



Portugal Gove St. Philip's

**Subdivision Design and
Construction Standards**

SUBDIVISION DESIGN AND CONSTRUCTION STANDARDS

The Council of the Town of Portugal Cove - St. Philip's hereby adopts the following Subdivision Design and Construction Standards.

Made and adopted by the Council of the Town of Portugal Cove - St. Philip's on 18th day of October, 2022.

Claudine Murray, Clerk

Carol McDonald, Mayor

All persons are hereby requested to take notice that anyone who wishes to view these Standards may do so at the Town Council Office of the Town of Portugal Cove - St. Philip's. Should there be any questions or need for clarification, please contact the Town at 895-8000.

SUBJECT TO CHANGE

These Subdivision Design and Construction Standards are subject to change without notice.

The onus lies with the user to ensure that they are in possession of the latest revision.

FORWARD

These standards shall be read and considered in their entirety and used in conjunction with the latest edition of the following publications:

Government of Newfoundland and Labrador Municipal Water and Sewer and Roads Master Construction Specifications

Transportation Association of Canada Road Design Manual (metric edition)

Transportation Association of Canada Uniform Traffic Control Devices for Canada (metric edition)

Town of Portugal Cove-St. Philip's Municipal Plan and Development Regulations, 2014-2024

Government of Newfoundland and Labrador Private Sewage Disposal and Water Supply Standards

Government of Newfoundland and Labrador Groundwater Assessment and Reporting Guidelines for Subdivisions Serviced by Individual Private Wells

In any case, where these standards are more stringent than a provincial or federal act or regulation, these standards will apply.

REVISIONS

REVISION #	DESCRIPTION OF REVISION	REVISION DATE	MOTION #
NO. 1	Appendix "A" Section 1.4 Financial Requirements: Section 1.4.3 Phase I and Phase II Security Deposits	June 2005	05-182
NO. 2	Section 4.3 Street Design Criteria: Table 1 Minimum "K" Value and Sidewalk Requirement	October 2011	2011-284
NO. 3	Section 4.3 (b) Street Design Criteria Street Length	January 2018	2018-013
NO. 4	Section 4.3 (b) and (c) Street Design Criteria Street Length	February 2019	2019-023
NO. 5	Appendix "B" Form 6 - Alternate Semi-Serviced and Unserviced Street Cross Section	August 2020	2020-157
NO. 6	Overall Review	October 2022	2022-325
NO. 7	Interim Review	April 2024	

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1.0 SUBDIVISION DEVELOPMENT

1.1 DEFINITIONS

1. **Approval in Principle** gives the Developer approval to proceed to the final design stage of the project.
2. **Consulting Engineer** means a professional engineer and firm, in good standing and licensed with the Professional Engineers and Geoscientists of Newfoundland and Labrador (PEGNL), retained by the Developer to be responsible for design and supervision of the subdivision works.
3. **Developer** means a person or company who has applied for and has been granted approval to subdivide or service an existing parcel of land.
4. **Master Specifications** means the Government of Newfoundland and Labrador Municipal Water, Sewer, and Roads Master Construction Specifications, as amended.
5. **Phase I Works** means all work relating to, but not limited to, the installation of water, sanitary, and storm sewer systems and ancillary works, construction of all communication and utility systems (including street lighting), the construction of all street and road right of ways (including granular base course, base course asphalt, curb and gutter, road shouldering, swales, ditches, culverts (with rip-rap), and asphalt pedestrian walkways), street signage, grading of all building lots (including development of structural engineered retaining walls required for lot development), development of open space areas and accesses to these areas, and privacy fencing.
6. **Phase II Works** means all work relating to, but not limited to, surface course asphalt, concrete pedestrian walkways, and topsoil, landscaping, and sodding of all public areas and road reserves (other than open space areas).
7. **Subdivision** means the process (and result) of dividing land, whether in single or joint ownership, into two or more smaller pieces of land for the purpose of development.
8. **Subdivision Permit** gives the Developer approval to proceed with construction work as per the executed subdivision agreement.
9. **Town** means the Town of Portugal Cove-St. Philip's, including both Town Council and municipal staff.

1.2 DEVELOPMENT APPROVAL

1.2.1 Application

The Developer will be required to submit a Building and Development Application and subdivision concept plan showing:

- (a) Street and lot layout;
- (b) Environmentally sensitive areas and buffers;
- (c) Areas of natural vegetation to be retained;
- (d) Stormwater management; and
- (e) Public open space.

1.2.2 Plan Review

The subdivision concept plan will be reviewed for the following:

- a) Lot Layout – The plan will be evaluated in accordance with the Town’s Development Regulations including development standards (lot areas and frontages) and driveway locations. The plan will also be evaluated for necessary future road connections and to ensure that the lot layout does not prejudice future development (ie. no “ransom strips”).
- b) Access – The plan will be evaluated for impact on traffic flows, ease of access to and from the subdivision, and separation distance between the proposed access and other existing street intersections.
- c) Water Supply – For areas to be serviced by municipal water, existing Town infrastructure will be evaluated to determine if adequate pressures and flows exist to service the proposed development.
- d) Sanitary Sewer – For areas to be serviced by municipal sanitary sewer, existing Town infrastructure will be evaluated to determine if the current infrastructure has the capacity available to accommodate the proposed development.
- e) Storm Sewer – For areas proposing to be serviced by existing municipal storm sewer infrastructure, the existing infrastructure will be evaluated to determine if the current infrastructure has the capacity available to accommodate the proposed development. The location and proposal for stormwater management will also be evaluated.
- f) Internal Street Layout - The street layout will be reviewed for general conformance to the design criteria as given in these Standards.

- g) Public Open Space – When a parcel of land is proposed to be subdivided into four lots or more, the Town shall require the provision of public open space within the development. The requirement for public open space shall be determined by the Town and shall comprise of either:
- i. Conveyance to the Town, for a nominal consideration of one dollar (\$1.00), an area (or areas) of useable land equivalent to 10.0% of the gross area of the subdivision, or 25.0 m² for every dwelling unit permitted in the subdivision, whichever is greater.
 - ii. In lieu of such area or areas of land, the payment of a sum of money equal to the undeveloped appraised value of the land which would otherwise be required to be dedicated. Financial contributions received will be reserved by the Town for the purpose of the acquisition or development of land for public open space or other public purpose.

The Town may also require a strip of land to be reserved and remain undeveloped along the banks of any watercourse and this land may, at the discretion of Council, constitute the requirement of land for public open space.

Where land to be subdivided abuts or is in the vicinity of an existing or proposed trail system, such as the East Coast Trail or a Town trail identified in the Town's Trails Master Plan, no permit will be issued for the development unless provision has been made for a public right-of-way to access the trail network and for the transfer of ownership of the right-of-way to the Town. Where a trail is proposed to be developed through land proposed to be subdivided, the proposed trail corridor shall be conveyed to the ownership of the Town, which shall be considered toward the requirement of land for public open space. Council may accept an adjusted trail corridor location within the property as long as the overall development of the trail is not impacted.

- h) Environmental – The plan will be evaluated for the protection of environmentally sensitive areas identified in the Town's Development Regulations.

1.2.3 Approval in Principle

If, upon review of the above, a deficiency(s) is determined to exist, the Town will correspond with the Developer advising of the deficiency(s) and provide an opportunity to address them.

Reviews will continue until such time that either the deficiency(s) have been addressed, the Developer advises that they wish to proceed with their application without revision, or no deficiencies are identified. The application will then be presented to the Planning and Development Committee and Council for review and decision. As part of the application review, Council may choose to complete a public consultation with area property owners in accordance with the Town's Municipal Plan. If so, the public consultation must be completed prior to consideration of the application.

Once reviewed and considered by Council, the application may be granted approval in principle. Approval in principle shall be valid for two years from the grant of approval in principle.

Approval at this stage is preliminary and will not prohibit further changes that may become necessary during the detailed design.

1.3 CONSTRUCTION APPROVAL

1.3.1 General

The subdivision is to be designed and constructed in accordance with these Standards, Master Specifications, subdivision agreement, the Town's Municipal Plan and Development Regulations, and the requirements of any other regulatory authority having jurisdiction.

1.3.2 Requirements

A Subdivision Permit must be issued by the Town within two years of the granting of the approval in principle. A Subdivision Permit may be issued upon receipt and consideration of the following (but not limited to):

- (a) Construction Engineering Drawings - The drawings should be drafted as per Section 3.0 with the following items shown (as required):
 - (i) Water, sanitary and storm sewer layout;

- (ii) Location of water, sanitary and storm sewer connections for individual lots;
 - (iii) Street alignment;
 - (iv) Lot metes and bounds, areas and lot numbers;
 - (v) Right of ways and easements;
 - (vi) Location of approved Canada Post mailboxes;
 - (vii) Plan profile (showing all street, water, sanitary sewer and storms sewers to be constructed);
 - (viii) Typical lot grading plan with driveway locations (lot grading in accordance with Appendix 'A'). If a structural engineered retaining wall is required for development of a lot, design of the retaining wall must be included;
 - (ix) Design of a system to achieve net-zero runoff for the development;
 - (x) Public open space area(s) and improvements;
 - (xi) Location and details of a natural vegetation buffer or other structural barrier such as a privacy fence along the side or rear boundaries of existing residential properties;
 - (xii) Benchmark locations and elevations;
 - (xiii) Direction of flow for sanitary and storm sewer systems;
 - (xiv) Curve data;
 - (xv) Natural drainage courses;

Areas where natural vegetation is to be retained, where feasible. Particular attention should be paid to the identification and retention of mature trees. On building lots where all mature trees must be removed, a minimum of one tree is required to be planted with 45.0 mm caliper and minimum spacing of 9.0 m between trees;
 - (xvi) Detailed drawings for any items not covered by the Master Specifications;
 - (xvii) Proposed street name(s); and
 - (xviii) Proposed subdivision name.
- (b) Sanitary Sewer Calculations - Calculations are to be submitted on standard forms and accompanied by a detailed drainage plan (see Appendix 'B').
- (c) Storm Sewer Calculations - Calculations are to be submitted on standard forms and accompanied by a detailed drainage plan (see Appendix 'C').
- (d) Stormwater Management Report - Required to be stamped by a Professional Engineer and include storm data used and graphs depicting outlet performance, and stormwater

modelling.

- (e) Groundwater Assessment Report - Required to be completed by the Developer and approved by the Department of Environment and Climate Change where a minimum sized subdivision is to be serviced by individual wells.
- (f) Fisheries and Oceans Canada - Copies of any approvals or exemptions required for works under the jurisdiction of Fisheries and Oceans Canada.
- (g) Department of Environment and Climate Change - Copies of any approvals required for works under the jurisdiction of Environment and Climate Change.
- (h) Department of Transportation and Infrastructure - Copies of any approvals required for works under the jurisdiction of Transportation and Infrastructure.
- (i) Department of Digital Government and Service NL - Copies of any approvals required for works under the jurisdiction of Digital Government and Service NL.
- (j) Canada Post - Copies of approval for the proposed Canada Post locations.
- (k) Deed - Proof of ownership of the land being proposed for development.
- (l) Road Access Approval - Approval from the Town's Public Works Department for road intersections.
- (m) Driveway Accesses - Submission of completed Driveway Access Form (see Appendix 'J').
- (n) Newfoundland Power - Submission and approval of NL Power distribution and easement plans. Below ground services are to be installed to service any lots which bound the shoreline, or shoreline buffer, of Conception Bay.

1.3.3 Approval

The detailed subdivision design will be reviewed for conformance with the Town's Plan and Regulations, these Standards, the Master Specifications, and any other regulatory requirements. If any problems are noted, the Town will correspond with the Developer to make necessary revisions and resubmit the drawings for approval.

Once all requirements listed in the approval in principle letter have been met, the Town and the Developer shall execute a subdivision agreement and a Subdivision Permit issued. A Subdivision Permit is valid for a period not exceeding two years. If the development has not commenced, the permit may be renewed for a further period not in excess of one year, but a permit may not be renewed more than once. Where the Developer is requesting an extension, an updated detailed

cost estimate must be provided to the Town, amendment to the Agreement executed, and additional financial security(s) provided to the Town.

The issuance of a Subdivision Permit shall not prevent the Town from thereafter requiring the correction of any errors or revisions to items which were not previously noted.

Revisions to the approved Subdivision Plan and Engineering Drawings shall not be made without the prior approval of the Town. Upon approval of any revision, revised drawings shall be submitted. Revisions must be clearly indicated with revision clouds.

1.4 FINANCIAL REQUIREMENTS

1.4.1 General

Prior to execution of a subdivision agreement and the issuance of a Subdivision Permit all applicable assessments, levies, development fees, and outstanding taxes and fees must be paid in full.

1.4.2 Assessments and Levies

- (a) Any outstanding assessments and/or levies on the property to be developed, as recorded by the Town, shall be paid to the Town in the form of cash or certified cheque.
- (b) Capital Recover Assessments The assessments may be for items such as:
 - (i) Water, sanitary and/or storm sewer systems;
 - (ii) Street improvements;
 - (iii) Pedestrian walkways;
 - (iv) Oversizing;
 - (v) Recreational;
 - (vi) or as otherwise required by the Town.
- (c) Trunk Sewer Assessments - If the subdivision is within the drainage area of a sanitary trunk sewer, for which there is an assessment registered, the assessment is an area assessment and is a fixed rate per hectare serviced.

1.4.3 Development Fees

The amount of development fees required will be determined by the Town in accordance with the Town's Tax Structure and Schedule of Fees in effect at the time a Subdivision Permit is issued.

All required development fees shall be paid to the Town in the form of cash or certified cheque.

1.4.4 Securities

- a) The amount of any securities required will be determined by the Town. All securities must be in the form of cash, certified cheque, or non-expiry bond or irrevocable letter of credit from an approved surety company.
- b) Phase I Security - To be in the amount of 10.0% of the estimated cost of Phase I Works. Phase I Security shall be in place prior to execution of a subdivision agreement and issuance of a Subdivision Permit.
- c) Phase I Warranty - To be in the amount of 15.0% of the estimated cost of Phase I Works. Phase I Warranty shall be in place prior to the acceptance of Phase I Works and shall remain in effect for a minimum of 12 months following the date of the letter of acceptance for Phase I Works.
- d) Phase II Security - To be in the amount of 125.0% of the estimated cost of Phase II Works. Phase II Security shall be in place prior to acceptance of Phase I Works.
- e) Phase II Warranty - To be in the amount of 15.0% of the estimated cost of Phase II Works. Phase II Warranty shall be in place prior to the acceptance of Phase II Works and shall remain in effect for a minimum of 12 months following the date of the letter of acceptance for Phase II Works.

1.4.5 Outstanding Taxes and Fees

A Subdivision Permit shall not be issued unless the owner of the property which is subject of the application remits payment of any and all outstanding taxes for the previous calendar year, and any and all other fees, or charges owed by the owner, whether or not the said taxes, fees or charges pertain to the property which is the subject of the application.

All outstanding taxes and fees shall be paid to the Town in the form of cash or certified cheque. Council may, in its sole discretion, waive this requirement upon the owner making satisfactory

payment arrangements for such taxes, fees or charges.

1.5 PHASE I WORKS

1.5.1 Schedule

Phase I Works shall not commence until a subdivision agreement has been executed and a Subdivision Permit issued. All work shall receive continuous site supervision by the Consulting Engineer.

All work shall be in accordance with the Town approved engineering drawings, Master Specifications, any other Regulatory authorities, and/or any other terms and conditions as deemed necessary by the Town. Where a conflict occurs, the more stringent, as determined by the Town Engineer, shall apply.

During construction and prior to acceptance of Phase I Works by the Town, accesses to the subdivision development shall be barricaded during non-working hours to prevent unauthorized access to the site.

1.5.2 Environmental

Where area(s) exist that are environmentally sensitive (as per the Town's Development Regulations) and must be protected (unless otherwise approved by Council). The Developer shall have the area(s) (and buffers) clearly identified (pegged, flagged, fenced, etc.) in the field by a Licensed Legal Land Surveyor.

The Town shall be immediately notified if any damage or disturbance occurs within the identified area(s). Rehabilitation of these area(s) shall be undertaken to the Town's satisfaction at the Developer's expense.

1.5.3 Acceptance of Phase I Works

Phase I Works will be accepted by the Town when all work has been completed and the following submitted and approved (where applicable):

- (a) Certificate of Compliance (sample provided in Appendix 'D');

- (b) As-built engineering drawings - The plan should be drafted as per Section 3.0 with the following items shown:
 - (i) Horizontal and vertical location of all underground utilities and appurtenances referenced to final surface elevation. Items that must be recorded include, but are not limited to: finished grades, manholes, catch basins, all inlet/outlet invert elevations, fire hydrants, valves, curb stops, bends, tees, reducers, centerlines of all long stretches of uninterrupted pipe, and centerlines and edges of all duct banks and underground utility lines;
 - (ii) Type of sidewalk and or curb and gutter shall remain as per original design and approval;
 - (iii) Street cross sections shall remain as per original design and approval;
 - (iv) A table containing Northing and Easting of all Manholes, Valves, Hydrants, Chambers, and services to individual lots;
 - (v) All cover and invert elevations shall be noted for manholes and catch basins;
 - (vi) Field changes of dimension and detail;
 - (vii) Benchmark locations and elevations; and
 - (viii) The Month and year of completion of the construction shall be shown on each plan.
- (c) As-built subdivision plan;
- (d) House service information forms (see Appendix 'E');
- (e) Lot grading plans (see Appendix 'A');
- (f) Master survey;
- (g) Concrete test results for curb and gutter;
- (h) Asphalt test results for the base course asphalt;
- (i) Granular test results for sub-grade works to the full limit of street right of way;
- (j) Fire flow test results as required by the Town;
- (k) Video inspection of sanitary sewers and storm sewers;
- (l) Survey monument information;
- (m) Video inspection analysis report;
- (n) Exfiltration/infiltration testing results for the sanitary sewer system (see Appendix 'F');
- (o) Deflection test results for the sanitary and storm sewer systems (see Sections 6.13 and 7.12);
- (p) Results of manhole exfiltration tests for sanitary sewer manholes (See Sections 6.15 and 7.14);

- (q) Verification that the water system has been swabbed and that swabbing was observed by the Town's Public Works Department;
- (r) Results of the pressure/leakage tests on the water system;
- (s) Test results summary sheet;
- (t) Commissioning reports for all pressure reducing valves, lift stations, pressure boosting systems, etc.;
- (u) Installation of all street signage (including street names) (as per Section 5.7.8);
- (v) Placement of all required asphalt markings (see Sections 5.4 and 5.5);
- (w) Completion of all open space site work, privacy fencing, etc.;
- (x) Execution of deeds of conveyance, easements agreements, and/or bill of sale (see Section 1.6);
- (y) Inspection by Public Works Department and the Town's Engineer (final as-built drawings must be accepted prior to completion of inspections);
- (z) Correction of all deficiencies noted and redressing any harm or cost incurred by the Town as a result of the work;
- (aa) Phase I Warranty (see Section 1.4.4); and
- (bb) Phase II Security (see Section 1.4.4).

1.5.4 Benchmarks

Benchmarks shall be installed as per the requirements detailed in the Association of Newfoundland Land Surveyors *Standards of Professional Conduct, Knowledge and Skill*, as amended.

1.5.5 Dwelling Construction

No work related to the construction of dwellings is permitted prior to the issuance of permits by the Town related to the construction of that specific dwelling. Permits will not be issued for individual buildings within the subdivision until Phase I Works have been accepted by the Town.

The Town may, at the Developer's written request, issue Building Permits for the construction of dwellings within the subdivision prior to the acceptance of Phase I Works where:

- (a) The subdivision road and shoulders (where applicable) are graded and complete with Class "A" granular to the satisfaction of the Town (without placement of base course asphalt);

- (b) The Developer shall be responsible for snow clearing and ice control, and ensuring that the road remains accessible for fire and emergency services vehicles;
- (c) The complete road reservation has been conveyed to the ownership of the Town;
- (d) Security has been provided to the Town to cover 100% of the cost of Phase I Works and 125% of the cost of Phase II Works;
- (e) Base course asphalt shall be completed and Phase I Works accepted by the Town by a date determined by the Town. If not, the Town may demand the security to complete all Phase I and Phase II Works in accordance with the Residential Subdivision Agreement, and;
- (f) When Building Permits are issued prior to acceptance of Phase I Works, no Occupancy Permits shall be issued prior to acceptance of Phase I Works. No municipal snow clearing, ice control, or garbage collection shall be provided for any building constructed prior to acceptance of Phase I Works and issuance of an Occupancy Permit for a lot within the development.

1.5.6 Warranty Period

The Phase I Warranty period shall be a minimum of one year from the date of acceptance of Phase I Works. The Developer shall at their own expense rectify and make good any defect or fault, however caused, appearing within the warranty period, including any harm or cost incurred by the Town as a result of such defect or fault.

Prior to the expiration of the Phase I Warranty period, the Town will re-inspect the Phase I Works. The Phase I Warranty will be released at the end of the warranty period providing all noted deficiencies have been corrected, at the Developer's expense. Should deficiencies not be corrected, the Town reserves the right to complete the work and deduct the costs from the Phase I Warranty.

1.6 TITLE TO BE CONVEYED

1.6.1 Dedications and Conveyances

Prior to acceptance of Phase I Works the Developer shall, at their expense, dedicate and grant to the Town, free from any and all encumbrances, the following lands for the consideration of One Dollar (\$1.00):

- (a) All lands required for public open space and/or public purposes; and
- (b) All streets and roads (including future street connections).

The Developer shall also provide to the Town all necessary Deeds of Conveyance as are required from time to time to confirm title of the same unto the Town.

1.6.2 Town Easements

Prior to acceptance of Phase I Works the Developer shall, at their expense, provide to the Town, for the consideration of One Dollar (\$1.00), all necessary easements and/or right of ways required by the Town for the purpose of accessing or maintaining proper surface drainage within the development (including swales/ditches on private property directing water toward municipal infrastructure), accessing, maintaining and/or repairing water, sanitary or storm sewer infrastructure, or accessing public lands that do not have frontage directly on a street within the boundaries of the subdivision. The Developer shall also provide all necessary Easement Agreements as are required from time to time to confirm title of the same into the Town.

1.6.3 Utility Easements and Right of Ways

Prior to acceptance of Phase I Works the Developer shall provide to the appropriate utility companies all necessary easements and/or rights of way required for the purpose of supplying electrical, communication services, street lighting, and any other utility services within the boundaries of the subdivision.

1.6.4 Sale of Piped Infrastructure

Prior to acceptance of Phase I Works the Developer shall, at their expense, provide to the Town, free from any and all encumbrances, a Bill of Sale, for the consideration of One Dollar (\$1.00), for all water, sanitary sewer and/or storm sewer infrastructure constructed in relation to the development and on-going servicing of the subdivision. The Developer shall also provide the Town all necessary Bills of Sale as are required from time to time to confirm title of the same into the Town.

1.6.5 All conveyances and easements shall be covered by legal documentation as approved by the Town's Solicitor.

1.7 PHASE II WORKS

1.7.1 Schedule

Phase II Works shall not commence without approval of the Town. Approval will not normally be granted until 80.0% of the lots have been built upon and rough grading completed, or two years has lapsed since acceptance of Phase I Works, whichever occurs first.

1.7.2 Acceptance of Phase II Works

Phase II Works will be accepted by the Town when all work has been completed and the following submitted and approved (where applicable):

- (a) Certificate of Compliance (sample provided in Appendix 'D');
- (b) Concrete test results for sidewalk;
- (c) Asphalt test results for surface course asphalt;
- (d) Second video inspection of sanitary and storm sewers (completed two weeks prior to placing surface course asphalt);
- (e) Placement of all required asphalt markings (see Sections 5.4 and 5.5);
- (f) Phase II Warranty (see Section 1.4.4);
- (g) Inspection of Phase II works by Public Works Department and the Town's Engineer; and
- (h) Correction of all deficiencies noted.

1.7.3 Warranty Period

The Developer shall, at their own expense, rectify and make good any defect or fault, however caused, appearing within one-year period from the date of acceptance of the Phase II Works, including any harm or cost incurred by the Town as a result of such defect or fault.

Prior to the expiration of the Phase II Warranty period, the Town will re-inspect the Phase II Works. The Phase II Warranty will be released at the end of the warranty period providing all noted deficiencies have been corrected.

2.0 SURVEYING

2.1 DEFINITIONS

Definitions with respect to the practice of legal surveying within the Province of Newfoundland and Labrador shall be in accordance with the *Land Surveyors Act, 1991*, as amended.

2.2 MEMBERS IN GOOD STANDING

Surveying services and work provided may only be carried out by a member in good standing and licensed with the Association of Newfoundland Land Surveyors (ANLS). In addition, professional firms which hold a valid “Certificate of Authorization” in accordance with the *Land Surveyors Act, 1991*, as amended, are the only persons permitted by law to undertake and assume responsibility for professional land surveying in the Province of Newfoundland and Labrador.

2.3 SURVEY STANDARDS

Surveying shall be completed in accordance with the Association of Newfoundland Land Surveyors *Standards of Professional Conduct, Knowledge and Skill*, as amended.

3.0 DRAFTING

3.1 PREPARATION OF DRAWINGS

3.1.1 CADD Drawings

Computer-aided design and drafting (CADD) shall be used in the preparation of construction and as-built drawings for all developments. Manually drafted drawings will not be accepted.

3.1.2 Submission of Drawings

The Town currently uses AutoCAD for drafting and archival storage of its own digital drawings. Digital drawings submitted to the Town shall be in AutoCAD *dwg* format, or *dxf* format, where the consultant uses a CADD platform other than AutoCAD. Prior to submission of digital drawings, the consultant shall enquire as to the version of AutoCAD currently being used by the Town and shall submit their drawings in a compatible format.

Digital construction and as-built engineering drawings shall be referenced to NAD 83 MTM 1 (North American Datum 1983). All features within the digital drawing shall be on separate layers, with feature codes clearly identified.

Throughout the process, complete sets of construction and as-built engineering drawings shall be submitted to the Town through digital medium. Drawings submitted to the Town shall be in Adobe *pdf* format and may be submitted through compact disc, USB drive or email. Transfer via another digital medium may be considered on a case by case basis.

3.1.3 Physical Size of Drawings

- (a) Maximum Size - The maximum size designation shall be "A1", which represents 594 mm wide x 841 mm long sheet; and
- (b) Minimum Size - The minimum size designation shall be "A3", which represents 297 mm wide x 420 mm long sheet.

3.1.4 Scales

- (a) All CADD drawings shall be drawn full size and plotted at a reduced scale. The plotting

scale of the construction and as-built engineering drawings shall be:

- i. Plan – 1:500, 1:1000 or 1:2500
- ii. Profile – 1:500 Horizontal
1:50 Vertical

(b) Detail plan and cross sections shall be at a scale that will fully illustrate the subject matter.

3.1.5 Grid Reference

Grid lines at 200.0 meters shall be shown and northings and eastings indicated.

3.1.6 North Arrow

A north arrow shall be placed in the upper right corner of each drawing.

3.1.7 Symbols and Line Types

Clearly defined drafting symbols and line types, shall be used on all drawings. Where symbols other than the standard ones are used, they shall be shown in the legend.

3.1.8 Lettering

Except as noted below for existing grades, all drawing notes and dimensions shall be roman simplex font and the minimum size lettering shall be Leroy 100, which represents a plotted height of 2.54 mm. For the purpose of annotating existing grades lettering size shall Leroy 60 size, which represents a plotted height of 1.524 mm. excluding the text for existing grades, it is recommended that no more than three (3) lettering heights be used on anyone drawing.

3.1.9 Cover Sheet

A cover sheet shall be provided for each drawing set and shall contain the following information:

- (a) Project Name;
- (b) Key Plan;
- (c) Name of Consulting Engineer and Sub-consultants;
- (d) Name of Developer;
- (e) List of drawing Names and Numbers;
- (f) Date of Issue; and

(g) "As-Built" if/when applicable.

3.1.10 Submission of Drawings

Construction and as-built engineering drawings must be submitted electronically to the Town for review. Once a final version of the drawings has been accepted, AutoCAD data and one white print copy of the approved drawings must be submitted.

3.2 GENERAL CONDITIONS

3.2.1 Street Names

All streets shall be identified and printed within street lines. Review and approval of street names shall be in accordance with the Town's Street Naming and Street Name Change Policy.

3.2.2 Intersection Identification

At intersecting streets or where the continuation of the streets are on other plans, the following note shall be shown on the Plan:

"For continuation see plan no. _____"

3.2.3 Percent Grade

Percent (%) grades (slope) shall be shown for all appropriate services to two decimal places.

3.2.4 Accuracy of Measurements

All distances shall be measured to the nearest centimeter.

3.2.5 Geodetic Datum

Elevations shown on any plan shall be referred to the Provincial Geodetic Datum and the reference Benchmark (B.M.), along with its location and description, shall be shown in the area above the Title Block.

3.2.6 Irregular Boundary Line Measurements

More or less distances shall not be accepted except along a water boundary or other irregular

boundaries in which case a “tie line” between the adjoining boundary end points shall show the bearing and the distance.

3.2.7 Revisions to Plan

- (a) If plans are revised, amended or altered, the date and Draftsman’s initial shall be noted in the revision area of the Title Block.
- (b) All corrections and changes shall be shown in permanent fashion, i.e. with ink.

3.2.8 Signing of Plan

All plans shall be stamped and signed by a Professional Engineer and firm in good standing and licensed with the Professional Engineers and Geoscientists of Newfoundland and Labrador (PEGNL). A Professional Engineer employed must be experienced in the work and an Engineer must be retained until final completion and acceptance of the Subdivision Development by the Town. Professional members licensed by PEGNL are the only persons permitted by law to undertake and assume responsibility for engineering and geoscience work in the Province of Newfoundland and Labrador.

4.0 EASEMENTS

4.1 GENERAL

4.1.1 Easement means an incorporeal right, distinct from ownership of the soil, vested in the Town or utility company and consisting of a use of another's land for any public service or utility.

4.1.2 When a public service or utility (such as municipal water system, sanitary or storm sewer infrastructure, surface drainage, other public works operations, electrical infrastructure, etc.) are to be installed other than in a street or walkway, an easement shall be provided for such installations.

4.1.3 The owner of the easement land shall not construct any type of structure over such easement area, unless otherwise permitted by the Easement Agreement.

4.2 DESIGN

4.2.1 The width of any easement shall be based upon the type and number of services proposed to be installed, and ease of access to the services proposed. A minimum width of 3.0 meters must be provided between the edge of the easement and the centerline of the feature nearest that edge. The width of the easement shall be determined by the Town or utility company.

4.2.2 The alignments for any easement shall be dependent upon the type of service to be installed.

4.3 ACCEPTANCE

4.3.1 Acceptance of services within an easement shall be carried out as outlined under the requirements for acceptance of Phase I Works (see Section 1.5.2).

4.3.2 Where an easement is required, a legal property survey for the easement and a legal easement agreement must be provided to the Town prior to acceptance of Phase I Works.

4.3.3 All easements shall be covered by legal agreement as approved by the Town's Solicitor.

4.4 RESTORATION

When the Town carries out work within an easement, it shall be responsible for restoring the area as close as practical to its original condition or as otherwise stipulated in the Easement Agreement.

5.0 STREETS

5.1 STREET CLASSIFICATION

Streets shall be classified as shown in the following table:

Table 5.1 – Classification of Streets

	Arterial	Collector	Local
Traffic Service Function	Traffic movement is of primary importance	Traffic movement and land access are of equal consideration	Traffic movement is of secondary importance
Land Service Function	Land access is of secondary importance		Land access is of primary importance
Parking ⁽¹⁾	On-street parking is discouraged	On-street parking is usually permitted	On-street parking is usually permitted
Typical ADT Range	5,000 - 30,000	5,000 - 30,000	<1,000
Flow Characteristics	Uninterrupted flow except at signals and crosswalks	Interrupted flow	Interrupted flow
Vehicle Types	All vehicles but large vehicles may be limited	All vehicles with large vehicle limitations	Passenger and service vehicles. Large vehicles may be restricted
Connections	Arterials, collectors, some locals	Arterials, collectors, locals	Collectors, locals

***Note:** ⁽¹⁾ Regardless of street classification, on-street parking shall be restricted seasonally in accordance with the Town’s Snow Clearing Regulations.

5.2 STREET DESIGN CRITERIA

5.2.1 Streets shall be designed to provide the safest and smoothest traffic flow possible. The criteria in Table 5-2 consist of the minimum requirements for flat vertical alignments. Specific vertical and horizontal alignments may dictate a variance in these requirements.

Table 5.2: Street Design Criteria

Design Parameter	Arterial	Collector	Local and Service Streets	
			w/ curb & gutter	w/o curb & gutter
Design speed	50 - 80 km/h	50 - 80 km/h	20 - 50 km/h	20 - 50 km/h
Maximum gradient	10%	12%	12%	12%
Minimum gradient ⁽¹⁾	0.5%	0.5%	0.5%	0.5%
Street reservation	30 m	20 m	15 m	18 m
Minimum Pavement width	15 m	15 m	11.5 m	6 m
Minimum radius	90 m	90 m	35 m	35 m
Maximum super elevation	0.06 m/m	0.06 m/m	0.06 m/m	0.06 m/m
Minimum stopping sight distance	As per TAC Geometric Design Guide for Canadian Roads			
Intersection sight distance	See Section 5.4.1, Intersections			
Minimum K-value ⁽²⁾				
Crest vertical curves	7	7	7	7
Sag vertical curves	11	11	11	11
Minimum length of vertical curves	The Length of a vertical curve should not be less than the design speed in km/h			
Maximum K-value for drainage ⁽³⁾				
Crest vertical curves	40	40	40	40

Sag vertical curves	30	30	30	30
Minimum intersection spacing	400 m	60 m	60 m	60 m
Minimum intersection turn-out radius	15 m	9 m	8 m	8 m
Sidewalks	See Section 5.5, Sidewalk Installation			
Street lighting				
Average maintained illumination level	1.5 cd/m ² or 22 lux	1.0 cd/m ² or 15 lux	1.0 cd/m ² or 15 lux	1.0 cd/m ² or 15 lux

- *Note:** (1) Minimum grade permitted with combined curb and sidewalk is 2.0%
 (2) Non-conforming K values may be accepted, provided their necessity can be justified from an engineering perspective.
- *Note:** For specific situations not covered by this section, the latest standards edition of Transportation Association Canada (TAC) should be used as a guide.

5.2.2 Traffic calming measures may be required within proposed developments. The extent and method of traffic calming will be determined by the Town.

5.3 CUL-DE-SACS

5.3.1 Maximum Length

- (a) The maximum length for a fully serviced, semi-serviced, or unserviced cul-de-sac shall be 450.0 meters;
- (b) Maximum length for an unserviced cul-de-sac may be greater in length than described in Section 5.3.1 (a) where it can be determined that the cul-de-sac will round out existing subdivision only and where no other alternative means of access can be provided. Examples of no other alternative access include abutting an environmentally sensitive area in accordance with the Town’s Development Regulations (ex. steep slopes or waterbody) or zoning which restricts development (ex. Watershed or provincial Agriculture Development Area); and
- (c) Maximum length of a cul-de-sac shall be measured along the street center line and begin from an existing street that provides alternate egress for emergency purposes and proceed

to the furthest point of the turning bulb. For the purpose of measuring maximum street length, secondary streets (existing or proposed) may be included in the measurement calculation. This is to ensure that, at no point, a building lot within a proposed development will be located greater than the maximum length specified in (a) and (b) from options of egress during an emergency. Diagrams 5-1 and 5-2 provide examples for the measurement of street length.

Diagram 5-1



Diagram 5-2



5.3.2 Design

Cul-de-sacs shall be restricted in use to instances where land access is not possible by through streets or the cul-de-sac is temporary in nature and part of a comprehensive plan providing connectivity. The following minimum design criteria shall apply to cul-de-sacs:

- (a) The turning circle radius of the cul-de-sac bulb shall be 15.0 meter radius at the curb face. In areas without curb and gutter, the radius of the asphalt surface shall be reduced such that the overall bulb reservation does not exceed that of a bulb of a curb and gutter cul-de-sac;
- (b) The transitional radius of the street line into the turning circle street line shall be 15.0 meter;
- (c) Low back curb and gutter shall be installed along the entire perimeter of the bulb (in areas where curb and gutter is required);
- (d) The maximum exit gradient of cul-de-sacs shall be +5.0%. This requirement applies to the street gradient beyond the 15.0 meter criterion noted in Section 5.4.1 (b); and
- (e) All cul-de-sac bulbs shall be centered in the right way unless otherwise approved by the

Town's Public Works Department.

5.3.3 Temporary Emergency Access

When required by the Town, a temporary emergency access shall be:

- (a) Constructed in accordance with Appendix 'G';
- (b) Connect directly with an adjacent public street;
- (c) No longer than the total length of the cul-de-sac; and
- (d) Conveyed to the ownership of Council.

5.3.4 Temporary Turnaround

A temporary turnaround area must be provided at the end of all streets that are temporarily terminated in dead ends. Temporary turnarounds must meet the standards for a cul-de-sac in Sections 5.3.1 and 5.3.2.

Where temporary cul-de-sacs are constructed and later converted to through streets, Developers shall remove the excess pave and curb of the bulb and reinstate the affected area only upon issuance of an Occupancy Permit for a dwelling fronting on the newly constructed street extension. The street reservation of the temporary cul-de-sac should be altered to that of a typical street section.

Once the excess pave and curb of the bulb have been removed and the area has been reinstated to the satisfaction of the Town, areas of the former temporary turnaround no longer required by the Town may be conveyed to property owners abutting the former temporary turnaround. Details regarding the conveyance will be included in the Subdivision Agreement.

5.4 INTERSECTIONS

5.4.1 Intersections shall:

- (a) Be of "T" type design;
- (b) Have a vertical alignment within the intersection approach of not more than 2.0% grade for a minimum distance of 15.0 m from the roadway intersection curb line;
- (c) Have an intersection angle of 90° where possible. The minimum angle is 75°;
- (d) Have an intersection sight distance that conforms to the guidelines established in the latest

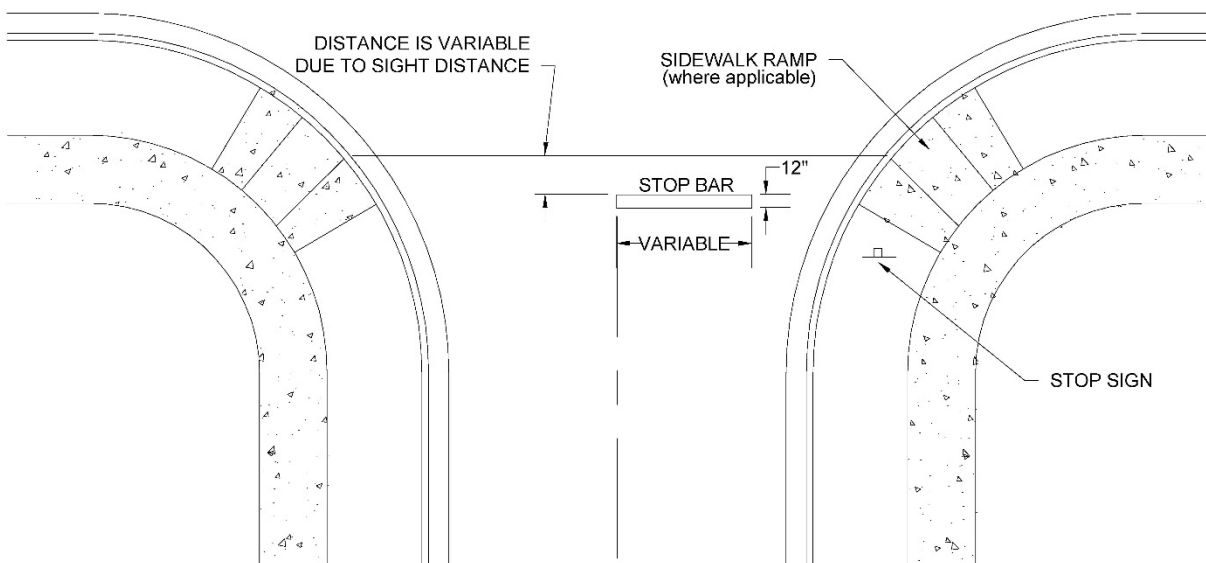
standard edition of the TAC Geometric Design Guide for Canadian Roads; and

- (e) Have a minimum center line distance between adjacent and/or opposite intersections:
 - a. on Local streets to Collector street of 60.0 meters;
 - b. on Collector streets to Collector streets 90.0 meters;
 - c. on Local streets to Local streets of 60.0 meters.

5.4.2 When two (2) streets (or more) intersect, only one (1) street may have a curved horizontal alignment; all other streets at this intersection shall have a minimum tangent section of 30.5 meters as measured from the point of street line intersection to the first point of horizontal curvature on each approach street line.

5.4.3 Stop lines shall be painted on the asphalt at all street intersections in accordance with Diagram 5-3. If a crosswalk and stop sign exist at the same location, there shall be a 1.0 meter separation between the stop line and the nearest crosswalk. Where there is no marked crosswalk, the stop line shall be set back from the intersection to allow for a future crosswalk.

Diagram 5-3

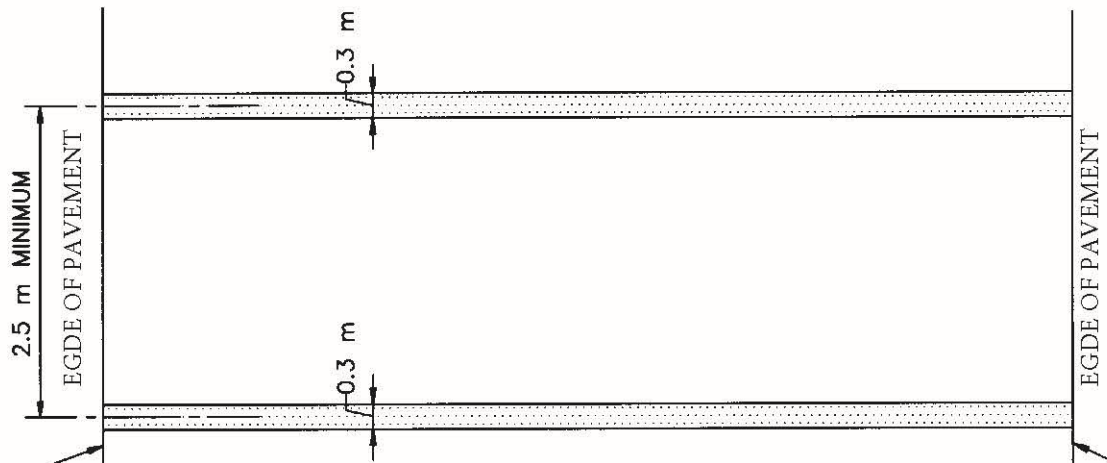


5.5 SIDEWALK INSTALLATION

The requirements for the installation of sidewalks on Town streets as a part of subdivision development are as follows:

- (a) Local streets require the installation of one sidewalk;
- (b) Local cul-de-sacs require the installation of a sidewalk on one side of the street which will meet the following guidelines depending on the streets symmetry:
 - (i) Symmetrical – Sidewalk may be placed on either side and must terminate at the return curve of the bulb.
 - (ii) Asymmetrical – Sidewalk should be placed on the side which allows it to follow the full length of the street center line.
- (c) Collector streets require the installation of two sidewalks; and
- (d) Arterial streets sidewalk installation shall be prescribed at Council's discretion.
- (e) Where pedestrians are required to cross a street to continue along the sidewalk (ie. At an intersection or where the sidewalk ends on one side of the street and continues on the other), a crosswalk must be painted on the asphalt in accordance with Diagram 5-4.

Diagram 5-4



5.6 DRIVEWAY ACCESS

5.6.1 All residential lots shall have a 6.0 meter wide driveway access. Greater widths or multiple accesses may be approved by the Town's Public Works Department but shall not exceed 50.0% of the lots frontage. Low back curb shall be installed as required.

5.6.2 Corner lots may be permitted to have driveway access from the flanking street as per the approved subdivision plan.

5.6.3 With the exception of infill lots on existing streets where no other access can be obtained,

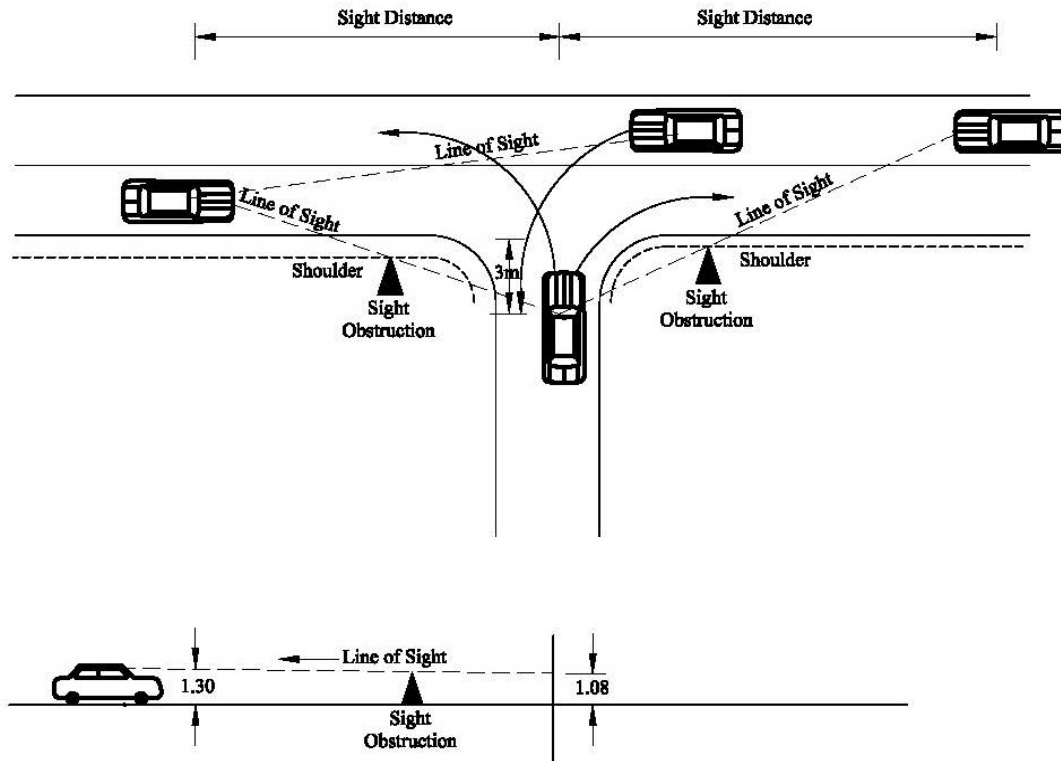
no driveway shall be permitted to enter onto an arterial street.

5.6.4 Any driveway entering a street reservation shall be graded such that it is below the projected grade line of the street crown for a minimum distance of 1.0 meter beyond the end of pave. Driveways intersecting with sidewalks shall also be graded below the projected grade line of the sidewalk for a minimum distance of 0.5 meter.

5.6.5 No new driveway shall be located closer than 10.0 meters to the street line of a new or existing intersection.

5.6.6 Individual driveway accesses must maintain a 65 m sightline for streets with an intended maximum speed of 40 km/hr or less. For streets with an intended maximum speed of greater than 40 km/hr, the required sightline will be determined by the Town's Public Works Department. Driveway access sightlines shall be determined in the same manner as the provincial Department of Transportation and Infrastructure's Policy for Highway Access Management (see Diagram 5-5).

Diagram 5-5



5.7 OTHER GENERAL REQUIREMENTS

5.7.1 Tangent distances between horizontal reverse curves shall not be less than 50.0 meters.

5.7.2 Horizontal alignment of streets shall be such that the center line and curb lines shall be symmetrical with their street lines.

5.7.3 Vertical alignments of streets shall be considered as symmetrical about the center line unless otherwise required by the Town.

5.7.4 All streets shall have a minimum 150.0 mm crowned roadway cross-section and in no case should the crowned roadway cross-section be less than 2.0%.

5.7.5 Curb and gutter with sidewalks shall be required for fully serviced developments. Curb and gutter with sidewalks may also be permitted in semi-serviced or unserviced areas with approval from the Town's Public Works Department.

5.7.6 All local streets shall have a minimum of 150.0 mm Class "B" and 100 mm Class "A" granular, and 40.0 mm base course and 40.0 mm surface course asphalt. Actual amounts required may vary in accordance with the appropriate street cross-section in Appendix 'G' of these standards. Additional granular and asphalt may be specified as determined by the Developer's or the Town's Engineer.

5.7.7 Local streets are to be constructed in accordance with the appropriate street cross-section in Appendix 'G' of these standards. Modifications required to these cross-sections for the development of collector and arterial streets will be determined by the Town's Engineer.

5.7.8 All required street signage (including street name signs) shall be supplied and installed by the Town at the cost of the Developer.

6.0 STORM SEWER

6.1 GENERAL

- (a) The storm sewer system shall be designed, drawn, installed, and constructed in accordance with these Standards, the Master Specifications, the product manufacturers requirements, or, in the absence of specifications, best engineering practices.
- (b) Certain materials and manufacturers may be required by the Town.
- (c) At the completion of the installation of the subdivision's storm sewer system and prior to acceptance of Phase I Works, "As-Built" engineering plans and confirmation that all required testing has been completed shall be provided to the Town.

6.2 DESIGN DRAINAGE AREA

The drainage area may be determined from topographic surveys and/or mapping showing contour lines and shall include any fringe areas not provided for in adjacent storm drainage areas, as well as other areas which may become tributary by reason of regrading.

6.3 DRAINAGE PLAN

The drainage plan shall be based on design elevations and shall show:

- (a) Streets;
- (b) Lots;
- (c) Water courses and direction of flow;
- (d) Proposed storm sewers with manholes numbered in accordance with Section 6.15;
- (e) Tributary areas to each manhole, size of the area in hectares, and the runoff coefficient clearly shown therein;
- (f) Contour lines having an interval not exceeding 1.0 meter;
- (g) Existing topographical spot elevations shown on proposed site and adjacent properties;
- (h) Direction of flow for proposed surface drainage; and
- (i) Design elevations.

6.4 DETERMINATION OF RUNOFF

Computations shall be based on the Rational Method formula:

$$Q = RAIN$$

Where: Q = maximum rate of runoff (l/s)

R = runoff coefficient selected from Table 6-1

A = area tributary to the point of design (ha)

I = average rainfall intensity, having duration equal to the time of concentration of drainage area (mm/hr.)

N = Constant = 2.778

Standard design forms (as per Appendix 'C') shall be used for all calculations.

Table 6-1: Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient
Developed	
Residential: Single Family	0.30 - 0.50
Residential: Double Dwelling	0.40 - 0.60
Residential: Row Dwellings	0.60 - 0.75
Apartment Buildings	0.60 - 0.70
Paved Parking Areas	0.90 - 1.00
Parks, Cemeteries	0.10 - 0.25
Playgrounds	0.30 - 0.40
Industrial: Light	0.50 - 0.80
Industrial: Heavy	0.60 - 0.90
Commercial: Light	0.50 - 0.70
Commercial: Core	0.70 - 0.95
Undeveloped	
Pasture	0.30 - 0.50
Cultivated Land	0.35 - 0.55
Woodland	0.25 - 0.45
Lakes/Wetlands	1.00

6.4.1 Rainfall Intensity

- (a) The value of rainfall intensity to be used in the Rational Method calculation shall be based on the most up-to-date rainfall IDF data available from Environment Canada for the St. John's area with consideration for climate change. This shall take into consideration available data regarding provincial climate change projections for St. John's Airport (nearest regional site). These projections suggest that extreme precipitation events will become more intense, for example:
- On a 24-hour basis, a 1-in-100 year storm is expected to bring 167 mm of precipitation by mid-century, an increase from the current climate's 137 mm (22% growth); and
 - On a 12-hour basis, a 1-in-100 year storm is expected to bring 150 mm of precipitation by mid-century, an increase from the current climate's 122 mm (23% growth).

More information on climate data can be provided at the following link: <https://www.gov.nl.ca/ecc/occ/climate-data/>. Rainfall return period and duration shall be determined as follows:

- (i) For the design of local storm sewers:
 - i. Return period 10 years
 - ii. Duration 10 minutes
- (ii) For the design of culverts, trunk sewers, bridges, and other critical structures as determined by the Town:
 - i. Return period 100 years
 - ii. Duration time of concentration for the drainage basin

- (b) The time of concentration shall be calculated using the Kerby equation as follows:

$$t_c = \left[2.1873 \frac{Ln}{\sqrt{S}} \right]^{0.467}$$

- Where:
- t_c = time of concentration (minutes)
 - L = maximum length water will travel from the farthest reach of the basin to the discharge point (m)
 - S = average slope of the drainage basin (m/m)
 - n = dimensionless roughness coefficient selected from Table 5-2

Table 6-2: Roughness Coefficients for Time of Concentration

Land Use	Roughness Coefficient
Developed	
Residential: Single Family	0.055 - 0.060
Residential: Double Dwellings	0.045 - 0.050
Residential: Row Dwelling	0.035 - 0.040
Paved Parking Areas	0.015 - 0.020
Parks, Cemeteries	0.070 - 0.10
Industrial	0.015 - 0.050
Commercial	0.015 - 0.040
Undeveloped	
Pasture	0.35 - 0.40
Cultivated Land	0.15 - 0.20
Woodland: Deciduous	0.50 - 0.60
Woodland: Coniferous	0.70 - 0.80

6.5 CAPACITY OF PIPE

Manning's Formula shall be used to compute the capacity of storm sewer pipes:

$$Q = \frac{AR^{\frac{2}{3}}S^{\frac{1}{2}}}{n}$$

Where:

Q = discharge (m³/s)

A = cross-sectional area of flow (m²)

R = hydraulic radius (m)

S = slope (m/m)

n = dimensionless coefficient of roughness selected from Table 5-3

All storm pipes shall be high-density polyethylene (DWC 320 kPa HDPE) and roughness coefficients used shall be as follows:

Table 6-3: Values of Manning’s Equation Roughness Coefficients

PRODUCT	DIAMETER (mm)	Roughness Coefficient
Dual Wall (smooth interior)	100 – 1500	0.015
Single Wall (corrugated interior)	100 – 200	0.016
	250	0.017
	300 – 375	0.018
	450 – 600	0.020
	750	0.021
	900	0.022
	1050	0.023
	1200 - 1500	0.024

6.6 MINIMUM SIZE

(a) The minimum size for storm sewer pipes shall be:

Street Sewers	300.0 mm
Catch Basin Leads	Single 200.0 mm/Double 300.0 mm
Building Sewer	100.0 mm
Driveway Culverts	450.0 mm
Road Crossing Culverts	600.0 mm

(b) The actual size for street sewers, driveway culvert and road crossing culverts will be governed by the design flow with consideration for future demands as determined by the Town’s Engineer.

6.7 VELOCITY (FOR DESIGN FLOW)

Minimum	1.0 m/s
Maximum	5.0 m/s (\leq 825.0 mm diameter)
	6.0 m/s ($>$ 825.0 mm diameter)

6.8 CHANGE OF SIZE

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

6.9 MINIMUM GRADIENT

The minimum allowable pipe gradient shall be the gradient required to produce the minimum acceptable velocity of 1.0 m/s at peak design flow. With the exception that, in no case, shall the gradient be less than 0.5%.

6.10 CLEARANCE

- (a) Sewer crossing sewer: A minimum of 150.0 mm clearance is required between outside barrels at all sewer pipe crossings.
- (b) Sewer crossing waterline (vertical clearance): A minimum of 450.0 mm vertical clearance and 3.0 meter horizontal clearance is required between the sewer pipe crossing a water pipe.
- (c) Sewer crossing waterline (horizontal clearance): Water lines shall be run in a separate trench from either the sanitary or storm sewers and shall have a minimum horizontal separation of 3.0 meters.

6.11 LOCATION

- (a) Storm sewers shall be located such that manholes are placed in the center of driving lanes, wherever possible.
- (b) Manholes shall be located at every change of grade, horizontal and vertical alignment, size, or material of the sewer.
- (c) Sewer mains and service pipes shall be marked with detectable service locator tape.
- (d) Sewer mains shall be located within the road reservation of an existing or proposed publicly owned and maintained street. Under no circumstances may sewer mains be located on private property.
- (e) A future connection must be installed at every existing or proposed street intersection that the sewer service being installed passes by.

- (f) For a future street within the subdivision boundaries, the service is to be capped 3.0 meters beyond the edge of asphalt.
- (g) For an existing street, the service is to be capped at the edge of the road reservation common to both streets.

6.12 EARTH LOAD

Shall be calculated by using the Marston Formula.

$$W_e = C_d W B_d^2$$

Where: W_e = Earth load on full width of conduit along the center line (N/m)

C_d = Load coefficient for trench condition

W = The design unit weight of the backfill material (usually taken as 120 pcf (1922 Kg/m³) but not less than actual weight as determined by soil investigation)

B_d = Horizontal width of trench at top of conduit (m)

6.13 VERTICAL DEFLECTION

Deflection testing of every section of sewer is required. The tests shall be conducted in accordance with the standards provided in the Master Specifications.

6.13 SUPERIMPOSED LOAD

The effect of concentrated and distributed superimposed loads shall be evaluated by generally accepted formula.

6.14 MANHOLES

- (a) Standard types of manholes and their details are shown in the Master Specifications.
- (b) All manhole chamber openings must be located on the upstream side of the manhole.
- (c) Special manholes shall be fully designed and detailed.
- (d) Maximum distances between manholes, unless otherwise specified, shall be 90.0 meters for 700.0 mm pipe or smaller and 120.0 meters for pipe greater than 700.0 mm.
- (e) All pipes turning at a greater angle than 45° in a manhole require a 150.0 mm drop.
- (f) Vertical drop pipes shall be provided in manholes where the vertical distance between

the invert of the inlet pipe and the invert of the outlet pipe is greater than 1.0 meter. The drop manhole should only be used when more acceptable alternatives cannot be incorporated into the design.

- (g) Manholes to be placed 5.0 mm below base course asphalt grade for the duration that base course asphalt is on the street.
- (h) Manholes to be adjusted to 5.0 mm below finish course asphalt grade immediately prior to placement of finish course asphalt.
- (i) Manhole frames and covers to be 600.0 mm round design.
- (j) Manholes shall be numbered consecutively for design reference using the last four digits of the Easting and the suffix 'R'.
- (k) Infiltration and exfiltration testing must be completed for all manholes as per the Master Specifications (see Appendix 'I').
- (l) A new manhole must be located a minimum of 6.0 meters from a new or proposed utility pole.

6.15 SPECIAL STRUCTURES

Inlet and outfall structures including headwalls, stilling chambers, etc. shall be fully designed and submitted in detail. In each case, topography shall be shown as well as the protective works necessary to counteract erosion of the site at the structure. Grates shall be provided on all inlet structures and outlet structures greater than 600.0 mm in diameter and shall be fully designed, detailed and approved by the Town.

6.16 OUTFALLS

All storm outfalls which empty into a ditch or water course must receive approval or a letter of exemption from Fisheries and Oceans Canada and the Provincial Department of Environment and Climate Change.

6.17 CATCH BASINS

- (a) The lead shall have a minimum 2.0% grade and shall discharge directly to an existing or proposed manhole located within 30.0 meters of the catch basin, unless otherwise approved.

- (b) Recess catch basin shall not be used.
- (c) Catch basins shall be located and spaced in accordance with conditions of design and shall provide for expected maximum flow.
- (d) Standard location for catch basins at street intersections shall be immediately upstream of sidewalk or pedestrian crosswalks and between intersections at all low points.
- (e) Spacing shall not exceed 95.0 meters for road grades up to 3.0%. On steeper roads, this spacing shall be reduced.
- (f) Catch basins are to be depressed 50.0 mm with respect to the gutter grade.
- (g) All catch basins located at low points shall be double catch basins.
- (h) A new catch basin must be located a minimum of 6.0 meters from a new or proposed utility pole.

6.18 HEADWALLS

- (a) Headwalls shall be designed for inlet control with $HW/D \leq 1.0$.
- (b) Headwalls exceeding 1.2 meters high must include a handrail or guard.

6.19 STORM SEWER SERVICE PIPE

Separate storm sewer service pipes shall be provided for each separately owned dwelling unit. Storm sewer service pipes must connect to the storm sewer main and not to a storm sewer manhole.

Storm sewer service pipes must not be located within 3.0 meters of the side boundary of a building lot.

Storm sewer service pipes, storm sewer drains, roof drains, foundation drains, etc. shall not be connected to any part of the sanitary sewer system. Unless otherwise approved by the Town, downspouts are required to discharge at the surface.

6.20 STORM WATER MANAGEMENT

6.20.1 Design

This primary goal of this section is to identify standards for stormwater management that when followed, will reduce the quantity and improve the quality of stormwater leaving a site. While this section provides a general framework of the Town's expectations on water quantity and quality targets for on-site stormwater management, the Town also recognizes that unique site-specific conditions may require alternative methods. As a result, that Town may consider innovative approaches if it can be demonstrated that performance objectives are met.

Storm water management must be incorporated into development plans to ensure no net increase in the post development peak stormwater discharge rate in order to reduce the impact on downstream infrastructure. For storm water management design, the 1:100 year, 24-hour return rainfall event shall be used based on the most up-to-date rainfall IDF data available from Environment Canada for the St. John's area. The duration shall be the time of concentration of the contributing catchment area, or the event time which requires the greatest storage, up to the 12-hour event mark. Based on hydrologic/hydraulic analysis, the Town may determine that stormwater detention is not necessary.

6.20.2 Stormwater Management Systems

- (a) Proposals for stormwater management systems may include the following types; however, the determination of the type of system to be used is subject to the approval of the Town:
- (i) Surface detention pond (dry pond);
 - (ii) Surface retention pond (wet pond);
 - (iii) Expanded ditch design;
 - (iv) Natural percolation into the subsurface soils (geotechnical report required);
 - (v) Enhancement of existing wetlands (with additional landscaping as required to conserve the wetland); and
 - (vi) Underground Systems with structural engineering as required and design features to the satisfaction of the Town Engineer.
 - (vii) Other innovative stormwater management types
- (b) For design storm flows greater than 50.0 l/s, XPSWMM Modelling software must be

employed to simulate the design storms and to demonstrate the effectiveness of the management system(s) proposed. The management systems noted above will be considered for flows greater than 50.0 l/s if the designs can be shown to be viable.

- (c) Other alternative or innovative systems for storm water detention will be considered on a case-by-case basis. In such circumstances, the Developer will be required to submit concept drawings and general calculations to support the request.
- (d) All detention systems must have an outlet device with an orifice dedicated to the pre-development flow and an overflow orifice/channel in the event that the pre-development flow orifice should block or fail.
- (e) Where applicable, approvals are required from Fisheries and Oceans Canada and the Department of Environment & Climate Change.

6.20.3 Surface Detention Ponds

Surface detention ponds are impounded areas used to temporarily store storm water runoff to promote settlement of runoff pollutants and restrict downstream discharge.

Wet detention ponds are similar to natural ponds in that there is always a permanent body of water (permanent water level (PWL)). During runoff events, additional temporary storage is provided above the PWL which then gradually recedes back to the PWL. Wet detention ponds may be constructed by an embankment or through excavation of a depression.

Stormwater detention ponds must also include the following associated infrastructure:

- (a) Metal security fencing, 2.4 meters high, is required around the entire perimeter of the detention pond which shall include a 2.4 meter wide access gate for Town staff to access the site;
- (b) An off-street parking area for Town vehicles must be provided;
- (c) The entire perimeter of the detention pond, except where exempted by the Town, must provide a drivable surface of a minimum 3 m width for Town equipment to perform maintenance on the retention pond; and
- (d) The Town may require the use of liners with specifications to the satisfaction of the Town's Engineer.

6.20.4 Ditches and Swales on Private Property

Ditches and swales located on private property for collection and transportation of surface water from the site to a roadside ditch, or other approved outfall, shall be constructed in accordance with Diagrams 6-1 or 6-2 (whichever is applicable). Ditches and/or swales on private property are to be maintained by the property owner.

Diagram 6-1

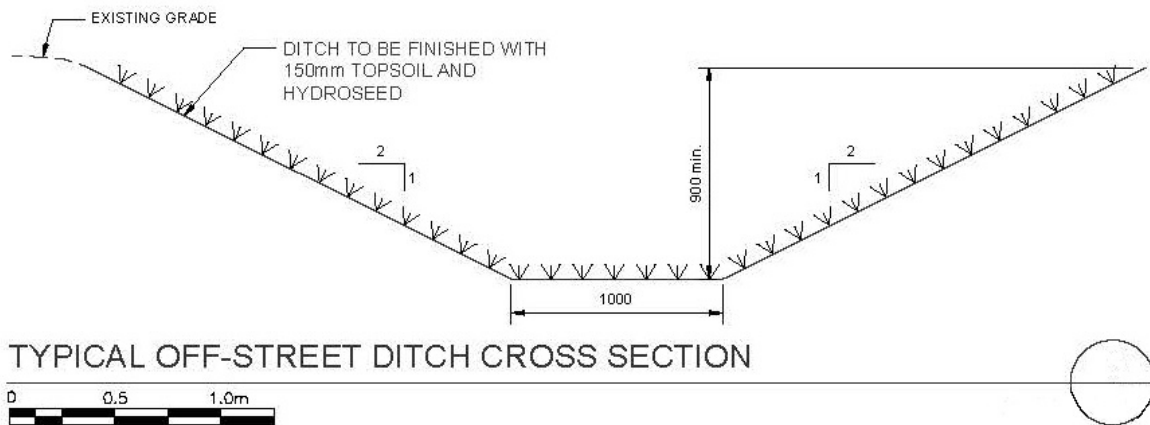
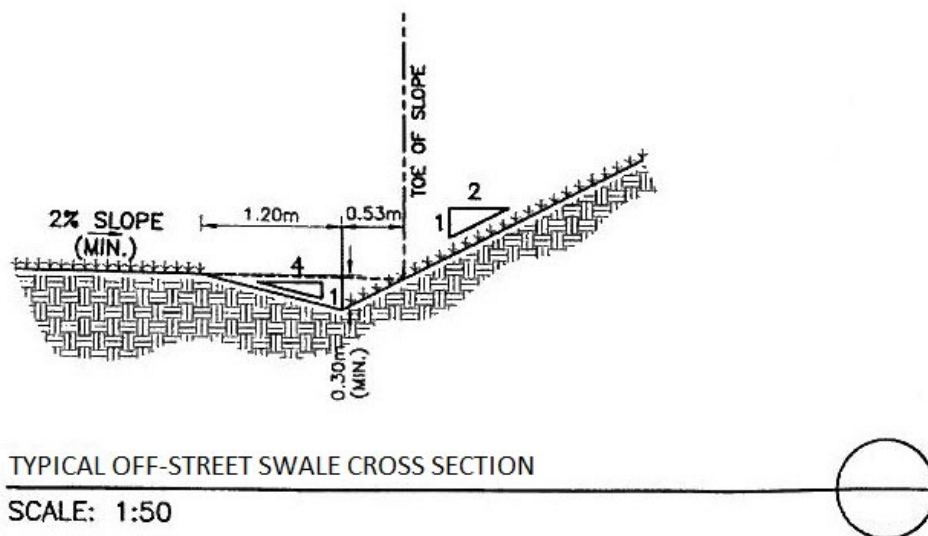


Diagram 6-2



7.0 SANITARY SEWER

7.1 GENERAL

- (a) The sanitary sewer system shall be designed, drawn, installed, and constructed in accordance with these Standards, the Master Specifications, or, in the absence of specifications, best engineering practice.
- (b) Certain materials and manufacturers may be required by the Town.
- (c) At the completion of the installation of the subdivision's sanitary sewer system and prior to acceptance of Phase I Works, "As-Built" signed engineering plans and confirmation that all required testing has been completed shall be provided to the Town.

7.2 DESIGN DRAINAGE AREA

The drainage area may be determined from topographic surveys and/or mapping showing contour lines and shall include all other areas which may become tributary by reason of regrading or pumping.

7.3 DRAINAGE PLAN

Plan of the drainage area shall show:

- (a) Streets;
- (b) Lots;
- (c) The size and grade of the sanitary sewer with manholes in accordance with Section 7.14; and
- (d) Tributary areas to each manhole, size of the area in hectares, and ultimate average population per hectare clearly shown therein.

7.4 EVALUATION OF DESIGN FLOWS

- (a) Standard design forms shall be used for all calculations (as per Appendix 'B').
- (b) The design of all sanitary sewers shall be based on the Peak Dry Weather Flow.
- (c) The minimum rate of infiltration for which capacity shall be provided is 22,500 L/ha/d.
- (d) The design flows from developments of single family residence shall be based on an

average population density of 80 people per hectare.

Average sewer flows are predicted based on 90.0% of water consumption. Design values for average sewer flows are shown in Table 7-1:

Table 7-1: Average Sewage Flow Rates

Land use	Average sewage flow rate
Residential	275 L/c/d
Light commercial	28,000 L/c/d
Light industrial	39,000 L/ha/d
Hospitals	3,000 L/bed/d
Schools	1,700 L/room/d
Hotels and motels	2,000 L/room/d

- (e) Average sewage flows shall be factored to provide peak sewage flow. The peaking factor for residential areas is determined by the Harmon Formula as follows:

$$M = 1 + \frac{14}{(4 + p^{1/2})}$$

Where: M = peaking factor, the ratio of peak flow rate to average flow rate (dimensionless)
 p = the tributary design population, in thousands, for residential areas

- (f) For areas other than residential development, the design population “p” shall be expressed as an equivalent population. The equivalent population is expressed by dividing the average sewage flow for the non-residential area by the average sewage flow for a residential area (275 L/c/d).

The equivalent peaking factor is taken as 80.0% of the value calculated with the Harmon Formula above using the equivalent population as the value for “p”.

- (g) Flow computations shall be based on Tables 7-2 and 7-3.

Table 7-2: Sample Calculations for Residential Areas

Row	Item	Value	Units	Note
1	Tributary area	30	hectares	
2	Average population density	80	person/ha	From Sect 7.4 (d)
3	Design population (p)	2,400	people	Row 1 X Row 2
4	Average sewage flow rate	275	L/person/day	From Table 7-1
5	Average sewage flow rate	7.64	L/s	(Row 3 X Row 4)/86,400
6	Peaking factor	3.52	dimensionless	From Harmon Formula [Sect 7.4 (f)]
7	Peak sewage flow	26.89	L/s	Row 5 X Row 6
8	Infiltration rate	22,500	L/ha/day	Minimum infiltration rate
9	Infiltration allowance	7.81	L/s	(Row 1 X Row 8)/86,400
10	Average dry weather flow	15.45	L/s	Row 5 + Row 9
11	Peak dry weather flow	34.7	L/s	Row 7 + Row 9

Table 7-3: Design Flow

LAND USE	PEAK SANITARY FLOW (FROM TABLE 6-2)	MINIMUM RATE OF INFILTRATION	DESIGN FLOW
Residential		22,500 L/ha/d	Peak Sanitary Flow + Minimum Rate of Infiltration

7.5 CAPACITY OF PIPE

All sanitary sewer mains shall consist of polyvinyl chloride pipe (SDR35 PVC). Capacity of sanitary sewer pipes shall be computed using Manning’s Formula (refer to Section 6.5). Where provided, the roughness coefficient stated by the pipe manufacturer will be used. In any case, a minimum roughness coefficient of 0.13 shall be used.

7.6 MINIMUM SIZE

- (a) The minimum size for sanitary sewer pipes shall be:
- | | |
|-----------------|----------|
| Street Sewers | 200.0 mm |
| Building Sewers | 100.0 mm |
- (b) The actual size for street sewers will be governed by the design flow with consideration for future demands as determined by the Town's Engineer.

7.7 VELOCITY (FOR DESIGN FLOW)

Minimum	1.0 m/s
Maximum	5.0 m/s (\leq 825 mm diameter)
	6.0 m/s ($>$ 825 mm diameter)

7.8 CHANGE OF SIZE

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

7.9 CLEARANCE

Pipe crossing clearances shall be in accordance with Section 6.10.

7.10 LOCATION

- (a) Sanitary sewers shall be located such that manholes are placed in the center of driving lanes, wherever possible.
- (b) Manholes shall be located at every change of grade, alignment, size, or material of the sewers.
- (c) Sewer mains and service pipes shall be marked with detectable service locator tape.
- (d) Sewer mains shall be located within the road reservation of an existing or proposed publicly owned and maintained street. Under no circumstances may sewer mains be located on private property.
- (e) A future connection must be installed at every existing or proposed street intersection that

the sewer service being installed passes by.

- (f) For a future street within the subdivision boundaries, the service is to be capped 3.0 meters beyond the edge of asphalt.
- (i) For an existing street, the service is to be capped at the edge of the road reservation common to both streets.

7.11 EARTH LOAD

Earth loads on sewers shall be calculated by using the Marston Formula (refer to Section 6.12).

7.12 VERTICAL DEFLECTION

Deflection testing of every section of sanitary sewer is required. The tests shall be conducted in accordance with the standards provided in the Master Specifications.

7.13 SUPERIMPOSED LOAD

The effect of concentrated and distributed superimposed loads shall be evaluated by generally accepted formula.

7.14 MANHOLES

- (a) Standard types of manholes and their details are shown in the Master Specifications.
- (b) All manhole chamber openings must be located on the upstream side of the manhole.
- (c) Special manholes shall be fully designed and detailed.
- (d) Maximum distances between manholes, unless otherwise specified, shall be 90.0 meters for sewers 700.0 mm diameter or smaller and 120.0 meters for sewers over 700.0 mm diameter.
- (e) Manholes shall be numbered consecutively for design reference using the last four digits of the Easting and the suffix 'S'.
- (f) Infiltration and exfiltration testing must be completed for all manholes as per the Master Specifications (see Appendix 'T').
- (g) A new manhole must be located a minimum of 6.0 meters from a new or proposed utility pole.

7.15 BUILDING SEWER

- (a) Separate and independent building sewers shall be provided for every single family house, each unit in a semi-detached, and each apartment building, office building, factory or similar building.
- (b) Pipe used in the extension of sewage service stubs to a building shall be, unless special approval is given by the Town in writing, polyvinyl chloride (PVC) plastic pipe CSA approved or type SDR35 or better.
- (c) For PVC pipe, joints shall be made using pipes with bell and spigot ends, and gaskets as recommended by the manufacturer.
- (d) Connections for individual buildings or units to the sewage system shall be completed in accordance with the Town's Water and Sewer Regulations.
- (e) Sewer service pipes must not be located within 3.0 meters of the side boundary of a building lot.

7.16 STORM WATER

Storm water drains, roof drains, or foundation drains shall not be connected to any part of the sanitary sewer.

7.17 SMALL SCALE TREATMENT SYSTEMS

While the Town promotes fully serviced development within areas of the Town that can be connected to existing municipal sanitary sewer infrastructure, the use of small scale treatment systems may be allowed. These small scale treatment systems must be approved by the Department of Environment, Climate Change and Municipalities in accordance with the *Guidelines for the Design, Construction and Operation of Water and Sewerage Systems*.

8.0 WATER SYSTEMS

8.1 GENERAL

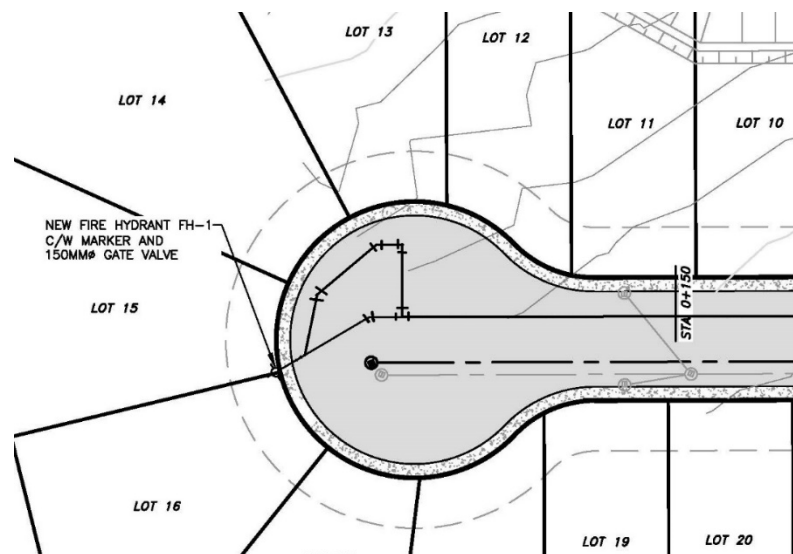
- (a) The water system shall be designed, drawn, installed, and constructed in accordance with these Standards, the Master Specifications, or, in the absence of specifications, best engineering practice.
- (b) Certain materials and manufacturers may be required by the Town.
- (c) At the completion of the installation of the subdivision's water system and prior to acceptance of Phase I Works, "As-Built" signed engineering plans and confirmation that all required testing has been completed shall be provided to the Town.

8.2 DESIGN CRITERIA AND LOCATION

8.2.1 Dead Ends

The water system shall be designed to exclude any dead ended pipe, so far as is reasonably possible. For permanent cul-de-sacs, water main shall be looped. Diagram 8-1 provides an example of water main looping.

Diagram 8-1



8.2.2 Size of Water Pipe

- (a) Minimum 200.0 mm diameter mains shall be used for all local mains, unless otherwise approved by Town's Engineer.
- (b) With the exception of temporary cul-de-sacs, 150.0 mm minimum diameter mains may be used on cul-de-sacs less than 200.0 meters in length or for short connections between pipes in the system.
- (c) The size of a main feeder pipe shall be a minimum of 300.0 mm diameter. The actual size will be governed by the maximum design flow with consideration for future demands as determined by the Town's Engineer.

8.2.3 Depth of Cover

- (a) All water pipe shall have a minimum cover of 2.0 meters in relation to the final finished street grade.
- (b) For streets not paved prior to November 15 of any year, a sufficient depth of fill shall be placed to give a minimum cover of 1.8 meters.

8.2.4 Material

All water main pipes shall be PVC DR 18 in accordance with Master Specifications.

8.2.5 Location of Water Pipes

- (a) All water main pipes shall normally be laid on the quarter point of the street right of way and in a separate trench from the sanitary and storm sewers. The Town's Engineer may approve combined trench construction under special circumstances.
- (b) All water pipes shall be marked with detectable service locator tape.
- (c) Water main pipes shall be located within the road reservation of an existing or proposed publicly owned and maintained street. Under no circumstances may water main pipes be located on private property.
- (d) A future connection must be installed at every existing or proposed street intersection that the water service being installed passes by.
 - (i) For a future street within the subdivision boundaries, the service is to be capped 3.0 meters beyond the edge of asphalt.
 - (ii) For an existing street, the service is to be capped at the edge of the road reservation

common to both streets.

8.2.6 Location of Valves

- (a) Valves at street intersections shall be located in the roadway at street line intersection.
- (b) Four (4) valves shall be required at each four-way street intersection. If there are more or less than four (4) streets meeting at any intersection, the appropriate number of valves shall be installed to allow complete isolation of the system.
- (c) On straight runs in a residential area, the maximum distance between valves shall be 180.0 meters.
- (d) Valves for hydrants shall be located within the road reservation and shall be located a maximum of 2.0 meters from the hydrant. Hydrant tee, lead, valve, and fitting shall have restrained joints. Where possible, valve box covers shall be placed in a concrete sidewalk or asphalt pavement and not in a gravel surface.
- (e) A future connection must be installed at every existing or proposed street intersection that the water service being installed passes by and shall have a valve installed just beyond the last service.
 - (i) For a future street within the subdivision boundaries, the service is to be capped 3.0 meters beyond the edge of asphalt.
 - (ii) For an existing street, the service is to be capped at the edge of the road reservation common to both streets.

8.2.7 Valve Chambers

- (a) All valves larger than 300.0 mm diameter shall be geared. All valves less than 400.0 mm shall be enclosed in a standard screw type adjustable box. The cover of the box shall have the term "WATER" printed on it for valves in the water system and the term "HYDRANT" for valves on hydrant branches.
- (b) All valves of 400.0 mm and larger shall be installed in a chamber constructed of reinforced concrete or made from a 1500.0 mm diameter pre-fabricated concrete manhole.
- (c) Access frames and covers for these chambers shall be cast iron, providing a clear opening of 750.0 mm in diameter with two countersunk lifting rings in the cover. The term "WATER" shall be imprinted on the cover. There shall be two access covers in each chamber larger than 1800.0 mm in diameter and access ladders shall be provided in the

chamber.

8.2.8 Hydrants

- (a) Hydrants shall be placed:
 - (i) Within the limits of the street right-of-way;
 - (ii) 600.0 mm behind the curb line;
 - (iii) a minimum of 2.0 meters from any driveway or utility structure;-
 - (iv) 600.0 mm behind the curb line or 400.0 mm behind the sidewalk (whichever is greater);
 - (v) Not more than 140.0 meters apart; and
 - (vi) So that no dwelling is more than 70.0 meters from a hydrant.
- (b) Hydrants shall be installed so that the top of the standpipe flange will be from 100.0 mm - 150.0 mm above the finished curb grade.
- (c) The branch pipe to the hydrant shall be 150.0 mm in diameter and shall include a 150.0 mm branch valve located 1.0 meter from the center line of the water pipe in the street. Therefore, all fittings shall have restrained joints for a distance of 12.0 meters. Where possible, valve box covers shall be placed in a concrete sidewalk or asphalt pavement and not in a gravel surface.
- (d) Dead-ended pipes shall only be temporarily permitted where a future extension to the system is anticipated. A hydrant shall be installed in its proper location at the dead end.
- (e) Hydrants shall be placed on the high points of the water system if air release valves are not provided.
- (f) All joints on hydrant leads, including the mainline tee, shall be equipped with joint restraining fittings.
- (g) Hydrants shall be Darling or McAvity brands.
- (h) All hydrants shall be red in color.
- (i) Hydrant markers shall not be attached to the hydrant and shall be placed in accordance with the Master Specifications.
- (j) The minimum distance from the center of a utility pole to the center of a hydrant shall be 3.6 meters (to maintain a 2:1 slope at a 1.8 m depth).
- (k) In areas without curb and gutter, a culvert to access the hydrant shall be installed directly in front of the hydrant with a minimum length of 2.5 meters.

- (l) In areas not serviced with municipal water, Council may require that the Developer install a dry hydrant for firefighting purposes. This will depend on site conditions and availability of a reservoir in the area as determined by the Town.

8.2.9 Sampling Stations

A Mueller Blow off Sampling Station may be required within the development. This requirement will be determined by the Town's Public Works Department or the Town's Engineer.

8.3 CONNECTION TO EXISTING WATER SYSTEMS

8.3.1 Service Interruption

A connection of the Developer's water system to any part of the existing water system must be carried out to cause the least interruption to existing service and each such connection must be completed by the Town. A connection of 100.0 mm diameter pipe or greater shall be by a tapping sleeve and valve unless otherwise approved by the Town's Public Works Department. All connections shall be pressure connections.

8.3.2 Other Connections

Whenever the existing water system is within reasonable distance from a proposed subdivision, and an interconnection is practical, the Developer shall be required, at their cost, to install the necessary pipe and interconnect the water system in their subdivision to the existing water system.

8.3.3 Scheduling a Connection

The Town shall assist in the scheduling of any such connection and will install the tapping sleeve and valve at the Developer's expense.

8.3.4 Prohibited Cross-Connections

No pipe, or private water service pipe cross-connection will be made from the existing water system to a water system in a subdivision which is connected to some other source of supply.

8.3.5 Tapping Sleeves and Valves

Whenever it is practical, tapping sleeves and valves shall be used for all ductile iron connections to existing water mains. Only models approved by the Town may be used.

8.4 WATER MAINS AND SERVICE PIPE

8.4.1 Water Service Pipe

(a) Size and Materials

Pipes shall be Municipex Poly Pipe. The pipe size for domestic services shall be determined from Table 8-1:

Table 8-1: Water Service Pipe Sizing

Pressure	25'	50'	75'	100'	200' (distance from mains)
20-24 PSI	1"	1"	1"	1"	1" (size of pipe required)
40-60 PSI	1"	1"	1"	1"	1"
Over 60 PSI	1"	1"	1"	1"	1"

The above assumes the elevation of the building or premises is not great enough to lose the main line pressures quoted in each category.

Table 8-1 is for single family units or for residences with basement apartments and is based on a maximum demand of 8.33 IMP. GPM. Service pipes to multiple family units, or to commercial property owners must be sized on the basis of expected demand, pipe length, and water pressure. Approximate water pressures for any area may be ascertained by contacting the Town's Public Works Department.

Water service pipes shall be connected to the water system at a point approximately 45° above horizontal with an approved corporation cock and with the formation of a goose-neck in the water service pipe immediately following the connection to the water pipe. Non-flexible water service pipe larger than 25.0 mm in diameter shall be connected to the water pipe at the horizontal with an approved corporation cock. An approved stop and drain fitting shall be installed in the water service pipe at precisely the street line and to this fitting will be connected a standard service box, the top of which shall be set at

finished sidewalk grade. Further information regarding water service pipe connections is available in the Municipal Specifications.

Water mains and service pipes shall be marked with detectable service locator tape.

(b) Depth of Cover

All water service pipes from the main in the street to and including the standard service box at the street line location shall be supplied and installed by the Developer so that there will be a minimum cover of 1.6 meters and a maximum cover of 2.0 meters in relation to the finished street surface and such installation must be approved by the Town prior to backfilling.

In places where ground conditions make it impossible to obtain this depth of cover, special approval must be obtained from the Town. In such instances the Town may require that insulation, heat tracing, or some other special protection be provided.

Water service pipes on private property must be installed so that there will always be a minimum cover of 1.5 meters both prior to and following landscaping.

(c) Oversized Water Service Pipes

Water service pipes larger than 25.0 mm shall be of a size and material as approved by the Town's Public Works Department or Engineer.

Joints and fitting connections in water service pipes shall be compression type, and completely watertight.

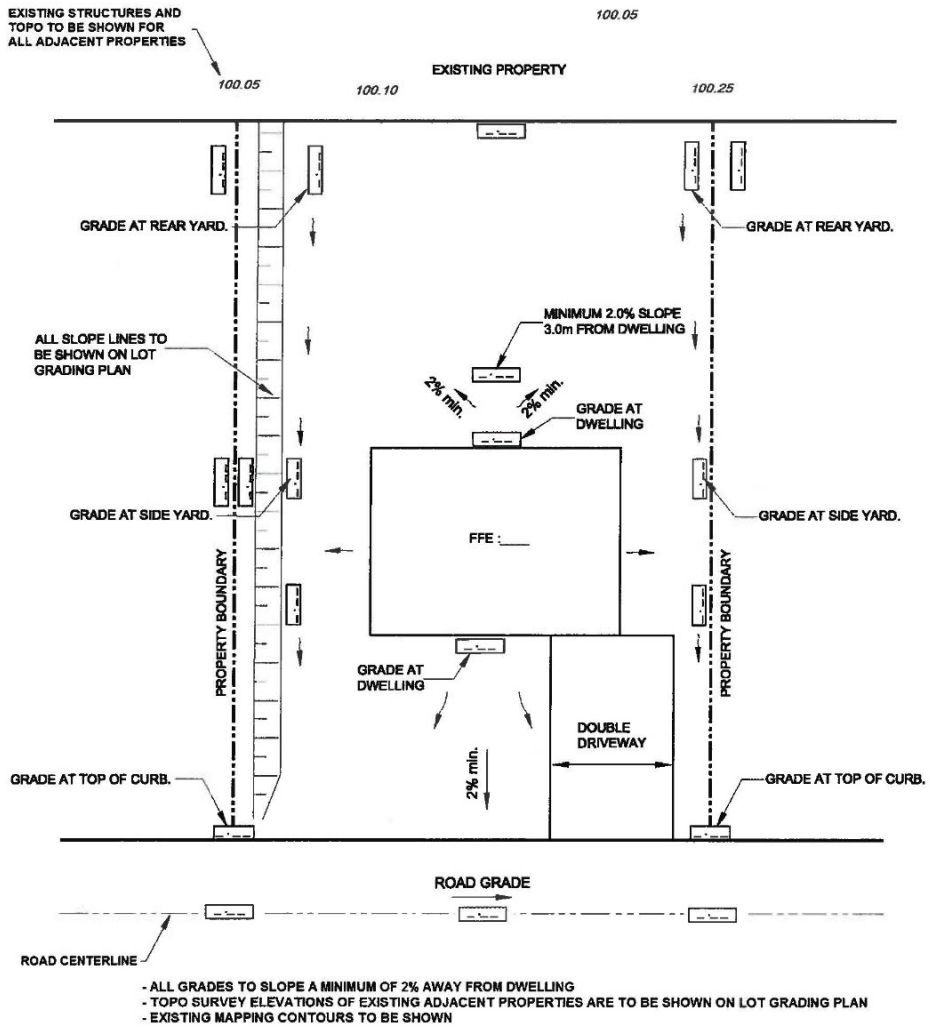
Before any water service pipe is connected to the water system on any street, the Developer shall have already installed the water system, swabbed, sterilized and tested same as required in the Government Specifications. Connections for individual buildings or units to the water system shall be completed in accordance with the Town's Water and Sewer Regulations.

Sewer service pipes must not be located within 3.0 meters of the side boundary of a building lot.

APPENDIX 'A' - LOT GRADING STANDARD

- (a) All lots shall be graded at a minimum of 2.0% away from the dwelling to prevent any ponding of water and to ensure positive drainage.
- (b) Top of concrete foundations shall be a minimum of 600.0 mm above the curb (high back) at the high side of the lot.
- (c) On a side sloping lot, the top of the concrete foundation shall be a minimum of 400.0 mm above the curb grade, at the high corner of the lot.
- (d) Garage floors shall be a minimum of 400.0 mm above the curb at the center line of the garage.
- (e) All slopes shall be maximum 2H: 1V.
- (f) Any retaining walls installed as part of the approval of the development shall be certified by the Consulting Engineer. All walls above 1.2 meters shall have a fence, handrail or guard.
- (g) Provide existing, or as-built, grades for any existing adjacent lands. Adequate grades to be provided to clearly show that drainage issues (either excessive run off or ponding) will not be caused by the new development to existing areas.
- (h) Finished grade information shall be provided for the four corners of all lots.
- (i) Finished grade information shall be provided for the area adjacent to the front and rear of the proposed dwelling unit.
- (j) The Grade plan shall indicate the direction of flow of surface water.
- (k) Sections and profiles of specific lots may be requested at the Town's discretion.
- (l) Should any existing grade in any lot meet or exceed 25.0% slope, additional grade information shall be required to illustrate the beginning and end of such grades.
- (m) A lot grading plan must be submitted for each dwelling prior to the issuance of an Occupancy Permit in accordance with the following:

TYPICAL LOT GRADING PLAN



APPENDIX 'B' - SANITARY SEWER DESIGN FORMS

DESIGN CAPACITIES AND FLOWS

PROJECT NAME:	PROJECT NO.:
STREET:	DESIGN DATE:
CONSULTING ENGINEER:	

DESIGN CALCULATIONS

UPSTREAM MIL	DIAMETER (mm)	CAPACITY (L)	VELOCITY (part)	SPACE CAPACITY	INFLITRATION	AVERAGE FLOW	PEAK FLOW

I HEREBY CERTIFY THAT THIS DESIGN HAS BEEN CARRIED OUT ACCORDING WITH ENGINEERING BEST PRACTICE AND THE TOWN OF PORTUGAL COVE-ST. PHILIP'S SUBDIVISION DESIGN AND CONSTRUCTION STANDARDS.

Engineer's Stamp

PROFESSIONAL ENGINEER

PIPE GEOMETRY

PROJECT NAME:	PROJECT NO.:
LOCATION:	DESIGN DATE:
CONSULTING ENGINEER:	

CURRENT		CONT	DESCRIPTION (STREET)	GRADE	#	DIA
Up MH #	Down MH #	DOWN MH #				

I HEREBY CERTIFY THAT THIS DESIGN HAS BEEN CARRIED OUT ACCORDING WITH ENGINEERING BEST PRACTICE AND THE TOWN OF PORTUGAL COVE-ST. PHILIP'S SUBDIVISION DESIGN AND CONSTRUCTION STANDARDS.

Engineer's Stamp

PROFESSIONAL ENGINEER

TRIBUTARY AREAS

PROJECT NAME:	PROJECT NO.:
LOCATION:	DESIGN DATE:
CONSULTING ENGINEER:	

UPSTREA M MH #	ZONINGS					

I HEREBY CERTIFY THAT THIS DESIGN HAS BEEN CARRIED OUT ACCORDING WITH ENGINEERING BEST PRACTICE AND THE TOWN OF PORTUGAL COVE-ST. PHILIP'S SUBDIVISION DESIGN AND CONSTRUCTION STANDARDS.

Engineer's Stamp

PROFESSIONAL ENGINEER

VERTICAL & HORIZONTAL INFORMATION

PROJECT NAME:	PROJECT NO.:
LOCATION:	DESIGN DATE:
CONSULTING ENGINEER:	

UPSTREAM MH #	NORTHING	EASTING	INVERT	LENGTH (M)	INVERT DOWN	GROUND ELEVATION

I HEREBY CERTIFY THAT THIS DESIGN HAS BEEN CARRIED OUT ACCORDING WITH ENGINEERING BEST PRACTICE AND THE TOWN OF PORTUGAL COVE-ST. PHILIP'S SUBDIVISION DESIGN AND CONSTRUCTION STANDARDS.

Engineer's Stamp

PROFESSIONAL ENGINEER

APPENDIX 'C' - STORM SEWER DESIGN FORM

CALCULATION OF STORM SEWER FLOWS

PROJECT NAME:	PROJECT NO.:
STREET:	DESIGN DATE:
CONSULTING ENGINEER:	

Q=RAIN
WHERE: Q = DESIGN FLOW (l/s) R = RUN COEFFICIENT I = RAINFALL INTENSITY (mm/hr) A = WATERSHED AREA (ha) N = CONSTANT = 2.778

DESIGN CALCULATIONS

MANHOLE SECTION	DESIGN AREA (ha)	RUNOFF COEFF. (R)	RAINFALL INTENSITY (mm/hr)	CONSTANT (N)	SECTION DESIGN FLOW (cub.m/s)	INCREMENTAL DESIGN FLOW (cub.m/s)	DESIGN SLOPE (%)	MANNING COEFF. (N)	DESIGN DIAMETER (mm)	NOMINAL DIAMETER (mm)	NOMINAL DIAMETER VELOCITY (m/s)	NOMINAL DIAMETER CAPACITY (cub.m/s)	EXTRA CAPACITY (cub.m/s)	PERCENT EXTRA CAPACITY (%)

I HEREBY CERTIFY THAT THIS DESIGN HAS BEEN CARRIED OUT ACCORDING WITH ENGINEERING BEST PRACTICE AND THE TOWN OF PORTUGAL COVE-ST. PHILIP'S SUBDIVISION DESIGN AND CONSTRUCTION STANDARDS.

Engineer's Stamp

PROFESSIONAL ENGINEER

APPENDIX 'D' - SAMPLE CERTIFICATE OF COMPLIANCE

CERTIFICATE OF COMPLIANCE

I, _____, the Consultant Engineer responsible for overseeing the development of the _____ residential subdivision in the Town of Portugal Cove-St. Philip's hereby certify that all works have been completed in compliance with the Town's Municipal Plan and Development Regulations, Subdivision Design and Construction Standards, residential subdivision agreement, the final construction engineering drawings approved by the Town (with revisions, if applicable), and requirements of all other regulatory bodies of government.

Signature: _____

Date: _____

Engineer's Stamp

APPENDIX 'E' - STANDARD HOUSE SERVICE

INFORMATION FORM

HOUSE SERVICING INFORMATION FORM (1 OF 2)

Street Address: _____

Owner of Property: _____

Person Interviewed: _____

Project: _____

Contractor: _____

Interviewer: _____ Date: _____

Services to be installed: _____

Does house have basement: () Yes () No () Crawl Space

Does owner plan to install a basement in future: () Yes () No

Existing lowest floor elevation: _____

Elev. of exist. Sewer from house where owner wishes to connect: _____

Water level of existing well: _____

History of well: _____

Additional comments: _____

REQUESTED LOCATION OF SERVICES

ON SKETCH LEFT INDICATE:

- LOCATION OF WELL
- REQUESTED LOCATION FOR WATER SERVICE (*W)
- REQUESTED LOCATION FOR SEWER SERVICE (*S)
- REQUESTED LOCATION FOR STORM SEWER (*R)
- TIE IN REQUESTED LOCATION OF SERVICES TO HOUSE OR BUILDING.
- FENCES ETC.

CURB STOP LOCATE BETWEEN STREET RIGHT OF WAY AND BACK OF SIDEWALK (IF REQUIRED).

DRIVEWAY LOCATION

TOP OF CURB AT CENTER OF LOT

SERVICE LOCATION APPROVAL

I the undersigned, (Home owner), do agree with the proposed location for the requested services, as indicated on the above sketch.

Home Owner _____ SIGNATURE _____ REPRESENTATIVE SIGNATURE _____

APPENDIX 'F' - HYDROSTATIC PRESSURE TEST RESULTS

PROJECT NAME:	PROJECT NO.:
STREET:	DESIGN DATE:
CONSULTING ENGINEER:	

CHAIN STA TO STA	PRESSURE (kPa)		LEAKAGE (L)		TEST TIME (MIN)	TYPE OF PIPE	DIA OF PIPE (mm)	LENGTH OF TEST SECTION	REMARKS
	WORKING	TEST	ALLOW	ACTUAL					

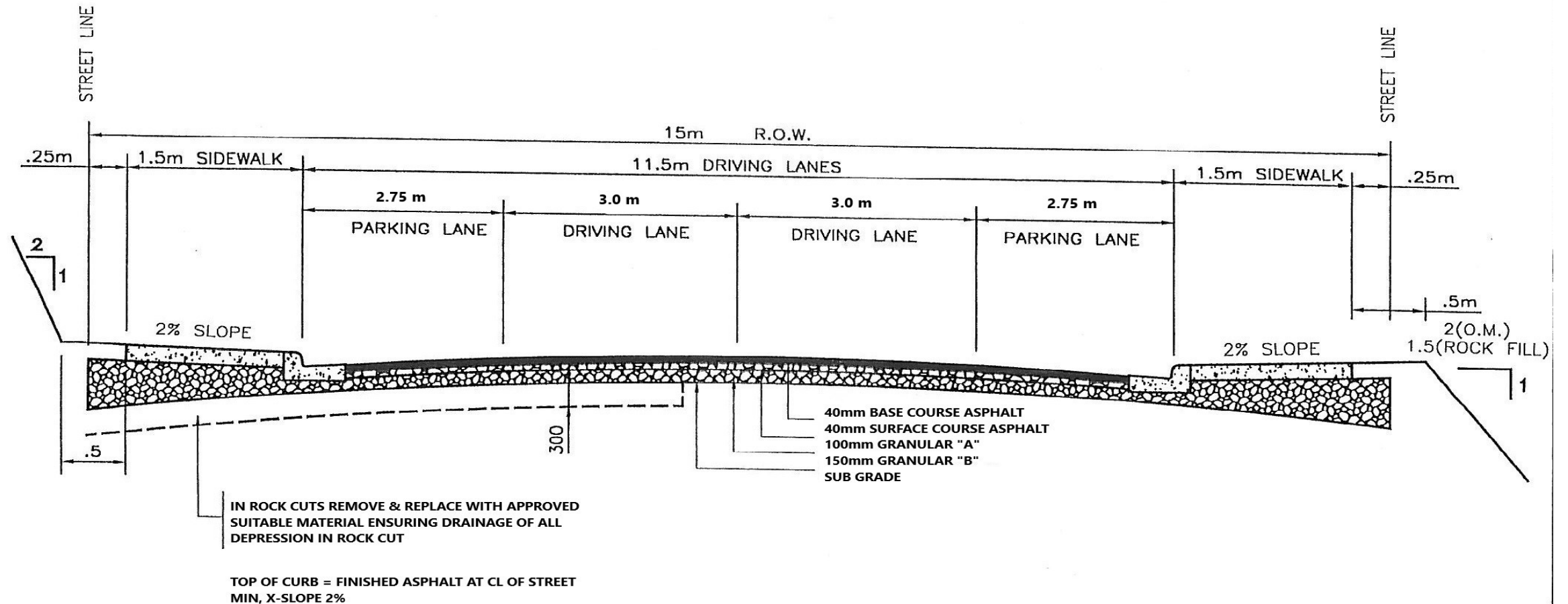
I HEREBY CERTIFY THAT ALL TESTS HAVE BEEN CARRIED OUT ACCORDING TO THE GOVERNMENT OF NEWFOUNDLAND AND LABRADOR MUNICIPAL WATER, SEWER AND ROADS MASTER CONSTRUCTION SPECIFICATIONS AND THIS/THESE SECTION(S) OF PIPE HAS PASSED THE REQUIRED TESTS.

Engineer's Stamp

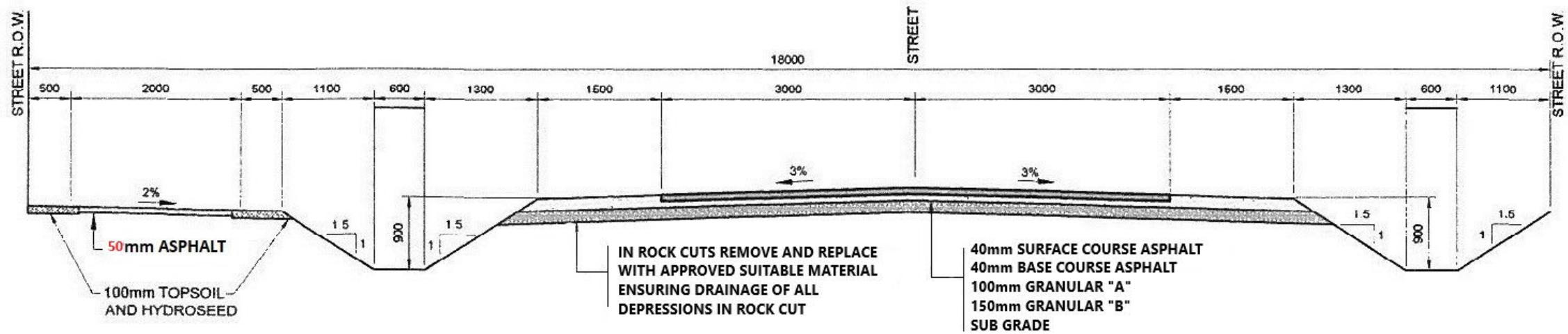
PROFESSIONAL ENGINEER

APPENDIX 'G' - STREET CROSS SECTIONS

W/ CURB & GUTTER

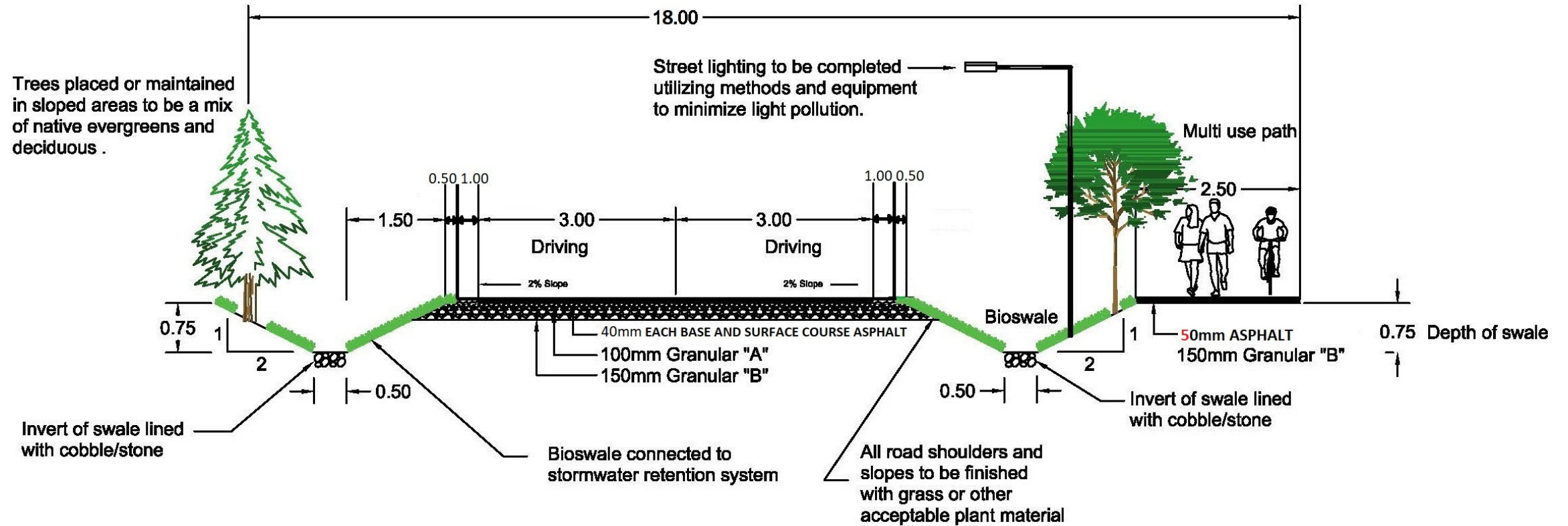


UNSERVICED & SEMI-SERVICED STREETS - OPTION 1

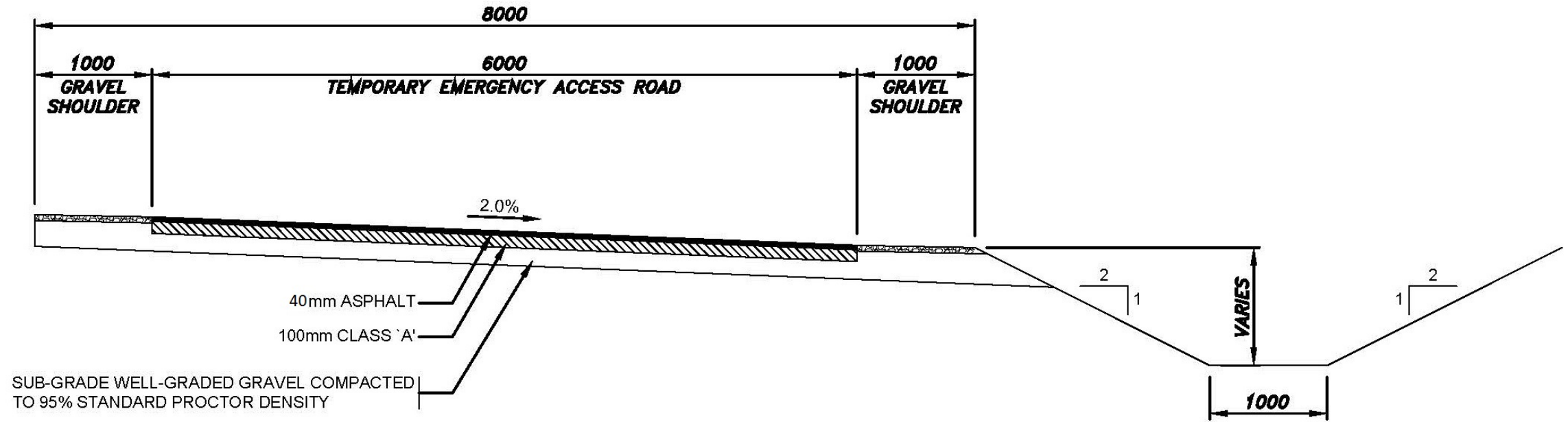


UNSERVICED & SEMI-SERVICED STREETS - OPTION 2

ROADWAY CROSS SECTION



TEMPORARY EMERGENCY ACCESS



APPENDIX 'H' - STORM SEWER TEST RESULTS

STORM MANHOLE TEST RESULTS

PROJECT NAME:	PROJECT NO.:
STREET:	TEST DATE:
CONSULTING ENGINEER:	

I HEREBY CERTIFY THAT ALL TESTS HAVE BEEN CARRIED OUT ACCORDING TO THE GOVERNMENT OF NEWFOUNDLAND AND LABRADOR MUNICIPAL WATER,

MH #	LOCATION	ALLOWABLE LEAKAGE	TEST TIME	ACTUAL LEAKAGE	PASS/FAIL	DEPTH OF TEST WATER ABV INV.	REMARKS

SEWER AND ROADS MASTER CONSTRUCTION SPECIFICATIONS AND THIS/THESE MANHOLES HAVE PASSED THE REQUIRED TESTS.

Engineer's Stamp

PROFESSIONAL ENGINEER

APPENDIX 'T' - SANITARY SEWER TEST RESULTS

SANITARY SEWER TEST RESULTS

PROJECT NAME:	PROJECT NO.:
STREET:	TEST DATE:
CONSULTING ENGINEER:	

LOCATI ON MH NO. TO MH NO.	DIA OF PIPE	M OF PIPE	ALLOWA BLE LOSS (LITERS)	NO. BLDG SERVICE S	M OF SERVICE PIPE	TEST DURATI ON (MIN)	MEASUR ED LOSS (LITERS)	PASS/FA IL	TEST DURATI ON (MIN)	MEASUR ED INFLOW (LITERS)	PASS/FAIL	REMARKS

I HEREBY CERTIFY THAT ALL TESTS HAVE BEEN CARRIED OUT ACCORDING TO THE GOVERNMENT OF NEWFOUNDLAND AND LABRADOR MUNICIPAL WATER, SEWER AND ROADS MASTER CONSTRUCTION SPECIFICATIONS AND THIS/THESE SECTION(S) OF PIPE HAS PASSED THE REQUIRED TESTS.

Engineer's Stamp

PROFESSIONAL ENGINEER

SANITARY MANHOLE TEST RESULTS

PROJECT NAME:	PROJECT NO.:
STREET:	DESIGN DATE:
CONSULTING ENGINEER:	

MH #	LOCATION	ALLOWABLE LEAKAGE	TEST TIME	ACTUAL LEAKAGE	PASS/FAIL	DEPTH OF TEST WATER ABV INV.	REMARKS

I HEREBY CERTIFY THAT ALL TESTS HAVE BEEN CARRIED OUT ACCORDING TO THE GOVERNMENT OF NEWFOUNDLAND AND LABRADOR MUNICIPAL WATER, SEWER AND ROADS MASTER CONSTRUCTION SPECIFICATIONS AND THIS/THESE MANHOLES HAVE PASSED THE REQUIRED TESTS.

Engineer's Stamp

PROFESSIONAL ENGINEER

APPENDIX 'J' - DRIVEWAY ACCESS CONFIRMATION

DRIVEWAY ACCESS COMPLIANCE

I, _____, the Consultant Engineer responsible for overseeing the development of the _____ residential subdivision in the Town of Portugal Cove-St. Philip's hereby certify that all driveway accesses have been designed in compliance with the required widths, separations distances, and sightline requirements of the Town's Municipal Plan and Development Regulations, Subdivision Design and Construction Standards, and requirements of all other regulatory bodies of government.

Signature: _____

Date: _____

Engineer's Stamp