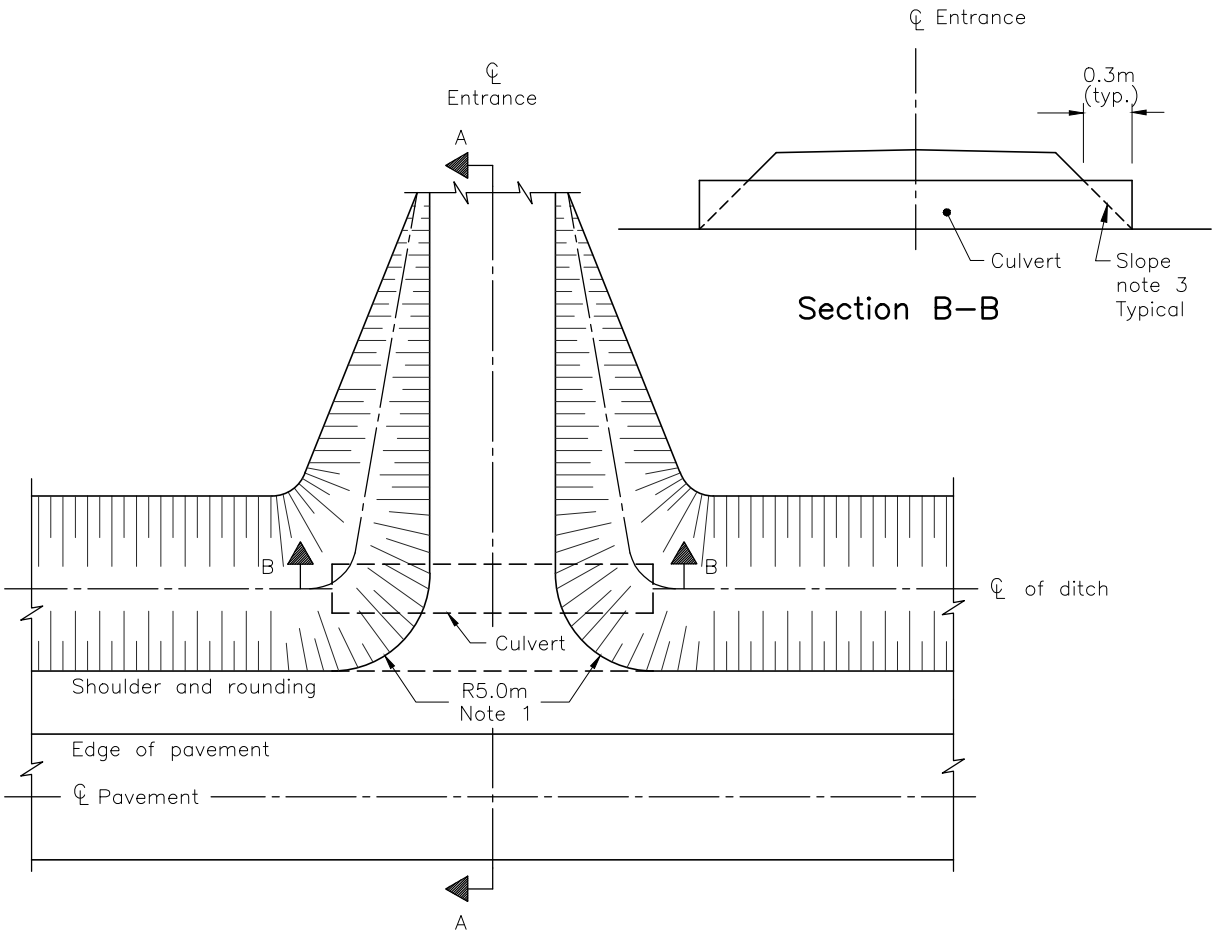
1. Minimum of 0.6m vegetated / permeable swale shall be maintained between property line and edge of driveway.

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.

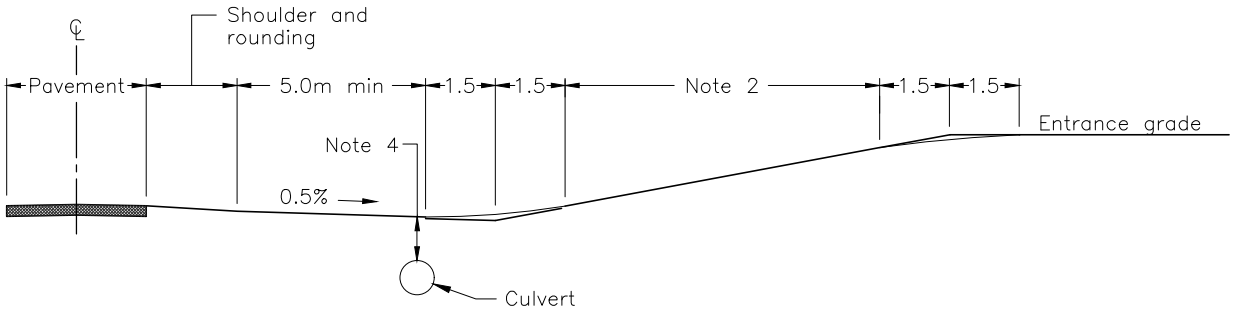
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Residential Driveways**	DWG. Date: June 1999
Approved:		Revision No.: 4
Scale: N.T.S		Revision Date: October 2018
		DWG No. 305



Plan

Section B–B



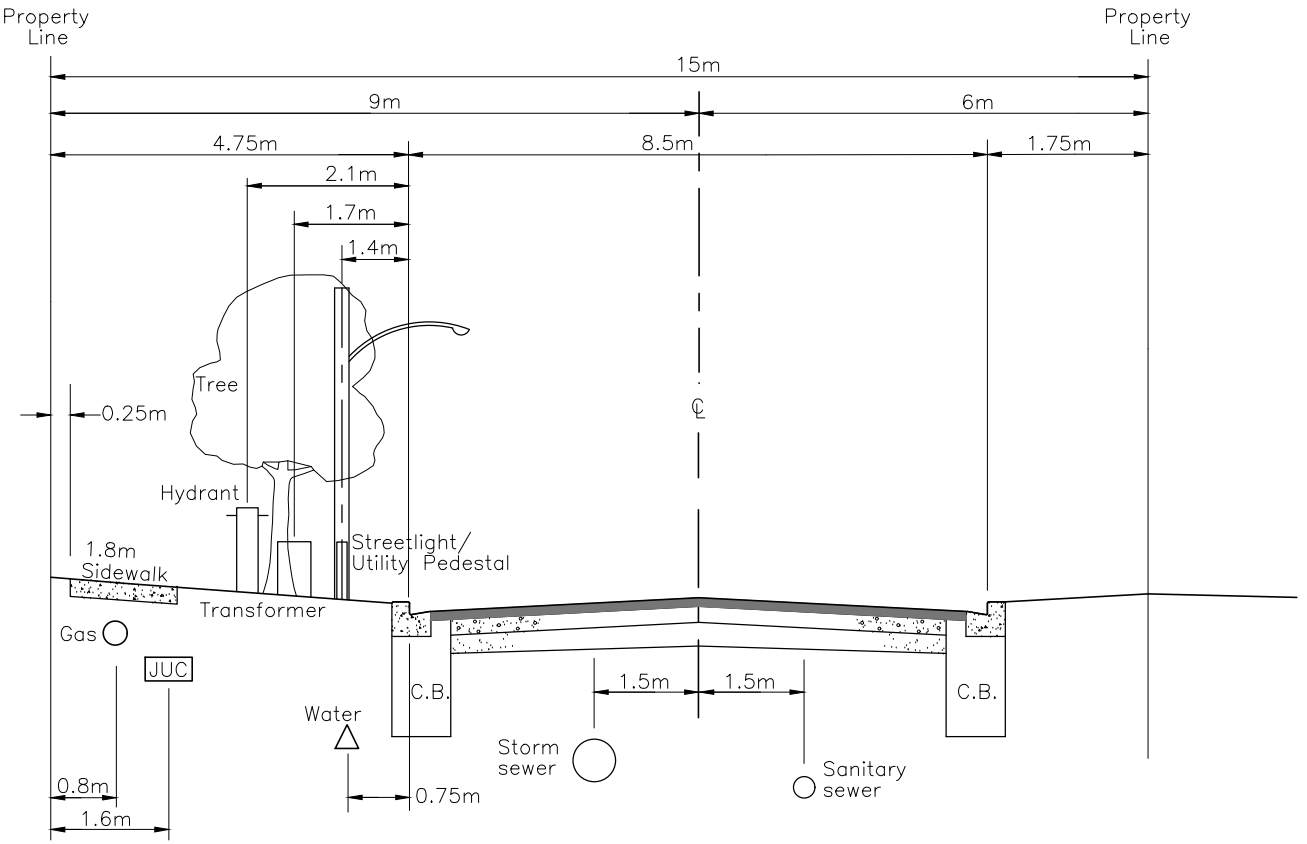
Section A–A

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:	**Rural Driveways**	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.

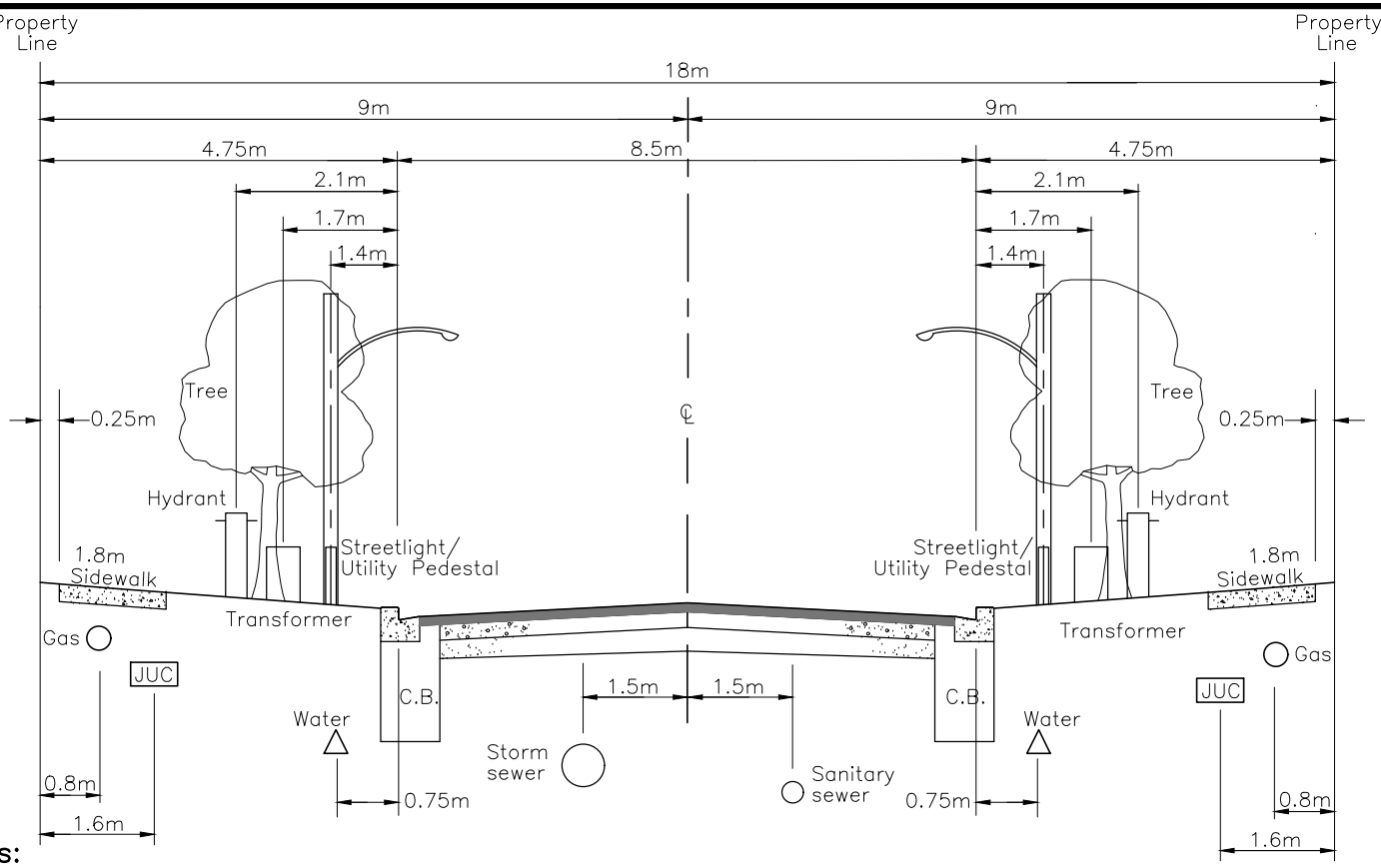
The Corporation of the Town of Whitby

Engineering Services

All dimensions in millimetres except where noted

Local Roadway
15.0m R.O.W.

Scale: N.T.S
Approved:
Checked:
DWG. Date: June 2022
Revision No.: -
Revision Date: -
DWG No. 400



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.

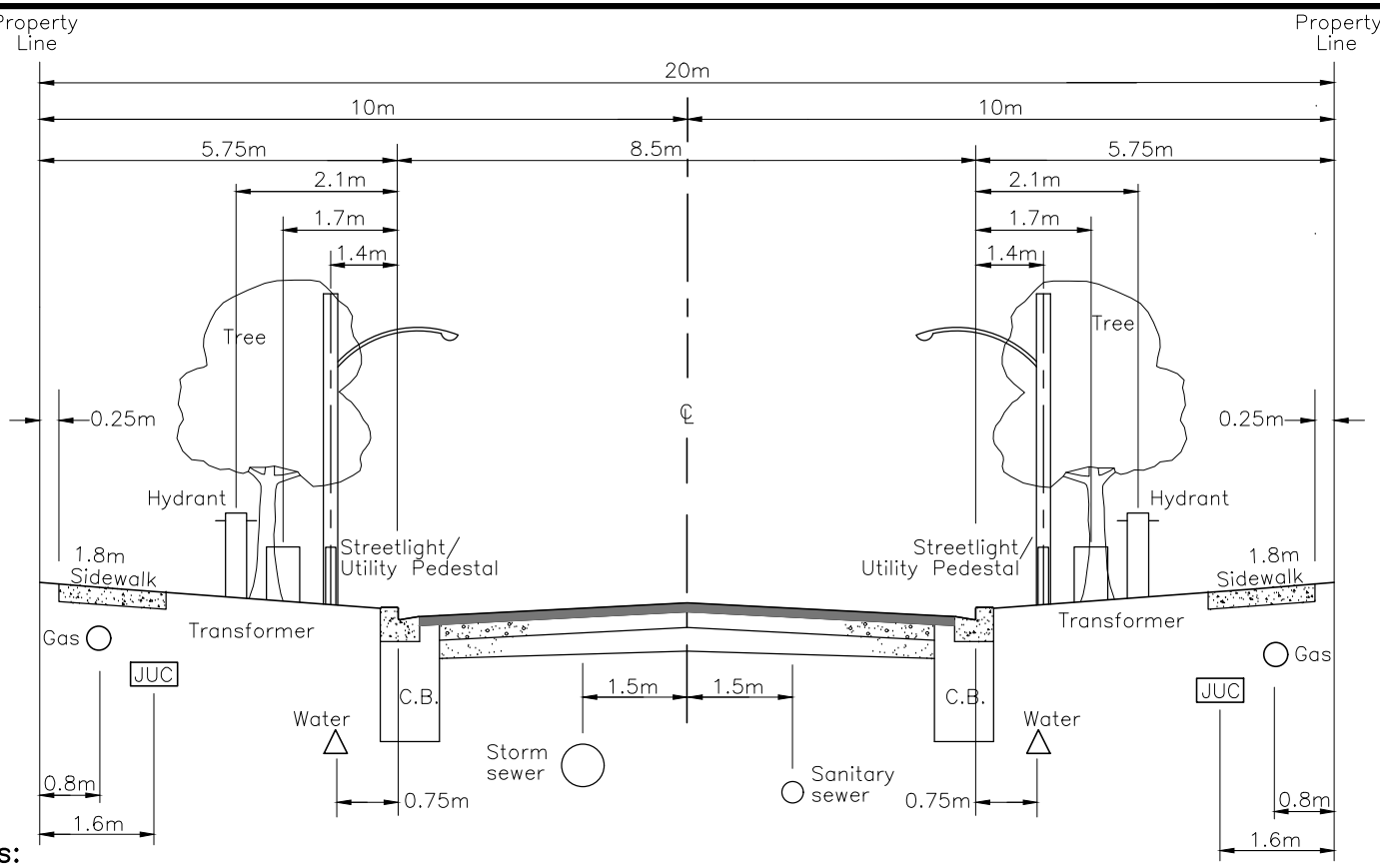
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Local Roadway
18.0m R.O.W.

Scale:	N.T.S
Approved:	
Checked:	
DWG. Date:	June 2022
Revision No.:	-
Revision Date:	-
DWG No.	400.10



Notes:

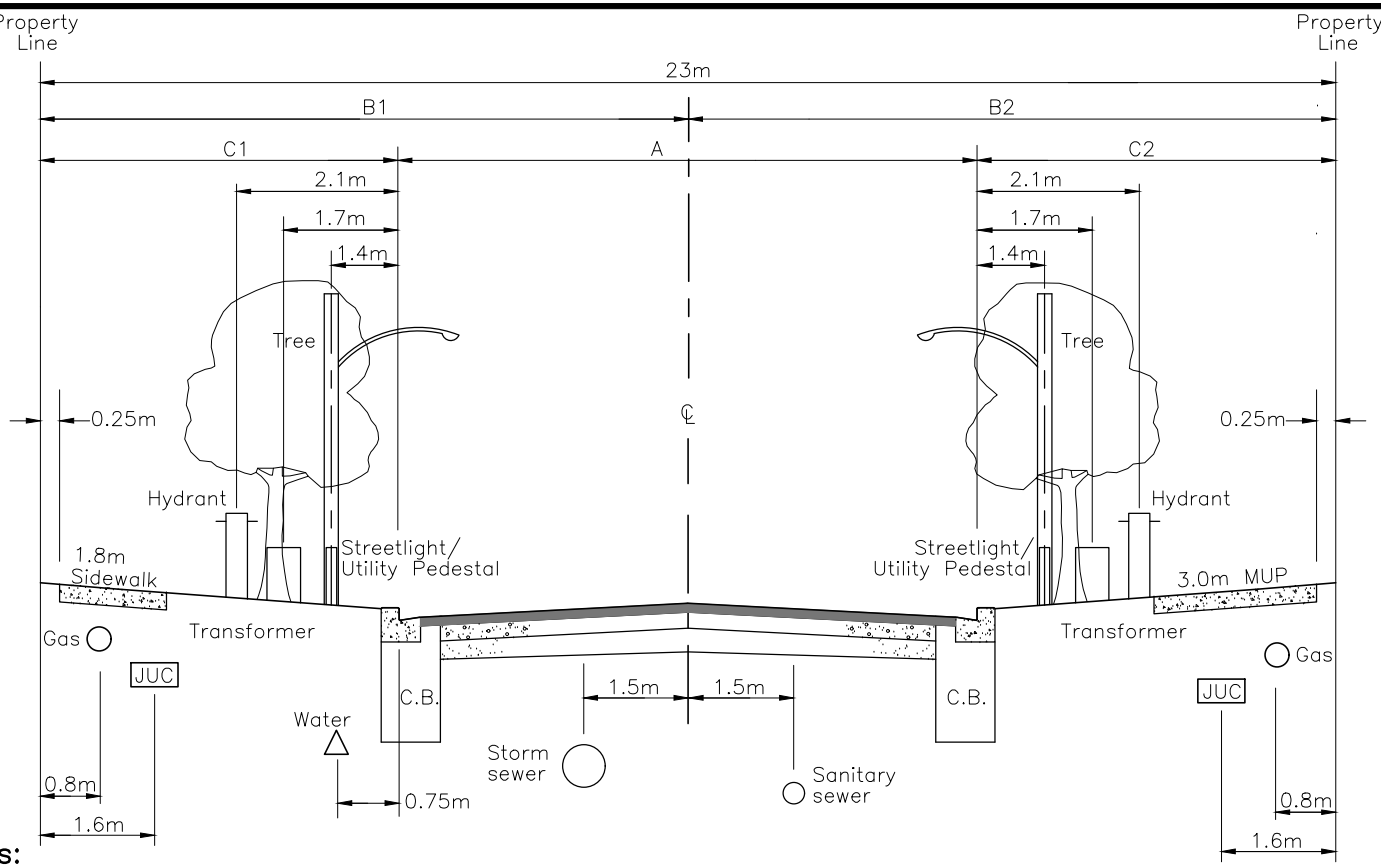
1. Trees will be centered within the boulevard between the end of sidewalk and face of curb.
2. All local roads adjacent to parks, schools and commercial areas shall have a 20m right–of–way (ROW) with 2.5m sidewalk on adjacent side and 1.8m sidewalk on the opposite side.
3. Transformers shall be installed 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

Local Roadway
20.0m R.O.W.

Scale:	N.T.S
Approved:	
Checked:	
DWG. Date:	June 2022
Revision No.:	-
Revision Date:	-
DWG No.	400.20



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.

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

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Collector Roadway 23.0m R.O.W.

Scale: N.T.S

Approved:

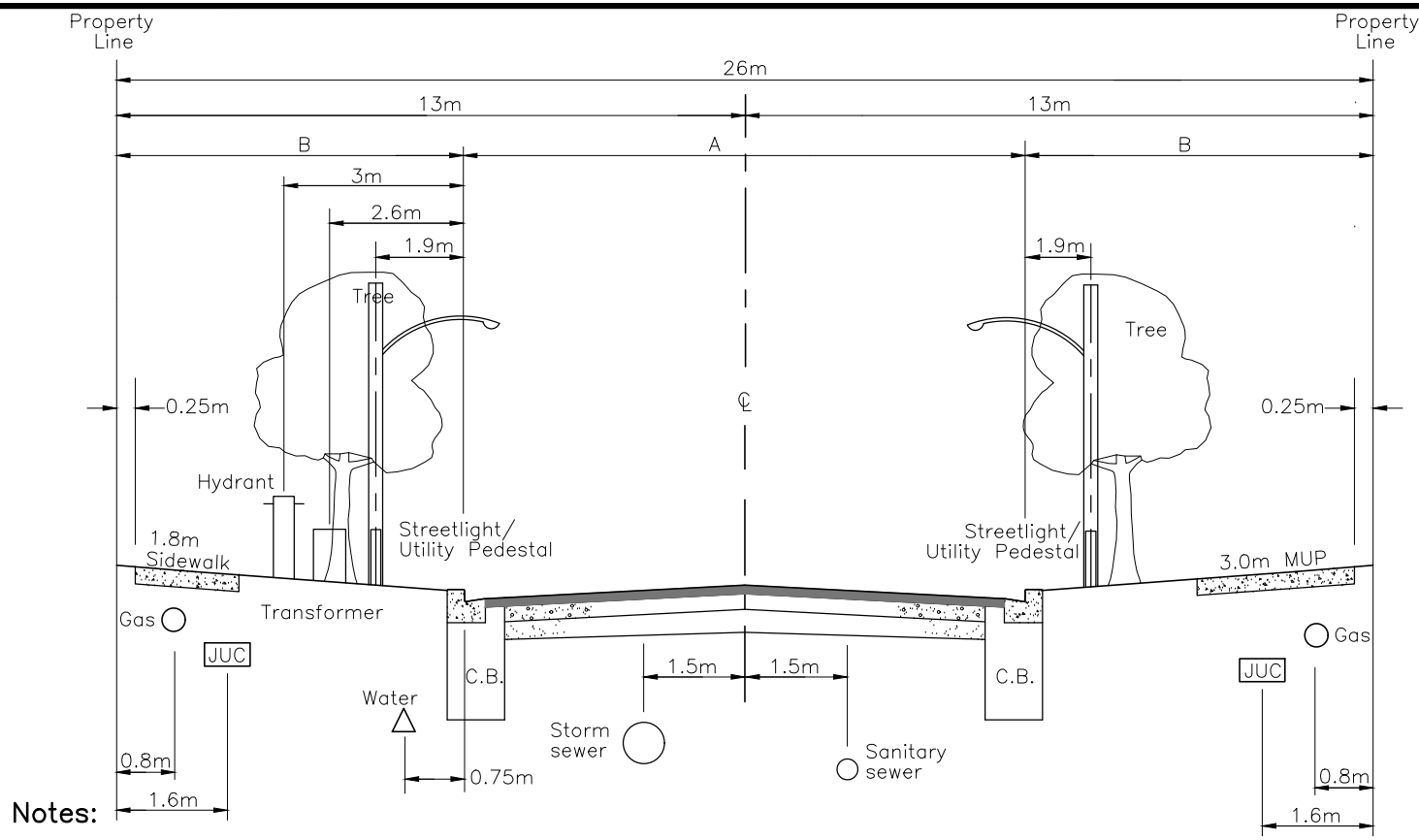
Checked:

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 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	11m
A	8.5m	10m	11m
B	8.75m	8m	7.5m

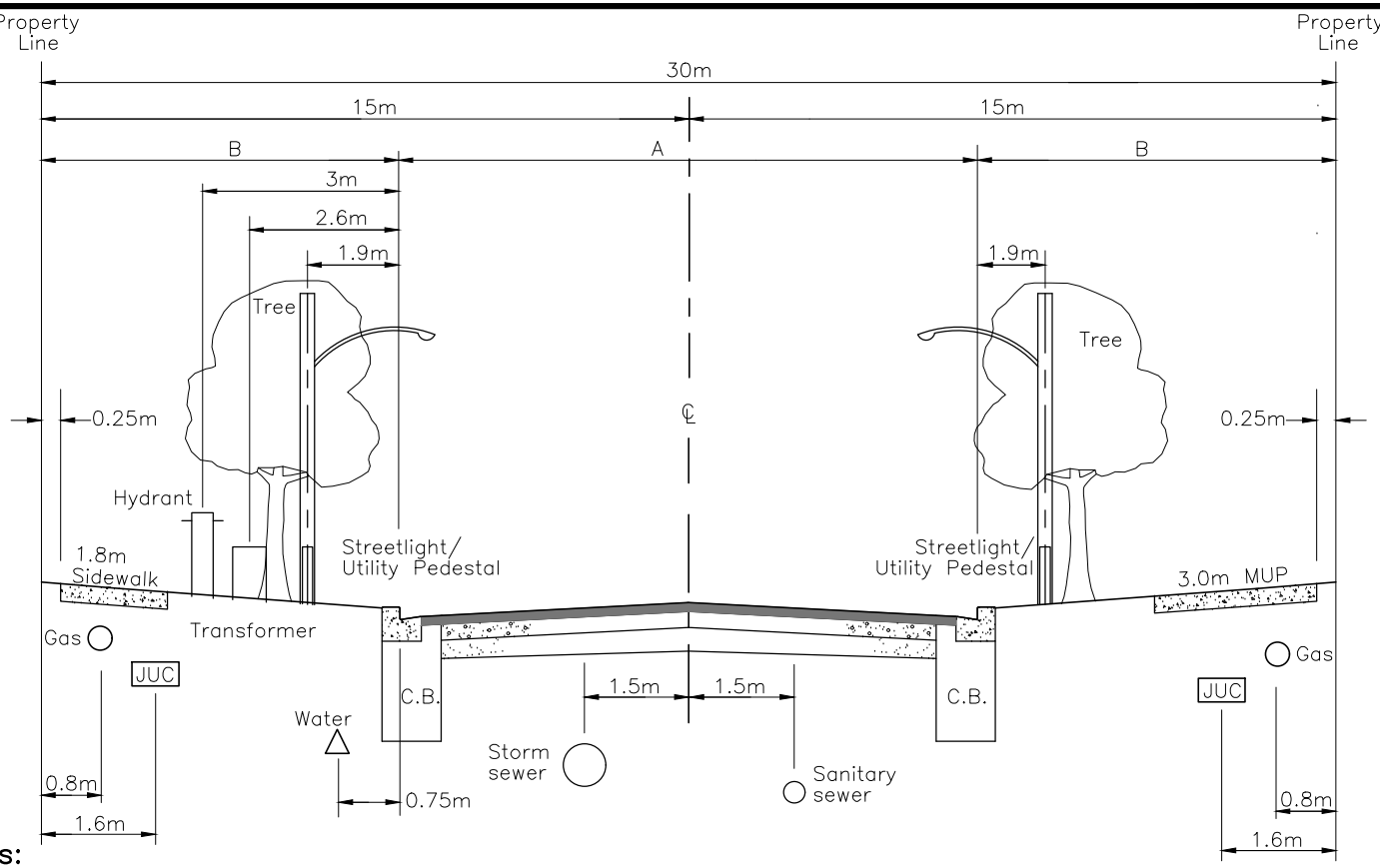
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Collector/Arterial C Roadway
26.0m R.O.W.

Scale: N.T.S
Approved:
Checked:
DWG. Date: June 2022
Revision No.: -
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.
4. All setbacks and widths will be subject to review, detailed design and approval by the Town of Whitby.

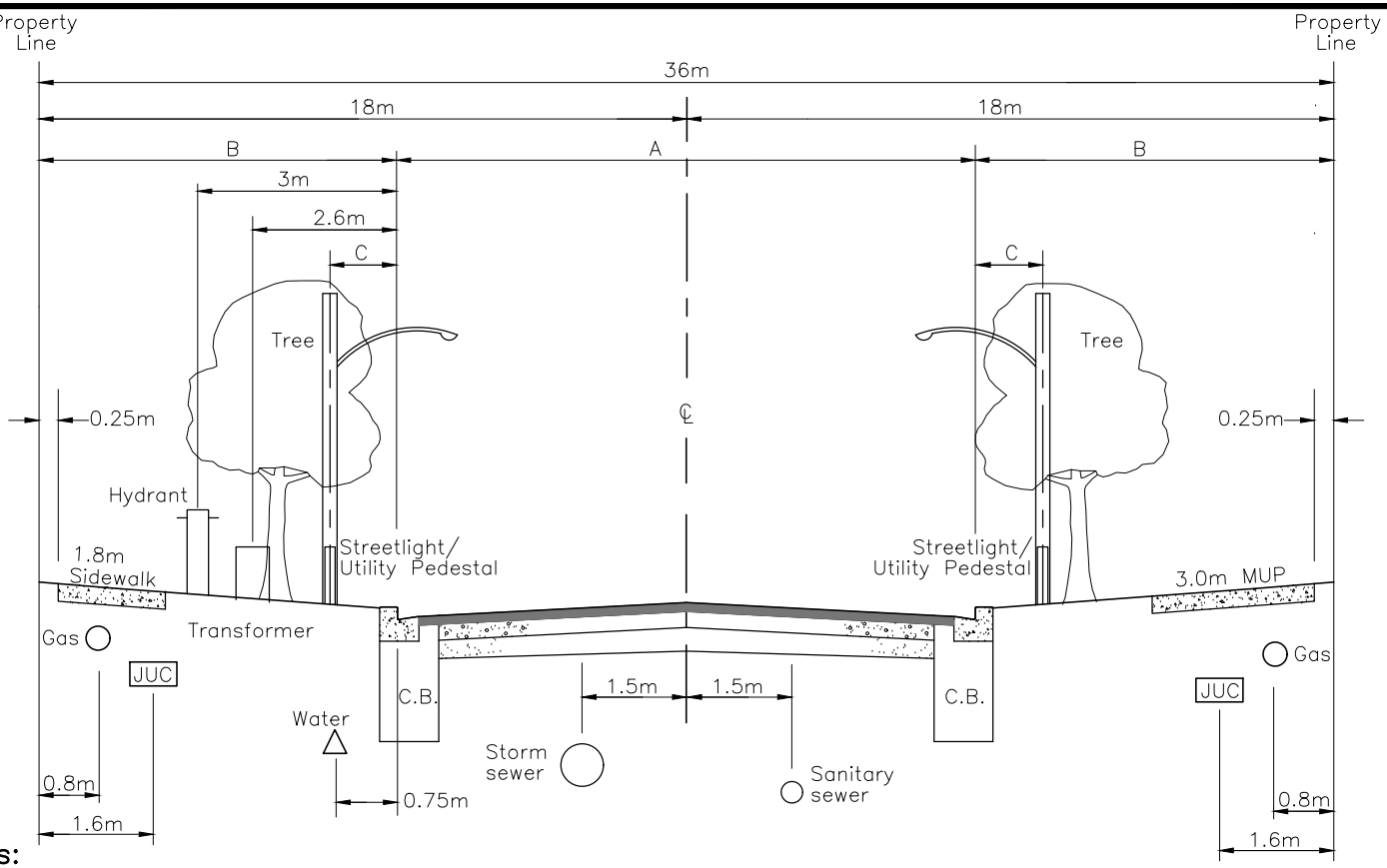
	Minimum	Maximum
A	8.5m	17m
B	6.5m	10.75m

Arterial C/B Roadway
30.0m R.O.W.

The Corporation of the Town of Whitby
Engineering Services

All dimensions in millimetres except where noted

Scale: N.T.S
Approved:
Checked:
DWG. Date: June 2022
Revision No.: -
Revision Date: -
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. 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. All setbacks and widths will be subject to review, detailed design and approval by the Town of Whitby.

	Minimum	Maximum
A	8.5m	24m
B	6m	13.75m
C	1.4m	1.9m

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Arterial B Roadway
36.0m R.O.W.

Scale: N.T.S

Approved:

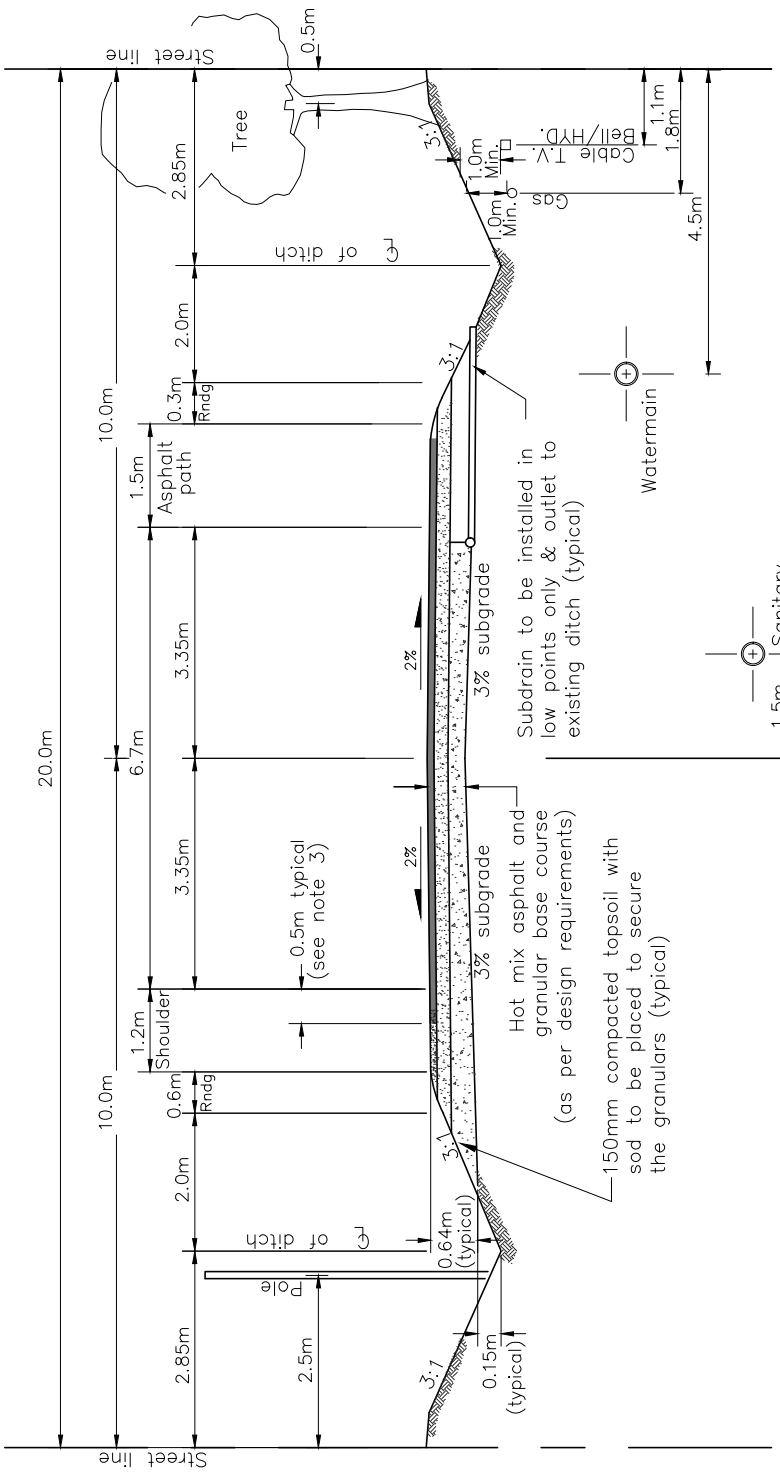
Checked:

DWG. Date: June 2022

Revision No.: -

Revision Date: -

DWG No. 402.10



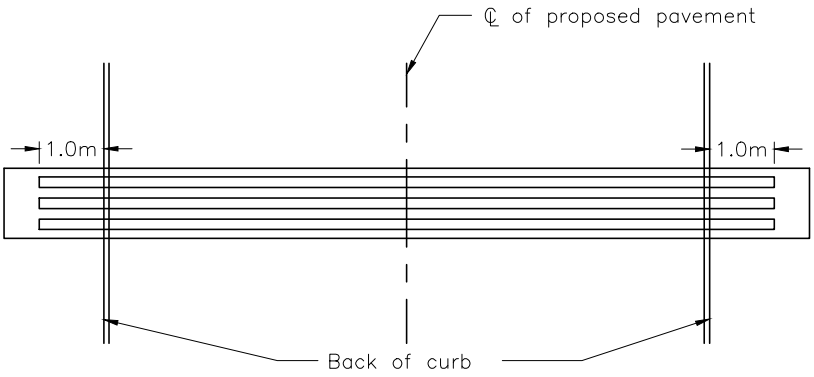
Notes:

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.

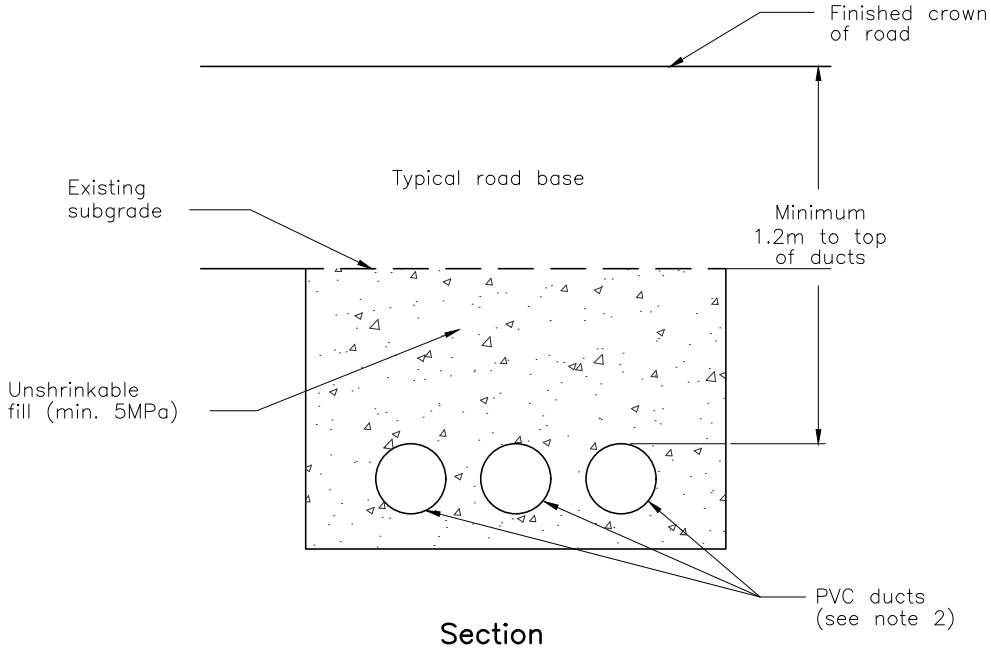
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby — **Engineering Services**

Checked:	**Rural Road 20.0m R.O.W. 6.7m Pavement**	DWG. Date: March 2004
Approved:		Revision No.: 3
Scale: N.T.S		Revision Date: August 2015
		DWG No. 403



Plan



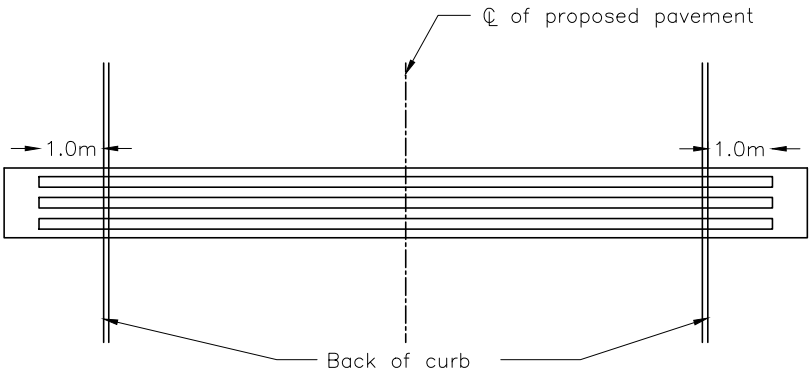
Section

Notes:

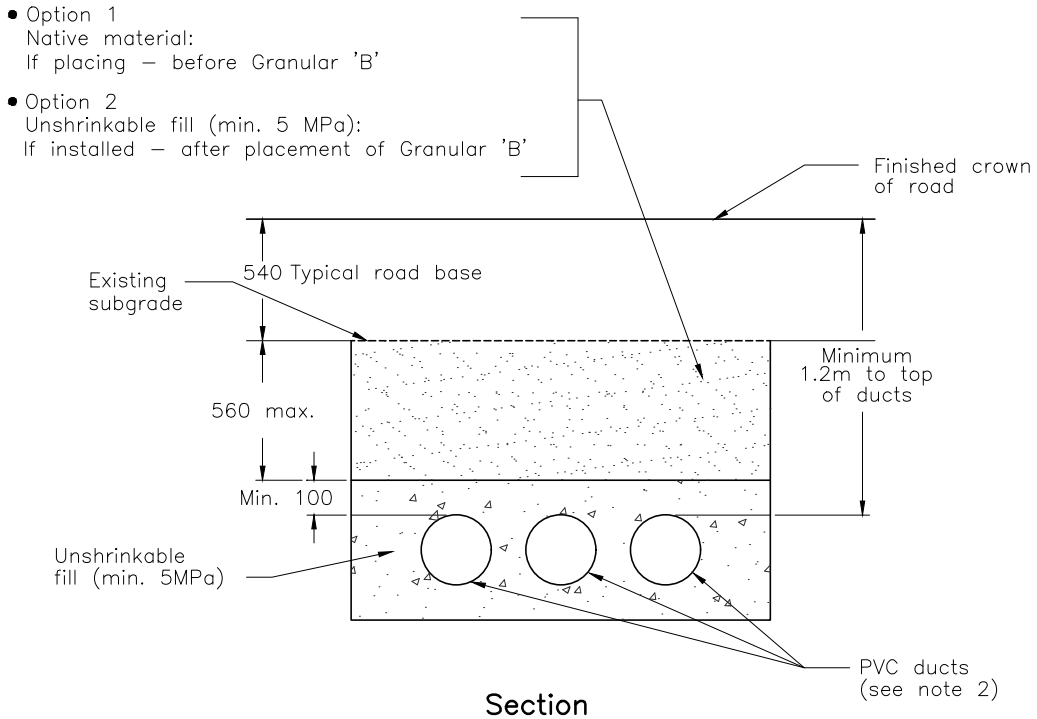
1. Crossing location and number of ducts to be stated on all construction drawings.
2. All ducts and spacing as per utility specifications.
3. All ducts to be installed prior to placement of road base.
4. End of ducts to be staked.
5. This is a minimum standard and shall be superseded by more stringent requirements if requested by utility companies.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked: M.	**Utility Duct Road Crossing Detail for Existing Roads**	DWG. Date: June 1999
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: August 2015
		DWG No. 404



Plan



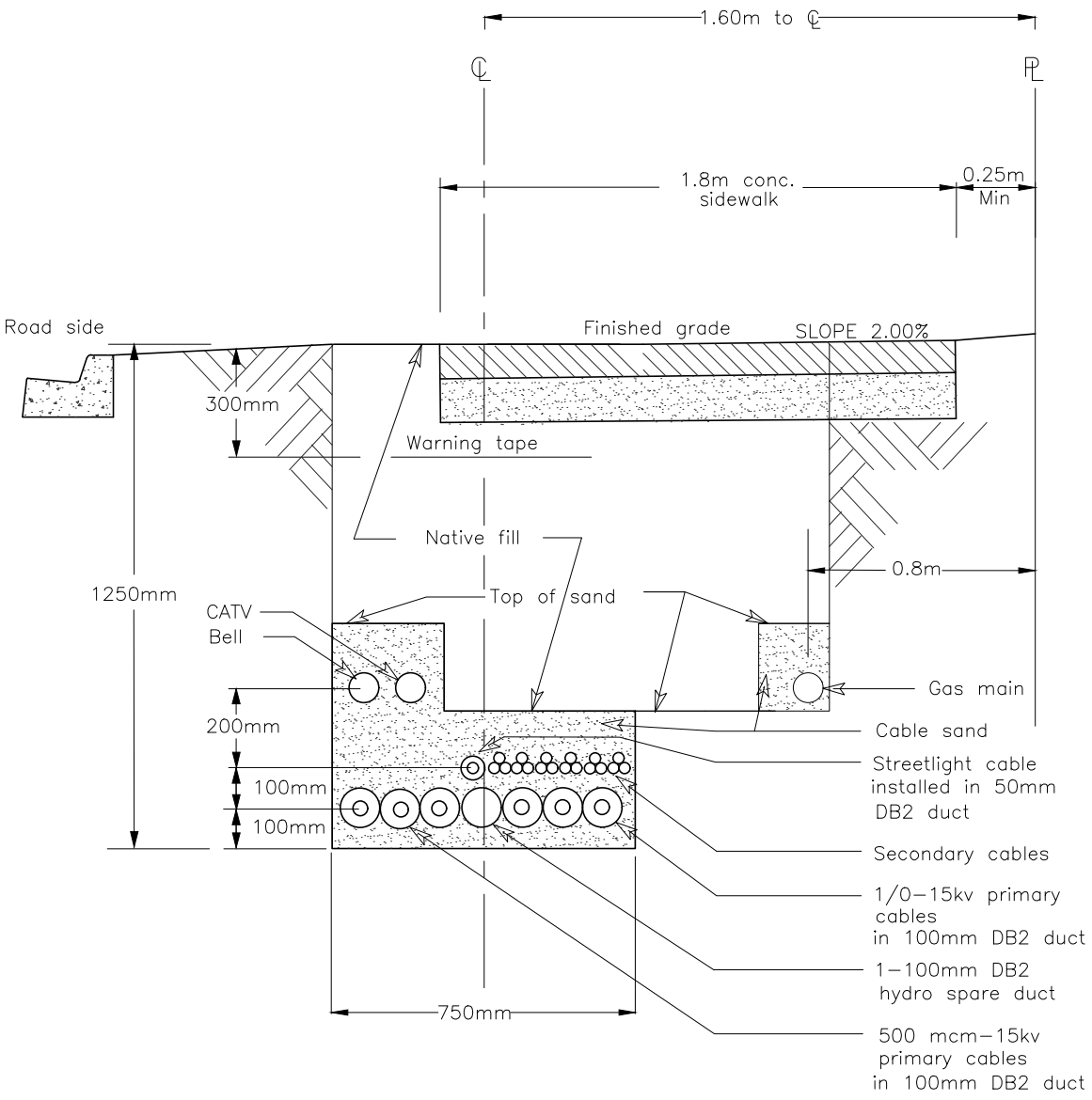
Section

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:	**Utility Duct Road Crossing Detail for New Subdivision**	DWG. Date: June 1999
Approved:		Revision No.: 3
Scale: N.T.S		Revision Date: July 2019
		DWG No. 404.10

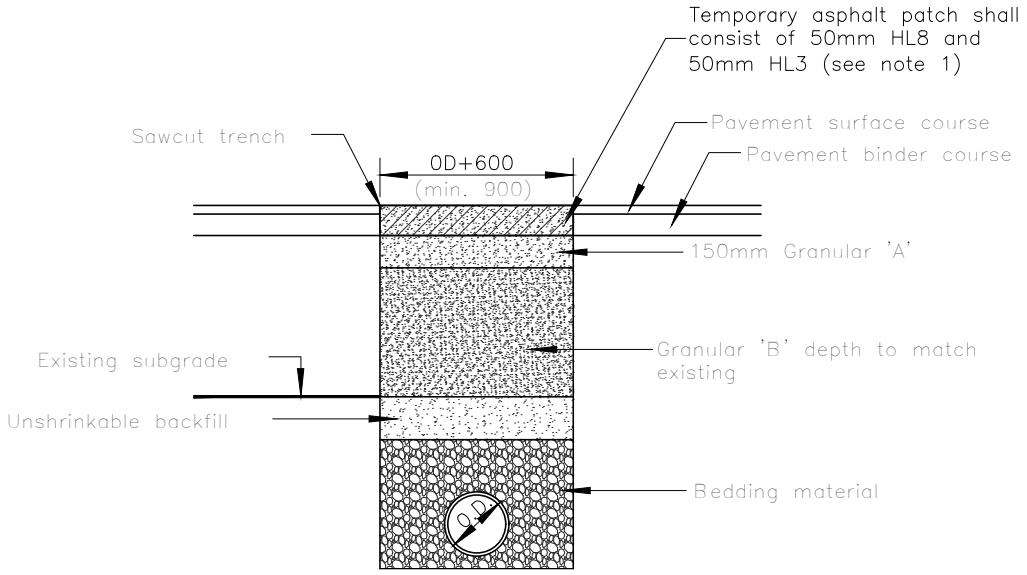


Notes:

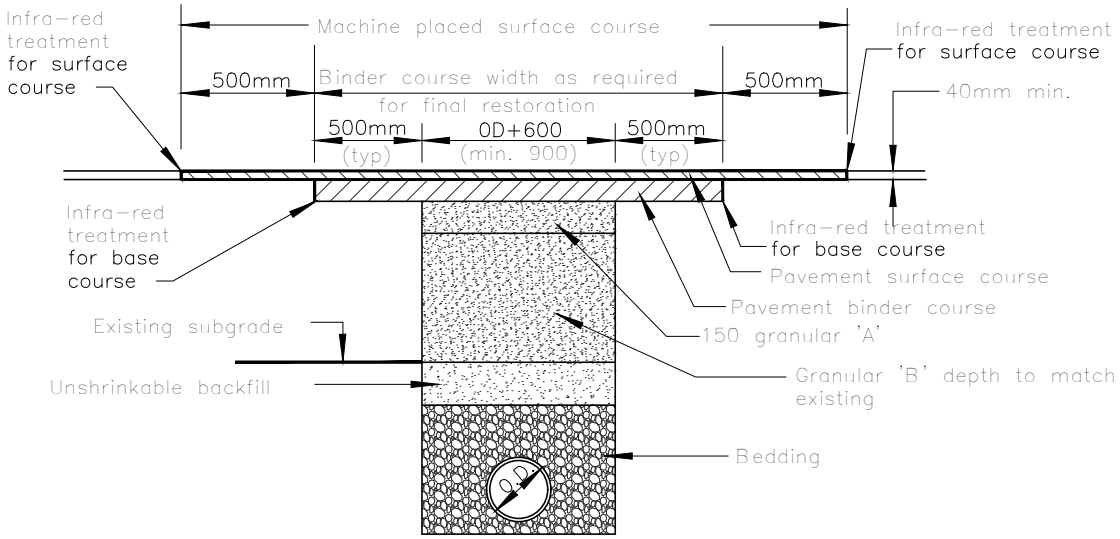
1. Crossing location and number of ducts to be stated on all construction drawings.
2. All ducts and spacing as per utility specifications.
3. Backfill to be compacted and verified to 98% standard proctor.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Direct Buried-joint Use Trench For Subdivisions Only-18.0m R.O.W.**	DWG. Date: August 2002
Approved:		Revision No.: 4
Scale: N.T.S		Revision Date: June 2022
		DWG No. 404.30



Trench Restoration For Roads Paved More Than 5 Years



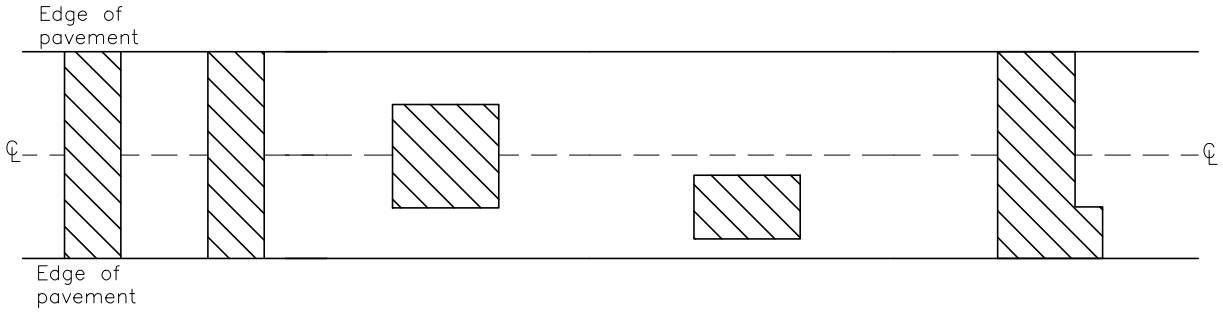
Trench Restoration For Roads Paved Less Than 5 Years

Notes:

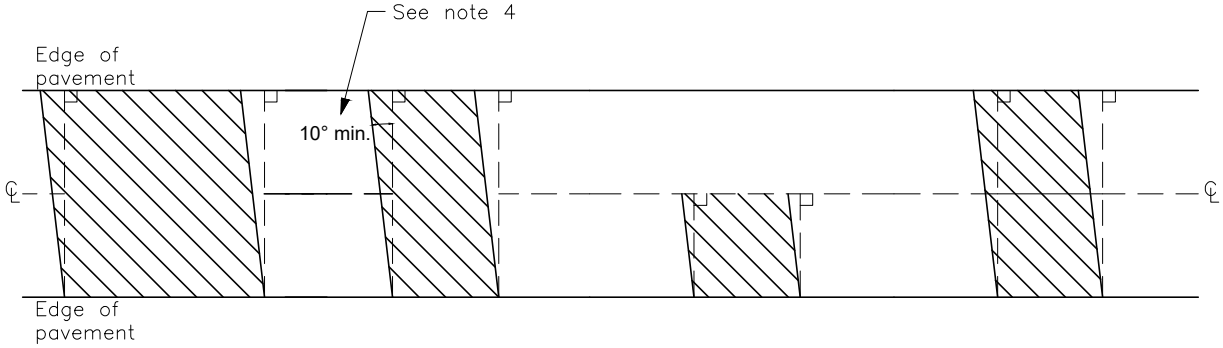
1. Temporary asphalt patch on dundas street and brock street shall consisit of 150mm HDBC in 50mm lifts.
2. All permanent restoration shall be directed by the Town of Whitby.
3. Depths shall be as noted unless otherwise specified.
4. If settlement occurs, the top asphalt shall be removed and re-paved as directed by the Town.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked:	**Trench Restoration Detail**	DWG. Date: January 2009
Approved:		Revision No.: 1
Scale: N.T.S		Revision Date: October 2018
		DWG No. 404.40



Not Acceptable



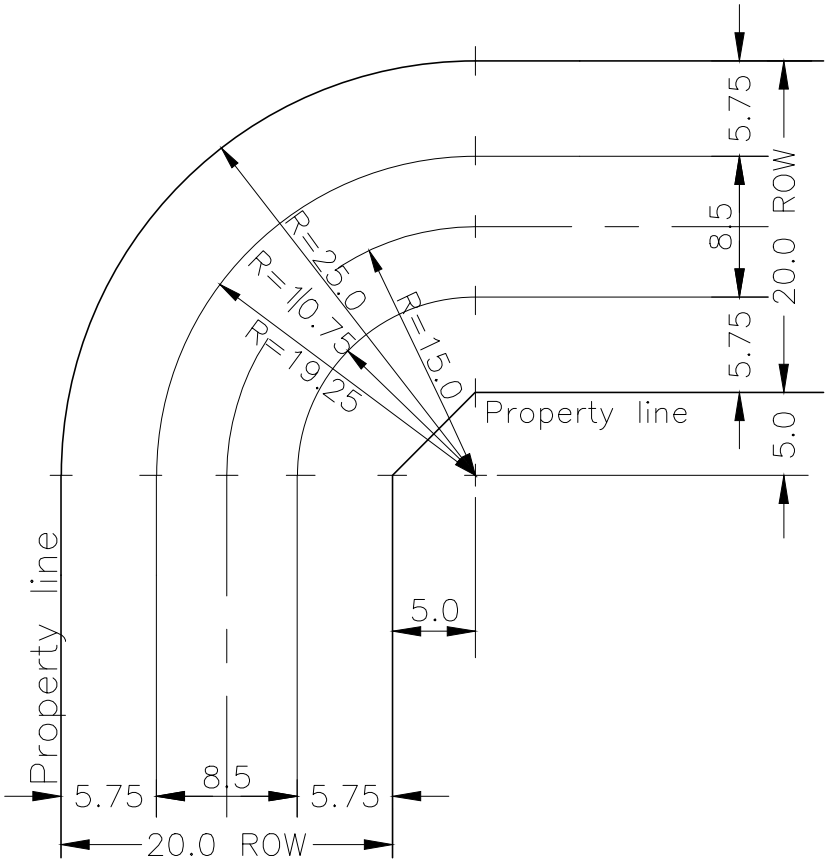
Acceptable

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:	**Asphalt Restoration Area**	DWG. Date: August 2015
Approved:		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 404.50

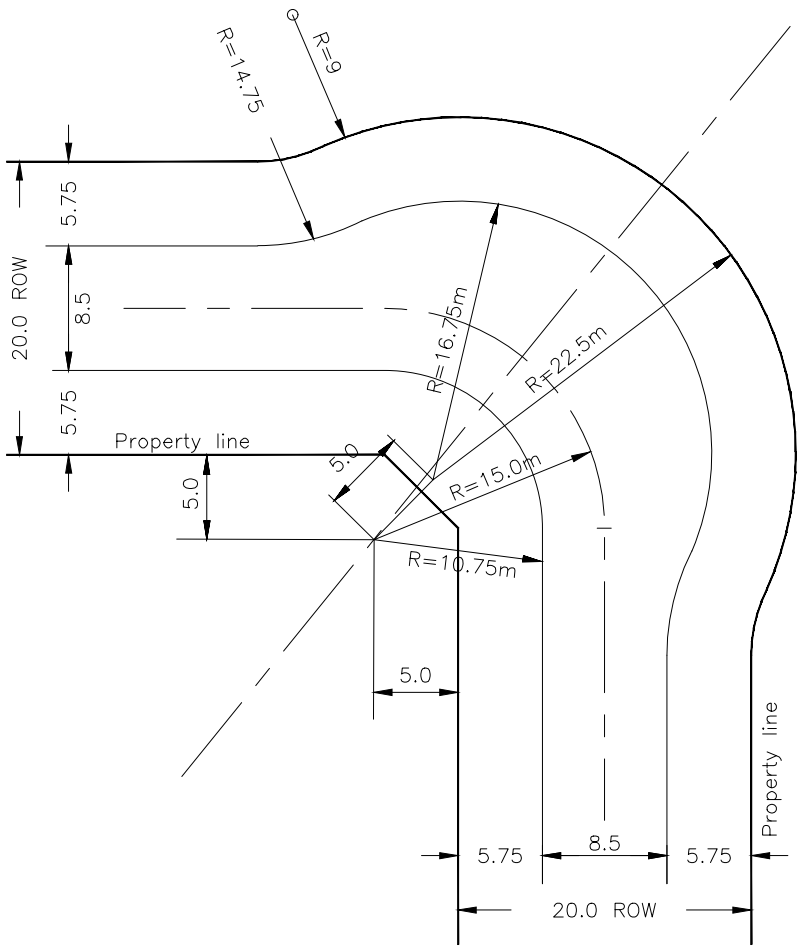


Notes:

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.	**Typical 90 ° Crescent 20.0m R.O.W.**	DWG. Date: June 1999
Approved:		Revision No.: 2
Scale: N.T.S		Revision Date: October 2018
		DWG No. 405

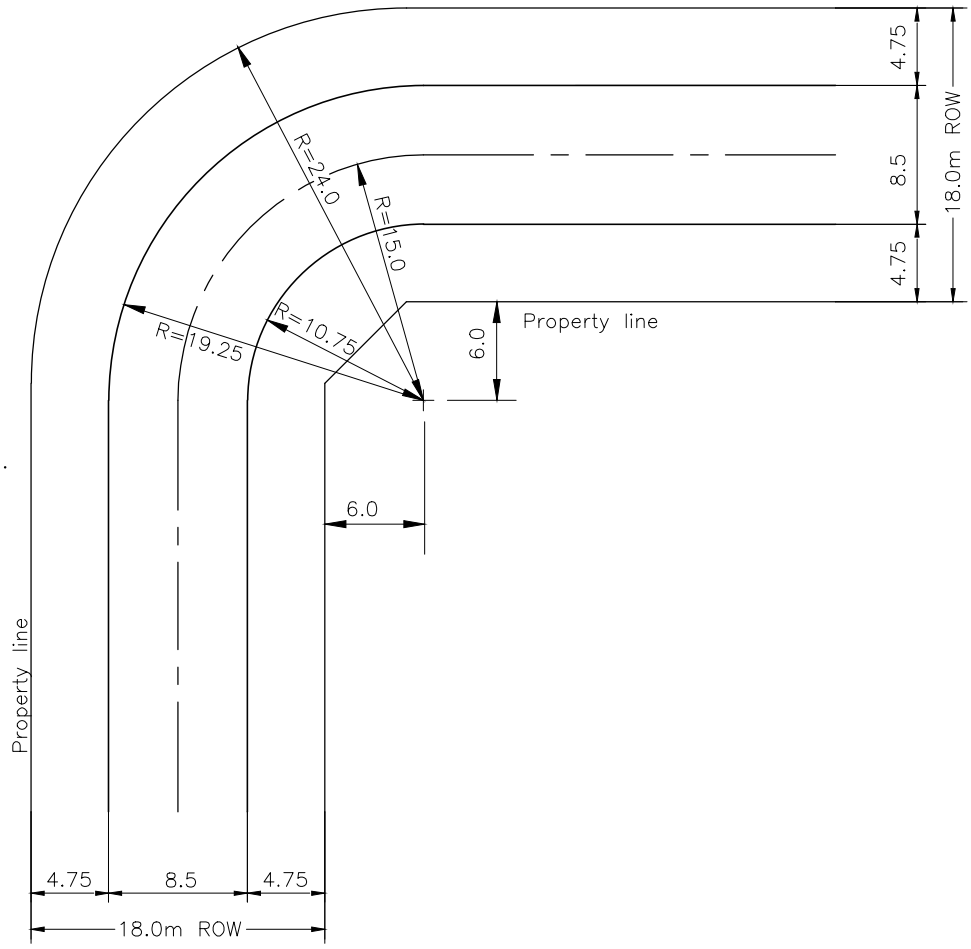


Notes:

1. Chainage to be computed using 15.0m radius at centreline.
2. Gutter grades to be specified on plans. Minimum gutter
3. Where 1.00% gutter grade is not possible, a catchbasin grade to be 1.00%.
   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:	**Typical 90 ° Crescent with Eyebrow 20.0m R.O.W.**	DWG. Date: July 2011
Approved:		Revision No.: 1
Scale: N.T.S		Revision Date: October 2018
		DWG No. 405.10

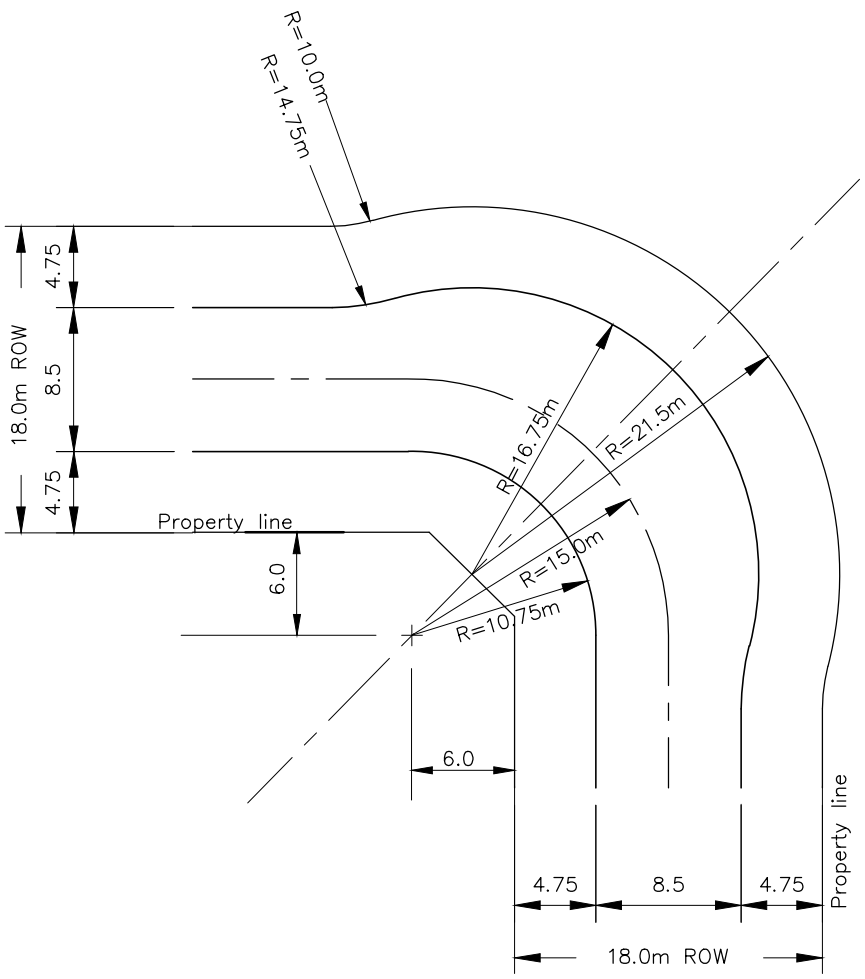


Notes:

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	**Typical 90° Crescent 18.0m R.O.W.**	DWG. Date: June 1999
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: August 2015
		DWG No. 406

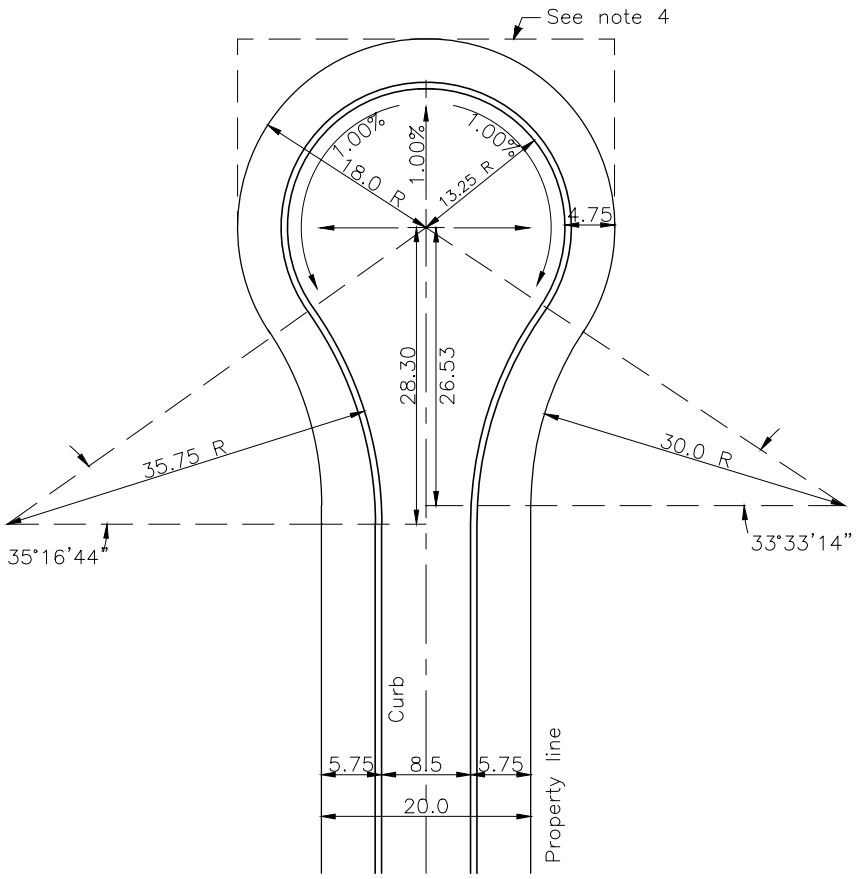


Notes:

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:	**Typical 90° Crescent With Eyebrow 18.0m R.O.W.**	DWG. Date: July 2011
Approved:		Revision No.: 1
Scale: N.T.S		Revision Date: August 2015
		DWG No. 406.10

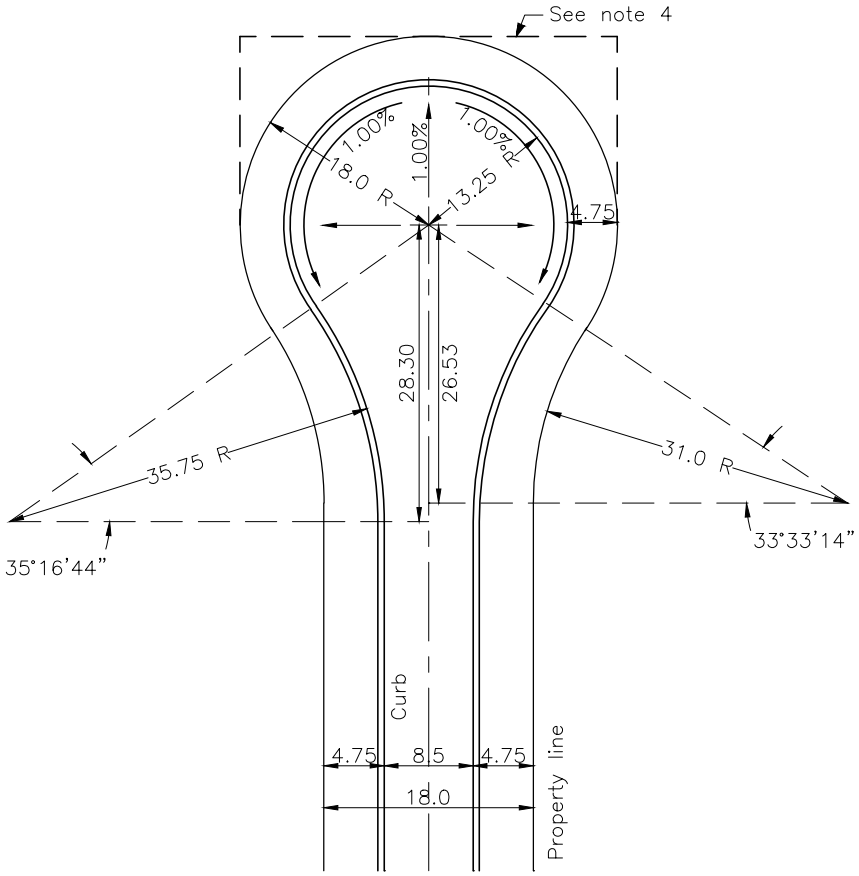


Notes:

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	**Typical Cul-De-Sac Terminating 20.0m R.O.W.**	DWG. Date: June 1999
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: October 2018
		DWG No. 407

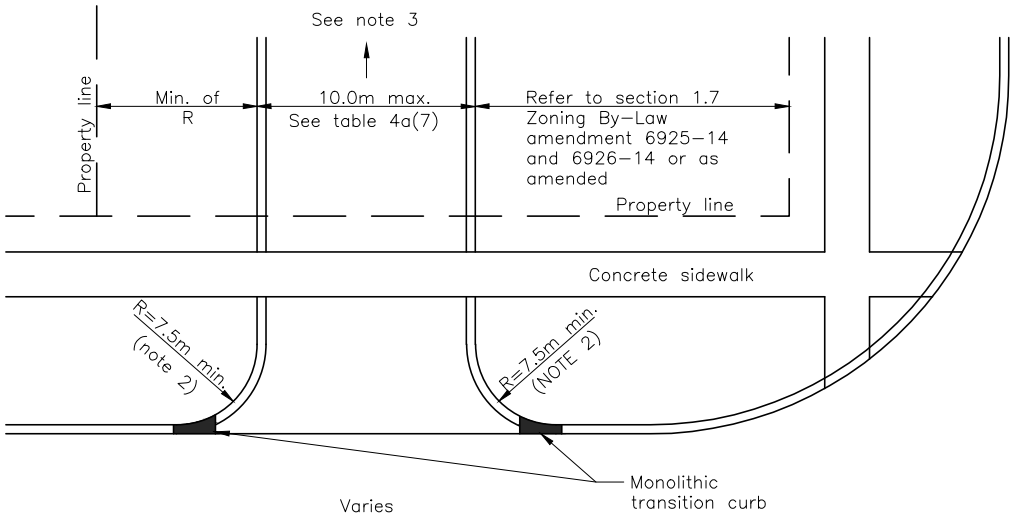


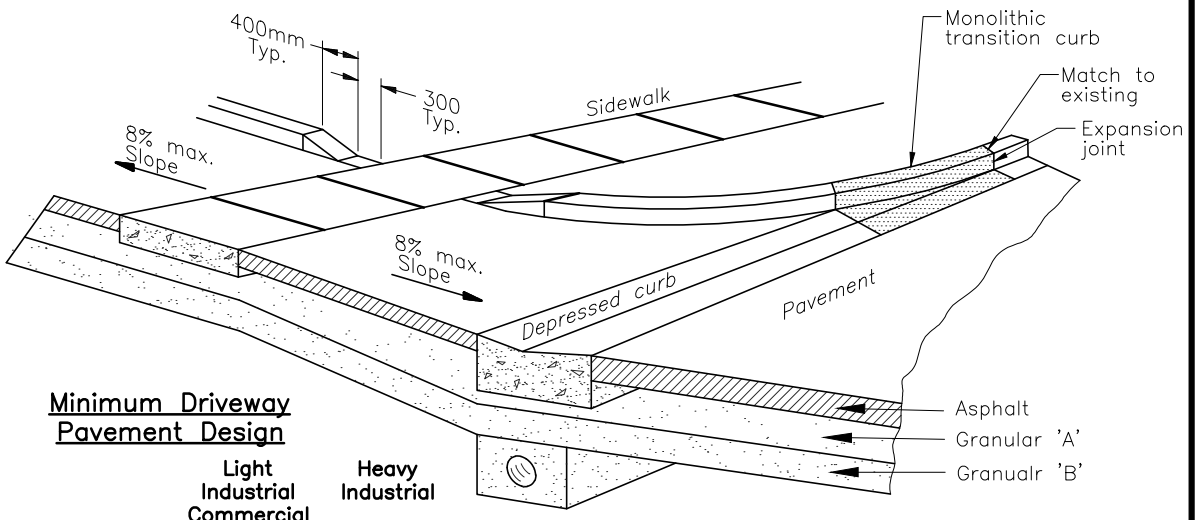
Notes:

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	**Typical Cul-De-Sac Terminating 18.0m R.O.W.**	DWG. Date: June 1999
Approved		Revision No.: 1
Scale: N.T.S		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

Parking By-Laws 6925-14, 6926-14 or as amended

Driveway Type	Minimum D/W Width	Maximum D/W Width
One-way	3.5m	7.0m
Two-way	7.0m	10.0m

Table 4a(7) driveway dimensions – Non-residential use

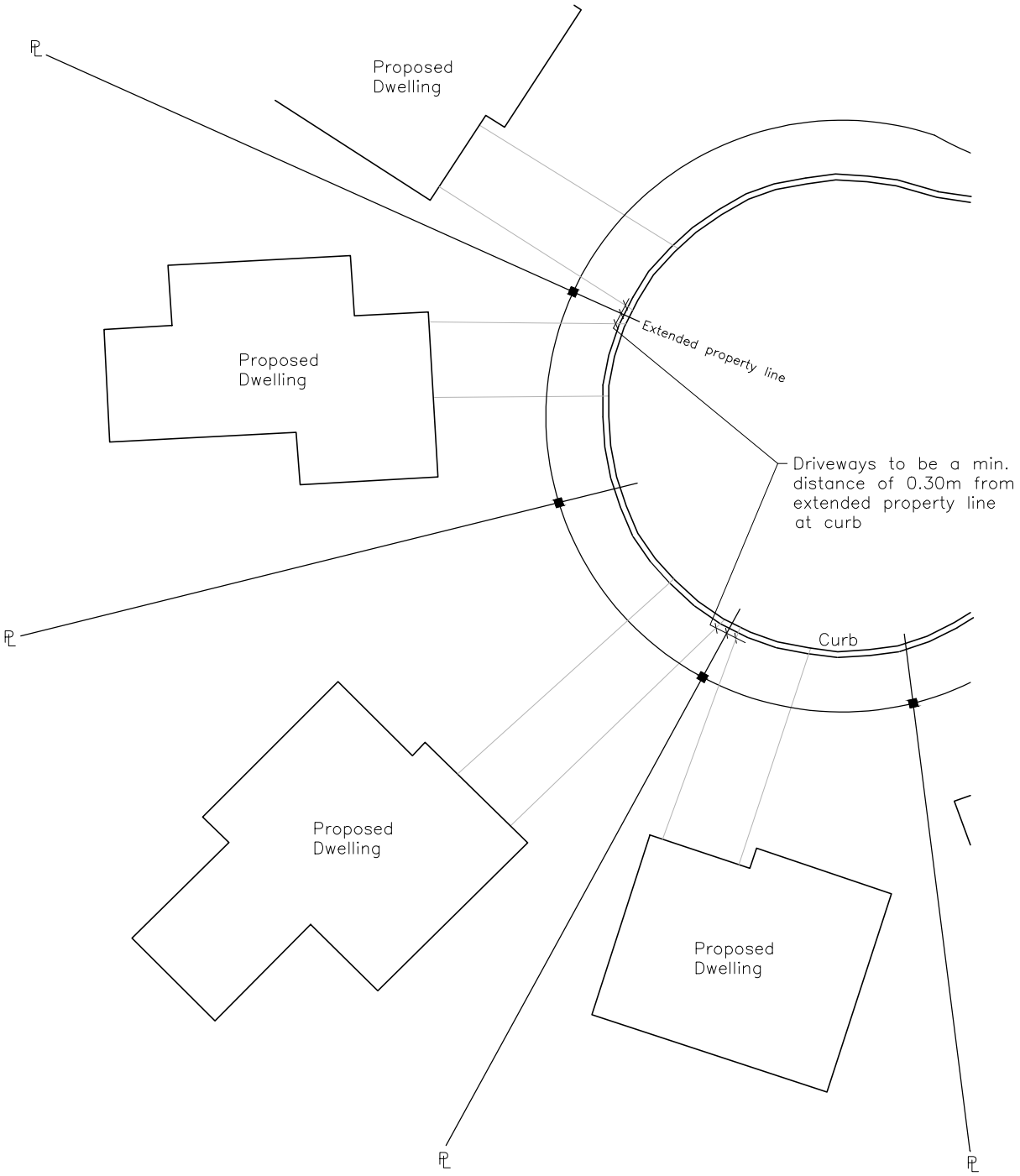
Notes:

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%.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby — Engineering Services

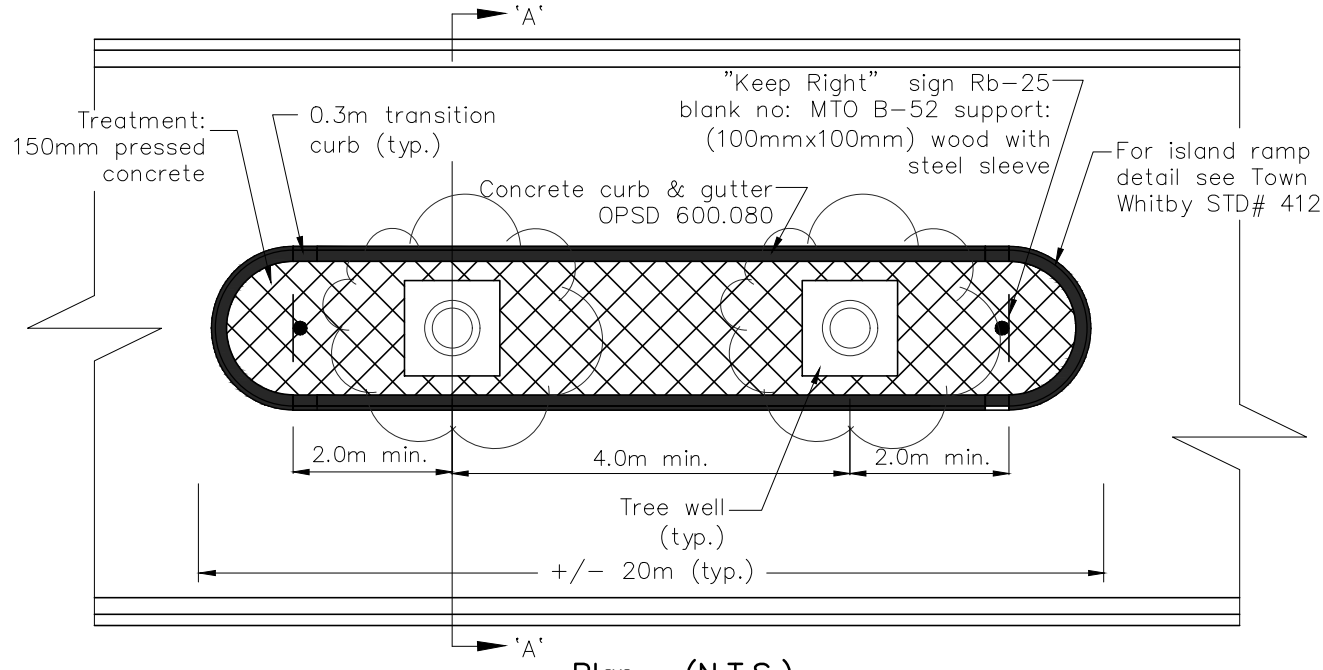
Checked	**Non-Residential and Multi-family Entrance Detail**	DWG. Date: November 1994
Approved		Revision No.: 5
Scale: N.T.S		Revision Date: October 2018
		DWG No. 410



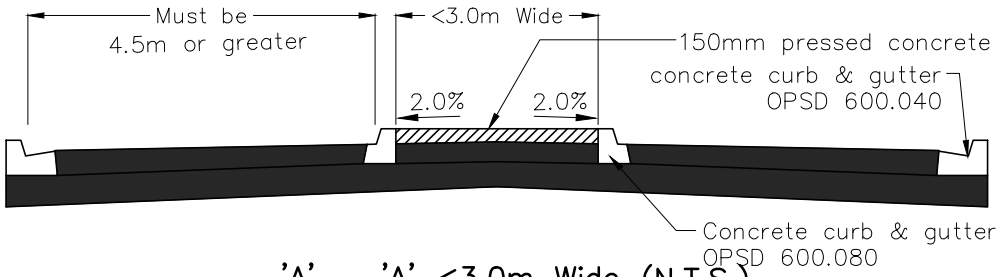
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby — **Engineering Services**

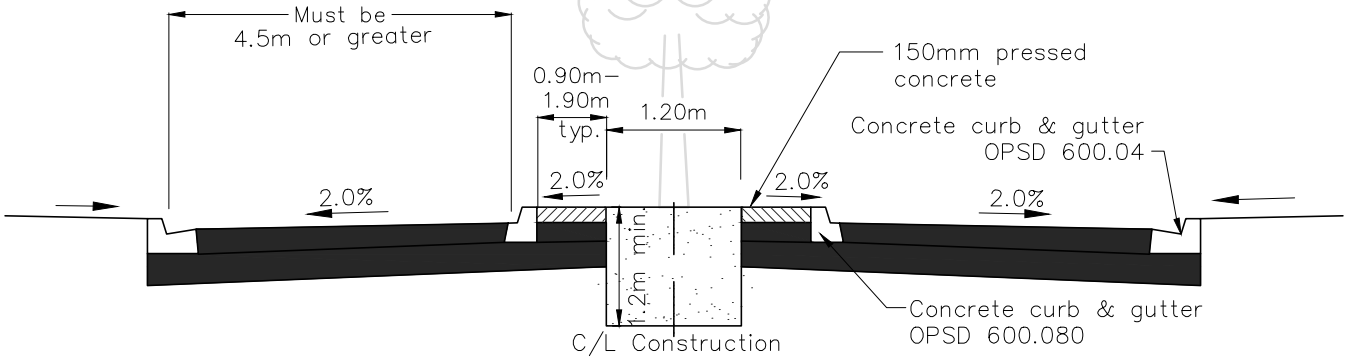
Checked	**Prop. Driveway Approaches Cul-De-Sac Area**	DWG. Date: January 1993
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: August 2015
		DWG No. 411



Plan (N.T.S.)



'A' – 'A' <3.0m Wide (N.T.S.)



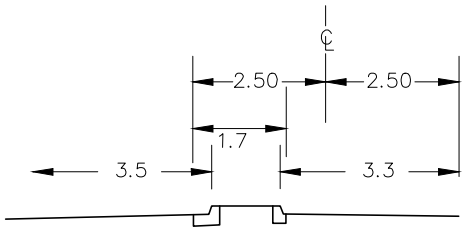
'A' – 'A' 3.0m–5.0m Wide (N.T.S.)

Notes:

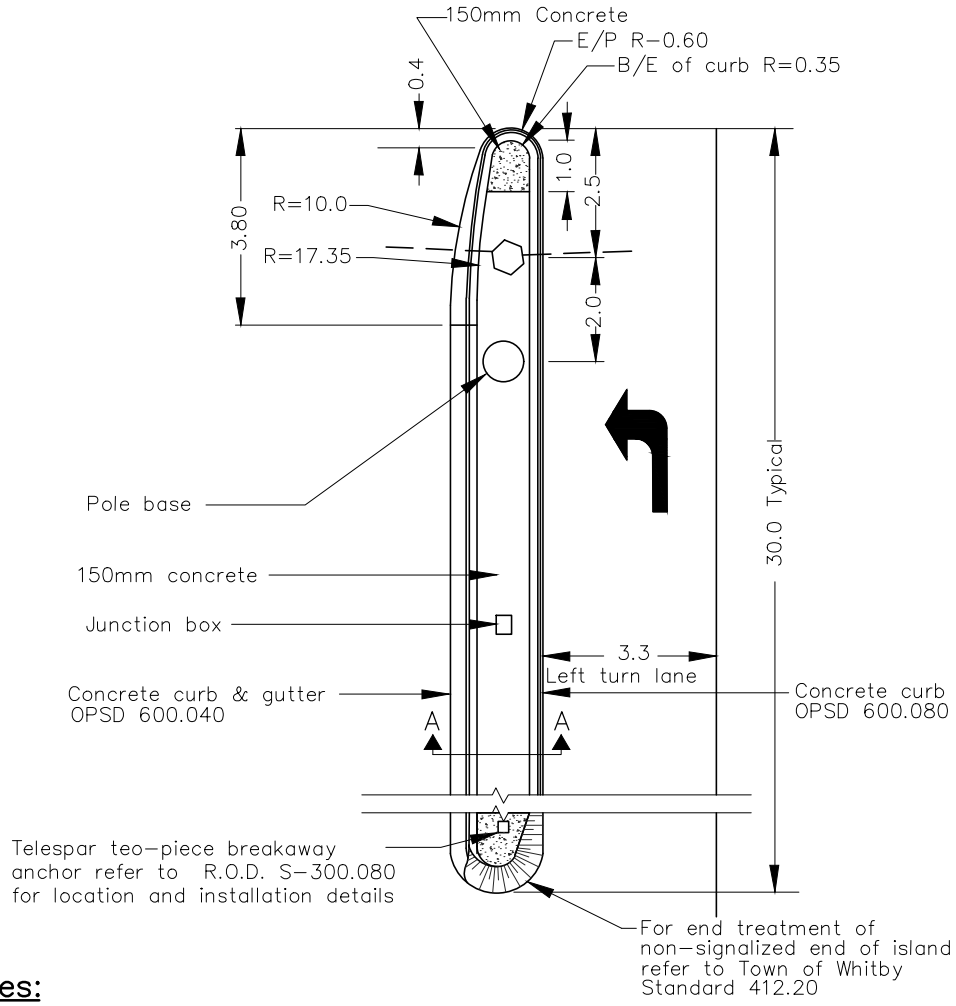
1. Tree type/species/number subject to approval from the Town of Whitby community and marketing services.
2. For planting bed 1.5m tree grate is optional
3. Pressed concrete colour to be georgia red or approved equivalent.
4. Pavement width must be 4.5m or greater for snow removal purposes.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Median Island**	Dwg. Date: May 2006
Approved		Revision No.: 3
Scale: N.T.S		Revision Date: August 2015
		DWG No. 412



Section A–A

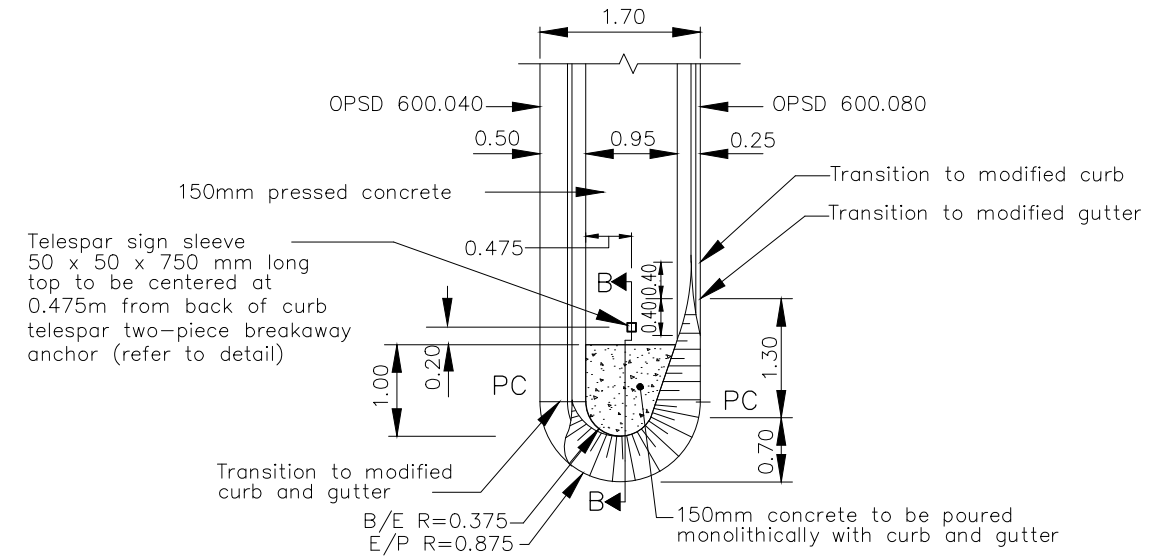


Notes:

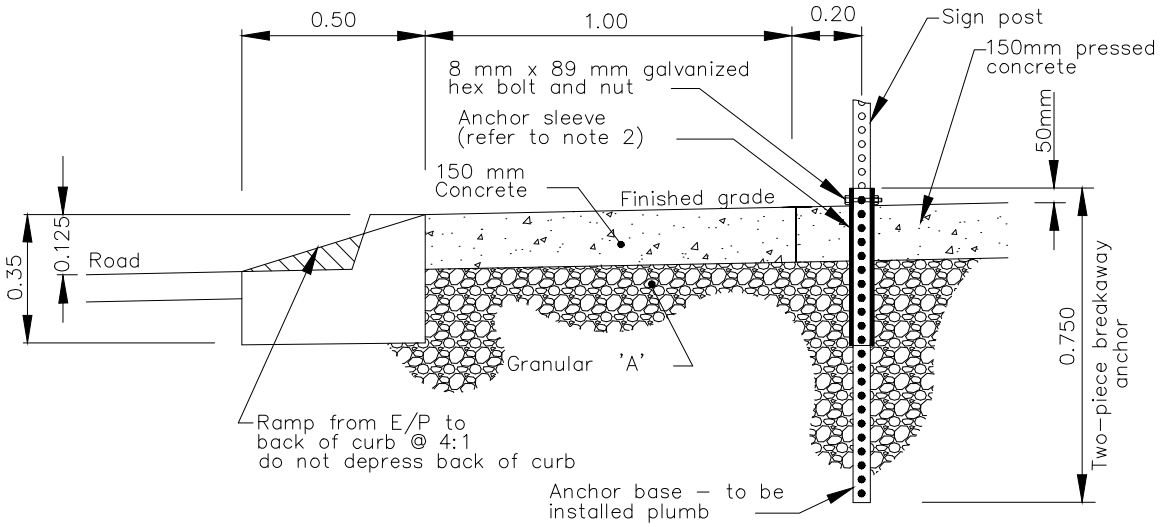
1. Do not ramp bullnose at signalized end of median island.
2. See Regional Standards S–300.070 for civil and electrical details pertaining to traffic signals.
3. Lane widths to be measured from face of curb.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Island Detail**	DWG. Date: Jan. 2009
Approved		Revision No: 4
Scale: N.T.S.		Revision Date: October 2018
		DWG No. 412.10



PLAN



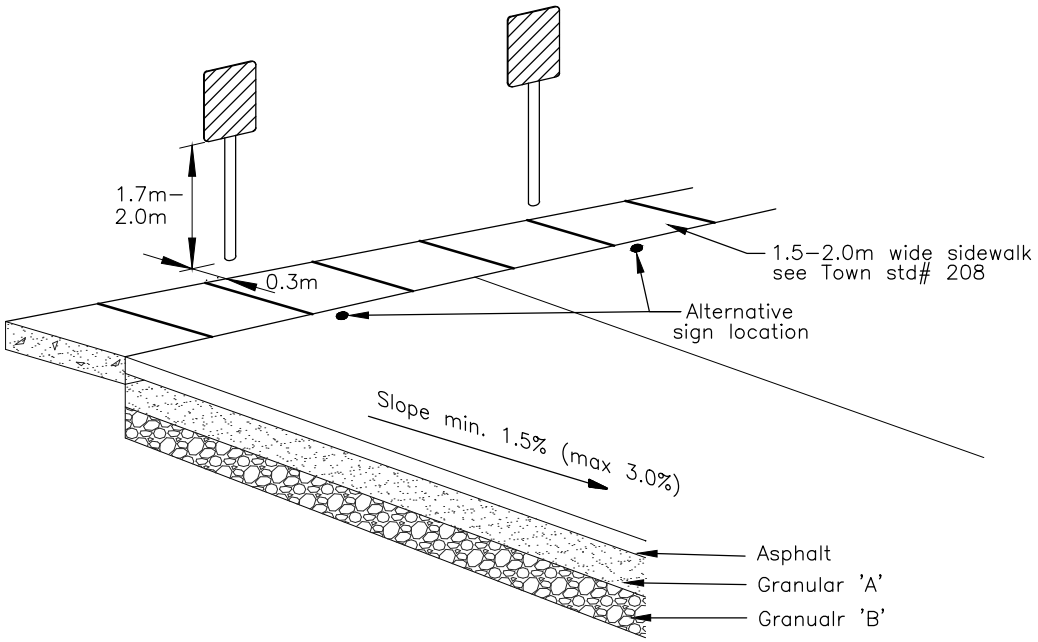
Section B–B

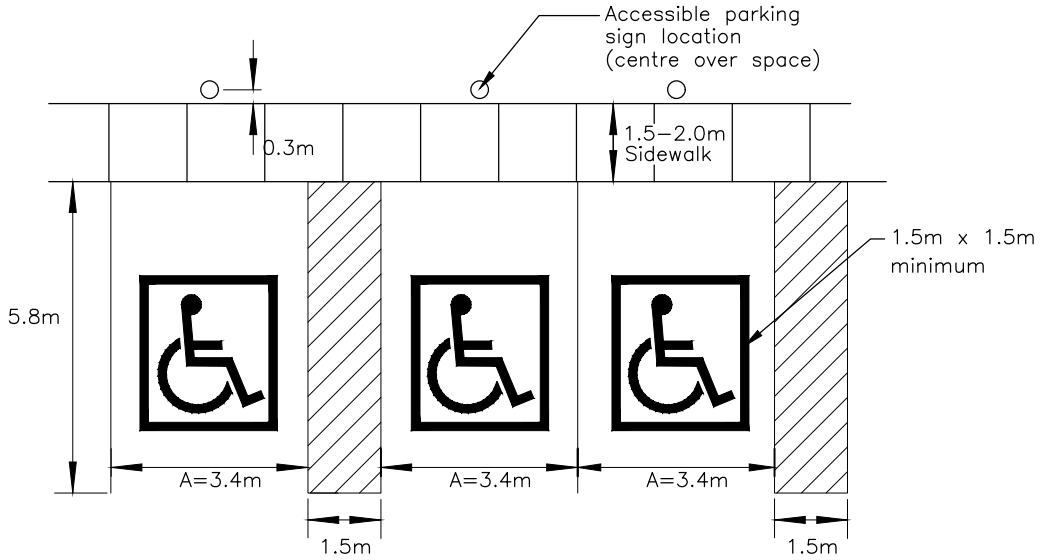
Notes:

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	**1.70m Wide Island Ramp End Detail**	DWG. Date: May 2006
Approved		Revision No: 4
Scale: N.T.S.		Revision date: October 2018
		DWG No. 412.20





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.
5. Sign location will be site specific.
6. Access aisles must be provided for all parking spaces and may be shared by two spaces.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Accessibility Parking Proposed and Retrofit**	Dwg. Date: January 2009
Approved		Revision No.: 3
Scale: N.T.S		Revision Date: October 2018
		DWG No. 413

Pavement Marking Legend			
Identification	Type	Colour	Width (cm)
1	Soild	Yellow	10
2	Double soild	Yellow	10
3	3–6–3 broken	Yellow	10
4	Soild	Yellow	20
5	Soild	White	10
6	3–3–3 broken	White	10
7	3–6–3 broken	White	10
8	3–9–3 broken	White	10
9	Soild	White	20
10	1–1–1 broken	White	20
11	3–3–3 broken	White	20
12	3–3–3 broken	White	30
13	Soild	White	30
14	Soild	White	45
15	Soild	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.

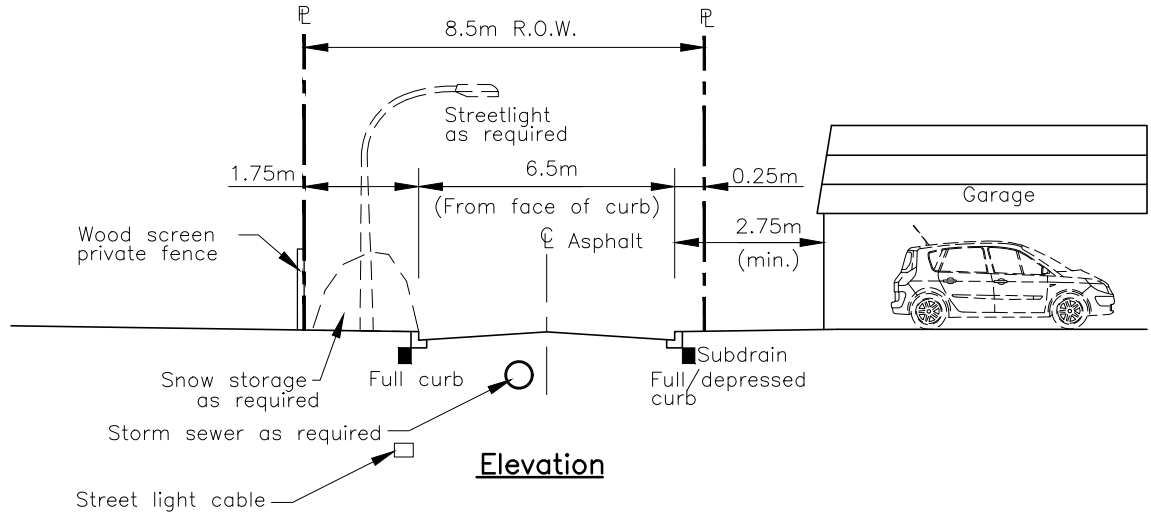
5. Laneways shall be illuminated to meet the requirements of the current day IESNA RP–8, Roadway Lighting Guideline.

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.

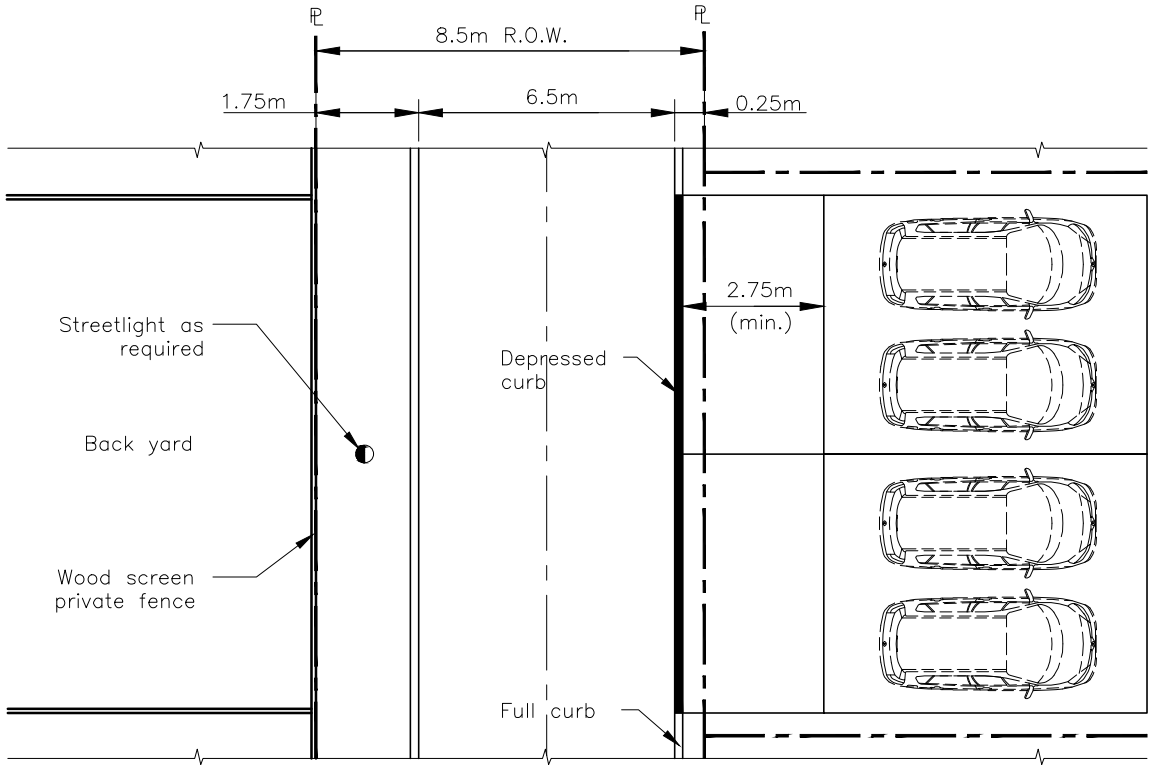
7. Street light poles in double loaded laneways shall be placed on private property with an easement in favor of the town. The street light cable shall remain within the boulevard.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Public Laneway - Criteria & Notes**	Dwg. Date: October 2018
Approved		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 415



Elevation



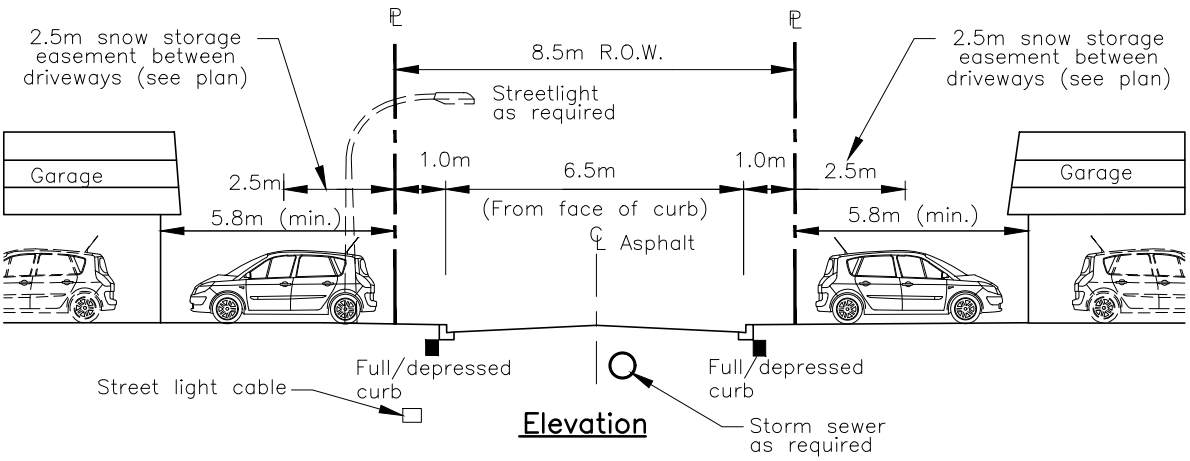
Plan

Notes:

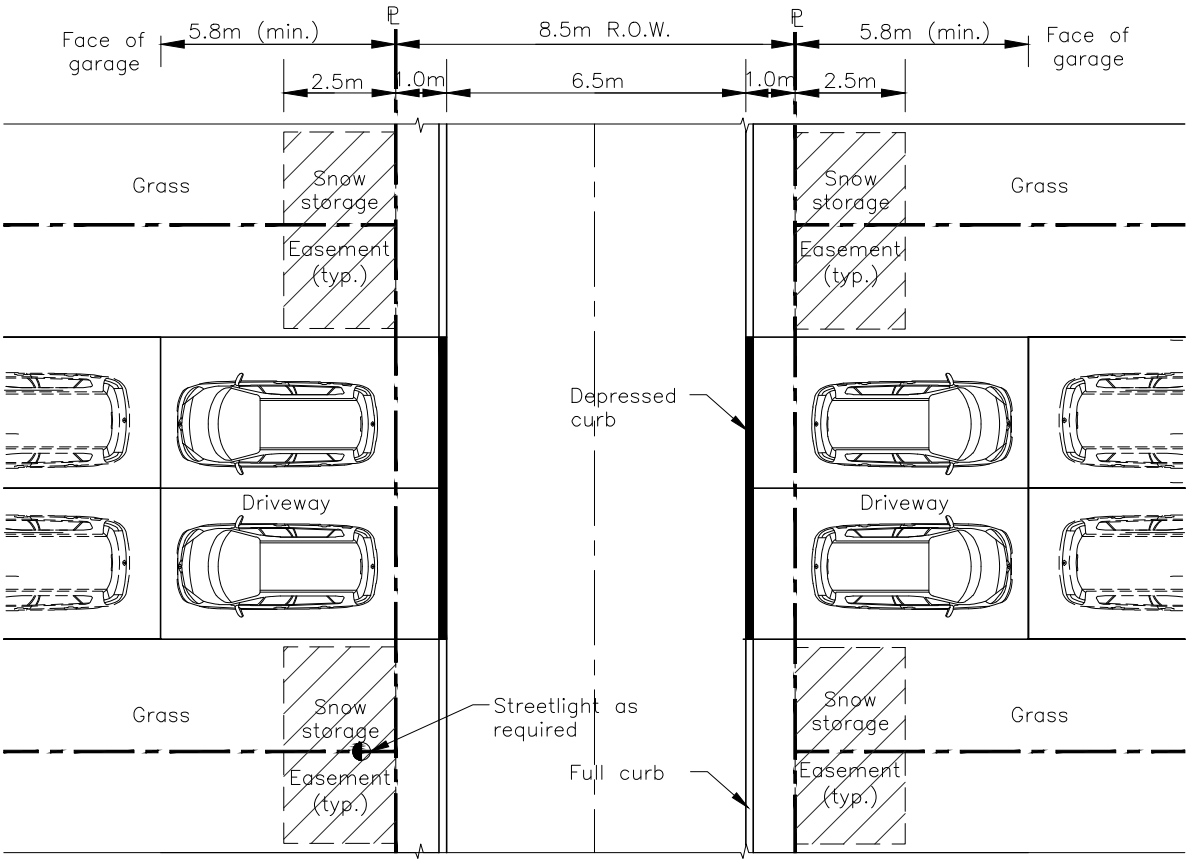
1. To be referenced in conjunction with Standard 415 Public Laneway – criteria and notes.
2. Any required above ground pedestals to be outside of 8.5m laneway on private property with easement to utility.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Single Loaded Public Laneway**	Dwg. Date: October 2018
Approved		Revision No.: -
Scale: N.T.S		Revision Date: -
		Dwg No. 415.10



Elevation



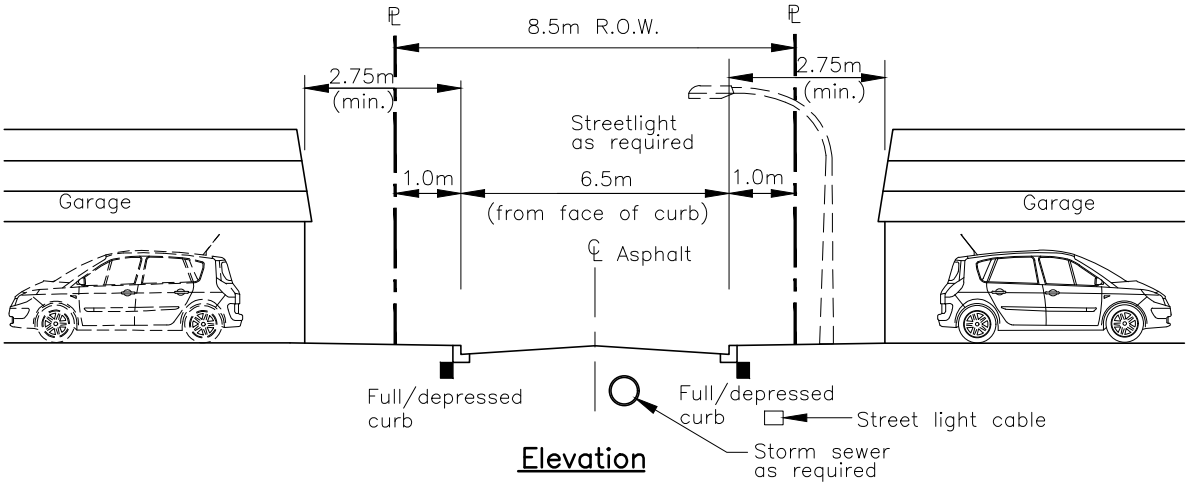
Plan

Notes:

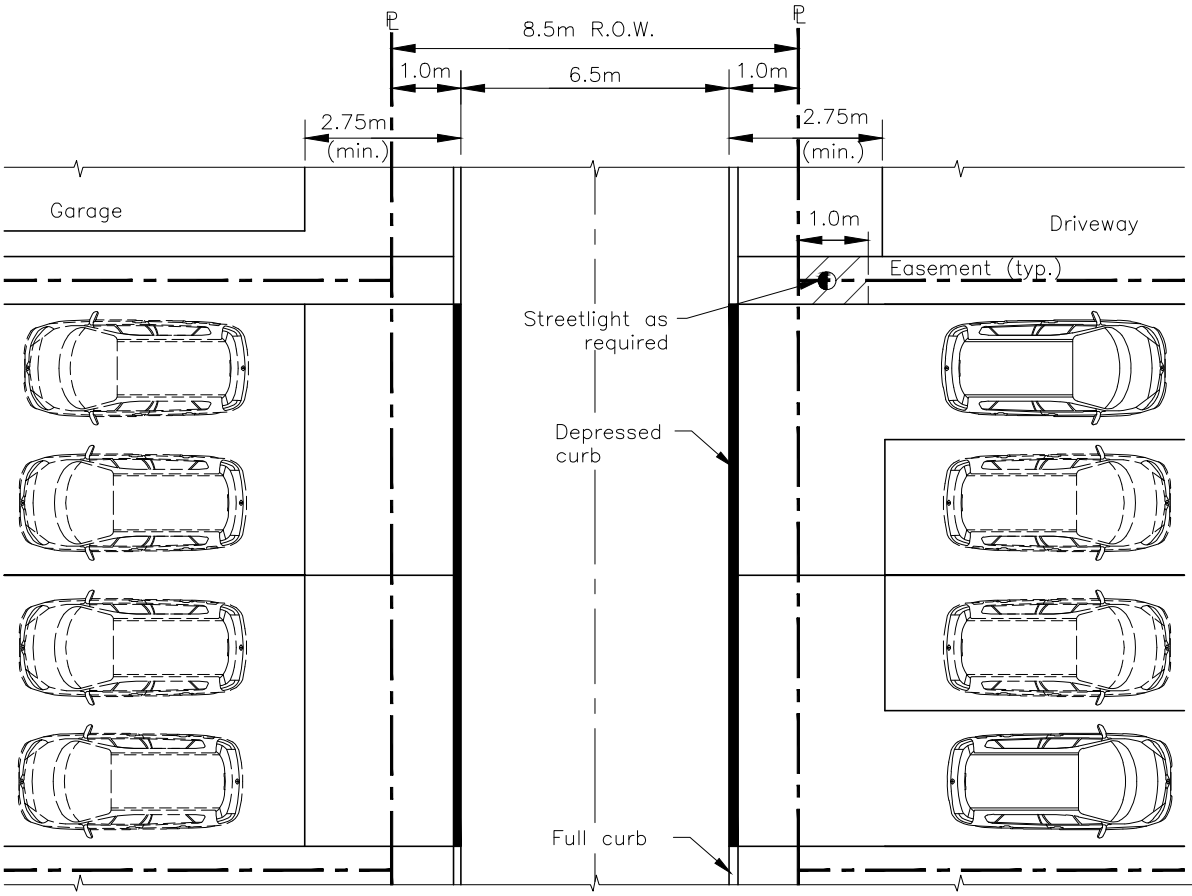
1. To be referenced in conjunction with Standard 415 Public Laneway – criteria and notes.
2. Streetlights may require easements.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Double Loaded Public Laneway with Tandem Parking**	Dwg. Date: October 2018
Approved		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 415.20



Elevation



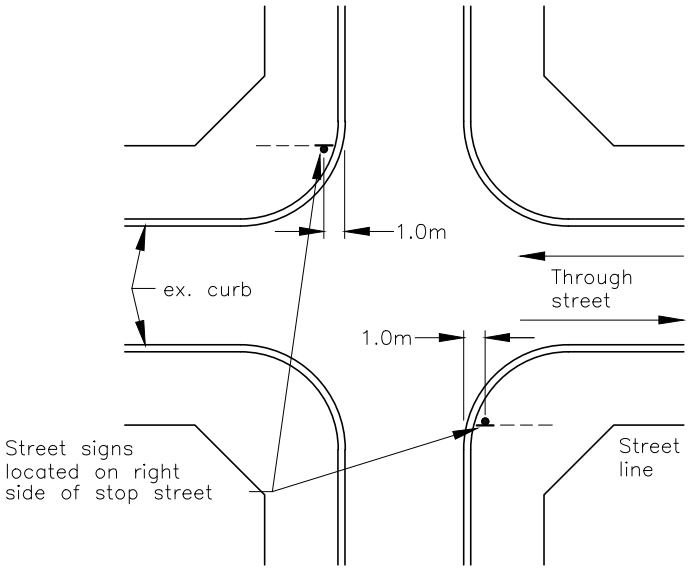
Plan

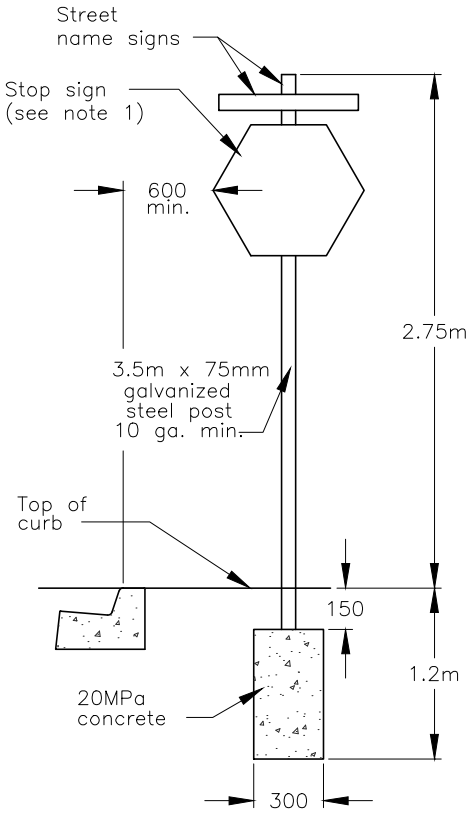
Notes:

1. To be referenced in conjunction with Standard 415 Public Laneway – criteria and notes.
2. Streetlights may require easements.
3. Snow relocation is required.

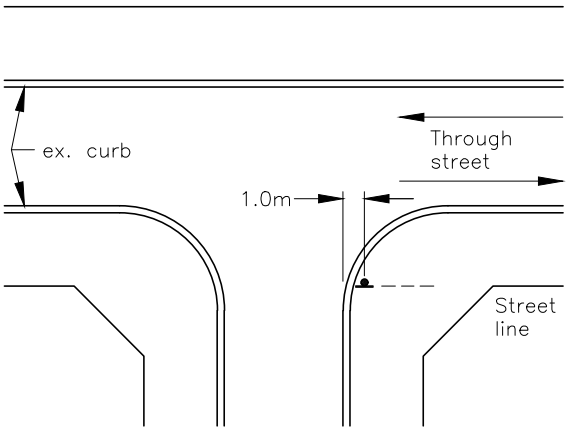
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Double Loaded Public Laneway with Side by Side Parking**	Dwg. Date: October 2018
Approved		Revision No.: -
Scale: N.T.S		Revision Date: -
		DWG No. 415.30





4–way Intersection
or 3 Way With Stop Bar
and Yellow Centreline 20m



3–way Intersection

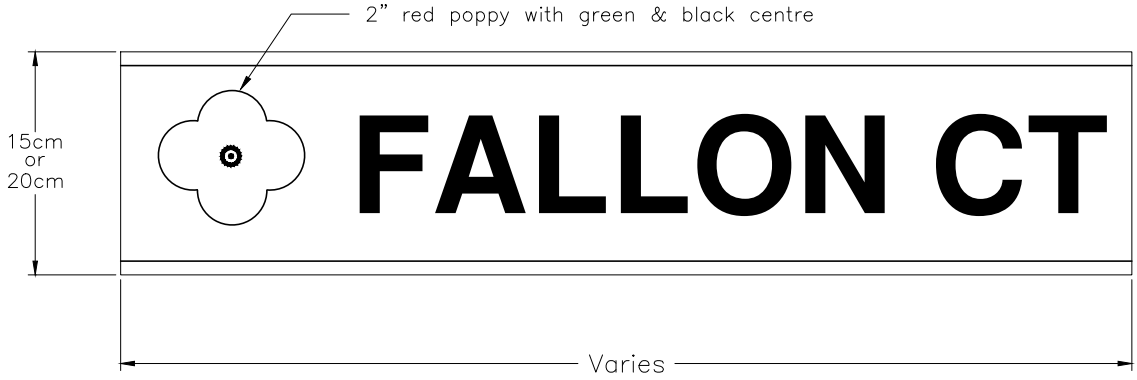
Notes:

1. All classes of regulatory signage in accordance with Ontario Traffic Manual Book 5.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Street Sign Location**	DWG. Date: May 1997
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: May 2006
		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.

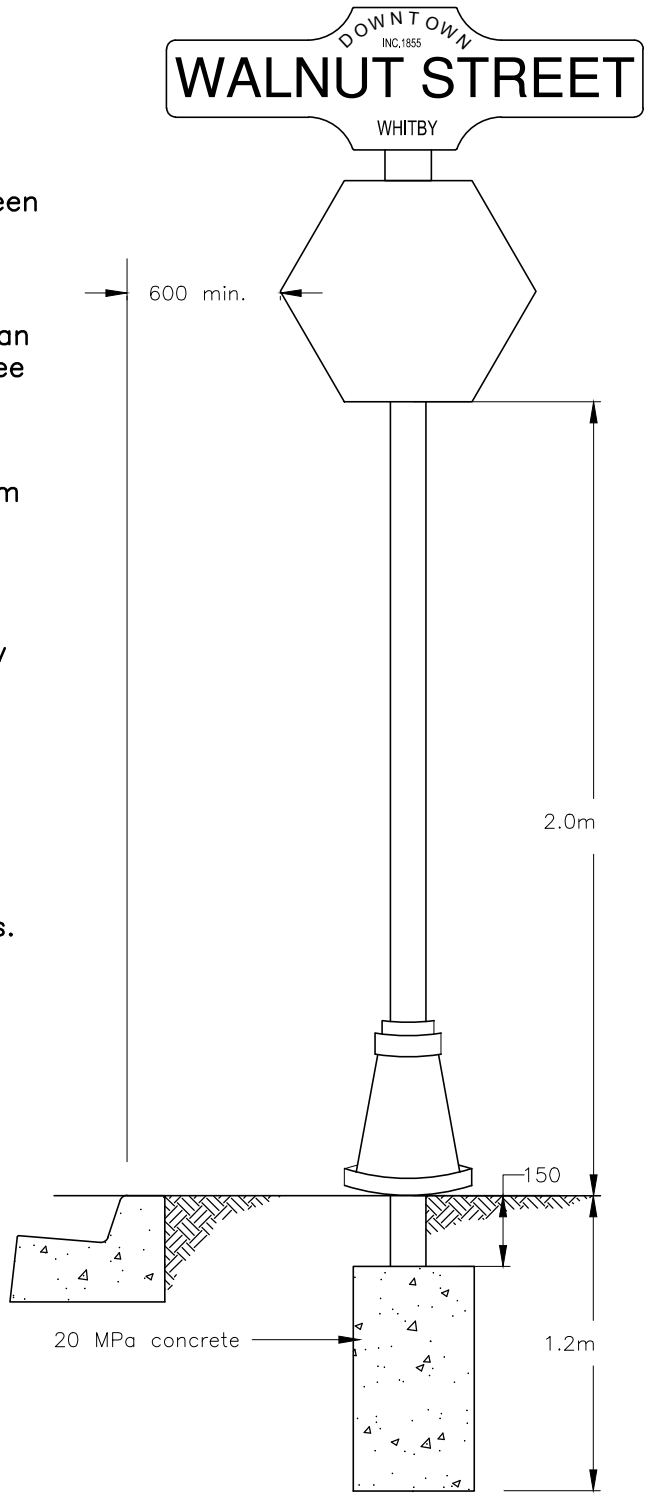
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Street Name Sign**	DWG. Date: November 1994
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: May 2006
		DWG No. 501

Notes:

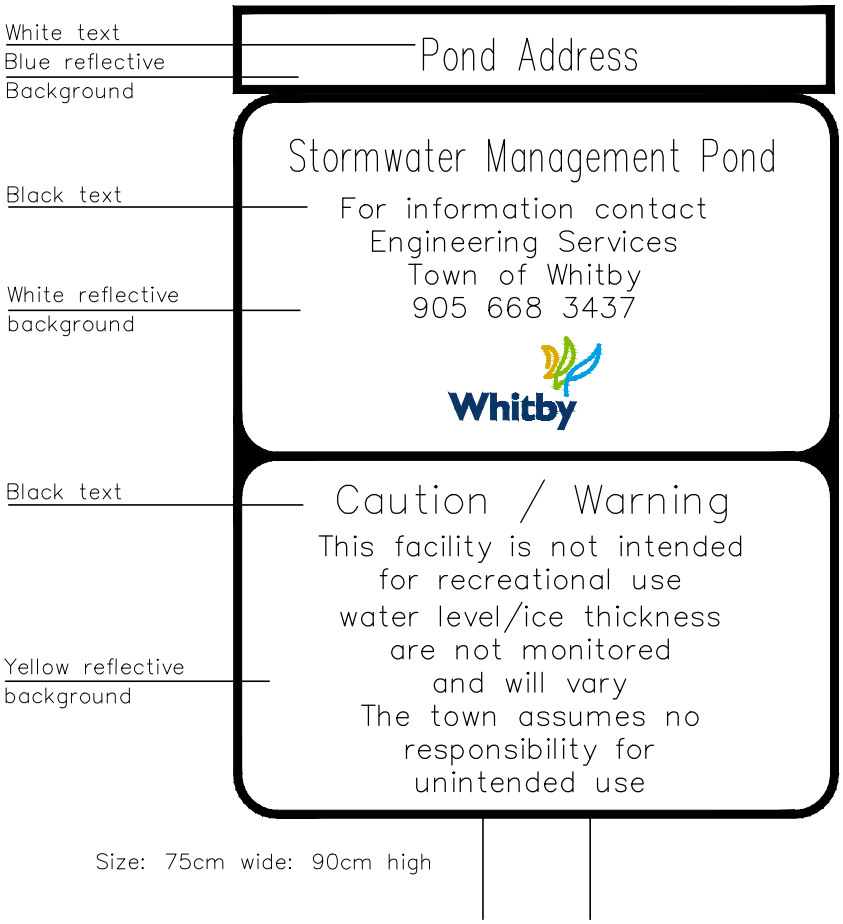
1. Plates to be 0.125 52–H32 alluminum etched and allodine background reflective and texted white letters on dark emerald green standard pantone 3435c colour background.
2. Characters, symbols & backgrounds of signs shall have an eggshell, matte or other glare–free finish.
3. Font type: sans serif – verdana minimum character height – 10cm length of sign to vary: minimum length 91.4cm maximum length 101.6cm

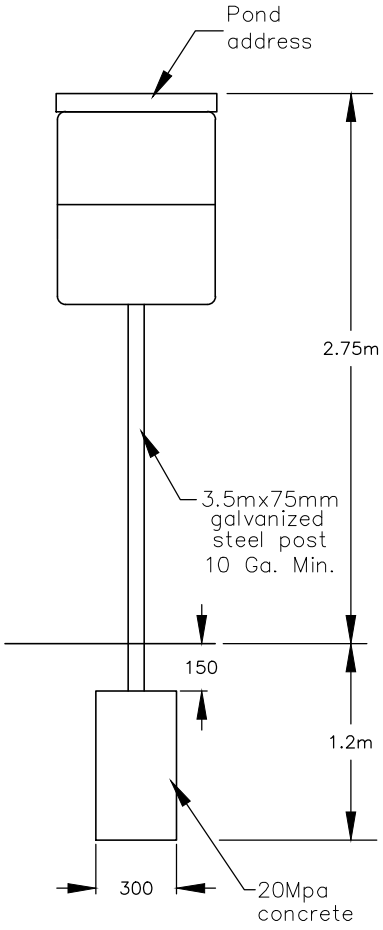
   A sign pattern will be provided by the Town of Whitby Operations Department.
4. Town of Whitby logo or other suitable graphic and local area to be identified (ie: Villiage of Brooklin) to be approved by Engineering Services or through subdivision agreements.
5. All north/south street names shall be placed at the top location of the sign.
6. Sign post and foundation shall be constructed to hold signs rigidily 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	**Heritage Street Sign**	DWG. Date: January 2009
Approved		Revision No: 3
Scale: N.T.S.		Revision Date: October 2018
		DWG No. 501.10



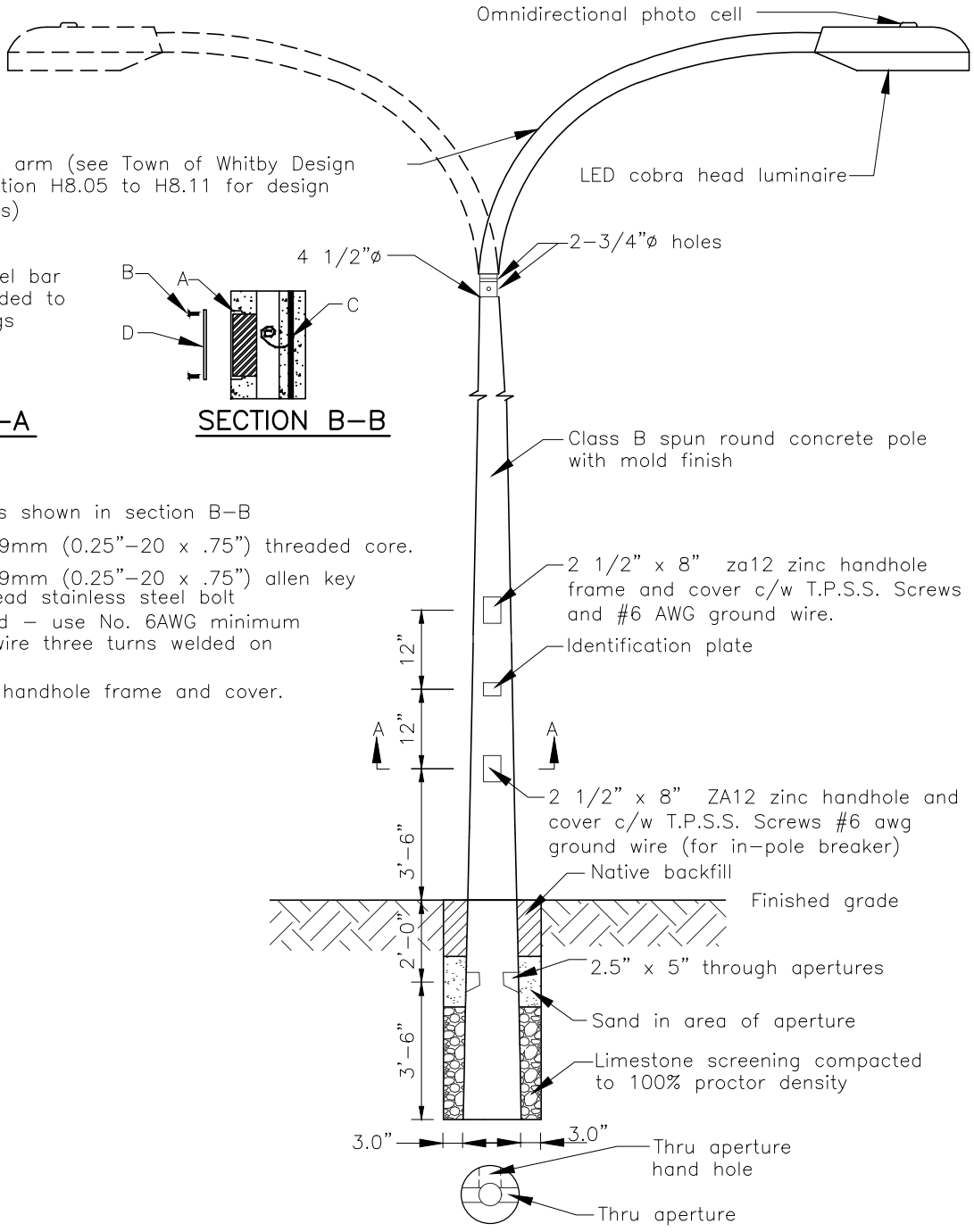


Notes:

1. 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	**Storm Pond Sign Detail**	DWG. Date: August 2015
Approved		Revision No: 1
Scale: N.T.S.		Revision Date: June 2022
		Dwg No. 501.20



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.

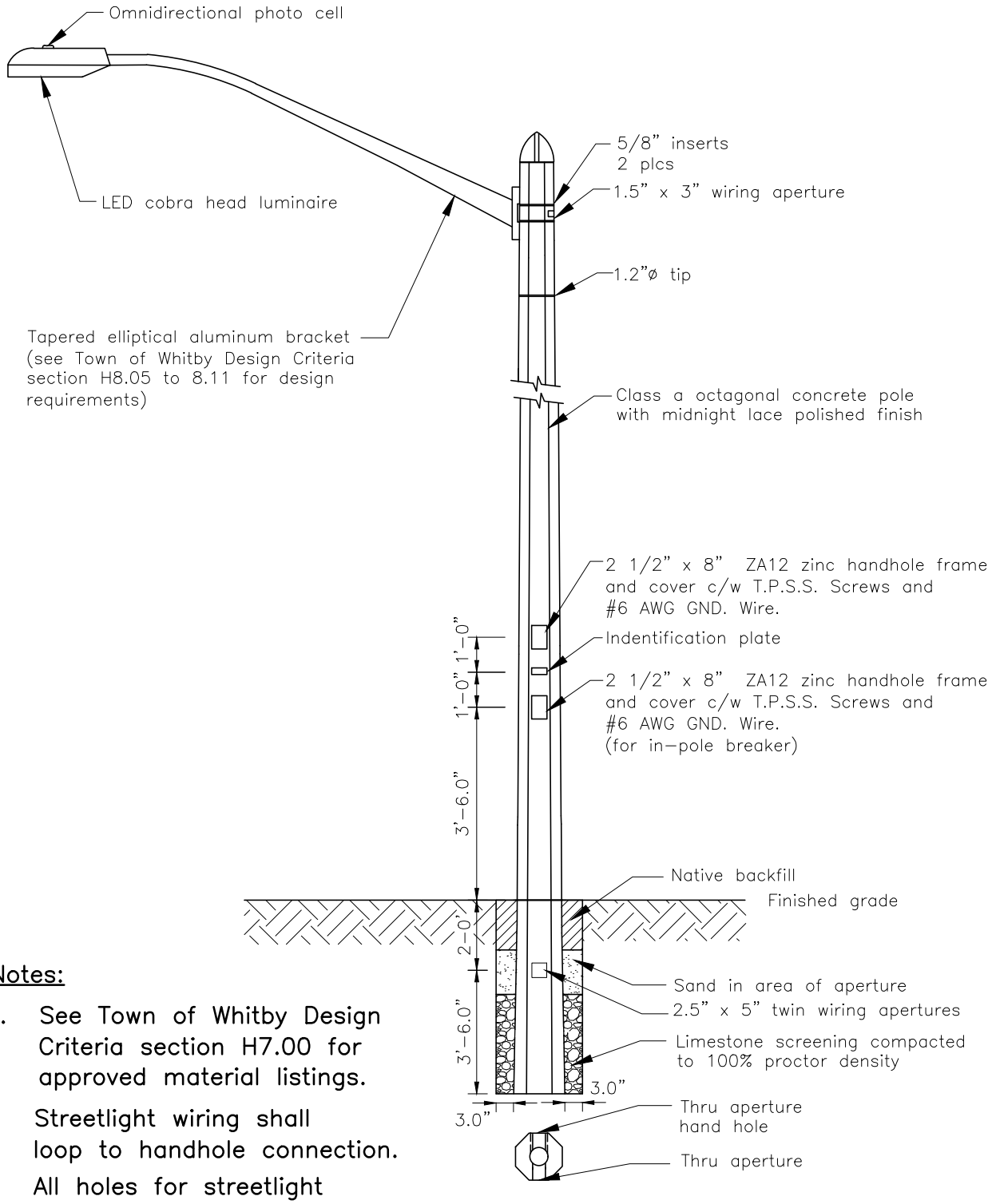
D. Cast metallic handhole frame and cover.

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**	DWG. Date: March 2004
Approved		Revision No.: 4
Scale: N.T.S		Revision Date: July 2019
		DWG No. 502.10

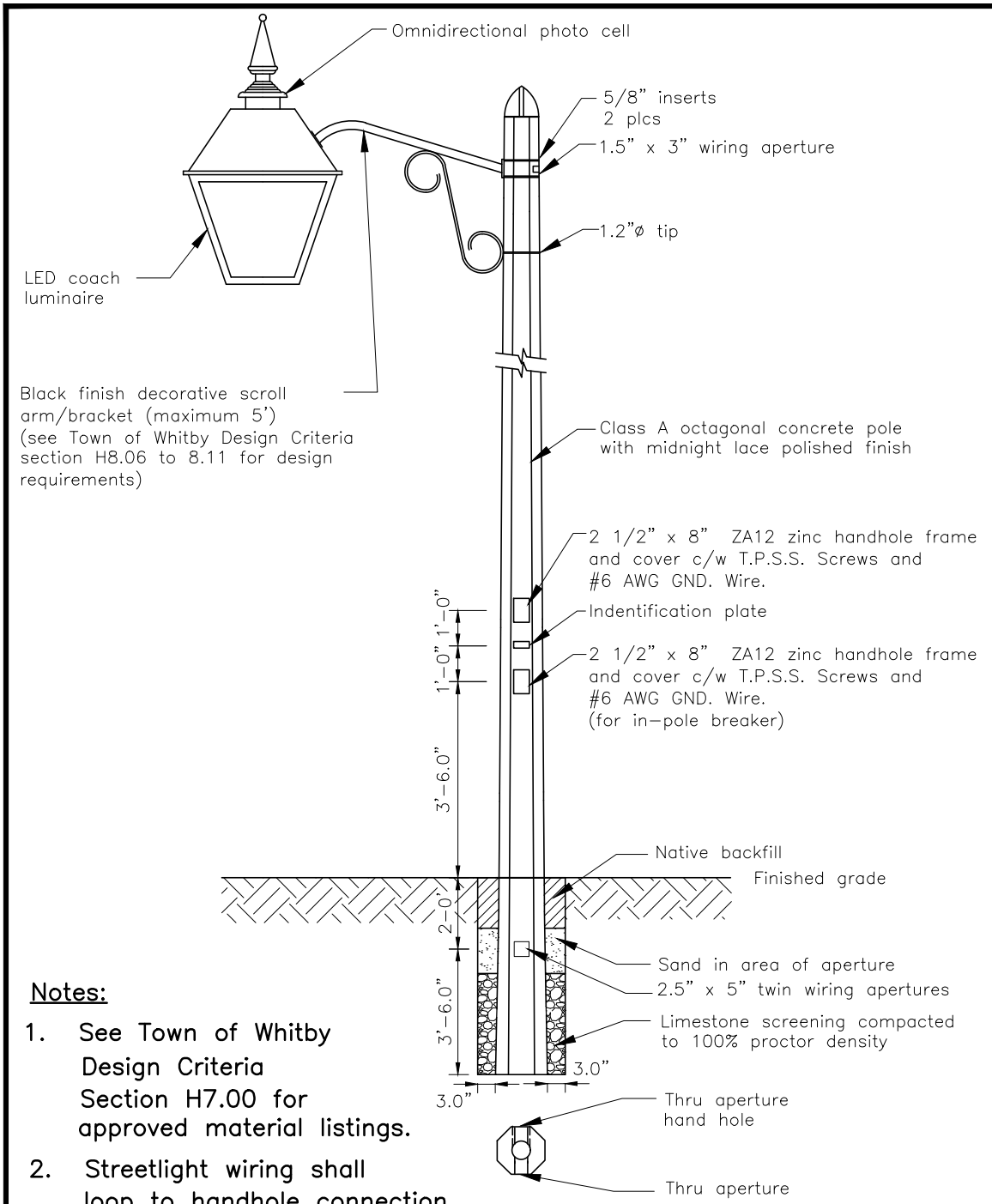


Notes:

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	**Standard Streetlight for Local and Residential Collectors Roads**	DWG. Date: August 2015
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: July 2019
		Dwg No. 502.20

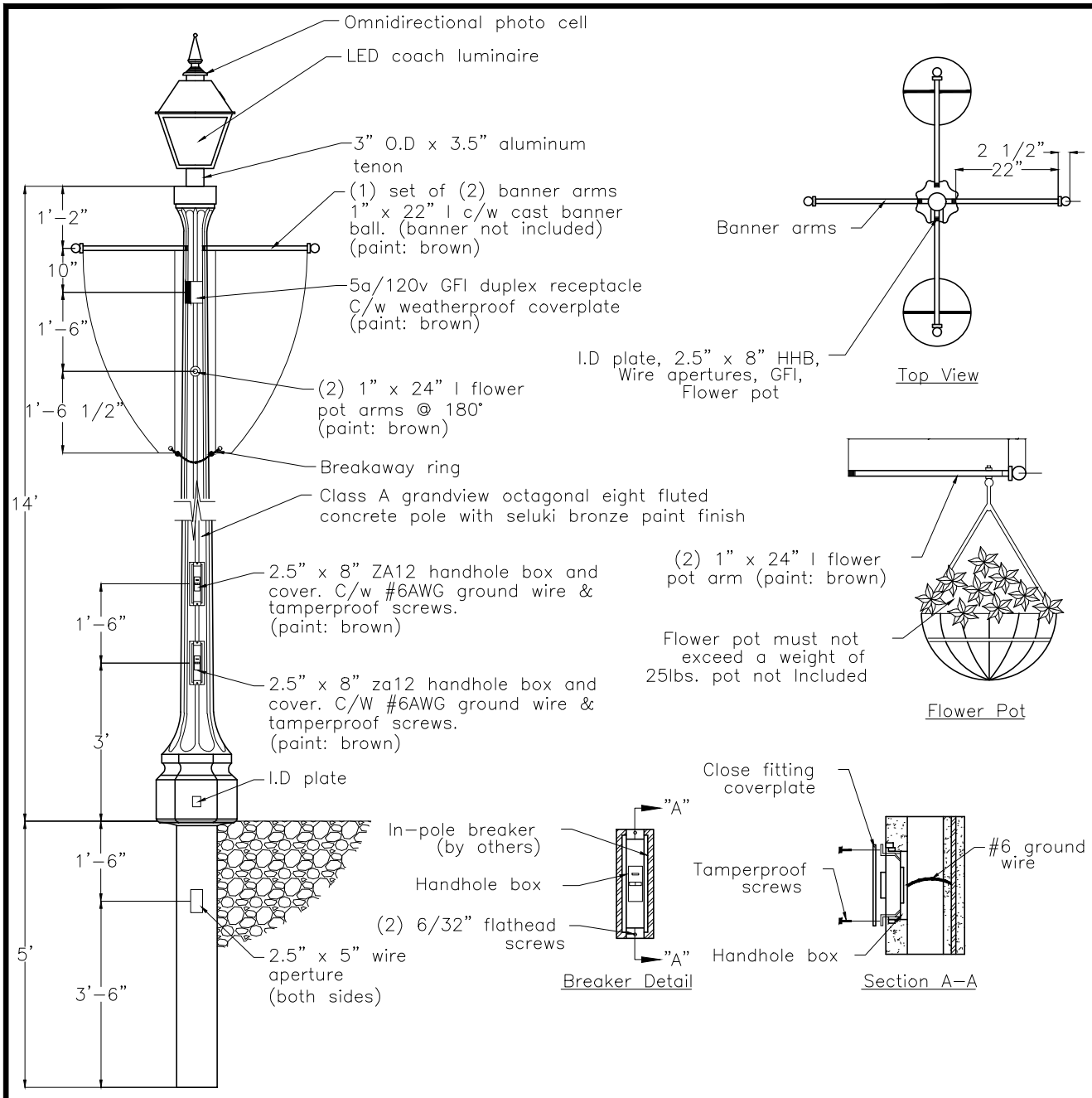


Notes:

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

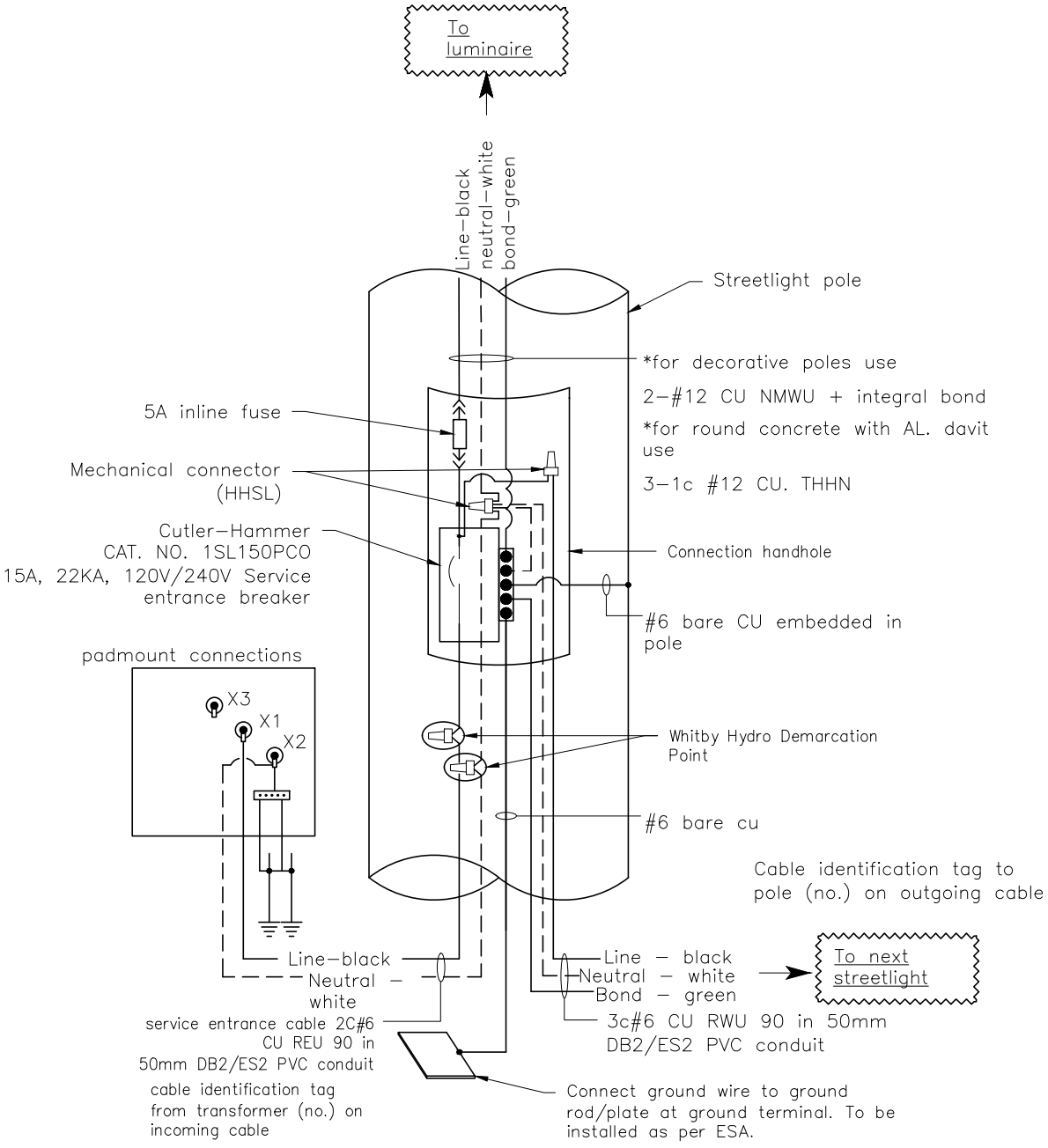


Notes:

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.

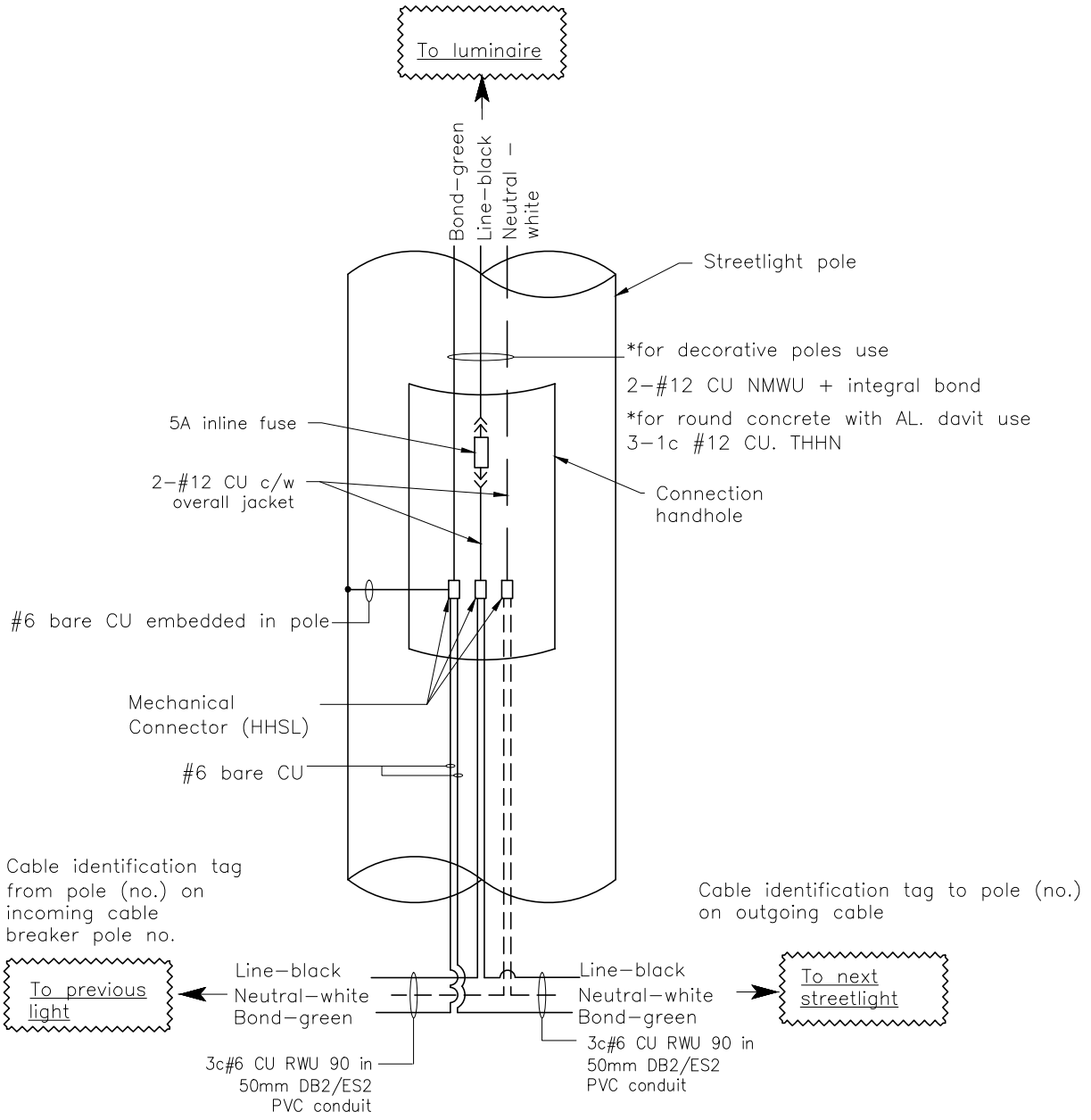
All dimensions in imperial except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Standard Streetlight for Designated Downtown Areas**	DWG. Date: August 2015
Approved		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 502.40



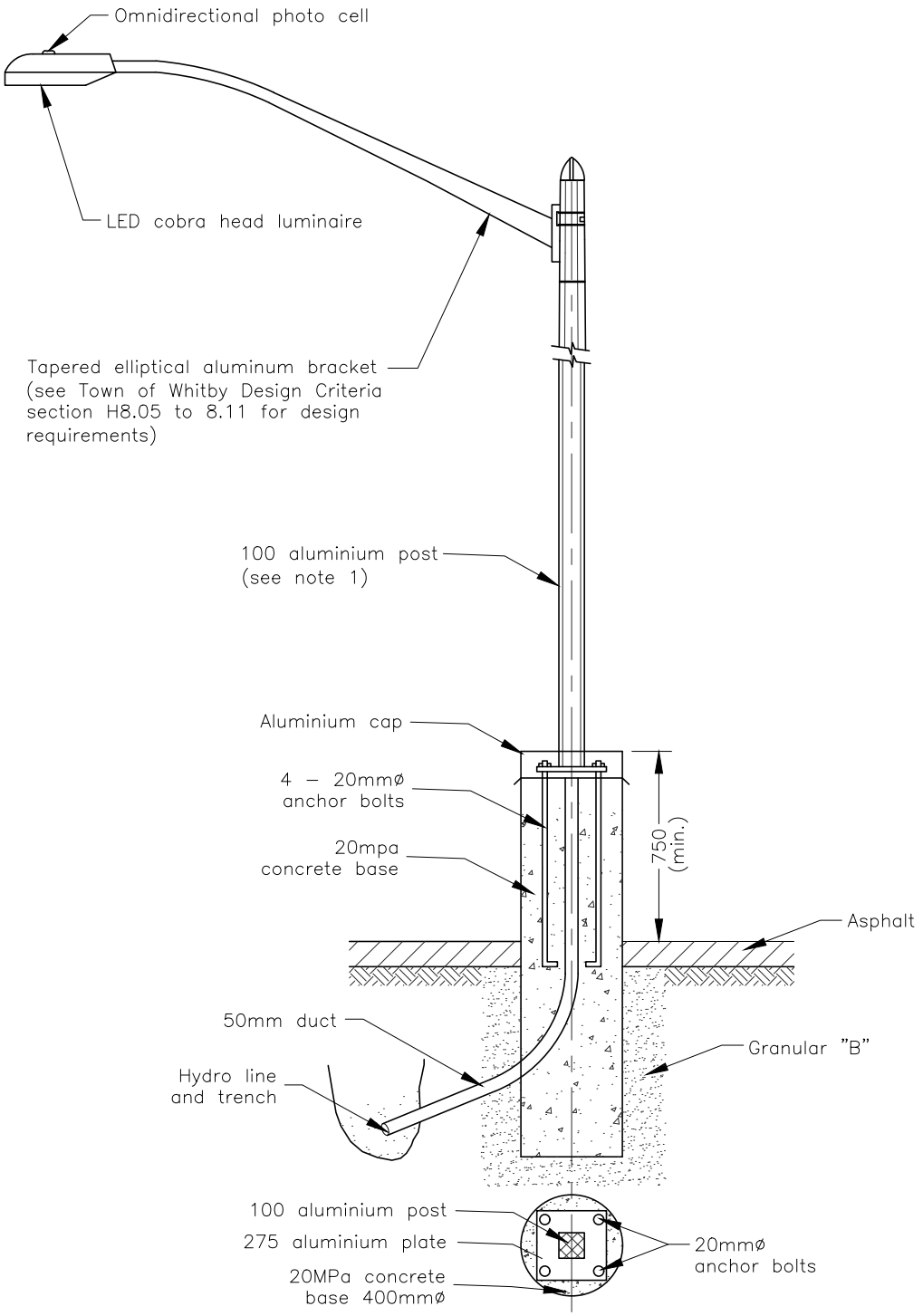
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Underground Distribution Standards** **Street Light Pole** **C/W Services Entrance Breaker Connection**	DWG. Date: August 2015
Approved		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	**Underground Distribution Standards** **Street Light Wire Diagram** **Non-service Entrance**	DWG. Date: August 2015
Approved		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 502.60

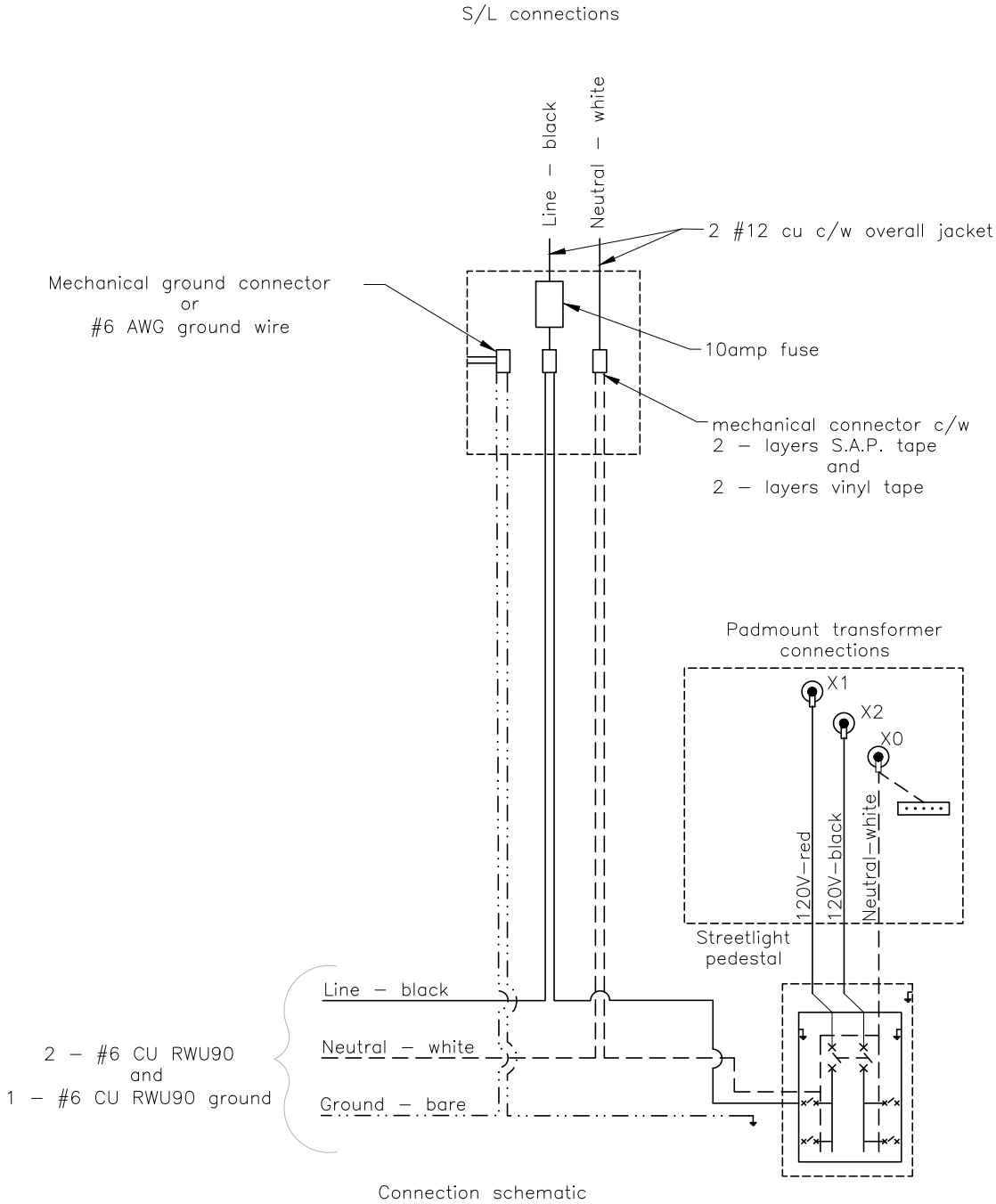


Notes:

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 50mmø PVC duct.

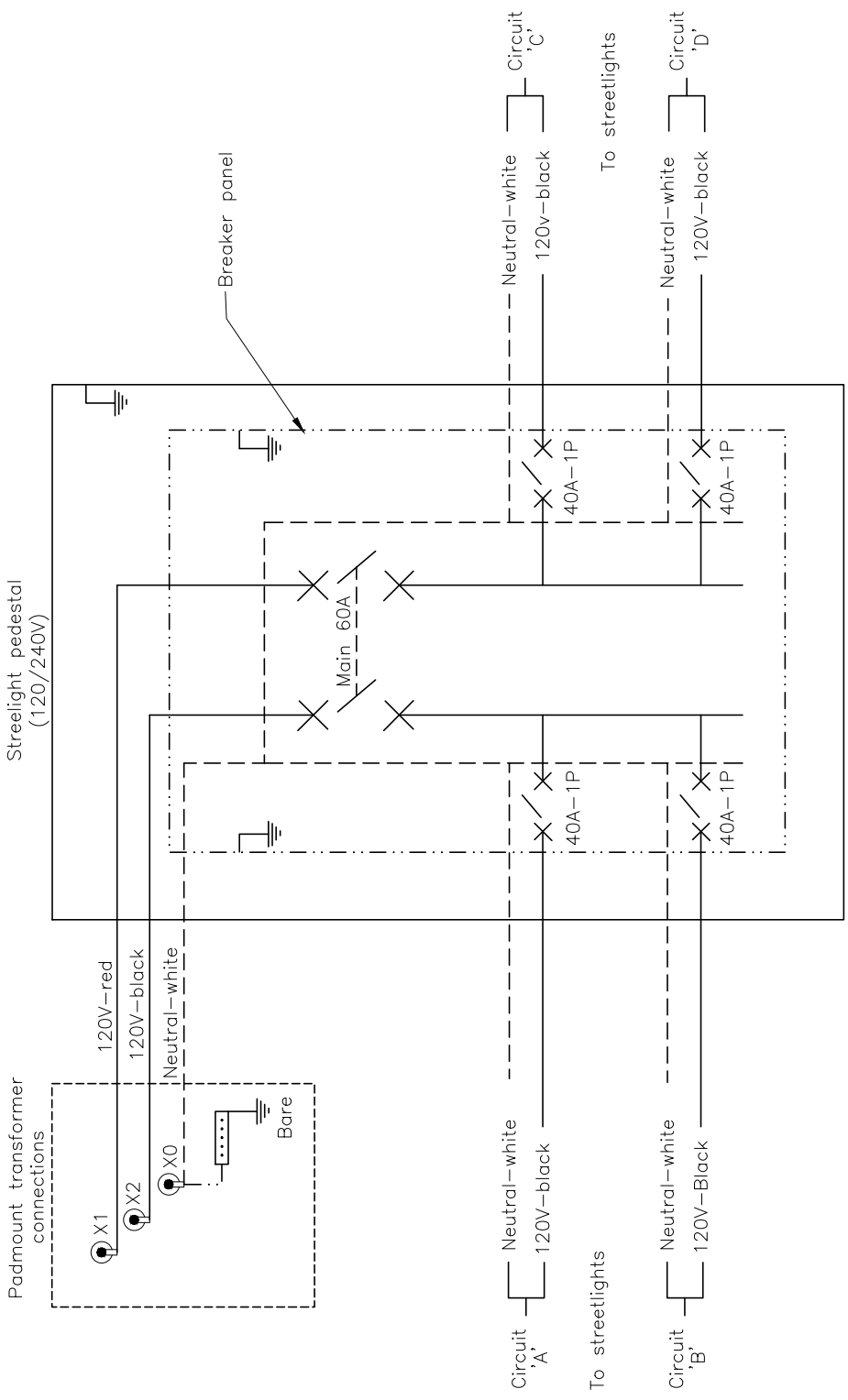
All Dimensions In Millimetres Except Where Noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Typical Municipal Parking Lot Light Standard Detail**	DWG. Date: March 2004
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: October 2018
		DWG No. 503



All dimensions in millimetres except where noted

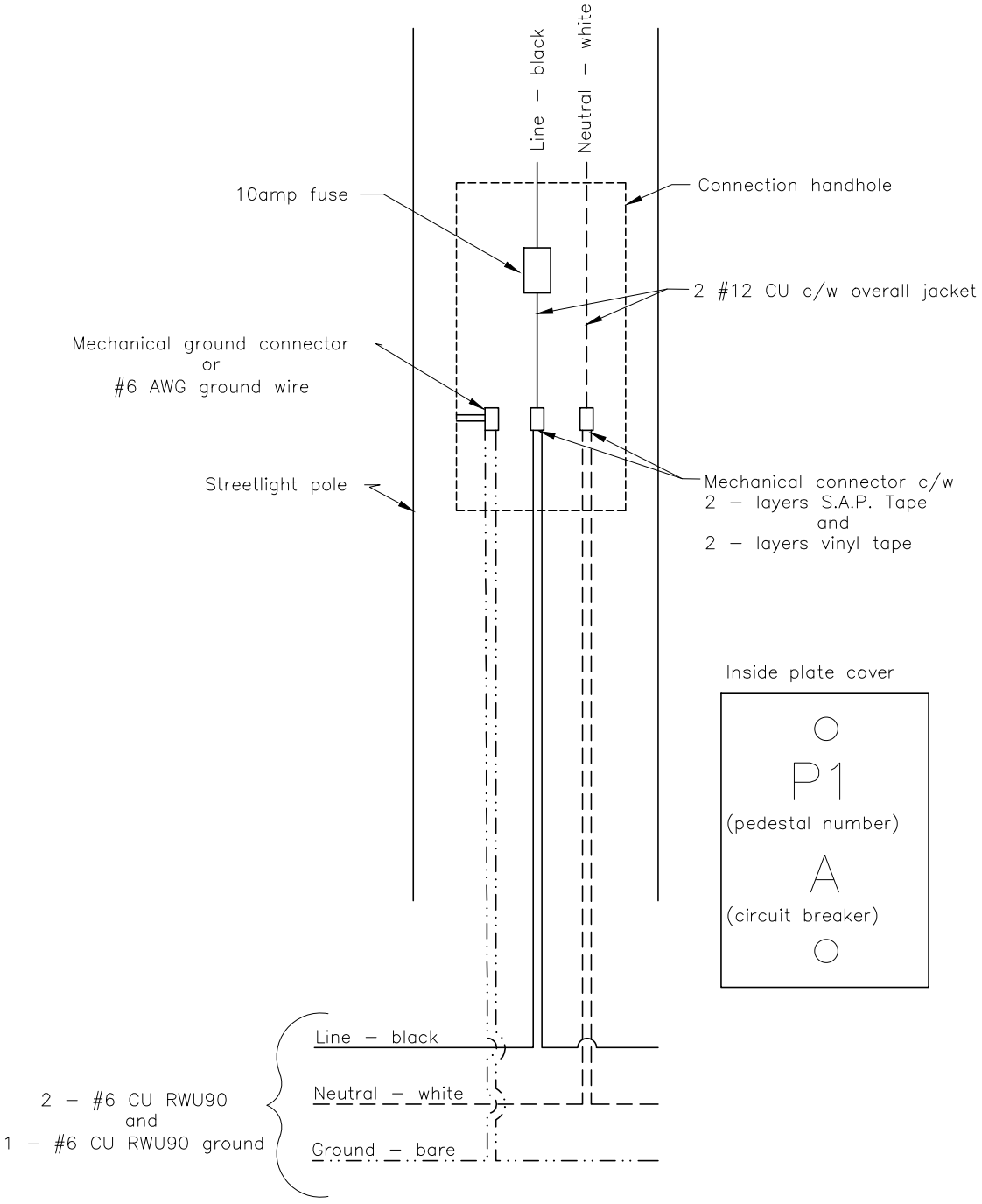
The Corporation of the Town of Whitby		Engineering Services
Checked	**Grounding Detail For Streetlight Pedestal and Poles**	DWG. Date: March, 2004
Approved		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 504



All dimensions in millimetres except where noted

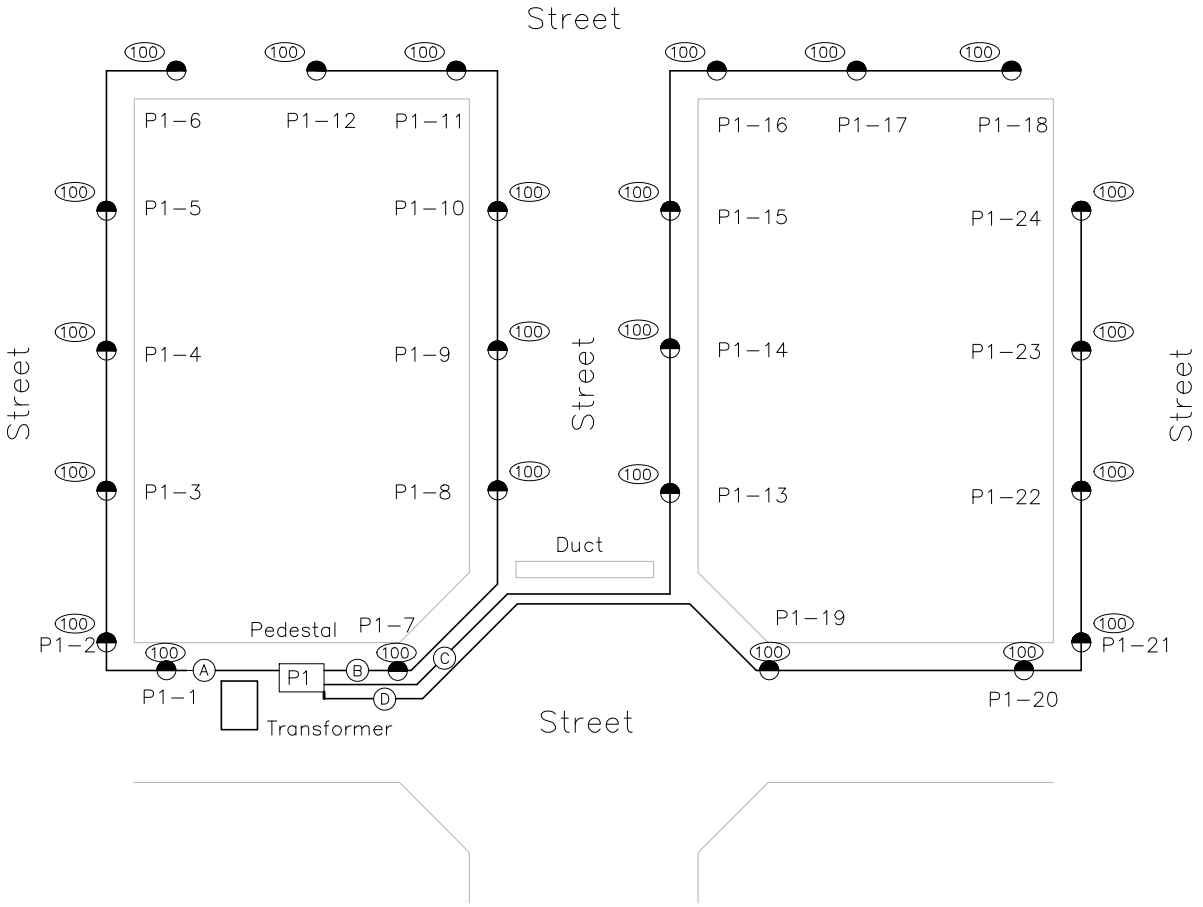
The Corporation of the Town of Whitby		Engineering Services
Checked	**Power Supply from Transformer to Pedestal to Streetlights**	DWG. Date: March, 2004
Approved		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 504.10

S/L Connection



All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Streetlight Wiring Diagram**	DWG. Date: March, 2004
Approved		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 504.20



note:

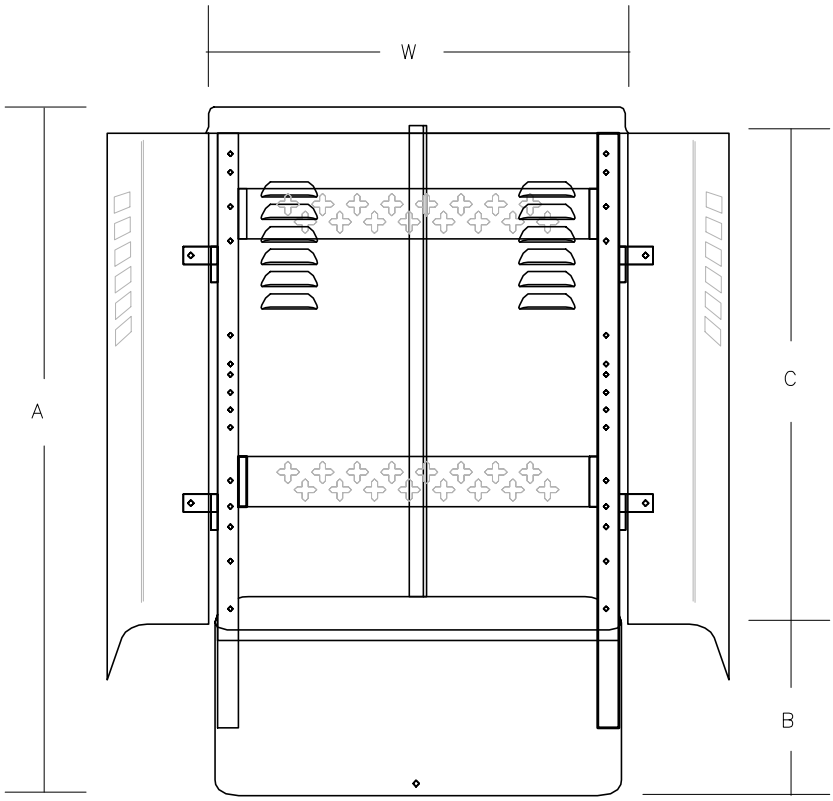
- Each streetlight pedestal radially feeds up to 4 circuits of 6 streetlights each.
- Each streetlight pedestal has a 60amp–2P 120/240V main breaker complete with 4–1P,40amp 120V breakers.
- Maximum circuit length, 540m – 100W streetlight.
- Maximum circuit length, 240m – 250W streetlight.

● – Represents streetlight.
(100) – 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	**Streetlight Pedestal Reference Numbering**	DWG. Date: March, 2004
Approved		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 504.30



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

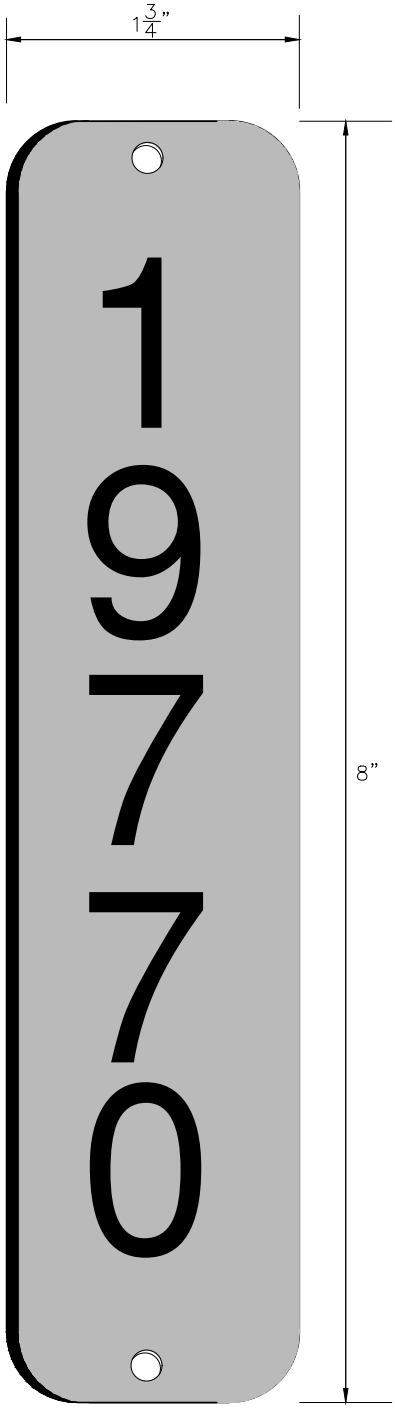
Note: units are equipped with two 32 inch mounting stakes and factory mounting brackets.

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	**Streetlight Pedestal Enclosure**	DWG. Date: March, 2004
Approved		Revision No.: 1
Scale: N.T.S		Revision Date: June, 2022
		DWG No. 504.40

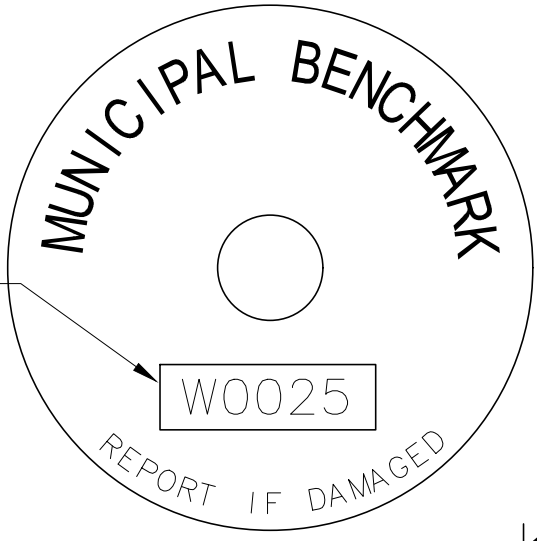


Notes:

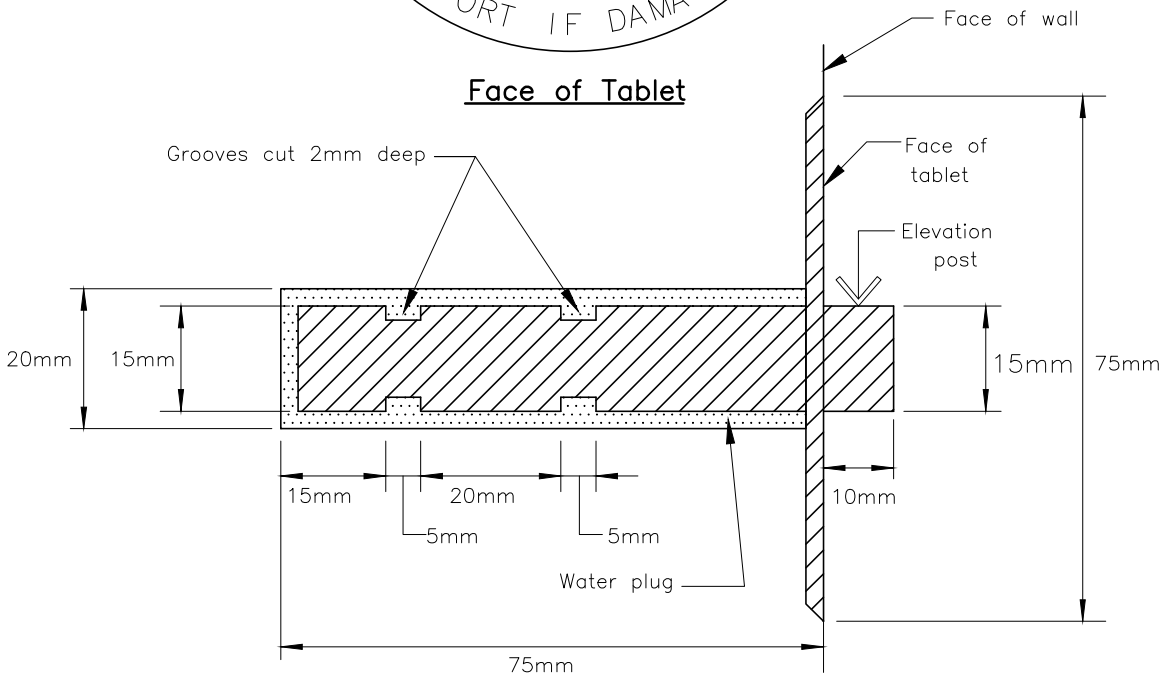
1. Plate dimensions 1 3/4 by 8", with rounded edges, 1/16" thick 2 ply.
2. Font is a custom engraving font called (gothic) font size – 1 3/16" tall by 13/16" wide.
3. Yellow plate with black lettering.
4. Material: plastic acrylic blend rated for UV outdoor.
5. Pole number height – 9 feet from the ground 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	**Pole Number Plate**	DWG. Date: October, 2018
Approved		Revision No.: .
Scale: N.T.S		Revision Date: .
		DWG No. 504.50



Face of Tablet



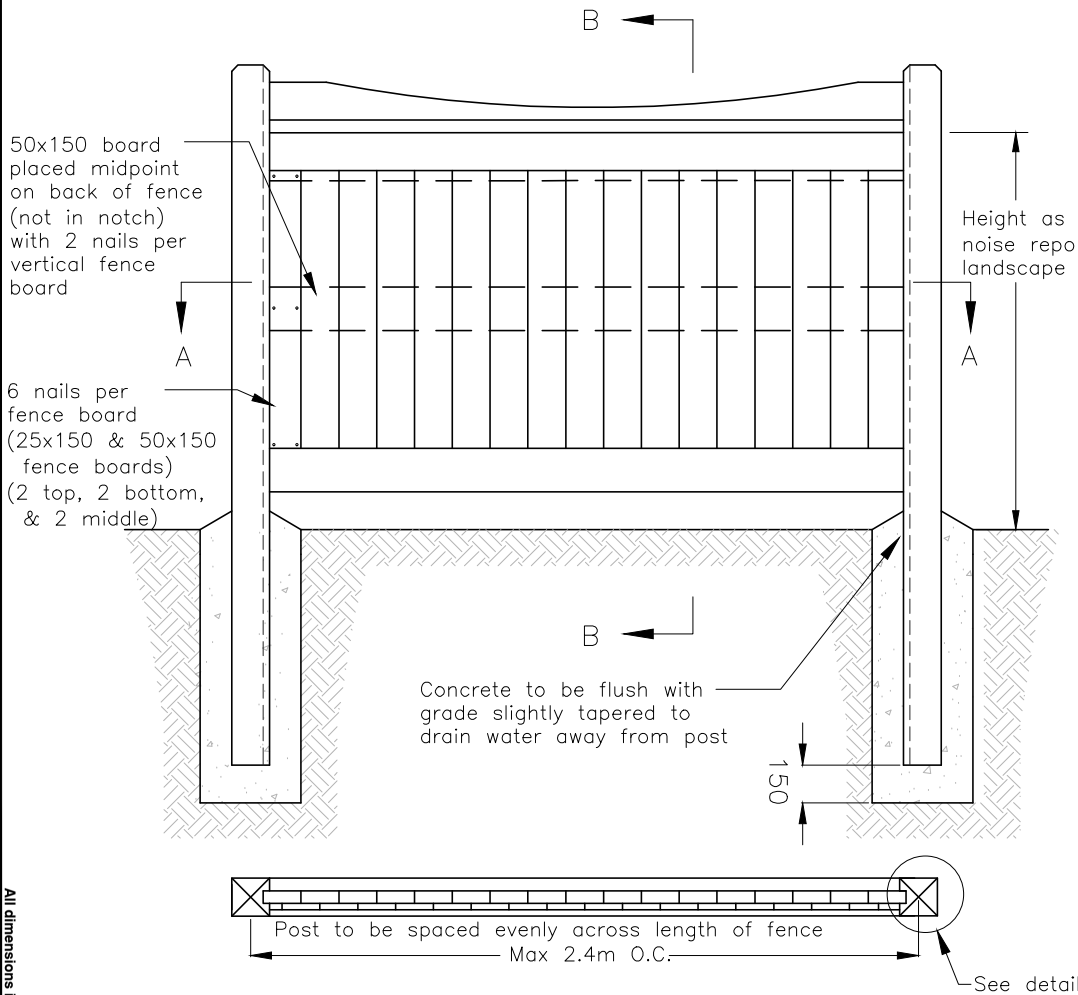
Cross Section

notes:

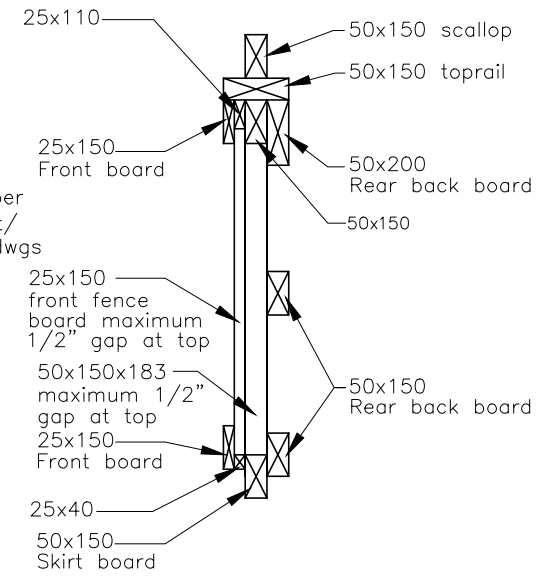
1. Tablet is cast in brass.
2. Tablet is to be mounted vertically in a concrete foundation wall of a building, bridge, or culvert with footings below the frost level, and has been in existence for at least two years.
3. Tablet to be numbered before installation by a town approved punch. the number to be approved by the Town of Whitby and be preceded by the letter W.
4. A 20mm ø 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

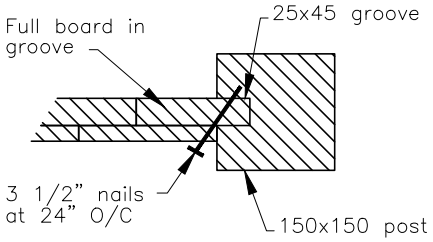
The Corporation of the Town of Whitby		Engineering Services
Checked	**Bench Mark Tablet**	DWG. Date: January 1993
Approved		Revision No.: 1
Scale: N.T.S		Revision Date: May 2006
		DWG No. 505



Section A–A



section b–b



Detail 'C'

Notes:

1. Refer to Town of Whitby Standard 506.10 for notes.

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby

Engineering Services

Wood Acoustic Fence

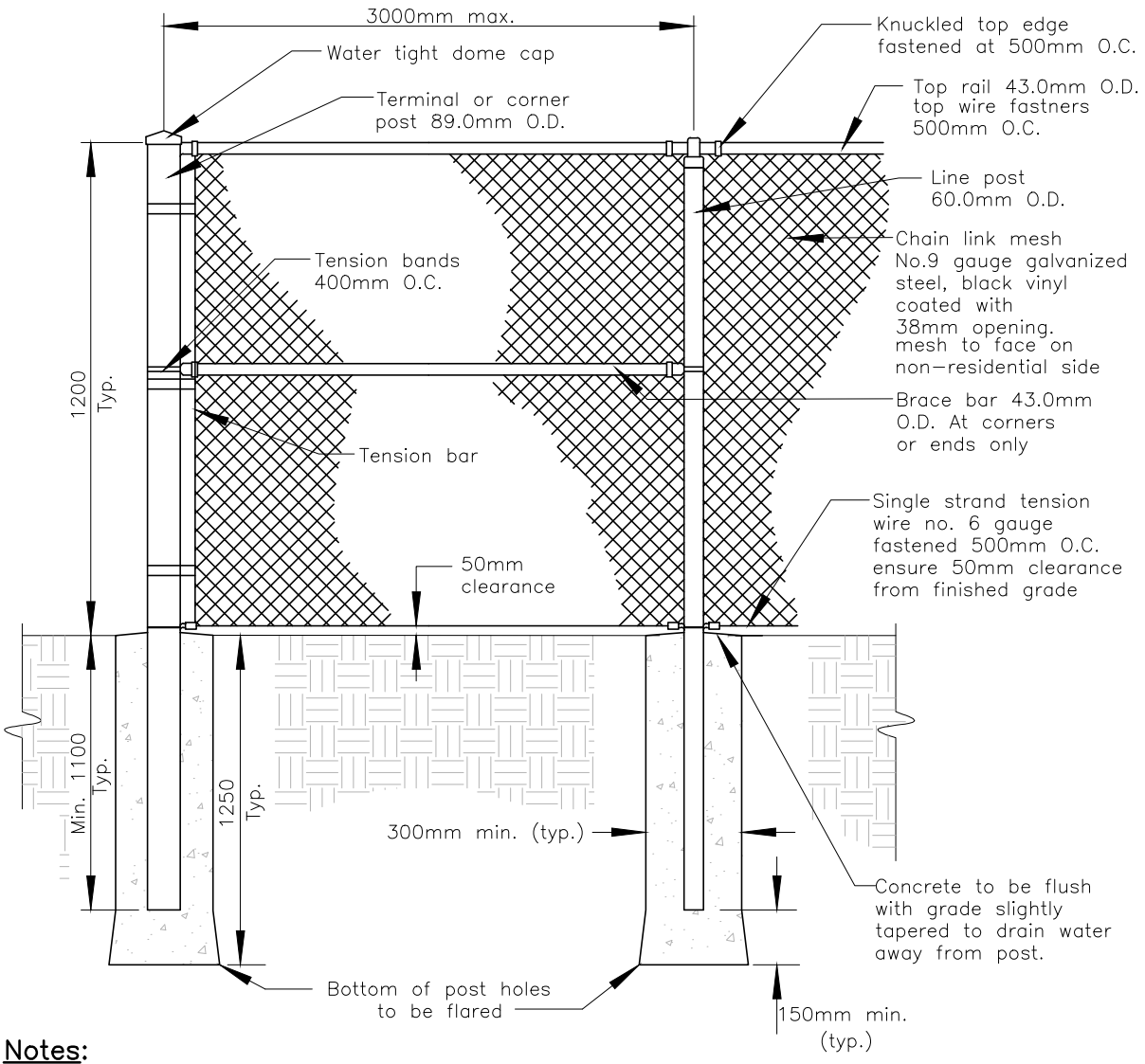
Scale:	N.T.S.
Approved	
Checked	
DWG. Date:	July 2002
Revision No:	3
Revision Date:	August 2015
DWG No:	506

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

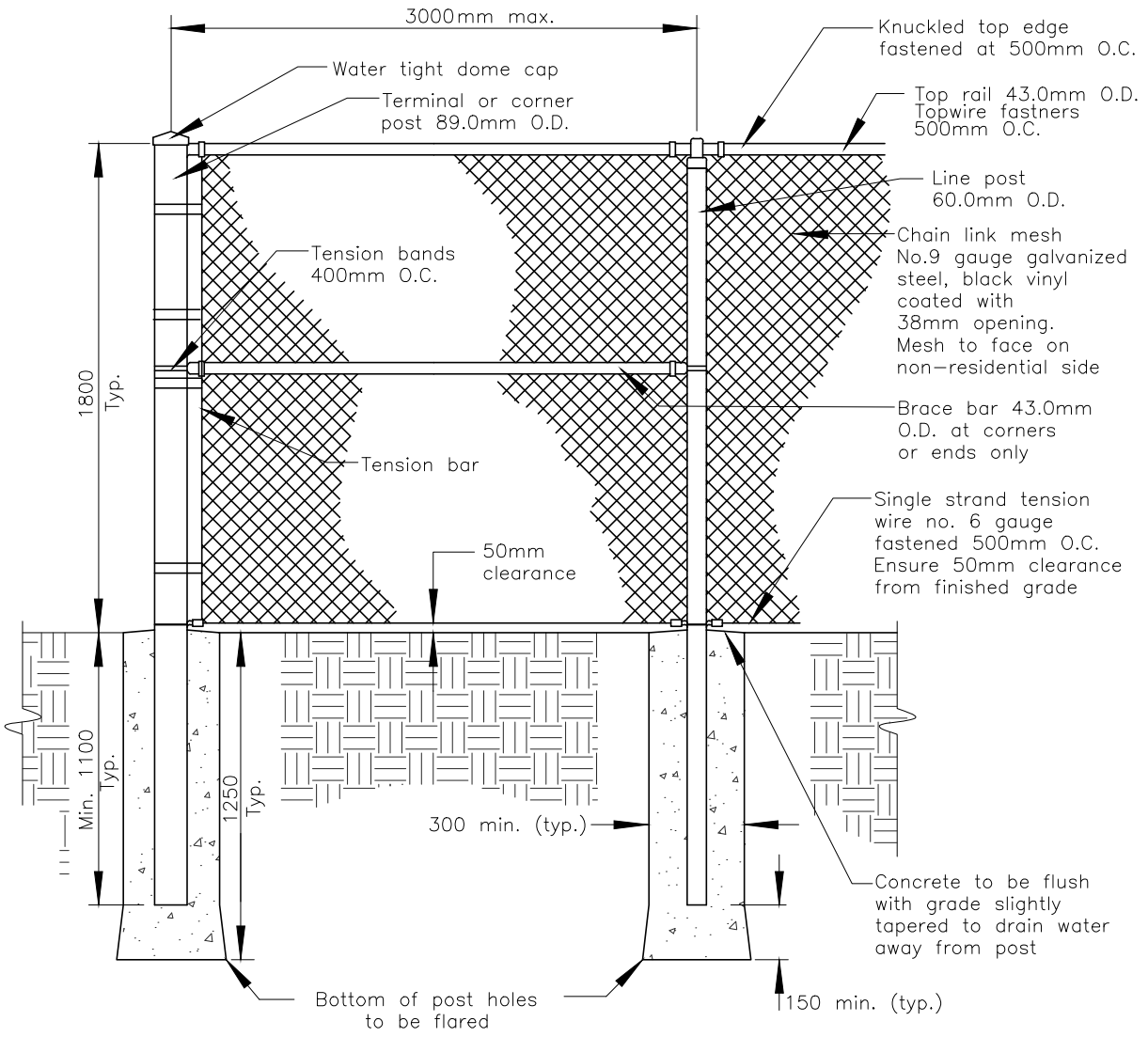


Notes:

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	**1200mm (4'-0") High Black Vinyl Coated Chain Link Fence**	DWG. Date: July 2011
Approved		Revision No: 1
Scale: N.T.S.		Revision Date: August 2015
		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	**1800mm (6'-0") High Black Vinyl Coated Chain Link Fence**	DWG. Date: July 2011
Approved		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

XXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXXXX

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: .	PX DRAWING NUMBER
DATE:	XXXXX 200X		

Date: XXXXXXX, 2003 File: W2000X-X_PX.dwg

Note:

1. 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	**Drawing Title Block for Town of Whitby Projects**	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

_____ P. Eng.

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 DRAWING NUMBER
DATE:	**XXXXX 200X**		

Date: XXXXXX, 2003 File: XXXXXXX_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: June 2022
		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
x**100.00**	- PROPOSED ELEVATION
x*100.00*	- 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	**Legal Drawing Title Block for Individual Siting Plans**	DWG. Date: October 2018
Approved		Revision No.: 1
Scale: N.T.S.		Revision Date: June 2022
		DWG No. 509.10

TEMPLATE N.T.S.

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
x**100.00**	- 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

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

*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	**Ledger Drawing Title Block for Individual Siting Plans**	DWG. Date: October 2018
Approved		Revision No.: 1
Scale: N.T.S.		Revision Date: June 2022
		DWG No. 509.20

The Corporation of the Town of Whitby
Sanitary Sewer and Storm Sewer House Connections

Subdivision: _____ File No.: _____
M–Plan: _____ Date: _____
Underground Maintenance Date: _____

Storm Sewer House Connection (STM)			
Lot No.	Dia.	Length and Bedding	Invert at Property Line

Sanitary Sewer House Connection (SAN)			
Lot No.	Dia.	Length and Bedding	Invert at Property Line

Comments: _____

_____

_____

_____

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby		Engineering Services
Checked	**Service Connection Record Subdivisions/Site Plans**	DWG. Date: July 2002
Approved		Revision No.: 5
Scale: N.T.S		Revision Date: June 2022
		DWG No. 510

The Corporation of the Town of Whitby

Storm Sewer Lateral Location Sheet

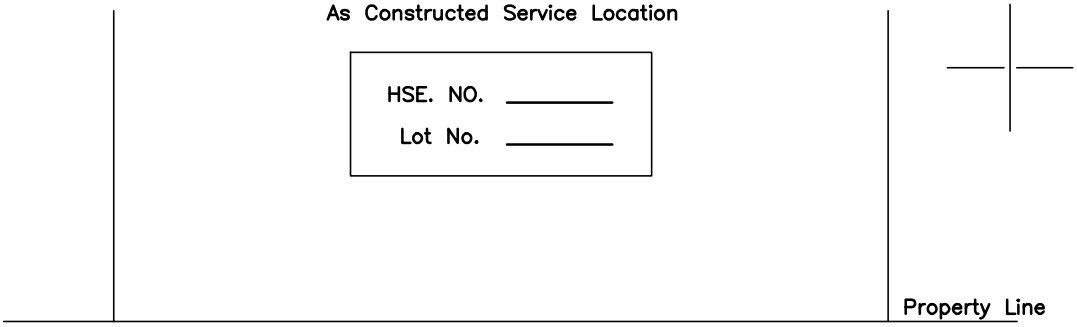
Street _____ Hse. No. _____ Lot No. _____

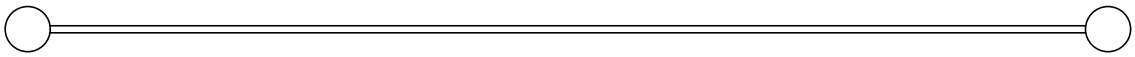
Contract No. _____ Plan No. _____ Station _____

Diameter of Pipe _____ Type of Pipe _____

Installed By _____ Date: _____

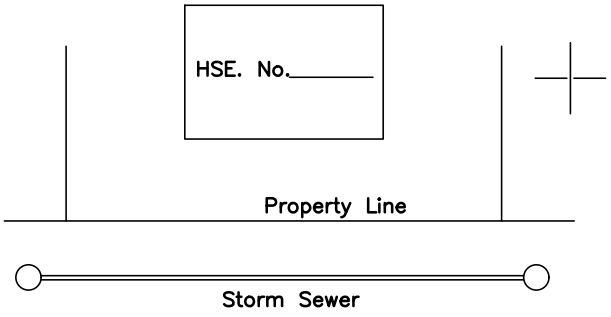
As Constructed Service Location





MH. _____ _____ Dia. Storm Sewer MH. ____

Proposed Service Location



As Constructed Information

Length of Lateral _____

Depth of Invert at property line (+) – _____

Invert Elevation _____

Remarks _____

I agree that the proposed service location should be as shown above

Owner / Tenant's Name

Signature Date

I certify that the information above is correct

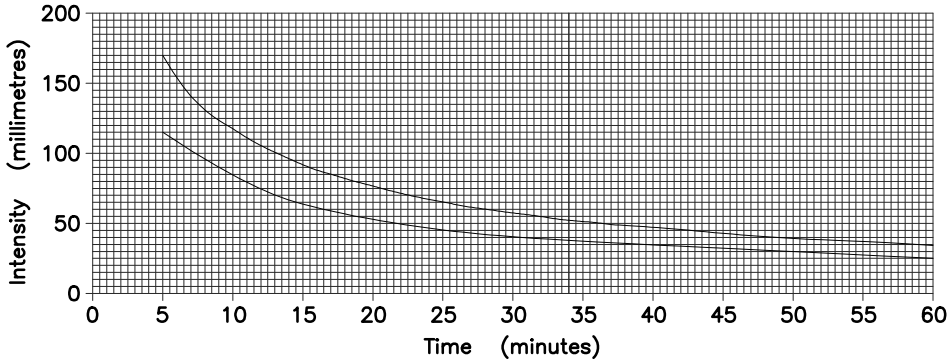
Inspector's Signature

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
Approved		Revision No.: 2
Scale: N.T.S		Revision Date: June 2022
		DWG No. 511



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

$$I = \frac{1050.524}{(t_C + 4.5)^{0.819}}$$

2 year curve

$$I = \frac{677.333}{(t_C + 4.5)^{0.792}}$$

All dimensions in millimetres except where noted

The Corporation of the Town of Whitby — Engineering Services

Checked	**Rainfall Intensity Curve and Values**	DWG. Date: July 2002
Approved		Revision No.: 5
Scale: N.T.S		Revision Date: August 2015
		DWG No. 512

Town of Whitby
Storm Sewer Design Sheet

Consultant: _____
File No. _____
Subdivision Name: _____

Prepared By _____
Checked By _____
Date _____
n= _____ ____year storm

Street	From M.H.	To M.H.	A Area (ha)	R Runoff COEFF.	2.78AR	ACCUM. 2.78AR	T of C (min.)	I Rainfall Intensity (mm/hr)	Q_F Peak Flow (L/S)	Pipe Dia. (mm)	Slope (%)	Length (m)	Q_P Capacity (L/S)	Velocity (m/s)	Time in Section (min.)	Total Time (min.)	Inverts Lower M.H.	Inverts Upper M.H.	Critical Slope(%)	Q_C Capacity @ Critical Slope(l/s)	Peak Flow Q_F / Pipe CAP Q	Remarks

Runoff Coefficients

0.20 Parks, Cemeteries and Playgrounds
0.65 Single Family Residential
0.65 Semi-detached Residential
0.75 Street Town Houses
0.85 Laneway Towns
0.90 Back to Back Towns
0.85 Industrial Areas
0.90 Commercial and Heavily Developed Areas
0.85 Apartments, Medium Density, Condo Townhouses, Schools and Churches

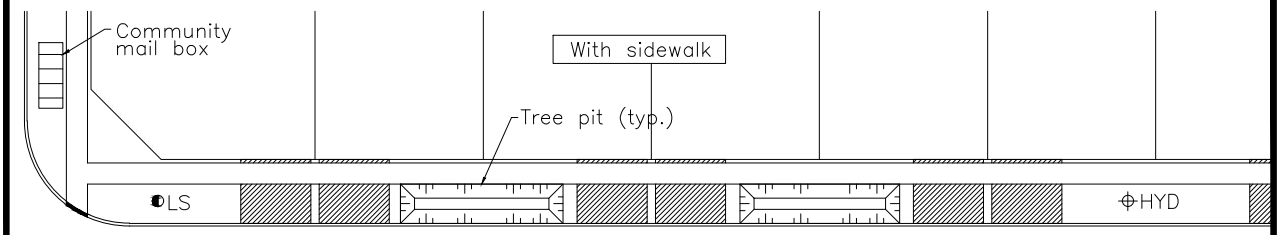
Note: Q is lesser of Q_P or Q_C

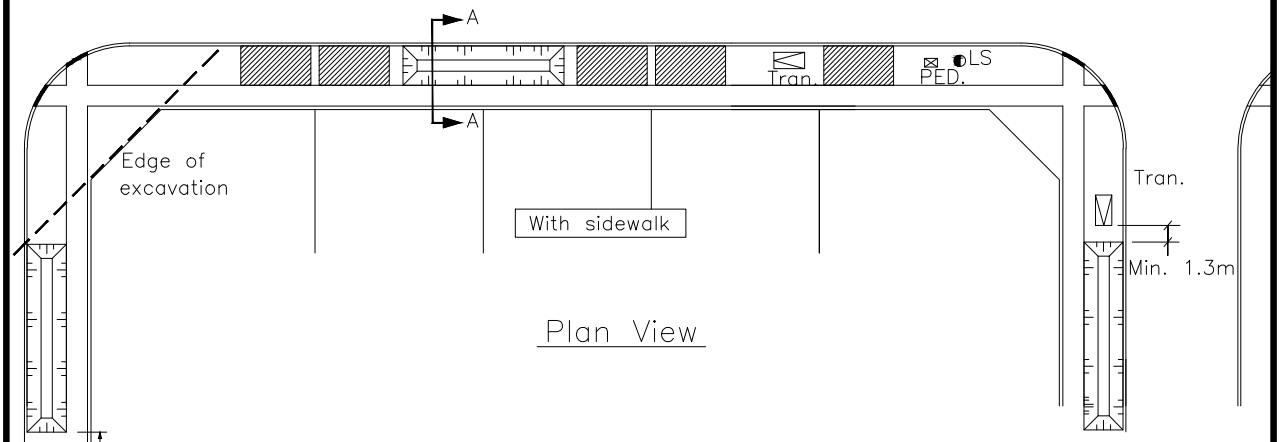
All dimensions in millimetres except where noted

The Corporation of the Town of Whitby
Engineering Services

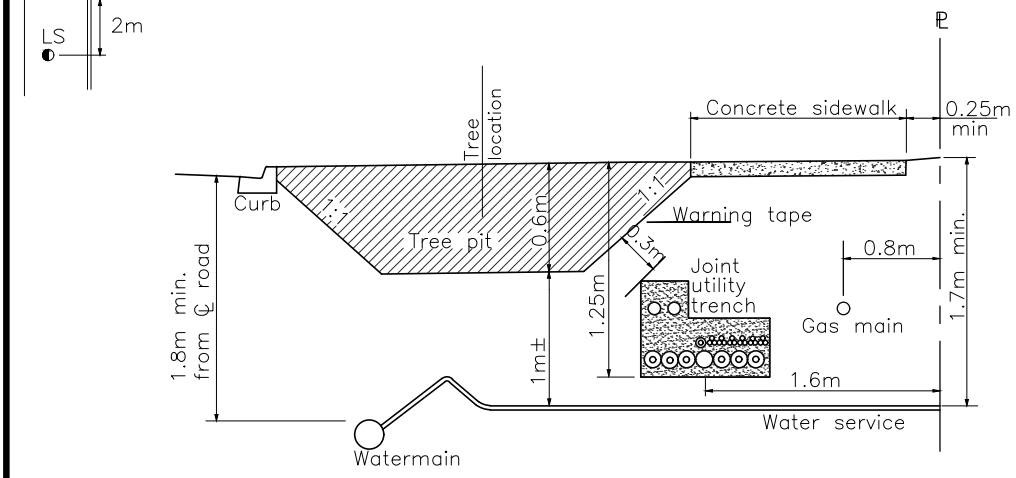
Storm Sewer Design Sheet

Scale: N.T.S
Approved
Checked
DWG. Date: July 2002
Revision No.: 7
Revision Date: June 2022
DWG No. 513





Plan View



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 or 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		Revision No.: 1
Scale: N.T.S		Revision Date: June 2022
		DWG No. 514