DISTRICT OF LANTZVILLE
BYLAW NO. 175, 2020

A BYLAW TO REGULATE AND REQUIRE THE PROVISION OF WORKS AND SERVICES IN CONNECTION WITH THE SUBDIVISION AND DEVELOPMENT OF LAND

AND WHEREAS section 506 of the *Local Government Act* authorizes the District of Lantzville to enact a bylaw to establish subdivision and development servicing requirements;

NOW THEREFORE the Municipal Council of the District of Lantzville in open meeting assembled enacts as follows:

1. This bylaw may be cited for all purposes as the "District of Lantzville Subdivision and Development Works and Services Bylaw No. 175, 2020".

2. The District of Lantzville Subdivision and Development Works and Services Bylaw is set out in Schedule 'A' attached to and forming part of this Bylaw.

3. Land must not be subdivided or developed, except in accordance with this bylaw.

4. If a portion of this bylaw is held invalid by a Court of competent jurisdiction, then the invalid portion must be severed and the remainder of this bylaw is deemed to have been adopted without the severed section, subsection, paragraph, subparagraph, clause or phrase.

5. District of Lantzville Subdivision and Development Bylaw No. 55, 2005 and its amendments are hereby repealed.

READ A FIRST TIME this 13th day of January, 2020.

READ A SECOND TIME this 13th day of January, 2020.

READ A THIRD TIME this 27th day of January, 2020.

ADOPTED this 10th day of February, 2020.

ORIGINAL SIGNED	*ORIGINAL SIGNED*
Mark Swain, Mayor	Trudy Coates, Director of Corporate Administration

Subdivision and Development Works and Services Bylaw

Schedule ‘A’ to Bylaw No. 175, 2020

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PART 1: STANDARDS FOR WORKS AND SERVICES

1 MINIMUM HIGHWAY FRONTAGE

1.1 Council delegates to the Approving Officer the authority to exempt a parcel, other than a panhandle parcel, from the minimum Frontage requirement under Section 512 of the *Local Government Act*, and for certainty, the parcel frontage is the dimension of a parcel that shares a boundary with the abutting road right-of-way.

1.2 An applicant for an exemption from the minimum frontage requirement may request reconsideration by Council of the Approving Officer's decision within 10 days of the date on which the decision is communicated to the applicant in writing.

1.3 A request for reconsideration must be delivered in writing to the Director of Corporate Administration and must set out the grounds on which the applicant considers the Approving Officer's decision is inappropriate and must be accompanied by a fee of $400.

1.4 The Director must place each request for reconsideration on the agenda of a Council meeting to be held not earlier than 2 weeks from the date on which the request for reconsideration was delivered.

1.5 The Director must notify the applicant and any other person who he/she reasonably considers may be affected by the reconsideration, of the date of the meeting at which it will occur.

1.6 At the meeting the Council may, after having heard the applicant and any other person who was notified, either confirm the decision of the Approving Officer or substitute its own decision.

2 GENERAL COMPLIANCE

2.1 Every owner of land in respect of which a subdivision or building permit application is made shall provide, locate and construct at their own expense, such highways, sidewalks, boulevards, boulevard crossings, transit bays, street lighting, water distribution system, fire hydrant system, sewage collection system, drainage disposal system, natural gas system, cable vision system, telephone line system, hydro system, trails and pathways within the subdivision, and on the highway or highways immediately adjacent to the land being subdivided as are required by this bylaw.

2.2 Unless otherwise required in this bylaw, Section 2.1 does not apply in respect of a building permit application unless the permit would authorize the construction of a residential building containing two or more dwelling units (excluding secondary suites), a single family dwelling having a true value of at least $500,000 (building permit application value), or another type of building having a true value at least $100,000 (building permit application value).

2.3 The owner shall retain, at their expense, a Professional Engineer who shall design the works and services required in accordance with this bylaw.

2.4 All works and services required to be installed at the owner's expense under this bylaw shall be constructed and installed to the standards prescribed under this bylaw prior to approval of the subdivision by the Approving Officer or the issuance of the building permit, unless the Municipality permits the owner of the land to:

(a) deposit with the Municipality a security, in the amount of 125% of the estimated cost of the works and services; and

(b) enter into a works and services agreement with the Municipality to construct and install the works and services by a date following the date of approval of the subdivision or issuance of the building permit, that is specified in the agreement.

2.5 The owner shall permit the Municipal Official to inspect all works and services during construction, for the purpose of accepting the works and services required by this bylaw, whether or not other authorities having jurisdiction have inspected or will inspect the works and services.

2.6 The owner shall, in all cases where the works and services have been installed prior to approval of the subdivision or issuance of the building permit,

(a) enter into a written agreement with the Municipality to rectify any deficiencies in design, materials or workmanship that may arise in connection with the works and services during the twelve months next following the assumption of responsibility for the works and services by the Municipality, or in the case of rainwater management systems, three years; and

(b) deposit with the Municipality security in the amount of 5% of the actual cost of the works and services, or $500 whichever is the greater, plus the estimated cost of maintaining any rainwater management systems for three years, as a guarantee of performance under the agreement.

2.7 A works and services agreement must, in addition to requiring the owner to construct and install the works and services by the date specified in the agreement, oblige the owner to:

(a) repair and make good all deficiencies for a period of at least twelve months next following the assumption of responsibility for the works and services by the Municipality, or in the case of rainwater management systems, three years;

(b) deposit with the Municipality security as described in section 2.6(b) in respect of the obligation to repair and make good such deficiencies;

(c) carry insurance in an amount and form acceptable to the Municipality; and

(d) indemnify the Municipality and save it harmless in respect of all costs and expenses it may incur arising from or connected with the construction or installation of the works and services, or by reason of liens for nonpayment of labour or materials, workers' compensation assessments, unemployment insurance, federal or provincial tax, check-off of dues or encroachment owing to mistakes in surveying.

2.8 A security provided under section 2.4 or 2.6 must be in the form of cash, a certified cheque payable to the Municipality, or except in the case of an amount less than $3,000.00, an unconditional, irrevocable and automatically renewing letter of credit drawn on a chartered bank or credit union having a business office in Lantzville or Nanaimo, or a performance bond that in the opinion of the Municipality's solicitor provides equivalent security to the Municipality as such a letter of credit would provide.

2.9 The Chief Administrative Officer is authorized to execute, on behalf of the Municipality, agreements described in sections 2.4 and 2.6.

2.10 The owner shall pay to the Municipality an administration and inspection fee equal to 4.5% of the estimated cost of the works and services certified by the owner's Professional Engineer up to the value of $500,000, plus 2.5% of such estimated cost over $500,000, up to $1,000,000, plus 1.5% of such estimated cost over $1,000,000.

2.11 Where water, drainage, or sewage systems required for the subdivision or development are not within a highway, the owner of the land in respect of which the application was made shall grant to the Municipality, or obtain from third parties at the owner's cost, a statutory right-of-way acceptable to the Approving Officer and the Municipality in accordance with the Municipality's standard right-of-way agreement.

2.12 The Municipal Official may require an owner to pay to the Municipality, in lieu of constructing or altering works or services required by this bylaw, cash in the amount determined by the Municipal Official to be the cost of designing and constructing or altering the works or services as of the time of approval of the subdivision or issuance of the building permit, if the Municipal Official determines on the basis of sound civil Professional Engineering practice or cost considerations that the works or services should be constructed or altered at a later time or concurrently with the construction or alteration of works or services serving adjacent or nearby parcels of land.

3 STANDARDS FOR ROADS

Road Configurations

3.1 Major and collector roads are to be continued without jogs through the area being subdivided and or developed. Collector roads shall have a width of 20 m. Major roads shall have a width deemed applicable as per Part 2 this bylaw and acceptable to the Municipal Official for the particular road involved.

3.2 Local roads shall conform in alignment to existing adjacent roads, where practicable, and shall have a width in accordance with the specifications of Part 2.

3.3 Cul-de-sac roads shall be provided at the closed end with an area designated to permit safe and adequate space for turning of motor vehicles and emergency vehicles. Provision shall be made in the turning area for a landscaped island unless the Approving Officer is satisfied that it is impractical to comply. Landscaping must be low maintenance and require minimal water. A parking island shall be provided in the turning area to accommodate on street parking on the basis of one parking space for each parcel around the turning area where the parcel has an area of less than 800 m², and a curb frontage which measures less than 9 m.

3.4 The property line radius of turning areas at the end of cul-de-sac roads shall be as set out in Part 2.

3.5 Intersecting road boundaries shall be rounded to a 6 m radius curve if:

(a) one of the intersecting roads is 15 m or less in width;

(b) one or both intersection roads are major or collector roads; or

(c) the interior angle at the road intersection is 80 degrees or less.

3.6 Jogs in road alignment at intersections shall be permitted, provided the distances between centre lines at the jog is a minimum of 80 m, unless it is impractical to comply because of the existing road configuration.

3.7 Where bends occur at the connection to an existing road alignment, the angle shall be replaced by an appropriate curve.

3.8 Reversed curves in road alignment shall be separated by tangents of at least 30.5 m or such greater length as the Director of Public Works may specify for traffic safety reasons.

3.9 Roads are to be laid out with due regard to the topography so as to avoid flat or excessive grades.

3.10 Intersecting roads shall meet substantially at right angles, unless, due to physical impediments the Approving Officer otherwise requires or permits. In no case shall roads intersect at any angle of less than 70 degrees.

Clearing and Grading

3.11 Only the area that is necessary for the building of all roads and utilities shall be brought to the designed grades and shapes. All unsuitable material shall be removed and replaced or otherwise dealt with in accordance with the specifications in Part 2.

Related Infrastructure

3.12 If water, sewer, drainage, hydro, gas or telecommunications infrastructure is to be provided to a subdivision or development, the services shall be installed concurrently with the construction of the roads and the design drawings shall describe the location of all such infrastructure. In the case of hydro, gas and telecommunications, the design drawings shall have been approved by the relevant utility provider before submission to the Municipality.

Surfacing

<u>Sidewalks</u>

3.13 Permanent concrete sidewalks shall be installed on each side of all major roads and on one side of all collector roads, and on residential roads if required by the Municipal Official to provide a safe pedestrian route to a school. Sidewalks shall be 1.5 m wide.

Multi-Use Trails/Paths

3.14 A multi-use trail right-of-way not less than 4 m wide shall be dedicated where, in the opinion of the Approving Officer, they are essential to provide circulation or access to schools, playgrounds, shopping centres, transportation, beaches, and other community facilities, or for proper circulation of pedestrian and bicycle traffic. Trail routes may be established by the Municipal Council from time to time. Multi-use trails shall have a paved width of 2.5 m constructed of pervious materials including crush stone, cement concrete pavement or asphalt, in accordance with the specifications in Part 2. Where there is an 18-inch drop that is at a 75-degree angle or greater and is at or within 20 cm of the edge of the walkway a 1.5 m chain link fence shall be erected on that side of the walkway, as per MMCD drawing C13.

Paved Roads

3.15 Roads shall be constructed with machine laid asphalt or cement concrete pavement with curbs. Construction shall be in accordance with the specifications in Part 2.

3.16 Curb dimensions and construction shall conform to the specifications in Part 2.

3.17 The required width of paving is shown in Part 2.

3.18 Where a highway or highways exist adjacent to the proposed subdivision but no developed road exists, or the existing road does not meet the width or construction standards set out in this bylaw, or an existing road lacks underground wiring or road lighting services required by this bylaw, a road, together with underground wiring and street lighting shall be constructed, installed, improved, upgraded, or widened along that portion of the highway or highways immediately adjacent to the lands being subdivided, except where deemed by the Director of Public Works to be premature based on sound Professional Engineering practice.

3.19 In cases where an owner is required to construct, improve, upgrade or widen less than the full designed width of the road, the improvements shall be installed for the prescribed width measured from the edge of the pavement or curb of the designed road nearest to the proposed subdivision.

3.20 Notwithstanding section 3.18, road improvements will be required in all cases where the existing road does not include at least 5 m in asphalt width, concrete curbs and 1 m gravel shoulders.

3.21 Unless required by section 3.18 to upgrade or widen the pavement to a higher standard, road improvements shall consist of upgrading the existing pavement to the minimum standards set out in section 3.20.

4 STANDARDS FOR WATER DISTRIBUTION SYSTEMS

General

4.1 All new parcels shall be provided with a connection to the Municipal water system when such connections are available and approved by the Municipality, and to the satisfaction of the Director of Public Works.

4.2 If a connection to the Municipal water system is unavailable, the Municipal Official may require the owner to provide a certification from a Professional Engineer that each new parcel has the capacity to supply at least 3400 L of drinking water per day from a well on the parcel that meets the *Drinking Water Protection Act* and the Guidelines for Canadian Drinking Water Quality. Each newly created parcel must be serviced only and solely by a well located within the boundaries of that parcel. Each well on each newly created parcel must meet the Municipality's water provision standards.

4.3 For any proposed subdivision where water servicing is intended to be provided from an onsite well, the owner/developer must provide to the Municipality a report from a Professional Hydrologist that certifies that the withdrawal of the minimum quantity of water specified in Section 4.2 from each of the proposed wells would have no negative impact on existing wells within a 150 m radius of the well.

4.4 Developers of parcels of land greater than 2 ha. shall be responsible for locating and developing a separate source of water, unless the Director of Public Works and the Approving Officer determine that it is not in the best interest of the Municipality.

Design

4.5 Watermains and appurtenances shall be designed in accordance with the locations and sizes required by Part 2 of this bylaw and shown on a plan approved by the Municipal Official. The locations of the watermains shall be within a road unless otherwise approved by the Municipal Official.

Construction

4.6 Watermains and appurtenances shall be laid in accordance with the specifications in Part 2.

5 STANDARDS FOR RAINWATER MANAGEMENT SYSTEMS

General

5.1 All new developments require a rainwater management system that will retain natural water flows on the land as long as possible and will maximize ground water recharge.

5.2 All small parcel residential developments require a rainwater management system that will provide an enhanced stormwater system installed by the owner that will detain water on the site.

5.3 Where a highway exists adjacent to the proposed subdivision but no stormwater main has been installed, the existing ditches shall be enhanced to accommodate the new and existing flows. If a piped system is required and authorized by the Municipal Official, then the stormwater mains shall be installed along the frontage of the subdivision and connected to the Municipal drainage system.

5.4 A rainwater management plan prepared by a Professional Engineer is required prior to construction of a new house on any parcel in the Municipality. The required rainwater management plan must include the installation of a stormwater infiltration system on the parcel that is designed appropriately for the size of the house and soil conditions, together with an outlet or service connection to the Municipality's drainage system or strata drainage system, as applicable, where such system is available. If, in the opinion of the Professional Engineer, the soils are not conducive to infiltration, the rainwater management plan must include an alternative system to suit the conditions of the parcel and to ensure that stormwater flows will not be directed to, or result to damage to, neighbouring properties.

5.5 Any watercourse flowing through the subdivision shall be retained as an open channel and left in its natural state or upgraded to enhance the riparian zone and stream channel.

5.6 Any flow of surface water from adjoining land or from the subdivision land shall be maintained naturally along the existing ground surface.

Design

5.7 The owner's Professional Engineer shall assess the proposed development in relation to existing natural and artificial drainage systems and recommend a rain water management system that protects the established amenities of adjacent properties and involves the use of piped systems only where reliance on on-site retention, open ditches and natural watercourses is not feasible.

5.8 Designs shall be in accordance with the specifications in Part 2 and the drainage system in the subdivision shall be fully integrated with the systems in adjoining areas.

5.9 Designs and plans shall be approved by the Municipal Official prior to construction.

Rights-of-Way

5.10 Where a subdivision is traversed by a watercourse or drainage ditch that is not in a Municipal right-of-way, a statutory right-of-way for drainage shall be provided along such watercourse or drainage ditch or its planned alignment with a width deemed necessary by the Municipal Official.

Vegetation and Soil Retention

5.11 In all new subdivisions, care must be taken to retain trees and soils to assist in rainwater management. No trees with significant root zones or leaf canopy may be removed outside the building envelope, the primary septic field area indicated in materials filed with the local health authority pursuant to the Sewerage System Regulation under the *Public Health Act* and driveway access area. Removal of native overburden must be minimized. In all subdivisions, and all lots must have a minimum 30 cm thick organic soil layer maintained or replaced on surfaces that will be vegetated.

5.12 Where confirmed by the Municipal Official, a portion of the land dedicated for parkland or a portion of existing parkland may be used for surface rainwater management facilities including Professional Engineered wetlands. humanmade subsurface rainwater management facilities will not be constructed under park lands without approval from Municipal Council.

5.13 Approvals for use of parkland for rainwater management must meet the following conditions:

a) Facility designs must be prepared by a person who is trained in the design of biological, hydraulic and aesthetic concerns for Professional Engineered wetlands or surface rainwater facilities in urban environs.

b) Park areas that already have significant trees, other environmental assets or developed park facilities will not likely be considered for rainwater management.

c) All designs must be reviewed and approved by the Municipal Official.

d) Each site must be evaluated to ensure the rainwater facilities are an asset in terms of hydraulic viability, environmental restoration, habitat creation, recreation and educational activities.

e) Rainwater facilities constructed within parkland will be maintained by the Municipality.

f) Rainwater facilities constructed on private sites will be maintained by the affected property owners.

6 STANDARDS FOR SANITARY SEWER SERVICING

General

6.1 All new subdivisions or developments in a sewer service area must be connected to a Municipal sewer collection system, including a sanitary sewage collection and disposal system complete with service connections to service all parcels being created by the subdivision.

6.2 Where a highway exists adjacent to the proposed subdivision but no sewer main has been installed, the main shall be installed along the frontage of the subdivision and connected to the Municipal sewer system.

6.3 Notwithstanding Section 6.1, where the Municipal sewer system is unavailable and the proposed subdivision would create fewer than three new additional parcels, individual onsite sewage disposal systems on each parcel designed and constructed in accordance with the Sewerage System Regulation under the *Public Health Act* are permitted.

6.4 All new subdivisions or developments outside of a sewer service area must be serviced with individual onsite sewage disposal systems on each parcel designed and constructed in accordance with the Sewerage System Regulation under the Public Health Act.

Design

6.5 The designs of a sewer system shall be in accordance with the specifications in Part 2 and the sewer system in the subdivision shall be fully integrated with the systems in adjoining areas.

6.6 Designs and plans shall be approved by the Municipal Official prior to construction.

PART 2: PROFESSIONAL ENGINEERING SPECIFICATIONS

1 GENERAL SPECIFICATIONS

1.1 Professional Engineer

1 All works and services shall be designed and inspected during construction by a Professional Engineer.

2 The Professional Engineer must maintain professional liability insurance to the value of at least $1,000,000 for the term of the Professional Engineer's engagement.

3 The owner/developer will be required to submit a letter confirming that a Professional Engineer / Client Agreement is in force and specifying the level of Professional Engineering services to be provided. The Agreement must be in accordance with any applicable guidelines of Professional Engineers and Geoscientists British Columbia. At a minimum, the Agreement shall provide for the level of Professional Engineering services required in this specification.

4 The Professional Engineer shall be responsible for design, layout, approval of materials, field reviews of installation, communication with the contractor, and preparation of as-constructed record drawings, for all services which are the responsibility of the owner/developer. Approval of the design drawing by the Municipal Official is only to ensure general conformance with this bylaw. The Professional Engineer is solely responsible for the appropriateness of the design in all aspects.

5 Professional Engineering Field Reviews shall consist of general and sufficient inspection to ensure that the works and services are constructed in accordance with this bylaw and approved design drawings. "Sufficient inspection" means a minimum of one site visit per day during construction. The Professional Engineer shall provide copies of inspection reports to the owner/developer and submit copies of inspection reports, when requested, to the Municipal Official.

6 In addition to the Professional Engineer carrying out field reviews, the Municipal Official or delegate may periodically inspect the work for general conformance to the specifications and approved design drawings and may assist in coordinating subdivision construction with any related works to be done by the Municipality. Inspection by the Municipal Official of any aspect of the works or services will not relieve the owner/developer of the responsibility to ensure that the works or services undertaken by their Contractor are in accordance with this bylaw approved design drawings.

7 The Municipal Official may bring to the attention of the Professional Engineer the use of unacceptable materials or practices. If satisfactory remedial action is not taken, the Municipal Official may issue instructions to the Professional Engineer to have the owner/developer's contractor cease construction until remedial action is taken.

8 If the Professional Engineer wishes to make any changes to an approved design, either before or during the execution of the work, they shall first submit a marked print showing proposed revisions to the Municipal Official. If approval is granted for the revision, the original drawing shall be immediately revised by the Professional Engineer, signed by the Municipal Official, and new prints issued. These two operations may be carried out simultaneously.

9 The Professional Engineer and the owner/developer must be aware that Municipal employees must adhere strictly to Workers Compensation Board regulations. If the Municipal Official or other Municipal employees are unable to perform their duties due to working conditions which are unsafe for them, delays in approvals or Municipal work may result.

1.2 Submission, Circulation and Approval of Design Drawings

1 The steps to be undertaken to have design drawings approved generally include:

(a) Preliminary drafting check by the Professional Engineer.

(b) Review of available fire flow within the Municipality by the Municipality's Professional Engineer.

(c) Circulation of drawings within the Municipality.

(d) Revisions as required by the Municipal Official.

(e) Submission of design drawing approval package to the Municipal Official with applicable administration and inspection fees and construction cost estimate.

(f) Submission to other authorities having jurisdiction.

(g) Issuance of design approval.

2 Design drawing numbers shall be obtained from the Municipal Official prior to the circulation submission.

3 Municipal preliminary check sheet shall be completed and submitted with the circulation submission.

4 Circulation submissions shall be six (6) full sets of design drawings.

5 The drawings will be checked by the Municipal Official upon receipt for obvious deficiencies and will be returned to the Professional Engineer if required.

6 The Municipal Official may request a review of drawings by Professional Engineers retained by the Municipality. Costs of this review will be charged to the owner/developer.

7 After circulation within the Municipality, a comment sheet is compiled and a design drawing approval form is prepared, indicating revisions to be done before approval will be considered. These are returned to the Professional Engineer for revisions to the design as required.

8 Among other items, the approval package submitted by the Professional Engineer shall include:

(a) Original design drawings on vellum and digital versions if required by the Municipal Official.

(b) A letter regarding the Professional Engineer/Client Agreement.

(c) The registerable plan of subdivision if early registration has been approved.

(d) Copies of any rights of way or easements required for the works and services.

(e) Any approvals and/or permits from other authorities having jurisdiction such as Island Health in relation to water supply systems and Ministry of Transportation and Infrastructure in relation to access to provincial highways.

(f) Works and services administration and inspection fee under this bylaw.

(g) An estimate of the cost of the works to be done by the owner/developer for calculation of security if early registration has been authorized.

(h) Oversize cost sharing proposal if applicable.

(i) Drainage calculations if applicable.

(j) Fire Underwriters Survey (FUS) fire flow calculations.

(k) Sewage flow calculations.

9 If any trees are to be removed from Municipal property, approval will be required from the Municipal Official before the design approval can be issued.

1.3 Required Approvals and Permits

1 The following are required prior to any construction:

(a) Approval of design drawings

(b) Permit to work on Municipal road allowance or rights of way

(c) Blasting permit

(d) Tree protection or removal permit

(e) Payment for works by Municipal forces

(f) Proof of contractors' insurance naming the Municipality as an additional insured in respect of the construction of the works and services.

1.4 Construction

1 The Professional Engineer shall make arrangements to inspect the site of the work in the company of a Municipal Official, such inspection to occur at least 24 hours prior to start of construction. The Municipal Official will indicate what works they must inspect and what their availability is for inspections.

2 If any work proceeds without Municipal inspection, the Municipal Official may require the works to be exposed for an inspection. Inspection by the Municipal Official of any aspect of the Works will not relieve the owner/developer of the responsibility to ensure that the works and services undertaken by their contractor are in accordance with this bylaw and the approved design drawings.

3 A copy of the approved design drawings and the Professional Engineering Specifications, including the MMCD, shall be maintained by the contractor at the construction site at all times during the installation of all works and services.

4 Underground subdivision services shall not be permitted to operate as part of existing Municipal services until the respective subdivision services have been inspected, tested and approved in writing by the Professional Engineer and reviewed by the Municipal Official. Testing and certification of underground services may be accepted if they are certified and sealed as having been installed as designed by the Professional Engineer.

5 Under normal works programs, the Developer will undertake all extensions and connections to Municipal infrastructure, however in specific circumstances the Municipality may require that all necessary connections or alterations to existing watermains, sanitary sewers, and storm drains be performed by the Municipality at the owner/developer's expense.

1.5 Testing of Works and Services

1 Works and services shall be tested in accordance with the relevant sections of the MMCD. The Municipal Official must be given a minimum 48 hours prior written notice of any testing.

2 If the owner/developer is required to install all the required works and services prior to subdivision registration or building permit issuance, they shall complete or provide the following:

(a) As-constructed record drawings, prepared in accordance with this bylaw, approved by the Municipal Official.

(b) An agreement and security as required by this bylaw.

(c) Payment by cheque or cash for the works to be installed by Municipal forces.

(d) Site grading plan at the discretion of the Municipal Official.

1.6 Municipal Acceptance of Works and Services

1 Acceptance of the works and services by the Municipal Official requires the following:

(a) As-Constructed Record Drawings – As-constructed record drawings prepared and certified by the Professional Engineer may be checked by the Municipal Official for deficiencies, drafting requirements, agreement with the site layout, and adherence to the Professional Engineering Specifications. If the drawings are unacceptable, a correction list may be prepared, and the drawings returned to the Professional Engineer for correction. The Professional Engineer shall submit a final sealed and signed drawing recording the as-constructed information and shall submit a digital AutoCAD file of the same information.

(b) Construction Completion Certificate – When all deficiencies in the works and services have been remedied and as-constructed record drawings have been accepted by the Municipal Official, a construction completion certificate shall be prepared by the Municipal Official. This indicates assumption of responsibility for the works and services by the Municipality.

(c) Deficiencies Agreement and Security – The owner/developer shall enter into an agreement and shall provide security in accordance with this bylaw.

1.7 Final Acceptance

1 The Municipal Official may inspect the works prior to the expiration of the period for which the owner/developer is responsible to correct deficiencies in the works and service and require the owner/developer to remedy deficiencies that have not yet been corrected.

1.8 Oversize Cost-Sharing

1 If works are required by the Municipal Official to be oversized, they shall be oversized at the owner/developer's expense. If the owner/developer wishes to enter into a latecomer agreement with the Municipality in respect of the cost of oversizing, the owner/developer shall have the owner/developer's Professional Engineer certify the cost and provide to the Municipal Official a schedule of benefiting parcels and a proposal for allocating the cost among the benefiting parcels in accordance with their development potential under the Zoning Bylaw and the Official Community Plan.

1.9 Right-of-Way or Easement

1 The owner/developer shall be responsible for the cost of acquiring any off-site rights-of-way required for the provision of works and services to the owner/developer's subdivision or development.

2 The owner/developer shall be responsible for preparing all right-of-way documents for sewer, drainage and water where the Municipality will assume responsibility for operation.

3 Documents for off-site rights-of-way required for a subdivision or development shall be returned to the owner/developer for registration prior to design approval.

4 For rights-of-way within a subdivision, a right-of-way plan and written documents, acceptable to the Land Title and Survey Authority of BC, must be submitted to the Municipality for approval at least two weeks prior to anticipated registration.

5 Private easement documents required for subdivision approval must be prepared by the owner/developer's lawyer and copies submitted to the Municipality along with a lawyer's letter of undertaking to register concurrently with the subdivision plan, at least two weeks prior to anticipated registration of the subdivision.

6 It is the owner/developer’s responsibility to request and to coordinate the preparation of right-of-way documents for power, telecommunications and natural gas.

7 Where a single storm drain, sanitary sewer or water line right-of-way or private easement is required, the minimum acceptable width is 3 m.

8 Where more than one service is installed in a right-of-way or private easement, the width must be increased sufficiently to accommodate the pipe sizes required, together with no less than 1m of clearance between the outside of a pipe and the edge of the right-of-way or private easement. The minimum acceptable width is 4.5 m for a right-of-way accommodating a single Municipal service and 6 m for a right-of-way accommodating two services.

9 Right-of-way documents shall include provision for access by the Municipality across any portion of the lot for maintenance or repair of the sewer, storm drain or water line.

10 Rights-of-way shall be located within a single property (not separated longitudinally by a property line), adjacent and parallel to property boundaries, and shall be clear of proposed building sites.

11 Rights-of-way shall be provided by the owner/developer for the eventual extension of the sanitary sewer and/or storm drain as required by the Municipal Official.

2 DESIGN SPECIFICATIONS

2.1 General

1 The design specifications apply to the design of sanitary sewers, storm drains, waterworks, roadways, and street lighting or any other Municipally owned and or operated utility or structure within the Municipality. They also apply to the location and coordination of other utilities within the Municipality.

2 No departure from the design specifications shall be permitted without the prior issuance of a Development Variance Permit from the Municipality.

3 The Municipality is not responsible for the precision of service information provided to an owner/developer from municipal records. The owner/developer shall confirm underground locations with utility companies and shall verify the locations and elevations of all existing services by actual survey.

2.2 Design Drawings

Electronic Drawing Standard

1 All design drawings shall be created using the most recent version of AutoCAD.

2 Circulation submissions shall be on paper prints. Final design submissions shall be in black ink on paper or mylar (suitable for blueprinting or photocopying), signed and sealed by the Professional Engineer. Sealed design drawings will be returned to the Professional Engineer once they have been approved by the Municipality and sufficient copies have been made.

3 As-constructed record drawings shall be signed and sealed by the Professional Engineer on mylar and separately in digital format.

4 The Municipality will provide digital drawing templates and layer conventions (naming, colours, line types, line widths etc.) on request. The Professional Engineer is to ensure that they use the most recent version of the Municipality's drawing standards and conventions.

Sheet Sizes

5 Standard sheet size is A1 metric size 594mm x 841mm.

Plan/Profile Layouts

6 Plan view shall be in the lower half of the sheet, with a Municipal title block along the bottom edge of the sheet.

7 Profile view shall be 1 x 5 lines to the centimetre and occupy the upper half of the sheet.

8 The use of plan on one sheet and profile on a second sheet is not acceptable.

9 A north arrow, generally orientated towards the top of the sheet, shall be shown on the design drawing.

10 Construction notes shall be confined to a separate "note" column, wherever possible, with numbered references in plan or profile.

11 Specific instruction or fitting details can be shown in plan view in a note box with a leader arrow to the specific item.

Scales

Normal:	Horizontal 1:500	Vertical 1:100 or 1:50
Details:	Horizontal 1:250	Vertical 1:20 or 1:50
Cross Sections:	Horizontal 1:100	Vertical 1:100
Structural Details:	1:20	

Proposed and Existing Services

12 Proposed construction shall be shown as heavy dashed lines. Existing works and services shall be shown as solid lines and shall be screened to 60% or else drawn with very fine lines to create the same effect as screening.

13 Existing watermains, sanitary sewers, and storm drains (including all appurtenances), as well as ditches, swales, rain water management facilities, pavement, curbs, sidewalks, underground wiring, gas, poles, trees, service connections and other underground utilities shall be indicated in plan and profile where applicable.

14 All services shall generally be shown on one plan with roads, sidewalks, sewers, swales, ditches, rainwater management devices, gas, water, and underground wiring and poles identified as MC or NMC, S/W, S, RWM, G, W, and U/G, H or T respectively. Other services shall be clearly designated on the drawing.

15 Dimensioning of drawings shall be given from an existing or proposed iron pin or lot line. Road chainage shall be tied to an iron pin from the start of construction. All proposed works and services shall be fully dimensioned.

16 Connections or alterations to existing watermains, sanitary sewers, drainage channels and storm drains shall be done by the owner/developer’s contractor and a Municipal Official must be present. All such connections shall be indicated on the design drawings with an ellipse(s) and referenced by notes.

Elevations and Vertical Datum

17 Vertical control shall be shown in metric geodetic datum (mean sea level = 0) (NAD 83). Bench mark numbers, locations and elevations can be obtained from the Municipality. The Municipality accepts no responsibility for the accuracy of the information it provides. The reference bench mark and elevation shall be shown on the design drawing. Elevations below 0 m geodetic shall be highlighted.

18 The design drawings shall show:

a) the elevation, to the nearest centimeter, of all survey pins

b) existing basement floors and,

c) where the building site is less than 1 m above the road level, any proposed basement floor elevation.

19 If a parcel is proposed to be filled, the drawings shall show existing ground elevations at corners of the allowable building envelope or show a centre of parcel profile, to indicate the extent of fill required. The placement of fill must be done under the direct supervision of a Professional Engineer and the owner/developer shall supply a signed and sealed report from the Professional Engineer attesting to the suitability of the placed fill for building.

Subdivision Key Plan

20 A key plan shall be included on the design drawings for subdivisions or if the location of the works cannot be easily deduced from the detailed design plans.

21 A key plan, when required, shall be on the right side of the design drawing and shall include the following information:

a) Plan of adjacent roads and existing lots with road names and legal descriptions of adjacent parcels given;

b) Civic address with the property being subdivided shown shaded;

c) North arrow;

d) The location of existing and proposed hydrants;

e) Contours at minimum 2m intervals;

f) Title "Proposed Subdivision of (give the full legal description)";

g) If the subdivision is to be developed in stages, each proposed stage shall be clearly outlined, and order of development indicated.

22 If a key plan is not required, the house number of existing houses shall be shown on the detailed design plan.

Rights-of-Ways and Easements

23 All existing statutory rights-of-way or easements and their permitted uses must be checked through the Land Title and Survey Authority of BC and shall be shown lightly shaded on the design drawing. Registration numbers shall be shown.

24 All proposed rights-of-way for new services are to be shown as a dashed line. These shall be tied to the iron pin in each lot, together with their width, permitted use, and the note "acquire" or "proposed".

Building Envelopes

25 The potential building envelope of each parcel is to be indicated by shading.

Roads and Parking Areas

26 Show all iron pins adjacent to the works and the existing ground elevation at each pin or proposed pin.

27 Both plan and profile shall be tied to an iron pin, preferably near or at 0+00 chainage. If the chainage exceeds 120 m, a second tie shall be shown.

28 Show the road width, curb and sidewalk offsets measured from the property line.

29 Show actual location and dimensions of sidewalk drops, on a detail plan at 1:250 if required for clarity.

30 Road profiles shall show gutter elevations except where there are no curbs, in which case the profile shall show centreline elevations. On super-elevated curves, the road profiles shall show gutter elevations for both sides.

31 Gutter elevations of cul-de-sacs shall be shown on a detail plan at 1:250, at all BC's and EC's and at intervals of no more than 5 m along the gutter line. A profile along the gutter line shall be shown if any grade across a turnaround exceeds 4%.

32 A cross sectional view of road construction shall be included when circumstances require special consideration. In all cases the standard drawing section shall be referenced on the drawing.

33 The profile shall be shown at true centreline length and provided in as close relationship as possible to the plan.

34 Locate catch basins by chainage to the centre.

35 Existing and proposed critical driveway locations within the subdivision shall be shown, as well as a profile of each of those driveways from the road centreline to the end of the driveway within the property.

36 Locate barricades.

37 Chainage of the BC and EC of horizontal curves shall be shown together with the internal angle, tangent length, arc and centreline radius. Curb return radii shall be shown.

38 The percent grade to two decimal places shall be shown on the profile together with the following information on vertical curves:

(a) The chainage and elevations of BVC, EVC, and VPI;

(b) The external value, ‘e’;

(c) The ‘K’ value;

(d) The length of the vertical curve;

(e) The elevation and chainage of low points for sag curves.

Sewers, Drains and Rainwater Management

39 The following information shall be shown on the profile:

(a) For sewers, size, type, class of pipe, class of bedding:

(b) For drainage, the type and location of rain water management systems.

(c) Percent grades to two decimal places and the size of the rain detention facility.

(d) Invert elevations at both inlet and outlet of manholes or detention facilities.

(e) Details of vertical and horizontal curves.

(f) Existing utilities.

(g) Manhole rim elevations.

40 The following information shall be shown on the plan:

(a) Details of horizontal curves and swale locations.

(b) Minimum floor elevations.

(c) Pipe and swale or detention facility offsets from property line.

(d) For sewers, chainage from the downstream manhole of service connections. Offset to the nearest property corner of the end of the service connection.

(e) The grade of service connections or swales from the upper end to the drop to the main, if other than two percent.

(f) Catch basins and other appurtenances.

41 The following additional information shall also be shown on the appropriate part of the drawing:

(a) Letter sanitary sewer manholes and cleanouts;

(b) Number storm drain manholes, cleanouts and silt traps;

(c) Structural detail of all manholes not covered by Supplementary Standard Detail Drawings or MMCD.

Water

42 Drawings shall indicate whether a watermain passes over or under other underground services which it is crossing.

43 The following information shall be shown on the profile:

(a) The size, type and class of pipe, and class of bedding.

(b) For all watermains, profile grades to 2 decimal places.

44 The following information shall be shown on the plan:

(a) The offset of the main centreline from the property line.

(b) The proposed elevation of the flange of hydrants.

(c) Extent of work required in making the connection to the existing watermain.

(d) Flushouts, air valves and valve clusters.

Third-Party Utilities

45 Design details or as-constructed record drawing information for utilities such as hydro, telephone, cable, telecommunications and gas shall be obtained from the appropriate utility company. A copy of the utility company's design drawings must be submitted to the Municipality with the design circulation package.

46 The following information shall be shown on the utility design drawings:

(a) Existing utilities.

(b) Utility offset from property line and/or iron pin.

(c) Lot connections and other appurtenances.

(d) Proposed poles shall be dimensioned from the pole's road face to property line and/or pin.

(e) Indicate how utility vaults will drain to the storm drain system and who will install the drain connection.

47 Underground hydro, telephone, cable, telecommunications and gas services shall be shown schematically on the owner/developer's design drawings.

2.3 As-Constructed Record Drawings

Submission Sets

1 Within four weeks of final inspection of all services installed by the owner/developer, the Professional Engineer shall deliver "as-constructed" record drawings to the Municipality. These drawings shall include the following statement signed, sealed and dated by the Professional Engineer:

"I certify that the following services (name them) were inspected during construction and to the best of my knowledge, were installed in accordance with the Professional Engineering Specifications and as shown on this drawing."

2 The first submission of as-constructed record drawings shall consist of one paper print of the approved design drawing with changes or corrections highlighted in colour.

3 After approval of the paper print submission, a digital copy of the original design drawing, revised as required to show services as-constructed, shall be submitted.

Colours

4 The as-constructed drawings shall clearly show the location of all services as installed, using offsets from survey pins. The extent shall be shown by inking the constructed service in the appropriate colour. The locations will be shown either by check-marking any original dimension on the drawing (if they are correct) or by showing the revised dimension beside the original dimension. In addition, the location to the end of underground pipe shall be shown.

Service or Utility	**Colour**
Sanitary sewer	red
Storm swales and culverts	green
Drains	green
Water	dark blue
Gas	brown
Curb, sidewalk and road	orange
Lighting	pale blue
Underground - Power	purple
Telephone	purple
Cablevision	purple

Tolerances

5 All horizontal dimensions shall be to the nearest 150 mm. All vertical elevations shall be to the nearest 3 mm, except that ground elevations and service connection inverts at property line shall be to the nearest 30 mm.

6 Road horizontal locations shall be to the nearest 30 mm.

7 Road vertical locations shall be to the nearest 15 mm.

Roads, Curb and Sidewalk

8 Locate the end of curbs, sidewalks and pavement.

Sewers, Rainwater Management Facilities and Drains

9 Show the location and extent of rock cuts and hardpan requiring blasting.

10 Show the invert elevation at both inlet and outlet of manholes.

11 Tie locations of manholes, cleanouts and other appurtenances to a minimum of two iron pins.

12 Locate catch basin leads at the main by measurement from the centre of the downstream manhole.

13 Locate service connections at property line showing distance from the nearest survey pin and at the main by chainage from the centre of the downstream manhole.

14 Show ground and invert elevations of sewer and drain service connections at the property line or edge of right-of-way.

15 Video records to current standards are required for sewer and drain lines.

Water

16 Show domestic water services and tie them to lot corner survey pins.

17 Show the location and extent of rock cuts and hardpan requiring blasting.

18 Show the profile of the main, indicating the invert elevations at 15 metre stations.

19 Tie the locations of fire hydrants to a main valve and to survey pins.

20 Locate all valves and tie to a minimum of two property pins.

Third-Party Utilities

21 Show the location and dimensions of service connections and all surface appurtenances, tied to property pins.

Street Lighting and Traffic Control

22 Show the location of luminaires, tied to property pins.

23 Show the location of conduits, using a line diagram.

24 Show connection points to B.C. Hydro and photo electric controllers.

25 Service cards are required for each lot created.

2.4 Sewer

General Principles

1 The Municipality requires that all residential parcels be serviced by either an on-site sewage treatment and disposal system designed and constructed in accordance with the Sewerage System Regulation under the *Public Health Act* or, where a Municipal sewer system exists, it be designed in accordance with industry standards and this bylaw to minimize or eliminate inflow and infiltration, minimize long term trench settlement, prohibit trench water from causing erosion, ensure mains are sized for future extension by the Municipality, and proper transitions are incorporated to minimize turbulence and odour.

Materials

2 The class and type of pipe and fittings, together with required class of bedding and trench widths, shall be selected such that the pipe will support the anticipated loads with a reasonable margin of safety. The Professional Engineer shall submit design calculations to the Municipal Official for review if requested.

3 Pipe product specifications and standards shall be as per the MMCD and the Supplementary Specifications.

4 Sewers may be smooth profile polyvinyl chloride (PVC) or concrete. High density polyethelene (HDPE) may be used if approved by the Municipal Official.

5 Concrete pipe design shall include detailed consideration of resistance to hydrogen sulphide induced corrosion.

Quantities

6 The quantity of sewage to be carried in a proposed sanitary sewer shall be determined by the Professional Engineer, having regard for the type and extent of existing and ultimate development within the total area to be served.

7 The design flow for pipe size selection shall be the average flow due to population, times a peaking factor, plus an allowance for groundwater infiltration.

8 Flows Due to Population – Average daily sewage flows for residential land uses shall be based upon 270 L per capita per day based on the use of low water consumption devices.

9 Population per dwelling unit shall be as follows:

Type of Residential Use	Population per unit
Single family and two family	2.5
All other residential uses	2.3

10 Average daily sewage flows for other land uses shall be as per Volume III of the Standard Practice Manual published by the B.C Onsite Sewage System Association. Flows from all sources shall be converted to population equivalents at the residential rate when determining the peaking factor below.

11 The peaking factor shall be calculated according to the Harmon formula.

12 The minimum allowance for ground water infiltration shall be 0.13 L/second/hectare (approx 1,000 Igal/day/acre).

Minimum Sizes

13 Sewer mains shall not be less than 200mm in diameter except that sewers in the upper 360m (total amount of upstream pipe) of a non-extendable system with a grade exceeding 2% may be 150mm in diameter.

14 Residential service connections shall not be less than 100mm in diameter. All other service connections to be 150mm in diameter.

Friction Factors

15 Pipe capacity shall be determined by the Manning Formula using the following roughness coefficients (n):

Concrete pipe 0.013

PVC pipe 0.011

Minimum Velocities and Grades

16 The minimum grade of sewers shall be that which produces a minimum velocity of 0.61 m per second except for the upstream portion of a residential sewer serving a design population of 25 or less, in which case the minimum grade shall be 0.6%.

17 The minimum grade of sewers above the last manhole of a non-extendable system shall be that which produces a minimum velocity of 0.90 m per second in the pipe or 0.6%, whichever is greater.

18 The minimum grade of service connections shall be 2.0%.

Vertical/Horizontal Curves

19 Pipes shall be designed for straight alignment and constant grade between manholes. The Municipal Official may approve a curved alignment if the Professional Engineer can satisfactorily demonstrate why it is necessary.

20 If a curved alignment is approved by the Municipal Official:

a) The radius of a horizontal curve shall be not less than 60 m, or that radius recommended by the pipe manufacturer, whichever is the greater.

b) A vertical curve must be designed so that the pipe deflection does not exceed the manufacturer's specifications.

c) Only one curve, either horizontal or vertical, will be permitted between manholes without approval of the Municipal Official.

Minimum Cover

21 Minimum cover for PVC pipe shall be 1 m.

22 Minimum cover for Concrete pipe shall be 1 m.

23 For installation under areas used for vehicular traffic, minimum cover shall be 1.5m.

Separation from Other Services

24 The minimum horizontal clearance between a sewer and other utilities or open ditches shall be no less than 1m, except as noted below.

25 Storm drains and sanitary sewers may be installed in the same trench, in which case they shall have a minimum horizontal clearance between the outsides of the pipes of 150 mm.

26 For separation to watermains, refer to Section 3.6.10.1 Separation to Other Services.

27 Sewers shall not be located within 1m of any utility pole.

28 Where it is necessary for a sewer to cross other underground services, the crossing shall be made at an angle greater than 20 degrees and the vertical clearance between the sewer and the service at the crossing point shall be not less than 150mm.

Manholes

29 Location Criteria – Manholes shall be provided at the following locations:

a) at all changes of grade and/or alignment, except on approved curves,

b) at all changes of pipe size,

c) at all pipe junctions other than normal service connections,

d) where a service connection is the same size as the main.

30 Spacing – The maximum distance between sewer manholes shall be as shown in the table below:

Pipe Diameter	**Maximum spacing**
200mm up to and including 375mm	120 m
400mm up to and including 1200mm	180 m
Over 1200mm	300

31 Design – Manholes for sewers up to 400mm in diameter shall be as per MMCD. Manholes for sewers of 400mm diameter or larger shall be individually designed by the Professional Engineer. The design shall include details of the reinforcing and benching. Manholes on lines that can be extended in the future, or providing connections to a main for future extensions, shall include securely capped stubs outside the manhole. For manholes less than 2 m deep, the stub shall be at least 1 m long. For manholes 2 m deep or more, the stub shall be at least 3 m long. If the stub is in rock, the trench shall be over blasted for 2 m beyond the stub end. Or as required as to prevent future disruption or damage of the surrounding utilities or roadways. Manholes shall include lids with bolts to prevent infiltration.

32 Hydraulic Considerations – Manholes shall include the following minimum drop in elevation from the inlet(s) to the outlet:

Horizontal Deflection Angle	**Drop (mm)**
0 - 45 degrees	25
Greater than 45 degrees	50

33 Hydraulic Considerations – Manholes shall include the following minimum drop in elevation from the inlet(s) to the outlet:

a) An outlet pipe larger than the inlet pipe(s) shall be designed such that the obvert of the outlet pipe is at the same elevation as the obvert of the lowest inlet pipe.

b) When a pipe leaving a manhole is designed at a flatter grade than a pipe entering the manhole, the Professional Engineer shall provide design details demonstrating how turbulence will be minimized.

c) Manholes shall be designed with no drop structure. The Municipal Official may approve a drop manhole for elevation changes to a maximum drop in invert elevation(s) of 600mm or greater than 600mm if the Professional Engineer can satisfactorily demonstrate why it is necessary. If a drop manhole is approved, allowance shall be made in the design for the effect of the resulting turbulence on the hydraulic capacity of the system and for the prevention of the generation of hydrogen sulphide.

d) Only in special circumstances will the construction of a force main and lift stations be considered acceptable to the Municipal Official. The construction of lift stations and force mains will be avoided and only considered as a last resort.

Service Connections (White PVC)

34 Service connections shall be installed to each proposed lot or to each duplex unit in a development, shall be connected to the main, and where lots are serviced with a piped drainage system shall be installed in a common trench with a storm drain service connection. Sewer lot service pipes are to be white PVC.

35 Service connections shall be installed at right angles to the main, within the boundaries of the lot being served, except in the turning area of a cul-de-sac.

36 Inspection chambers shall be installed on all sewer services up to and including 200mm in size as per MMCD S7, with the plug and post painted red. A larger service shall have a manhole installed at the property line.

37 Service connections to a main installed in a right-of-way shall be extended to the edge of the right-of-way.

38 On a panhandle lot, where a service connection is to be located in the access strip, the service connection shall be extended from the front property line, along the access strip, to the main body of the lot, at the time of subdivision development

Future Developments

39 Where sewers can be extended to accommodate future development upstream, the mains shall be extended to the limits of the subdivision as specified herein.

40 All new sewer line installations require a video inspection.

2.5 Rainwater Management

Guiding Principles

1 The Municipality requires that Low Impact Development (LID) techniques be incorporated in all developments and that the Developer provide drainage structures that will:

a) reduce the rate of post development site runoff to predevelopment levels of a 10-year rain fall event

b) ensure a “zero net increase” in runoff

c) improve the quality of site drainage water

d) reduce erosion and sediments

e) address downstream impacts of peak rain runoffs created by the development.

2 The Municipality is open to consideration of site-specific drainage solutions brought forward by the Owner/developer, designed by the Professional Engineer.

3 Rainwater shall be managed using surface structures as much as possible. Natural wetland areas, swamps and ponds shall be incorporated into LID designs.

4 The Municipal Official may at his/her discretion request a peer review of the Professional Engineers design to ensure it is in keeping with current Low Impact Development techniques.

5 Perimeter drains may be gravity to daylight or pump to surface.

Rainwater Management and Erosion Control

6 The components of rain water management that shall be incorporated in the development depend on the type of the receiving watershed. These shall include: rain water storage, constructed wet lands, natural wet lands, sediment basins with inlet protection, oil/grit separators, grass swales, silt fencing and inlet protection. Direct ocean discharges will be individually addressed.

7 Conceptual design information for rain water management methods is illustrated in Supplementary Standard Detail Drawings DES12 to DES16. Detail design shall conform to good Professional Engineering practice. Proponents may use other techniques provided they can be shown to have similar efficiencies. Any alternative systems must receive written approval from the Municipal Official prior to design submission.

8 Any rain water management facility proposed to be located on public park land shall conform to this bylaw.

9 Rain water storage may be combined with a constructed wetland or provided in a separate detention facility such as a pond or underground chamber. The live storage volume for the “minor” event (approximately 2 years) shall be 200m³/ha of impervious surface area of the completed development, regardless of existing condition. Impervious area includes roofs, driveways, roadways and other hard surfaced areas. The corresponding maximum site release rate shall be 5 L/s per ha of total contributory catchment.

10 The detention facility shall have normal overflow capability for the peak 10-year design flow and an emergency overflow capability for the 200-year peak design flow that is routed in a way that does not threaten downstream property with erosion or flooding.

11 Rain water storage volumes may be reduced if used in combination with an infiltration system designed in accordance with good Professional Engineering practice. The reduction in the storage requirement shall be proportional to the percentage of peak minor event post development discharge that is infiltrated to ground. Rain water storage may be eliminated if peak minor event post development discharge downstream from an infiltration system does not exceed 5 L/s per ha of contributory catchment. Infiltration systems shall incorporate appropriate pretreatment systems to prevent clogging of the soils with fine materials.

12 If downstream drainage facilities do not have capacity to accommodate the calculated post development 10-year peak flow rate, then the onsite detention facility shall also be designed to control the 10-year flow to its predevelopment level for the site.

13 Rainwater quality improvements for developments shall preferably be achieved with a constructed wetland. For developments of 10 lots or less, a “treatment train” approach using oil/grit separators followed by a grassed swale is acceptable. Proprietary treatment train or multi-chamber methodologies may also be used if similar efficiencies in pollutant removal can be certified.

14 Treatment facilities shall be designed on the basis of the post development peak “6-month” storm, which is deemed to be 60% of the 2-year peak flow. Constructed wetlands and grassed swales shall provide water surface areas equivalent to 1% of the contributory catchment area. This surface area shall be calculated as the extent of ponding caused in the wetland or swale by a 6-month rain event.

15 Hydraulic overflow capacities for constructed wetlands shall be the same as for detention facilities, as outlined in a previous section of this specification.

16 Constructed wetlands shall be designed with input from a professional who specializes in wetland designs. Proof of input by the professional shall be provided in writing to the Municipal Official.

17 Oil/grit separator chambers may be proprietary or non-proprietary. Chambers are to be designed to remove approximately 90% of the sediment particles larger than 100 microns. The Professional Engineer shall supply sufficient information to satisfy the Municipal Official that the removal efficiency can be achieved.

18 Temporary sediment basins shall have surface areas equivalent to 1% of the contributory development area. All runoff shall be directed to a sediment basin except where it is impractical to construct a sediment basin due to the very small catchments involved. In this case silt fencing shall be installed to intercept all overland runoff before it leaves the development site.

19 Temporary storm drain inlet protection shall consist of geotextile fabrics and gravel filters placed over catch basins and other inlets to prevent inflow of sediments.

20 The Owner/developer shall arrange for the removal of sediment from the basin when the available storage volume has been reduced to two-thirds of the original volume.

21 Temporary sediment control shall remain in place until the development area is 90% built out and landscaping is established and stabilized. Sediment basins may be converted to constructed wetlands at this time.

22 Storm water management systems will normally be constructed on private property or on non-roadway lands dedicated to the Municipality. Facilities will only be permitted on park lands where significant enhancement is achieved and where approval is received from the Municipal Official at project initiation.

23 Where underground systems are used and proposed to be located on Municipal or private lands, rights-of-way for the purpose of maintenance and access for heavy equipment must be provided, including constructed gravel roadways. Minimum access right-of-way widths are 3.7m and maximum road grades shall be 15%.

24 Maintenance schedules and proof of maintenance shall be provided for all private systems annually. For new systems, a maintenance security sufficient to pay the cost of three years of service must be provided to the Municipality. After three years of adequate maintenance, the maintenance security shall be returned to the Owner.

25 Where the rain water management facilities are constructed under Municipal roadways, said facilities must be cleaned, inspected and certified acceptable by the Owner/developer prior to the Municipal Official accepting the entire project. This is normally at the expiration of the one-year maintenance period.

Approved Storm Drain (Piped Systems)

26 Enclosed systems proposed by the Owner/developer's Professional Engineer and approved by the Municipal Official must show the class and type of pipe and fittings, together with required class of bedding and trench widths as set out in the MMCD documents. The Professional Engineer shall submit design calculations to the Municipal Official for review if requested.

27 Video Camera inspection is required prior to paving and again one month prior to expiry of deficiency period.

28 Pipe product specifications and standards shall be as per the MMCD and the Supplementary Specifications.

29 Storm drain mains may be polyvinyl chloride (PVC-either smooth profile or ribbed profile), HPPE (High Density Poly Ethylene) in special applications when other types listed are not suitable, ductile iron, or concrete.

30 Storm drain services may be green smooth profile polyvinyl chloride (PVC) or approved alternative.

31 Catch basin leads may be smooth profile polyvinyl chloride (PVC) or approved alternative.

32 Culverts may be concrete or galvanized corrugated steel pipe or approved alternative for shallow culverts.

Flow Calculations

33 The recurrence interval used in designing storm drains up to and including 900mm shall be fifteen (15) years. Drains greater than 900mm shall be designed to 50 years.

34 Flow rates shall be calculated using the Rational Method.

35 Calculations shall be submitted as per Standard Municipal Drawing DES 11 and shall be accompanied by a topographic plan of the drainage basin(s) at 1:2500 maximum. The proposed pipe network shall be included on the plan.

36 Future land use, as detailed in the Community Plan, shall be incorporated in the flow calculations.

37 The intensity-duration curve shall be as per Standard Municipal Drawing DES 10.

38 The following minimum values shall be used for the inlet time to the upstream end of non- extendable storm drain lines and for the coefficient of runoff (C);

Land Use	Inlet Time (min)	Min. Coeff (c)
Unimproved areas, parks, playgrounds, cemeteries, etc.	Calc'd individually	0.35
Residential areas - low density, single family dwelling neighbourhoods	10	0.6
High density and largely impervious areas	5	0.9

* Composite values based on percentages of different types of contributory areas may be established from the figures above.

39 Comprehensive calculations shall be submitted for any rainwater management facilities, including such things as design flows, storage volumes, release rates, orifice sizing, etc.

Pipe Capacity

40 Storm drain mains shall be a minimum 200mm diameter.

41 Catch basin leads shall be a minimum 150mm diameter.

42 Drain service connections for single family dwellings shall be 100mm diameter.

43 Connections for other than single family dwellings shall be sized in accordance with the *BC Building Code*.

44 Driveway culverts shall be a minimum 300mm diameter and a minimum 6.0 m in length or determined by the Municipal Official.

45 Pipe capacity shall be determined by the Manning Formula using the following roughness coefficients (n):

PVC pipe	0.011
Concrete pipe	0.013
Ductile iron	0.013
CSP pipe	0.025

Min/Max Velocities

46 The minimum grade of storm drains shall be that which produces a minimum velocity of 0.61 m per second in the pipe.

47 The minimum grade of service connections shall be 2.0%.

Vertical/Horizontal Curves

48 Pipes shall be designed for straight alignment and constant grade between manholes. The Municipal Official may approve a curved alignment if the Professional Engineer can satisfactorily demonstrate why it is necessary.

49 If a curved alignment is approved by the Municipal Official, the radius of a horizontal curve shall be not less than 60m, or that radius recommended by the pipe manufacturer, whichever is the greater. A vertical curve shall not be less than 30 m in length. The curve must be designed so that the pipe deflection does not exceed the manufacturer's specifications. Only one curve, either horizontal or vertical, will be permitted between manholes.

Minimum Cover

50 Minimum cover for PVC pipe shall be 1 m.

51 Minimum cover for concrete or ductile iron pipe shall be 1 m.

52 For installation under areas used for vehicular traffic, minimum cover shall be 1.5 m, except for catch basin leads.

Separation from Other Services

53 The minimum horizontal clearance between a storm drain and other utilities or open ditches shall be no less than 1 m, except as noted below.

54 Storm drains and sanitary sewers may be installed in the same trench, in which case they shall have a minimum horizontal clearance between the outsides of the pipes of 150mm.

55 Storm drains shall not be located within 1 m of any utility pole.

56 Where it is necessary for a storm drain to cross other underground services, the crossing shall be made at an angle greater than 20 degrees and the vertical clearance between services at the crossing point shall be not less than 150mm.

Manholes

57 Manholes shall be provided at the following locations:

a) at all changes of grade and/or alignment, except on approved curves,

b) at all changes of pipe size,

c) at all pipe junctions other than normal service connections.

d) where a service connection is the same size as the main, and

e) at the upstream end of all storm drains.

58 The maximum distance between manholes shall be as shown in the table below:

Pipe Diameter	**Maximum spacing**
200mm up to and including 375mm	120 m
400mm up to and including 1200mm	180 m
Over 1200mm	300 m

59 Manholes for storm drains up to 400mm in diameter shall be as per MMCD Standards. Sump manholes are not approved by the Municipality.

60 Manholes for storm drains of 400mm diameter or larger shall be individually designed by the Professional Engineer. The design shall include details of the reinforcing and benching if the manhole base is to be cast-in-place. For a precast base, the Professional Engineer shall supply a signed and sealed shop drawing from the manufacturer for review.

61 Manholes on lines that can be extended in the future, or providing connections to a main for future extensions, shall include securely capped stubs outside the manhole. For manholes less than 2 m deep, the stub shall be at least 1 m long. For manholes 2 m deep or more, the stub shall be at least 3 m long. If the stub is in rock, the trench shall be over blasted for2 m beyond the stub end or as to prevent future damage to other utilities and roadways.

62 Manholes shall include the following minimum drop in elevation from the inlet(s) to the outlet:

Horizontal Deflection Angle	**Drop (mm)**
0 - 45 degrees	25
Greater than 45 degrees	50

63 An outlet pipe larger than the inlet pipe(s) shall be designed such that the obvert of the outlet pipe is at the same elevation as the obvert of the lowest inlet pipe, or with the minimum drop noted previously, whichever provides the greater drop.

64 When a pipe leaving a manhole is designed at a flatter grade than a pipe entering the manhole, the Professional Engineer shall provide design details demonstrating how turbulence will be minimized.

65 Manholes shall be designed with no drop structure. If a drop structure is unavoidable, approval in writing must be obtained from the Municipal Official. The maximum drop in invert elevation(s) is 600mm. The Municipal Official may approve a drop manhole for elevation changes greater than 600mm if the Professional Engineer can satisfactorily demonstrate why it is necessary. If a drop manhole is approved, allowance shall be made in the design for the effect of the resulting turbulence on the system hydraulic capacity or erosion of the system components.

Silt Traps

66 Silt traps shall be located at the entrance to an enclosed storm drain system from an open ditch, a landscaped area, or a French drain.

Service Connections (Green PVC)

67 Service connections shall be installed to each proposed lot or to each duplex unit in a development, shall be connected to the main, and where feasible shall be installed in a common trench with a sanitary sewer service connection. The Owner/developer may apply to the Municipal Official for approval of alternative methods of dealing with stormwater.

68 Service connections shall be installed at right angles to the main, within the boundaries of the lot being served, except in the turning area of a cul-de-sac.

69 Inspection chambers shall be installed on all sewer services up to and including 200mm in size as per MMCD S7, with the plug and post painted green. A larger service shall have a manhole installed at the property line.

70 Service connections to a main installed in a right-of-way shall be extended to the edge of the right-of-way.

71 On a panhandle lot, where a service connection is to be located in the access strip, the service connection shall be extended from the front property line, along the access strip, to the main body of the lot, at the time of subdivision development.

Catch Basins

72 Each catch basin shall be connected to a storm drain by an individual lead.

73 Details of construction and spacing of catch basins are provided in MMCD S11 Catch Basins. Side inlet catch basins shall be an approved design.

Driveway Culverts

74 Driveway culverts shall have end walls as necessary, of concrete, mortared concrete block or mortared rock. Concrete filled sandbags are not acceptable.

Interception of Overland Flow and/or Seepage

Interception of Overland and/or Seepage

75 Wherever possible, surface water is to be kept on the surface and directed through swales or ditches on Municipal and/or private lands. Where it is not possible to maintain surface flows the Professional Engineer shall incorporate works as necessary to intercept the flows or seepage, such as French drains, diversion ditches, silt traps, etc., all connected to the storm drain system in a manner acceptable to the Municipal Official.

Discharges from Service Stations and Restaurants

Discharges from Service Stations and Restaurants

76 In addition to any other rain water management device required by this specification, discharges from service stations and or restaurants shall be intercepted by combination silt trap/grease interceptors. In the specific case of Service Stations an Oil/Water Separators will be required.

Lot Drainage

77 All lots are to be developed such that residential house roof drains are directed onto the surface as overland flow. Lot grading shall ensure flows from roof leaders do not result in flooding of adjacent properties.

78 Residential perimeter drains are to discharge to gravity where possible. Where gravity service is not possible, pumped systems may be installed but pumped water must discharge to the lot surface.

79 Water leaving residential lots must be directed and controlled to prevent flooding of downstream properties.

2.6 Waterworks

General Principles

1 All designs for extensions of the Municipal water system shall be reviewed and approved by a drinking water officer in accordance with the *Drinking Water Protection Regulations* under the *Drinking Water Protection Act.*

Materials

2 The class and type of pipe and fittings, together with required class of bedding and trench widths, shall be selected such that the pipe will support the anticipated loads and pressures with a reasonable margin of safety. The Professional Engineer shall submit design calculations to the Municipal Official for review if requested.

3 Pipe product specifications and standards shall be as per the MMCD and the Supplementary Specifications.

4 All pipe and fittings shall conform to the specifications for a working pressure of 1035 kPa (150psi). Where working pressure exceeds 1035 kPa, materials shall be subject to special design.

5 Watermains may be polyvinyl chloride (PVC) minimum class 150 DR 18 or ductile iron with a rating of 150 psi or greater.

6 When a watermain is located in a right-of-way on private property, it shall be ductile iron pipe.

7 Ductile iron pipe and fittings shall have a cement mortar lining.

8 All fittings and appurtenances shall have standard hub ends. Flanges may be approved upon application.

9 19mm and 25mm water service tubing shall be polyethylene.

10 39mm and 50mm water service tubing shall be type K soft copper tubing or approved alternative.

Minimum Residual Pressures

11 Watermains shall not be extended unless the residual pressure will be greater than 275 kPa (40 psi) during peak daily demand. A watermain shall be capable of delivering a minimum dynamic pressure at the highest building (top floor) of not less than 240 kPa.

Minimum Fire Flows

12 Fire flow demand shall be in accordance with the current "Water Supply for Public Fire Protection", by Fire Underwriters Survey, for the existing or anticipated land use. Residual pressure at this flow rate plus the average daily demand shall not be less than 138 kPa (20 psi).

Network Requirements

13 Where a final road pattern of a subdivision creates a weak watermain network, a supplementary connection of a minimum of 150 mm diameter shall be required to an existing main and may necessitate the provision of a Right-of-Way over private property in favour of the Municipality.

Pipe Capacity

14 Watermains shall be a minimum of 200mm diameter.

15 In a cul-de-sac with ultimate length not over 90 meters, the watermain size may be reduced to 150mm diameter. Smaller diameter pipes will be considered by the Municipal Official as deemed necessary.

16 Water services for single family residential or duplex shall be minimum 19mm. The size may be increased at the direction of the Municipal Official to 25mm to reduce potential head losses through the service.

17 Flow calculations should be done using the Hazen-Williams formula, using the following roughness coefficients:

PVC pipe C = 150

Ductile Iron pipe C = 130

Maximum Head Loss

18 Watermains shall be sized such that under maximum day flows, the head loss is not more than 5 m per 1000 m.

Locations

19 Watermains shall extend at least 1.25 m beyond the pavement for extendible roads but shall terminate 1.25 m inside the curb line of the extreme end of a permanent cul-de-sac.

Minimum Cover

20 All watermains and services shall have a minimum cover of 1 m.

21 All watermains 200 mm diameter and larger shall be installed to a designed grade.

22 All watermains within vehicular traffic areas shall have a minimum cover of 1.5 m.

Separation to Other Services

23 At any location there shall be a minimum horizontal clearance of 3 m between a watermain and a sanitary sewer or storm drain. The Professional Engineer shall first obtain approval of the Regional Public Health Professional Engineer if an alternative is to be proposed.

24 At any location there shall be a minimum horizontal clearance of 1m between a watermain and any other existing or proposed underground services or open ditches.

25 Watermains shall not be located within 1 m of any utility pole.

26 Where it is necessary for a watermain to cross other underground services the crossing shall be made at an angle greater than 20˚. The vertical clearance between sanitary sewers or storm drains and the watermain at the crossing point shall be not less than 450mm; special pipe support encasement may be required. For all other services, the vertical clearance shall be not less than 150mm.

Replacement of A.C. Pipe at Crossings of Other Services

27 When another service (e.g., sewer or drain) is installed such that it crosses below an existing asbestos cement (AC) watermain, the existing watermain material shall be replaced with ductile iron pipe for a distance of at least 2 m beyond each edge of the trench of the service crossing the watermain.

28 The watermain replacement work shall be done by the Municipality at the owner/developer's expense, and this shall be indicated on the Design Drawings.

Thrust Blocks, Joint Restraints

29 Thrust blocks and/or joint restraint fittings shall be specified at all tees, bends, and caps.

Vertical/Horizontal Curves

30 Watermain pipe may be deflected at each joint in accordance with the manufacturer's recommendations. PVC pipe is not to be bent.

Valves

31 Valves shall be as per MMCD W3.

32 Valves shall be located so as to direct the flow of water to the required areas and to minimize the portion of the distribution system affected by a single water main break or shut down.

33 There shall be three valves at a "tee" (other than for hydrants) and four valves at a "cross". Valves shall be attached directly to fittings on the downstream sides and shall be of the same diameter as the fittings.

34 Line valves shall be not more than 150m apart. For convenience of operations, line valves should be located adjacent to a hydrant tee if there are no connecting mains within 120 meters. Valves, where possible, will be spaced so that a maximum of one fire hydrant is isolated during a watermain break.

35 Line valves or hydrant valves shall not be located closer than 600mm to a curb line, in a ditch invert, above another service, or placed in the wheel path of traffic.

36 On service connections greater than 25mm, a valve shall be placed on the connection adjacent to the main.

37 Valve boxes not within the paved portion of the road shall have a paved apron around the valve box.

Hydrants

38 Hydrants shall be Mueller, AVK or authorized equal.

39 Hydrants shall be located in the boulevard and should preferably be located at or near a road intersection; otherwise they may be located on the projection of the property line dividing two lots. In selecting the location for a hydrant, the probable route of the fire engine shall be considered.

40 A hydrant shall not be located within 3 m of a utility pole or light standard, within 1 m horizontally of underground service pipes or open ditches, or within 2.2 m of the curb line.

41 Hydrants shall be located so that every home is within 120 m but with due regard to the location of existing hydrants. Whenever practical, hydrants shall be near the highest and/or lowest point of the watermain.

42 Additional hydrants may be required at school, apartment, commercial, or other high value properties. Fire hydrant coverage shall be in accordance with the current "Water Supply for Public Fire Protection", by Fire Underwriters Survey.

43 The design drawings shall indicate the final elevation to which the hydrant flange is to be set. Any adjustments required after the system is in service will be made at the Owner/developer's expense.

44 Maximum lineal spacing of 150m between hydrants.

45 Hydrants on far side of ditch must be made accessible by placing an appropriately sized culvert in the ditch and covering the culvert with acceptable materials, and placing head walls on each side of the culvert as per 3.5.4 of these standards.

46 Hydrants shall be marked with a blue reflector placed on the centerline of the road directly in front of the hydrant

Air Relief Valves

47 Air relief valves shall be as per MMCD standards.

48 Provision shall be made for expelling air by the installation of air relief valves where necessary.

49 Double acting air valves shall be installed at all high points on watermains 200mm and larger.

Flush Valves

50 Flush valves shall be as per MMCD standards.

51 Flush valves or hydrants shall be installed at all dead ends.

52 Provision shall also be made for expelling air during filling by the installation of double acting air valves or test points where necessary. The initial flush shall be through a port which shall be a minimum of ½ the diameter of the main.

Service Connections

53 Service connections shall be installed to each proposed lot in a development or to each duplex dwelling unit, shall be connected to the main in a road allowance, and shall be installed at right angles to the main, within the boundaries of the lot being served, except in the turning area of a cul-de-sac. No service connection is to be provided to a lot by way of a private easement over another property.

54 Service connections shall be separated from other services as per watermains.

55 Traffic islands with planting areas shall be provided with a 19mm water service.

56 If a development requires a private fire line as well as a domestic water service, the fire line shall be completely separate from the domestic service.

57 Service connections shall terminate at property line with a meter setter that contains a backflow prevention device as approved by AWWA in a meter box.

58 Meter box and meter are to be provided by the developer.

59 All meters shall be Sensus 'Touch Read' compatible as approved by the Municipality.

Backflow Prevention

60 There shall be no physical connection between a public and a private potable water supply system, nor between either a water system and a sewer or appurtenance thereto, which would permit the passage of private water or any sewage or polluted water into the potable public supply.

61 No pipe, valve or fitting which has been exposed to raw sewage shall thereafter be included in a potable water system, either temporarily or permanently.

62 All water services shall be provided with a backflow prevention device meeting AWWA standards, located at property line.

2.7 Roads

Classifications, Widths and Design

1 Roads shall be dedicated and designed in accordance with the Supplementary Standard Detail Drawings in Appendix 1 of this bylaw based on their classification, as determined by the Municipal Official.

2 Turnaround road allowances shall be 20 m wide as required to suit the design.

Vertical Alignment

3 The vertical alignment of the road shall be set to serve adjacent properties, with access driveways at a grade not steeper than 20% and conforming to the requirements as shown in Municipal Standard Drawing DES16.

4 The length of a vertical curve shall be calculated using the values in the TAC Manual or Urban Supplement.

5 Vertical Control:

Maximum grade - Collector	12.0%
Maximum grade - Residential	15.0%
Minimum grade	0.5%
Minimum grade at curb returns	0.5%
Maximum grade on turn around at cul-de-sac	8.0%
Maximum grade at residential approach to collector	5.0% for 15m tangent length back from intersecting road edge
Maximum grade at residential or collector approach to major road	3.0% for 15m tangent length back from intersecting road edge
Normal Crown	2.0%

6 Crossfall - the practice of crossfalling a road is acceptable at intersections and where required because of topographical features.

7 Superelevation - horizontal curves on residential roads are not to be superelevated. Collector and Major roads may be superelevated as per the TAC Manual with Municipal approval.

8 Transition - the length of a transition from a normal cross-sectioned road to a section of road where there is superelevation shall in no case be less than 45 m.

9 Extensions - evidence that vertical alignments are satisfactorily extendable will be required.

Horizontal Alignment

10 The horizontal alignment of the road shall be centred in the road allowance.

11 Centreline chainage stations shall be referenced and dimensioned from an identifiable iron pin.

12 Minimum radius of curvature shall be as follows:

Classification	Min Centreline Radius
Residential	90 m*
Collector	100 m
Major Road	Special Design

*Subject to the approval of the Municipal Official, curves on crescent shaped residential roads may be reduced to a minimum centreline radius equal to 30 m.

13 A horizontal curve shall be fully described showing internal angle, radius, tangent length, and arc.

Structural Design

14 Gravel thickness shown are minimum requirements only. Site conditions may warrant greater thickness. The Municipal Official may require a Geotechnical Assessment.

15 Reference to or details of the cross-section dimensions and requirements must be shown on each design drawing submitted.

16 The toe of a fill slope or top of a cut slope shall not encroach on private property. The containment of these slopes within the road allowance may require the design of a retaining wall or the widening of the right-of-way to contain the cut or fill slope.

17 Where cut slopes are to be made into ground seepage zones or where the extent of the slope would generate surface runoff, curtain drains shall be required at the base of the slopes and connected to the road drainage system or other suitable point of discharge.

Intersections

18 Curb returns of 8m radius are required for residential road intersections. Curb returns located on bus routes and on roads within industrial and commercial districts require a larger radius to facilitate trucks and bus traffic.

19 When a new residential road with curbs intersects an existing road, curb returns shall be constructed to blend into the existing road width, unless directed otherwise by the Municipal Official.

20 Vertical curves at intersections shall terminate prior to the gutter line of the major roadway thereby insuring that the crown on the major roadway is maintained.

21 Sidewalk corner ramps and crosswalks at intersections shall be as per MMCD Drawing C8 or C9.

Turnarounds

22 The design of a turn-around shall conform to Municipal Standard Drawing R13SS. The dimensions may have to be increased to meet traffic and vehicular requirements, or where the turn-around is skewed.

23 The landscape design of a turn-around shall be as per Municipal Standards.

Driveways

24 Driveway grades shall be as per Municipal Standard Drawing R14SS.

25 Driveway crossings of sidewalks shall be as per Municipal Standards.

26 Signage for major driveways shall be as per Municipal Standard Drawing R15SS.

27 Driveways may have to be pre-built in steep area to avoid damage to the Municipality's infrastructure in the future.

Pathways and Multi Use Trails

28 Pathways and trails are defined in the trail guide.

29 Pathways shall be all weather, wheelchair accessible, with a minimum of 1.5 meters wide and shall be hard-surfaced in the case of urban pathways or surfaced with 3/8" minus crush stone compacted in place or other approved surface material in other cases. Maximum vertical grades shall be 8% and crossfall 2%. Pathways linking areas used by seniors and disabled persons may be hard surfaced if required by the Municipality.

30 Trails shall be all weather walkways that meander through community areas and shall be surfaced with chips or crush stone as required by the Municipality. Widths to be a minimum of 2.5 meters and grades must not exceed 12%. Cross fall shall not exceed 4%.

31 Longitudinal and cross drainage shall be provided as required to meet topography. Water must not be directed onto private property unless prior arrangements for downstream control are provided. In no instance is the Municipality to be made responsible for downstream drainage from development-initiated trails or pathways.

32 Concrete sidewalks shall comply with MMCD standards.

Catch Basins (where required and approved by design)

33 Catch basins shall be constructed as per MMCD standards.

34 Double catch basins shall be installed at locations of high runoff and at the low point of sag curves.

35 Catch basins shall be located at the higher end of the curb returns of intersections, at the lowest point of the sag vertical curves, and at a spacing not greater than the following:

Road Width	**Maximum Spacing**
6.5 m	90 m
8.0 m	75 m
14.0 m	60 m

36 Double catch basins shall be installed at locations of high runoff and at the low point of sag curves.

37 On roads with superelevation crossfall the maximum spacing shall be one-half of the above figures. Adequate allowance shall be made to handle runoff from turn-arounds.

38 Exceptions to the above maximum spacing of catch basins may be allowed, where paving is to be installed on existing roads and where houses are drained in a manner satisfactory to the Municipal Official.

Appurtenances

39 The design drawings shall indicate utility poles that are to be relocated or replaced.

40 Handrails shall be as per MMCD standards.

41 Rock retaining walls shall be as per Municipal Standards. Retaining walls other than per the Standard Drawing or in excess of 1.5 meters high shall be designed by the Professional Engineer to good Professional Engineering standards.

Emergency Vehicle Access

42 Emergency vehicle access shall be as per Municipal standards.

Road Closures, Barriers and Gates

43 Road closures shall be as per Municipal standards.

44 Concrete barriers shall be Ministry of Transportation and Infrastructure (MOT) 690mm CRB-E or approved equal.

45 Metal gates shall be as approved by Municipal Official.

46 All signage will be supplied and installed by the owner/developer.

Design Drawings

47 The table below lists the Detail Drawings to be used or referred to in the design of services.

Drawing No	**Name**
DES 10-A	Rainfall Intensity Curve
DES 10-B	Time of Concentration
DES 11	Storm Drainage Calculations
DES 12	Combined Constructed Wetland and Detention Facility
DES 13	Grassed Swale
DES 14	Sediment Basin
DES 15	Bioretention Swale
DES 16	Rain Garden

3 CONSTRUCTION SPECIFICATIONS

3.1 Master Municipal Construction Document (MMCD)

1 All construction of works and services shall be in accordance with the MMCD unless noted otherwise in these Construction Specifications.

3.2 Supplementary Specifications

1 The following sections of the MMCD are amended as indicated:

MMCD Section	Subsection	Title	Supplementary Specification
2221 Rock Removal	1.7	Seismic Survey and Monitoring	Delete wording in Clause 1.7.1, "Contract Administrator", and replace with, "Contractor"
	1.7	Seismic Survey and Monitoring	Delete wording in Clause 1.7.2, "Owner", and replace with, "Contractor, unless otherwise indicated."
	1.1	Permits and Approvals	Add Clause 1.10.1, Comply with General Conditions, Clause 20, Laws, Notices, Permits and Fees.
	3.1	Blasting and Vibration Control	Add Clause 3.1.5, "Contractor will be responsible for any and all damages resulting from blasting operations."
2223 Excavation, Trenching and Backfilling	3.6	Surface Restoration	Add Clause 3.6.10 "Sprinkler Restoration. Restore and test all sprinkler systems damaged during construction."

2512 Hot-Mix Asphalt Concrete Paving	3.1	Finished Tolerances	Delete Clause 3.10.4 and replace with: “Against concrete gutter, finished asphalt surface to be higher than the gutter by at least 5mm and not more than 10mm. “
2666 Waterworks(cont)	2.5	Service Connections, Pipe Joints and Fittings	Delete wording in Clause 2.5.1, and replace with, “Pipe diameter 19mm to 25mm water service tubing shall be Polyethylene to AWWA C901, Pressure class 160 tubing certified to CSA B137.1. Pipe diameter 38mm to 50mm water service tubing shall be Type K annealed copper, to ASTM B88M.
	2.7	Underground Service Line Valves and Fittings	Delete Clause 2.7.3.2, and replace with, “38mm and 50mm to be ductile iron body and bronze stem to ASTM B 62, ball or cylinder type construction utilizing rubber o-ring seals.”
	3.14	Corrosion Protection	Add Clause 3.14.2 “Wrap all mechanical joints and bolts with petrolatum tape (Densyl Tape or equivalent) to manufacturers specifications.”
2721 Storm Sewers	2.5.8.1	Service Connections	Insert the following: ‘... with approved PVC saddle OR INSERTABLE TEE installed to ...”

	2.5.8.2	Service Connections	Add sentence " Hole to be machine cut, not by hand saw."
	3.12	Video Inspection	The video inspection report shall be to WRC standards.
2731 Sanitary Sewers	2.3.8.1	Service Connections	Insert the following: '... with approved PVC saddle OR INSERTABLE TEE installed to ..."
	2.3.8.2	Service Connections	Add sentence " Hole to be machine cut, not by hand saw."
	3.12	Leakage Testing	The method of testing shall be a Low Pressure Air Test.
	3.18	Video Inspection	The video inspection report shall be to WRC standards, and shall illustrate flow through the pipe for all design grades less than 2%.

3.3 Supplementary Standard Detail Drawings

1 The drawings attached as Appendix 1 are supplementary to the standard detail drawings in the MMCD.

PART 3: DEFINITIONS

In this bylaw,

Owner/developer means a person who has applied for approval of a subdivision of land or made a building permit application, whether as the owner or as the authorized agent for the owner of the land in respect of which the application was made;

Approving Officer means the Approving Officer or Deputy Approving Officer appointed by the Council of the Municipality*;*

Collector Road means any road directly connecting to an arterial highway at one end and connecting to a rural or residential road on the other end;

Common Driveway means any driveway that provides shared access to two or more parcels;

Contractor means any person or corporation undertaking the installation of municipal services on behalf of an owner/developer;

Cul-de-Sac means a road that terminates in a vehicular turning area;

Municipal Official means the Approving Officer, Director of Public Works or designate;

Frontage means the length of parcel lines adjoining a road;

Frontage Road means a road which is parallel and adjacent to a major road and which provides access to abutting parcels;

Highway means a public road and any other public way, including the full extent of the highway dedication, but excludes the area seaward of the present natural boundary of the sea;

Local Road or **Residential Road** means a road that carries light traffic volumes with an origin or destination along its length;

Low Impact Development means any development technique that reduces the environmental and physical impact on the subject lands and receiving streams off site from the subject lands;

Major Road means a road designated as a major road in the Official Community Plan;

Master Municipal Construction Documents or MMCD means the Master Municipal Specifications and Standard Detail Drawings in Volume II of the latest version of the Master Municipal Construction Documents, published by the Master Municipal Construction Documents Association, as amended or replaced from time to time and includes the definitions of relevant terms in the General Conditions in Volume II, but excludes any provisions in the Master Municipal Specifications that deal with measurement and payment;

Municipal or **Municipality** means the District of Lantzville;

Owner means a person registered with the Land Title and Survey Authority of BC as owner of the land Proposed to be subdivided or developed;

Parcel means any parcel, lot, block or other area in which land is held or into which it is subdivided under the *Land Title Act* or the *Strata Property Act* and includes a water parcel;

Professional Engineer means an engineer qualified to practice in a relevant field and registered and in good standing with Engineers and Geoscientists BC;

Public Utility means any system having facilities installed in a right-of-way for the purpose of providing a service to property and shall include water distribution, sewage and drainage collection, street lighting, electric power distribution, telephone, cable television, and gas distribution systems;

Right-of-Way means land or any interest in land acquired for the purpose of:

(a) public rights of passage with or without vehicles; or

(b) erecting and maintaining any pole-line; or

(c) laying, placing, and maintaining drains, ditches, pipes, transmission lines, or wires for the conveyance, transmission, or transportation of water, electric power, natural gas or telecommunications;

(d) the disposal or detention of sanitary sewage, storm water or drainage; or

(e) the operation and maintenance of any other undertaking of the Municipality, and shall include a statutory right-of-way as defined in the *Land Title Act*;

Roadway means the portion of a road that is improved, designed and used for vehicular traffic;

Road means a highway that affords the principal means of vehicular access to abutting parcels, and includes a road or road allowance;

Rural Road means any road in a rural zone and located outside the Growth Containment Boundary, which is not a collector or major road;

Rural Zone means a zone designated as rural in the Zoning Bylaw;

Sidewalk means a walkway constructed of concrete or asphalt that is intended for pedestrian traffic only;

Subdivision means the division of land into two or more parcels under the *Land Title Act* or the *Strata Property Act*, whether by plan, descriptive words or otherwise;

TAC Manual means Geometric Design of Canadian Roads, published by the Transportation Association of Canada, September 1999, as amended or replaced from time to time.

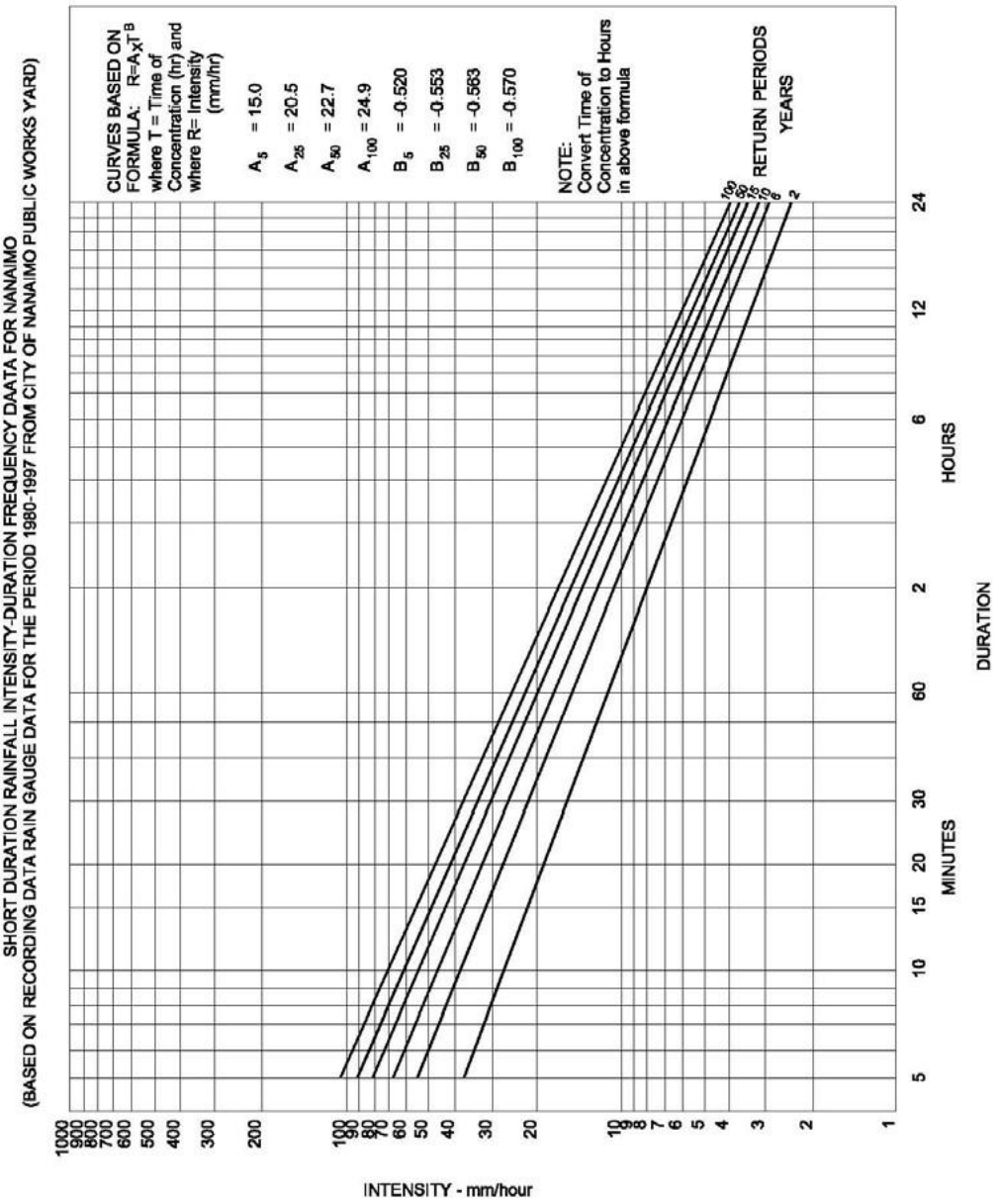
TAC Urban Supplement means Urban Supplement to the Geometric Design of Canadian Roads, published by the Transportation Association of Canada, 2007, as amended or replaced from time to time.

Trail or **Path**, **Multi Use**, means a highway for the use of the walking public and bicycle traffic, that may be designed to afford emergency or maintenance vehicle use;

Watercourse means any drainage course or source of water in a channel with defined continuous banks, whether usually containing water or not, including any ditch, stream, creek or river, as well as portions in a conduit or culvert, but specifically excludes constructed ditches within a highway right-of-way that do not form the main channel of a stream or creek;

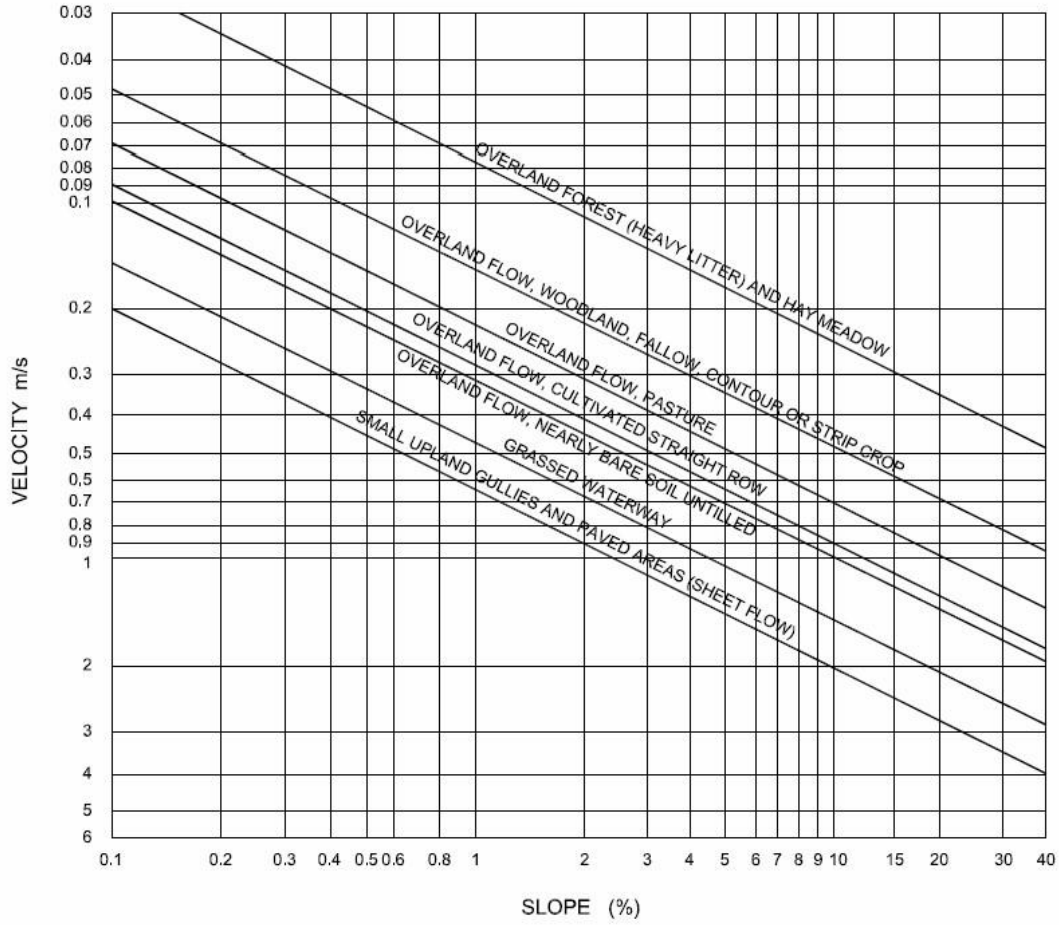
Works and Services means the roadways, drainage, water and sewer systems, sidewalks, boulevards, multi-use trails, street lighting and underground wiring or any other works required to be provided in connection with the subdivision or development of land under this bylaw.

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



Rainfall Intensity Curve	Revision Date: 2005	Drawing Number: DES10-A

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



UPLAND METHOD FOR ESTIMATING TIME OF CONCENTRATION

NOTES:

1. THIS TABLE IS LIMITED FOR USE IN DRAINAGE BASINS
2. THIS TABLE DOES NOT MAKE ALLOWANCES FOR VARIATIONS IN SOIL TYPES AND MAY UNDERESTIMATE TIMES

Time of Concentration	Revision Date: 2005	Drawing Number: DES 10-B

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page

Storm Drain Calculatuions

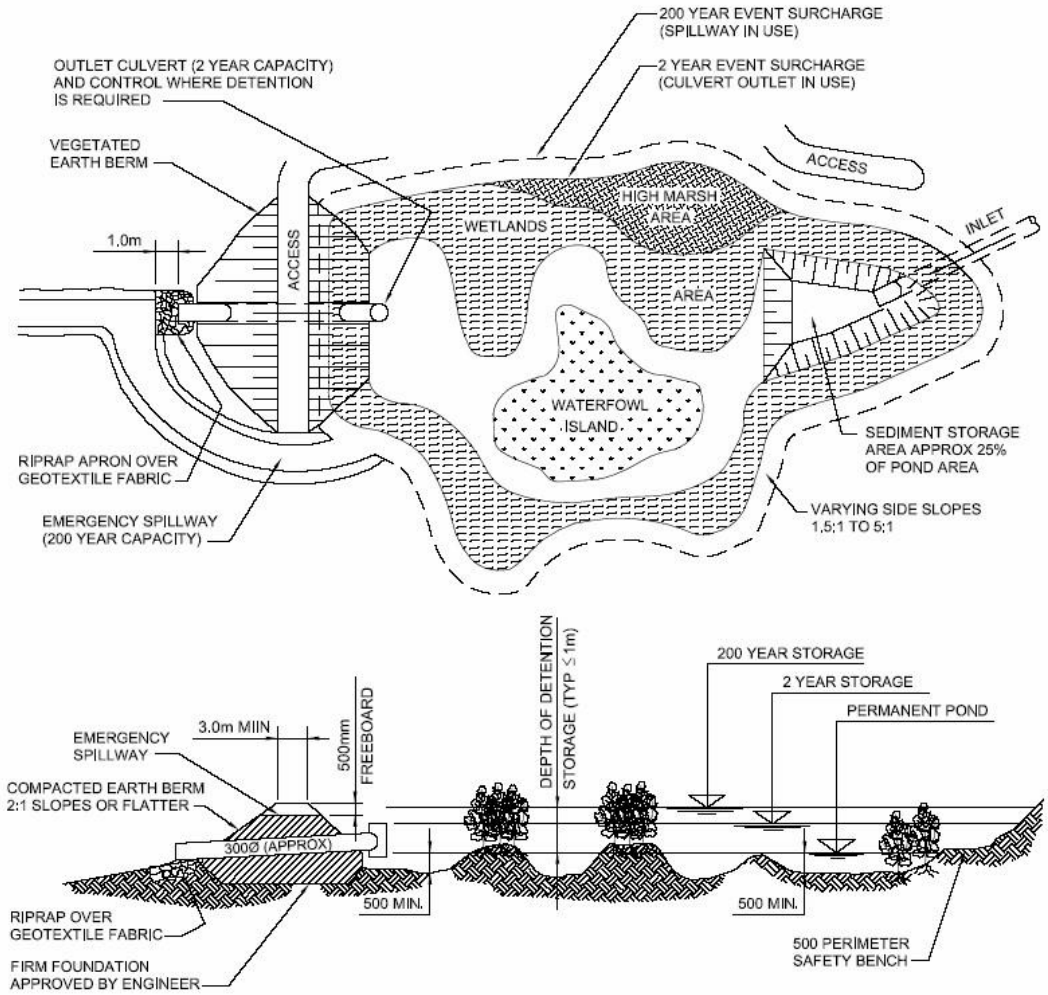
Consultant ____________ File No. ____________

Calculations by ____________ Date ____________ Figures given below apply to the ______ end of each line

Line	Incr Area *ha*	Area *ha*	Tc *minutes*	I mm/hr	C	Q Actual m^3/sec	Pipe Size & Slope mm & %	Length *m*	n	Q Capacity m^3/sec	V *ha*	Tr *minutes*	Remarks

Storm Drainage Calculations	Revision Date: 2005	Drawing Number: DES 11

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



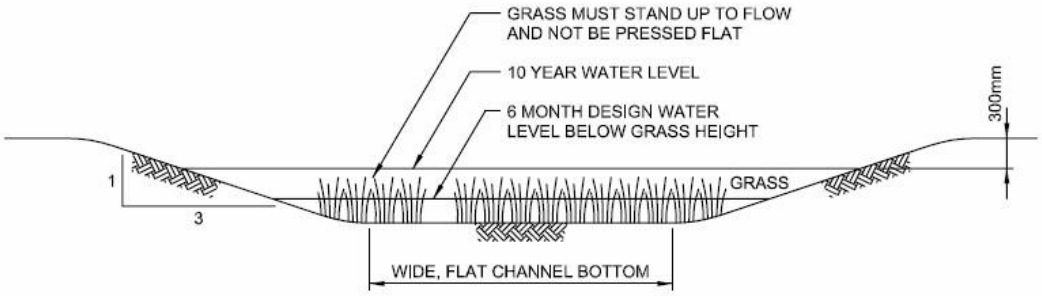
NOTES:

1. SUITABLE FOR CATCHMENTS UP TO 2 HECTARES, FOR LARGER CATCHMENTS THE OUTLET PIPE AND SPILLWAY CONCEPTS MAY VARY.

2. FOR ALTERNATIVE OUTLET STRUCTURE SEE CONTROL MANHOLE

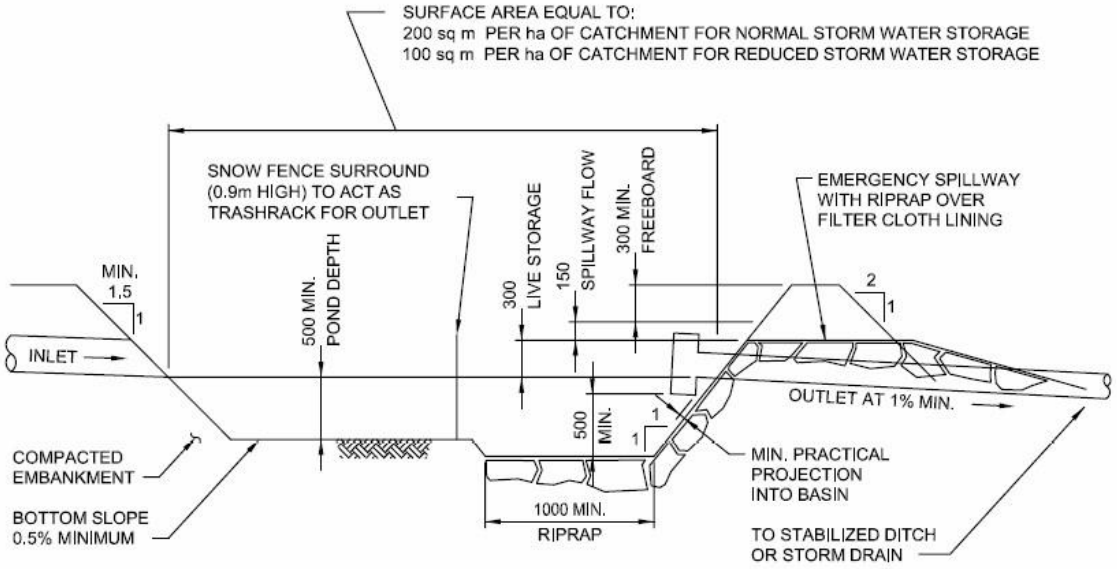
Combined Constructed Wetland and Detention Facility	Revision Date: 2005	Drawing Number: DES 12

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



Grassed Swale	Revision Date: 2005	Drawing Number: DES 13

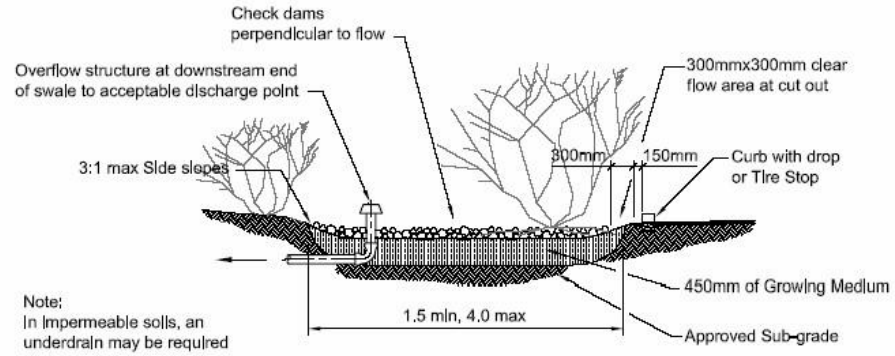
District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



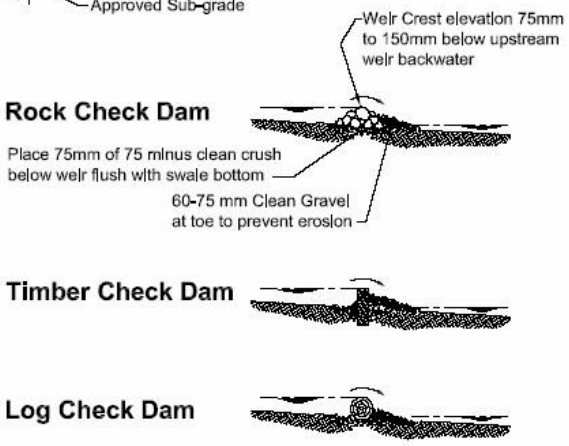
NOTES;
1. REMOVE SEDIMENT WHEN POND IS ONE-THIRD FULL.

Sediment Basin	Revision Date: 2005	Drawing Number: DES 14

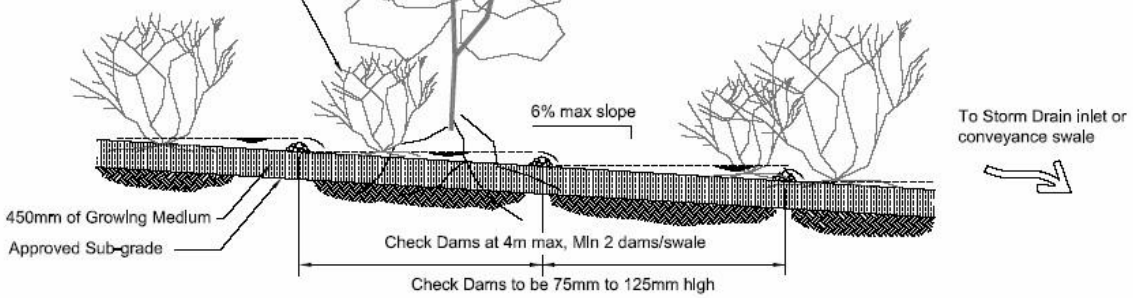
District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	Page



Section



Check Dam Options
NTS



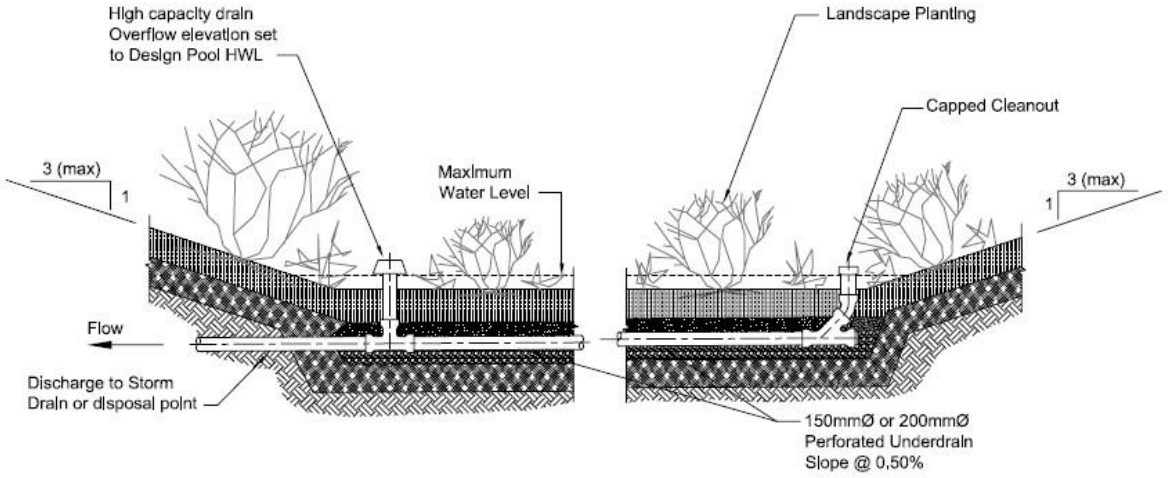
Profile

NOTES:

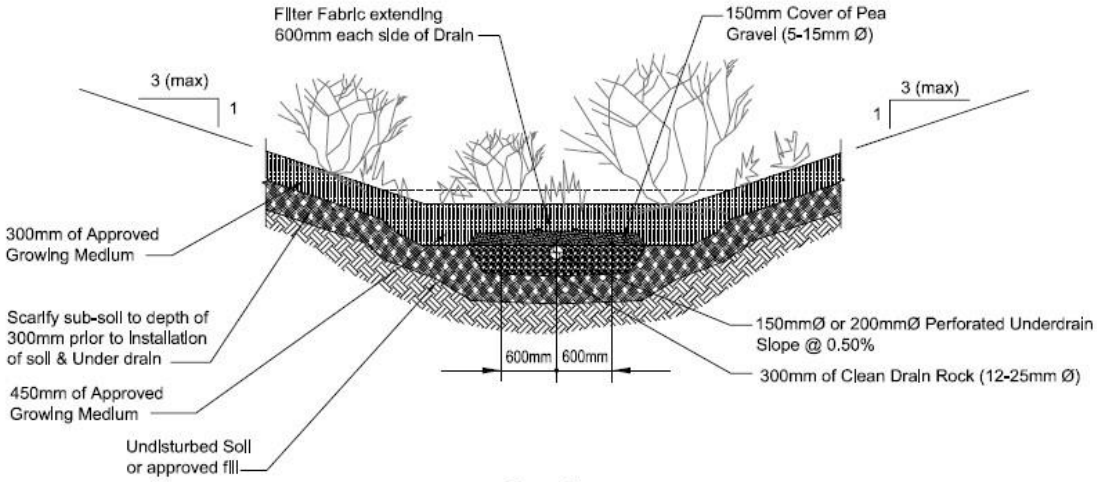
1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

Bioretention Swale	Revision Date: 2005	Drawing Number: Des 15

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	Page



Profile



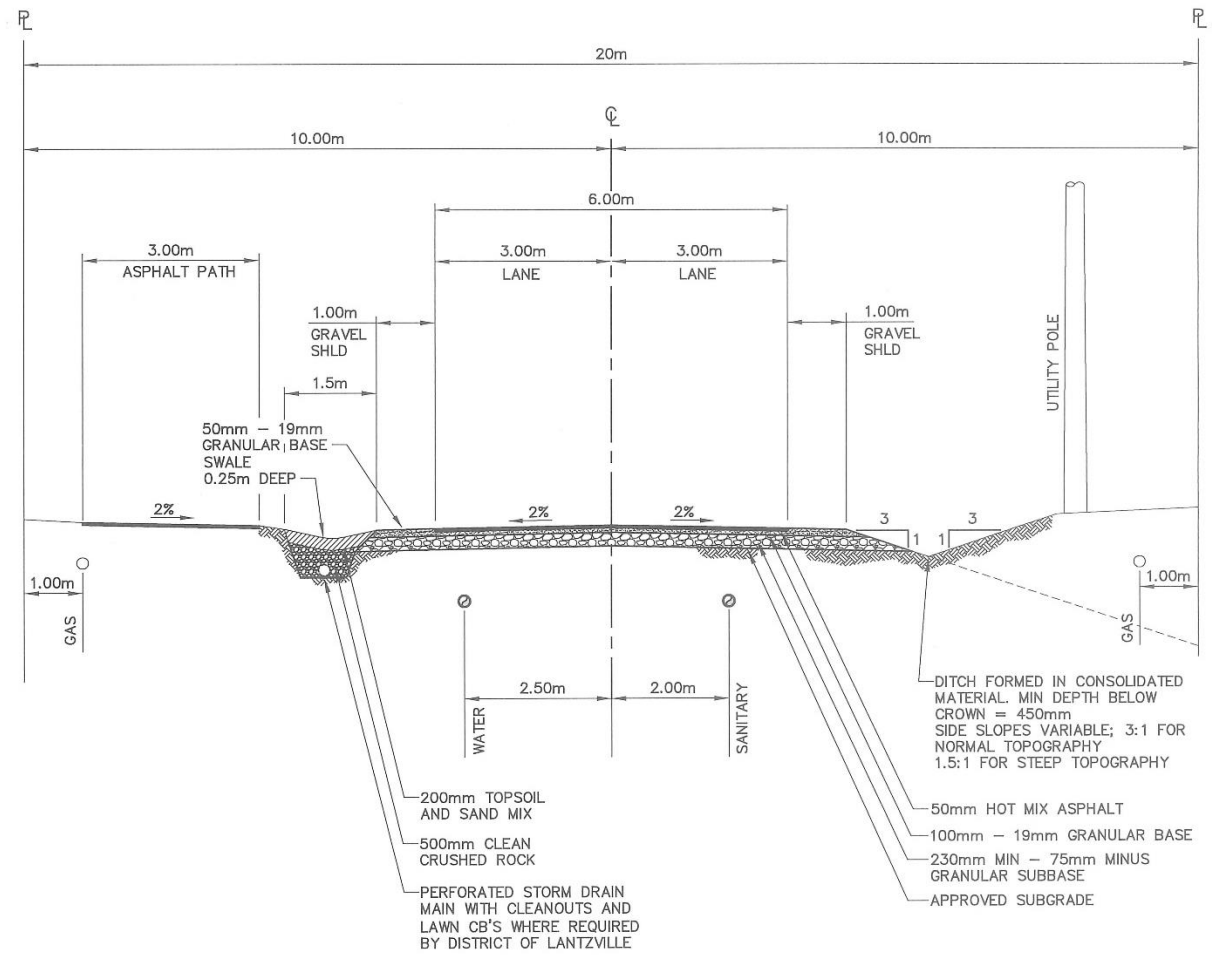
Section

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

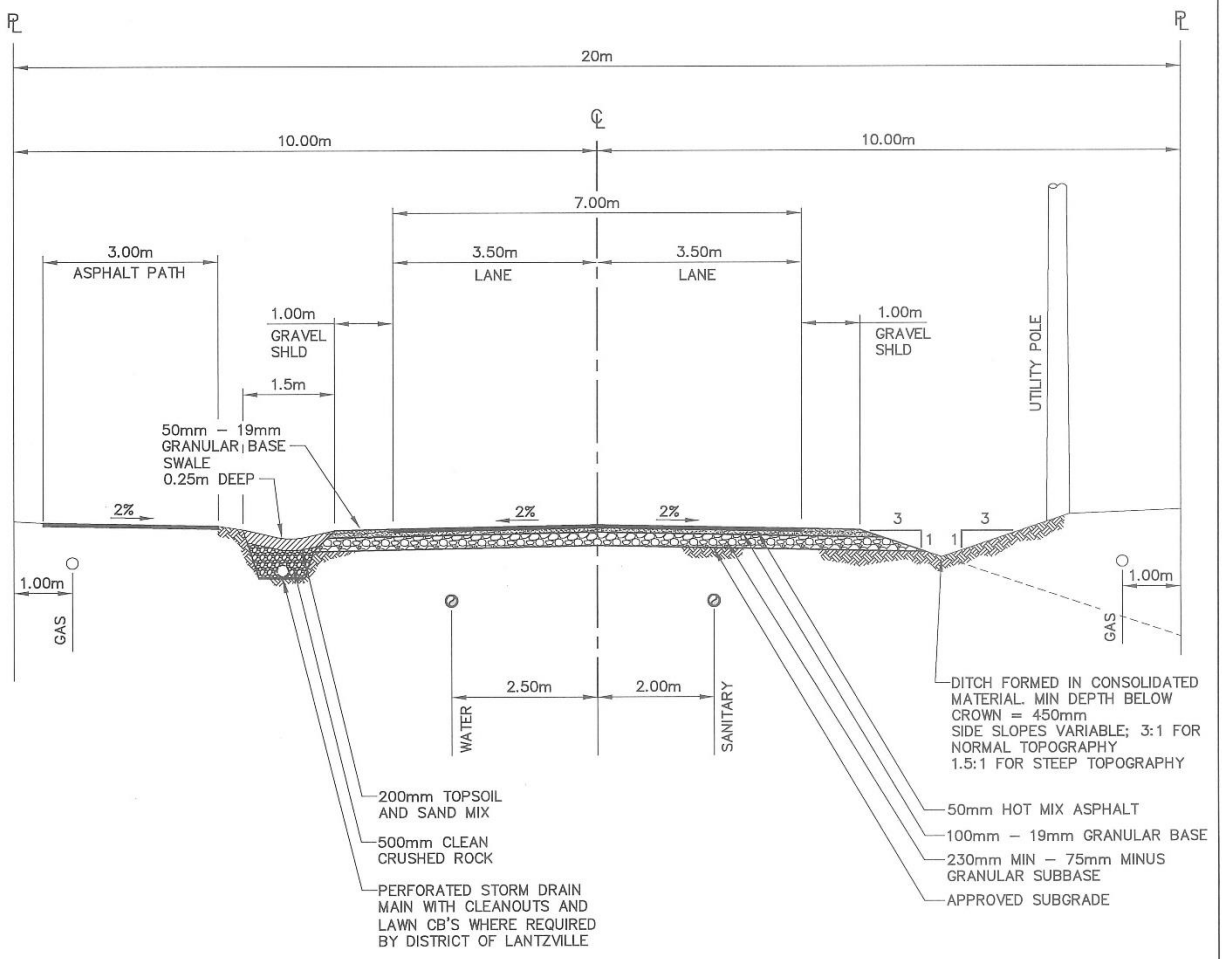
Rain Garden	Revision Date: 2005	Drawing Number: Des 16

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



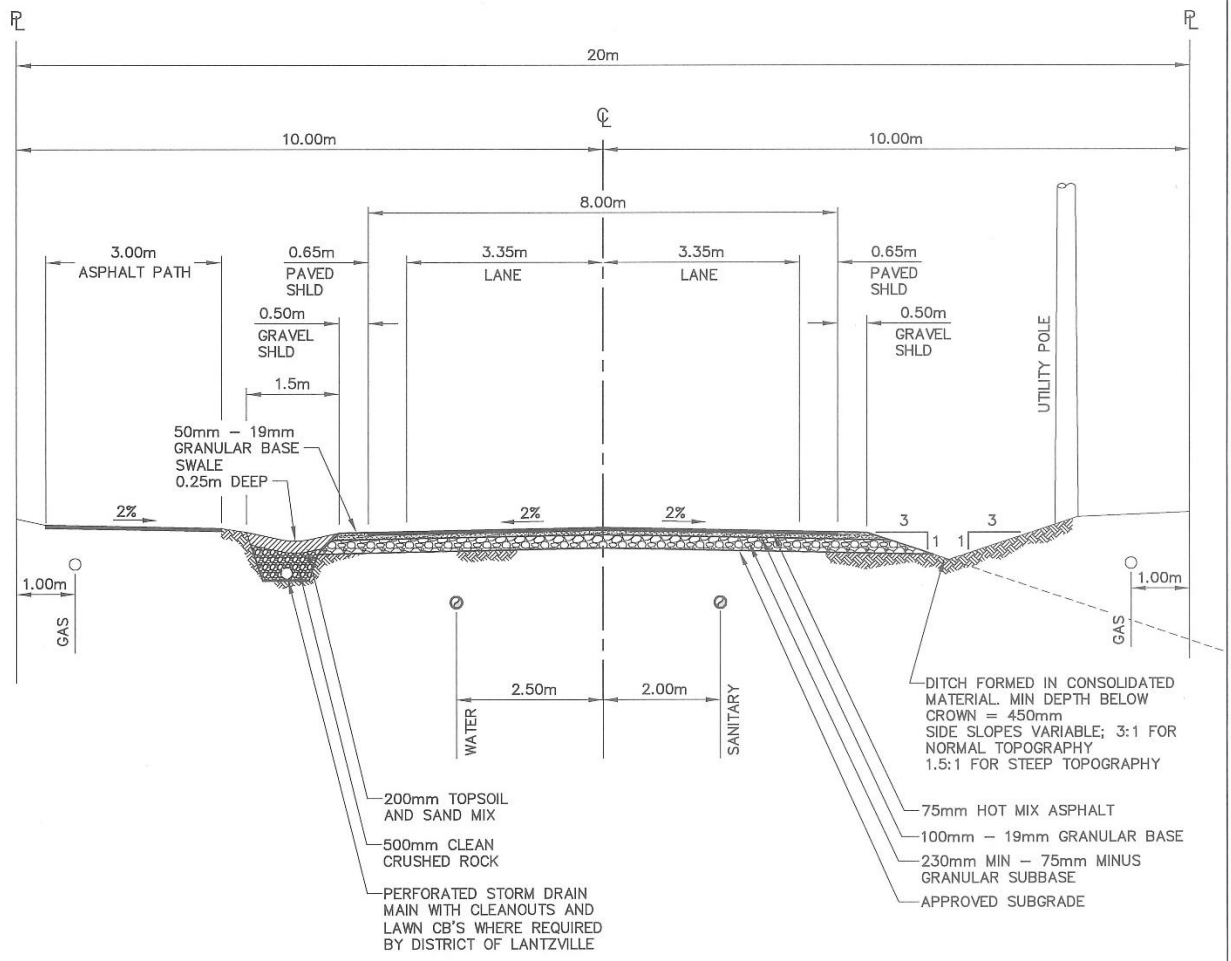
Rural Local Road (Low Volume)	Revision Date: 2019	Drawing Number: RL1 (LV)

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



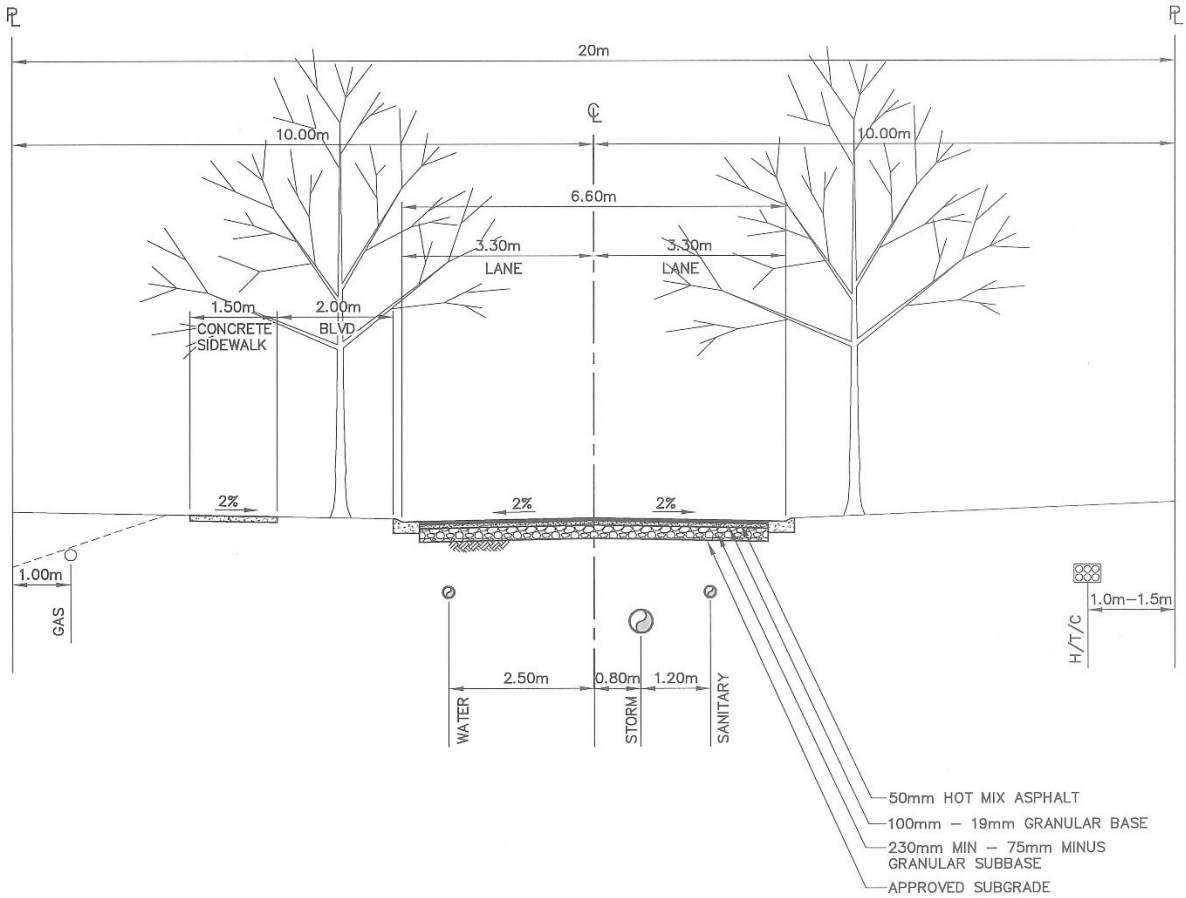
Rural Local Road	Revision Date: 2019	Drawing Number: RL1

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



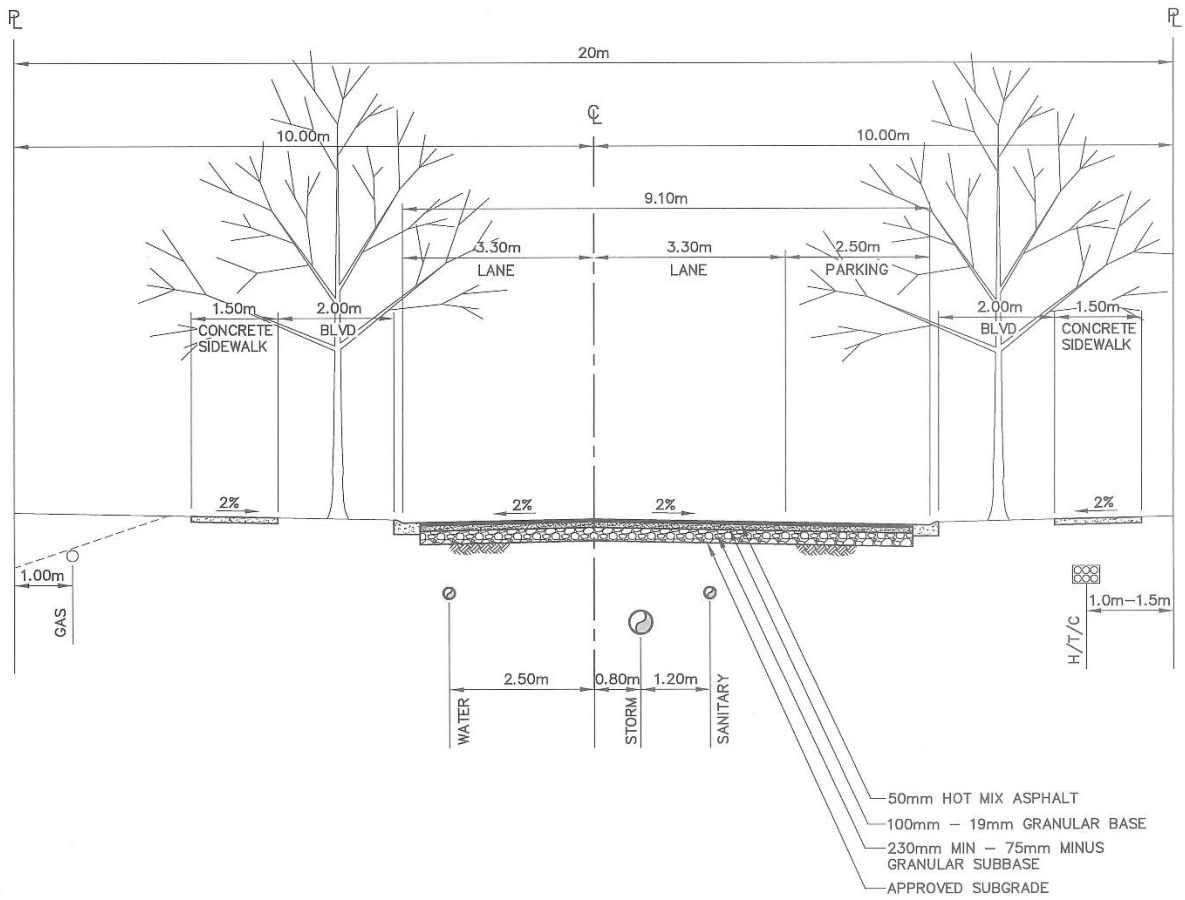
Rural Collector Road	Revision Date: 2019	Drawing Number: RC1

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



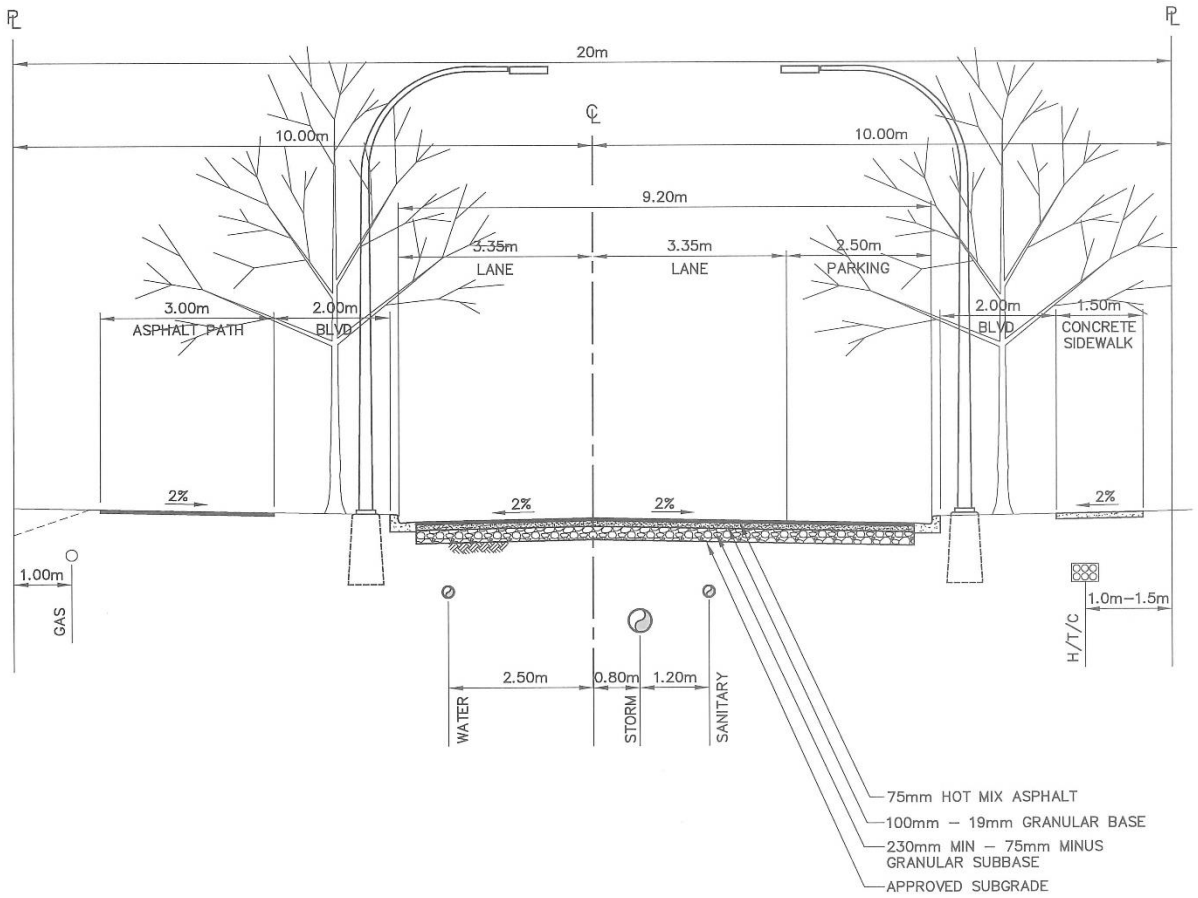
Urban Local Road (Low Volume)	Revision Date: 2019	Drawing Number: UL1 (LV)

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



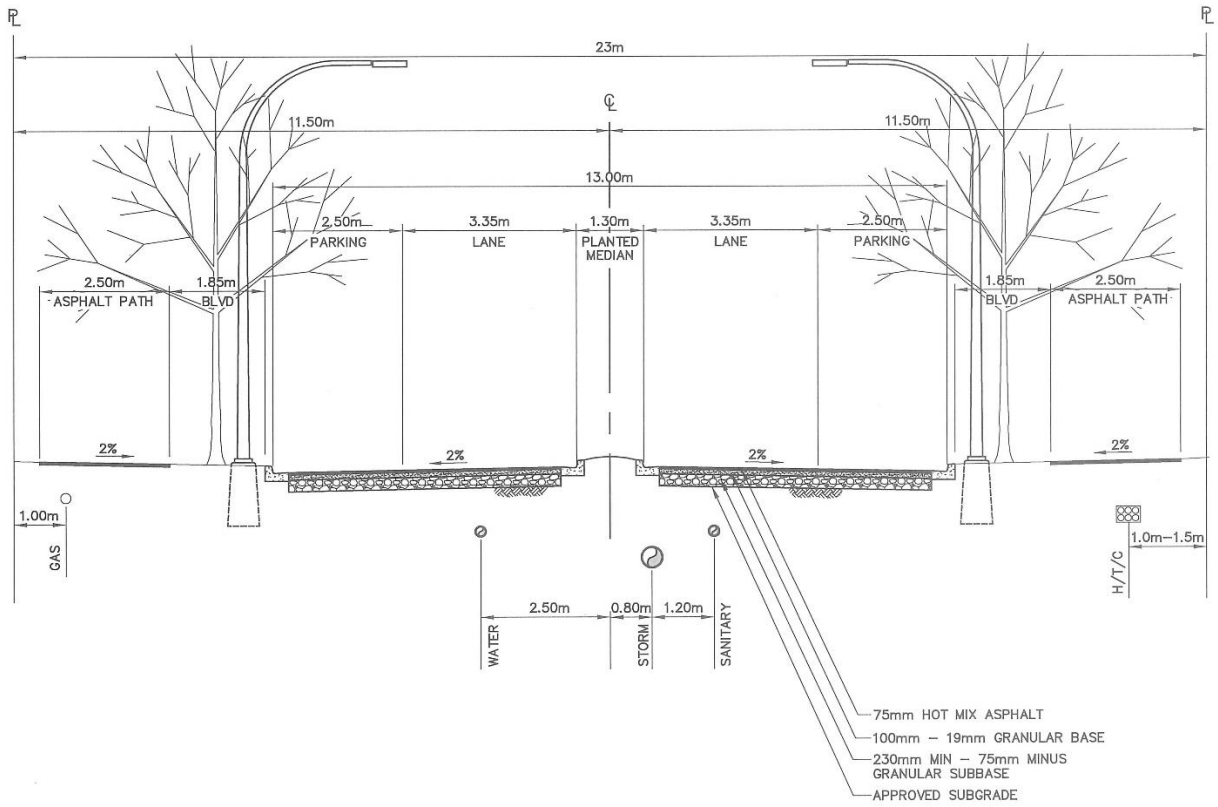
Urban Local Road	Revision Date: 2019	Drawing Number: UL1

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



Urban Collector Road	Revision Date: 2019	Drawing Number: UC1

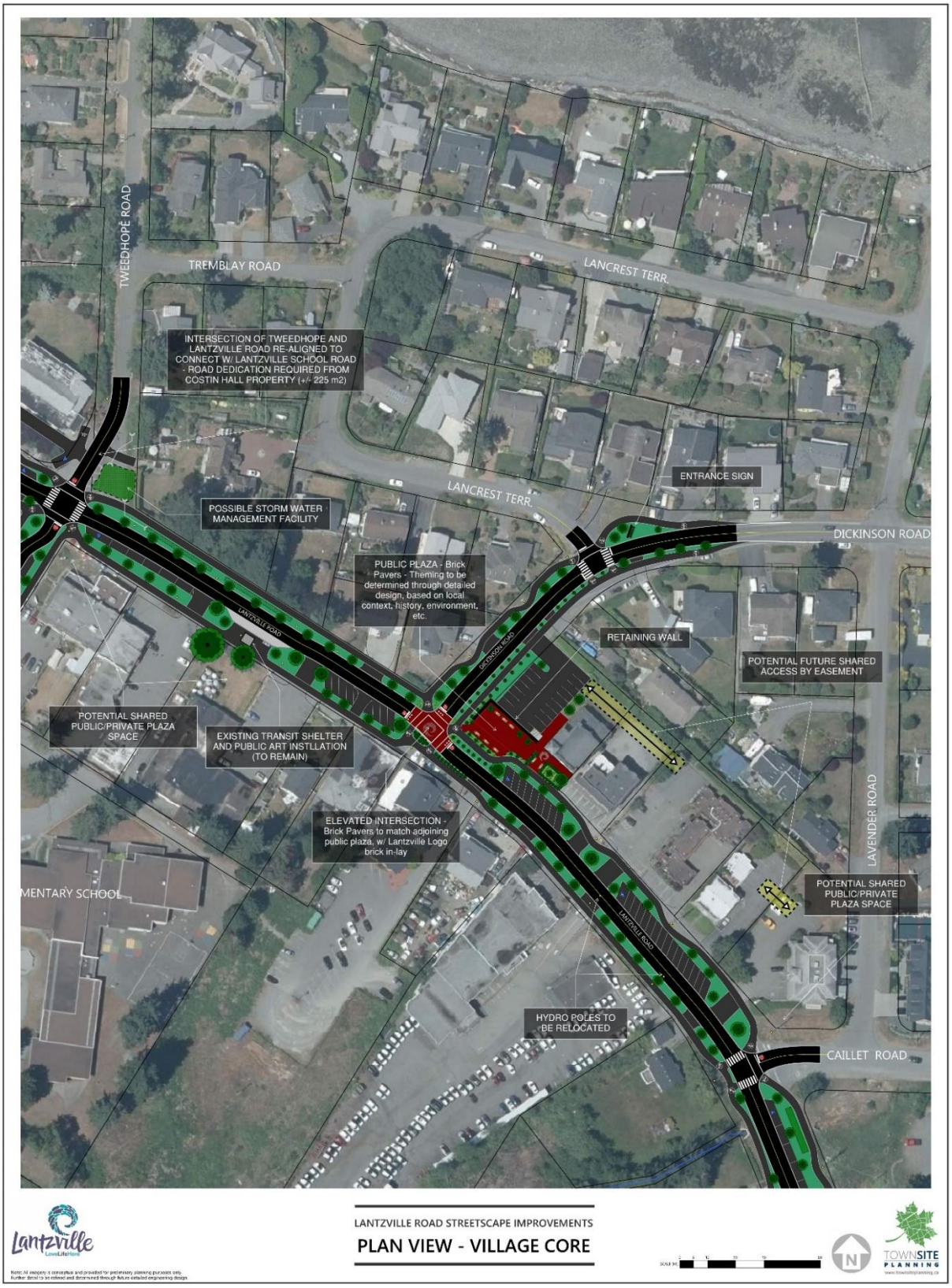
District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	

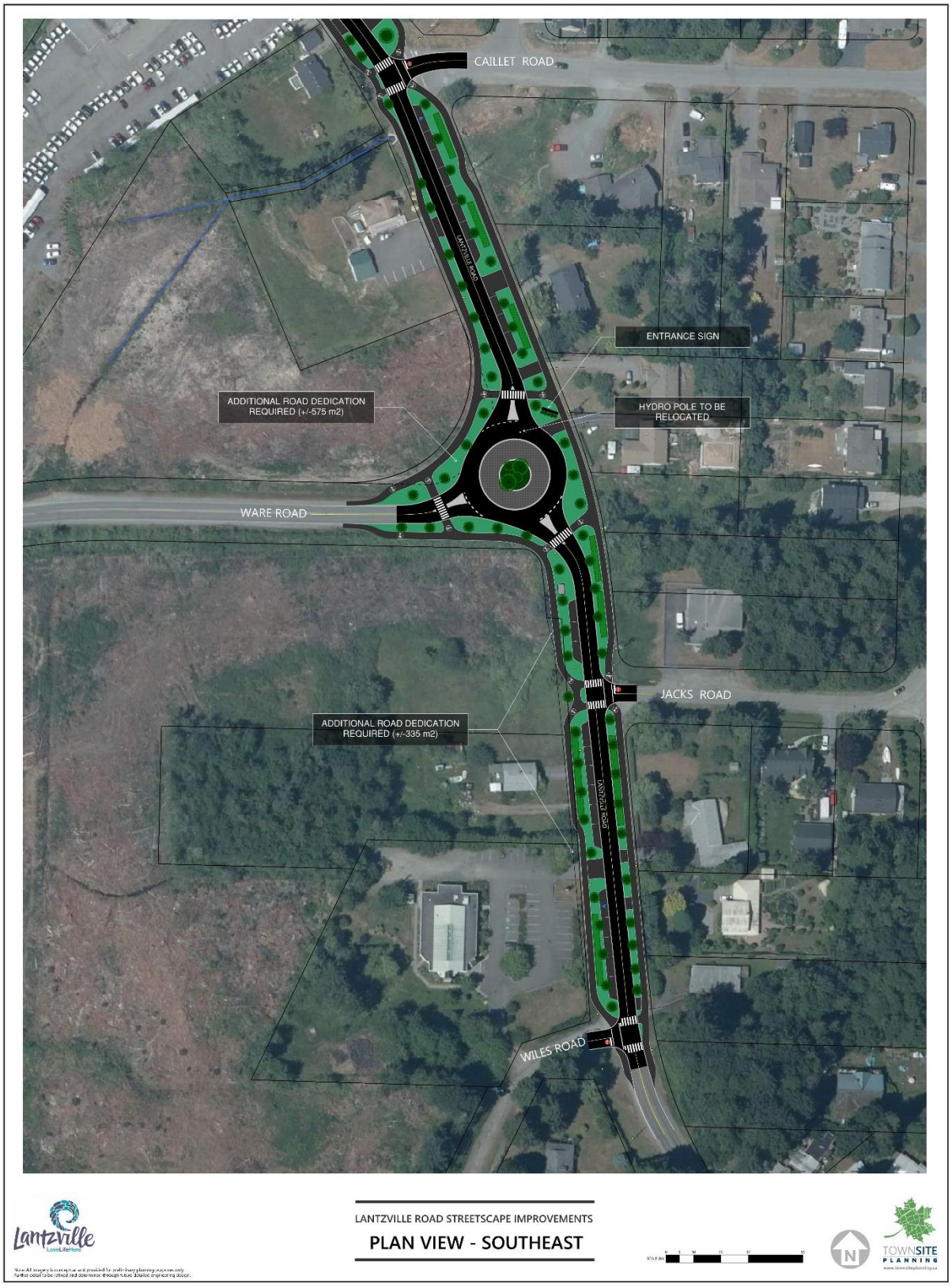


Ware Road (Village)	Revision Date: 2019	Drawing Number: Village1

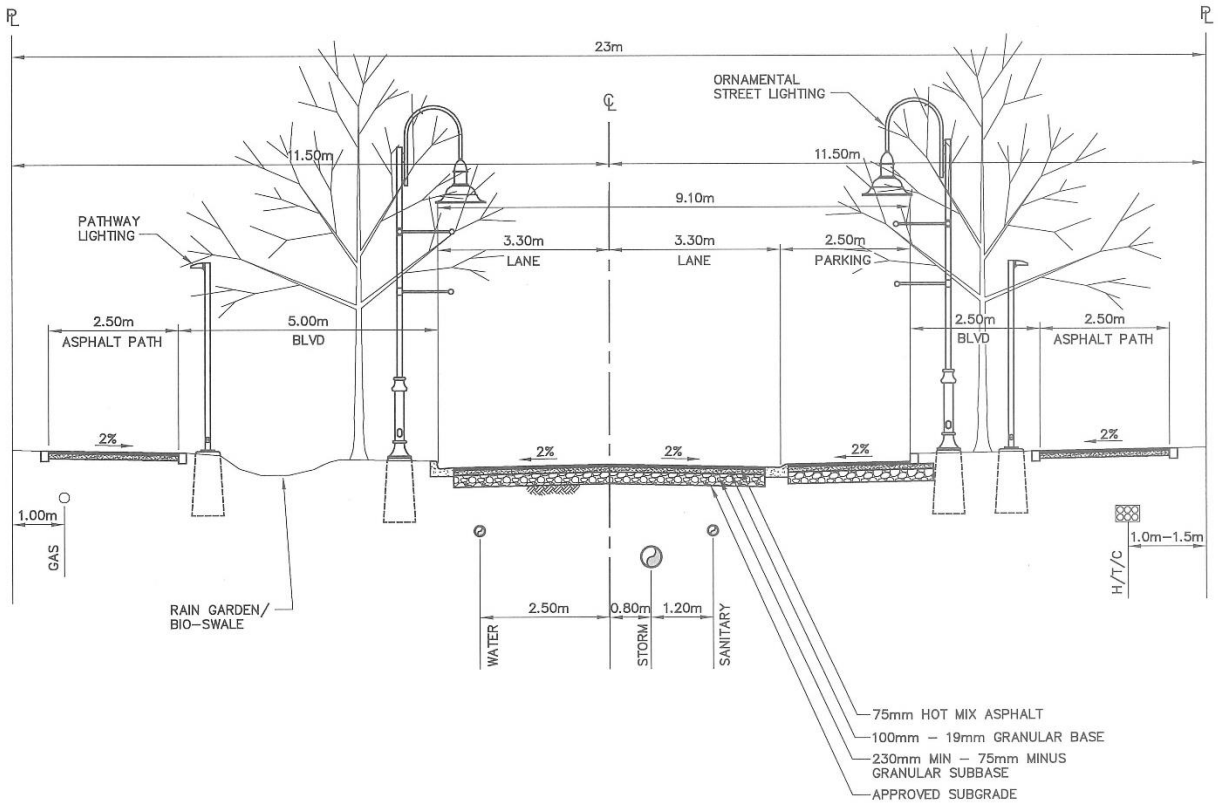

LANTZVILLE ROAD STREETSCAPE IMPROVEMENTS
PLAN VIEW - OVERALL
Lantzville
TOWNSITE PLANNING
HUDDLESTONE PARK
TRIPLEJAY ROAD
LANCREST TERR
DICKINSON ROAD
SEAVIEW ELEMENTARY SCHOOL
CAILLET ROAD
WARE ROAD
JACKS ROAD
WILES ROAD
LANTZVILLE ROAD
ENTRANCE SIGN
RETAINING WALL
POSSIBLE STORM WATER MANAGEMENT FACILITY
EXISTING TRANSIT SHELTER AND PUBLIC ART INSTALLATION (TO REMAIN)
ELEVATED INTERSECTION
ADDITIONAL ROAD DEDICATION REQUIRED (+/- 875 m2)
ADDITIONAL ROAD DEDICATION REQUIRED (+/- 385 m2)


HUDDLESTONE ROAD
ENTRANCE SIGN
HUDDLESTONE PARK
TWEEDHOPE ROAD
RETAINING WALL
LANTZVILLE ROAD
STATUTORY RIGHT OF WAY (SRW) REQUIRED TO FACILITATE TO TRAIL CONNECTION TO PUBLIC PARKING (Approx. 210 m2)
LANTZVILLE SCHOOL ROAD
UPGRADED PUBLIC PARKING LOT - POSSIBLE COST-SHARE W/ SD68
POTENTIAL SHARED PUBLIC/PRIVATE PLAZA SPACE
LANTZVILLE ROAD STREETSCAPE IMPROVEMENTS
PLAN VIEW - NORTHWEST
N
TOWNSITE PLANNING


TWEEDHOPE ROAD
TREMBLAY ROAD
LANCREST TERR.
INTERSECTION OF TWEEDHOPE AND LANTZVILLE ROAD RE-ALIGNED TO CONNECT W/ LANTZVILLE SCHOOL ROAD - ROAD DEDICATION REQUIRED FROM COSTIN HALL PROPERTY (+/- 225 m2)
ENTRANCE SIGN
POSSIBLE STORM WATER MANAGEMENT FACILITY
DICKINSON ROAD
PUBLIC PLAZA - Brick Pavers - Theming to be determined through detailed design, based on local context, history, environment, etc.
RETAINING WALL
POTENTIAL FUTURE SHARED ACCESS BY EASEMENT
POTENTIAL SHARED PUBLIC/PRIVATE PLAZA SPACE
EXISTING TRANSIT SHELTER AND PUBLIC ART INSTLLATION (TO REMAIN)
ELEVATED INTERSECTION - Brick Pavers to match adjoining public plaza, w/ Lantzville Logo brick in-lay
LAVENDER ROAD
POTENTIAL SHARED PUBLIC/PRIVATE PLAZA SPACE
MENTARY SCHOOL
HYDRO POLES TO BE RELOCATED
CAILLET ROAD
LANTZVILLE ROAD STREETSCAPE IMPROVEMENTS
PLAN VIEW - VILLAGE CORE
TOWNSITE PLANNING

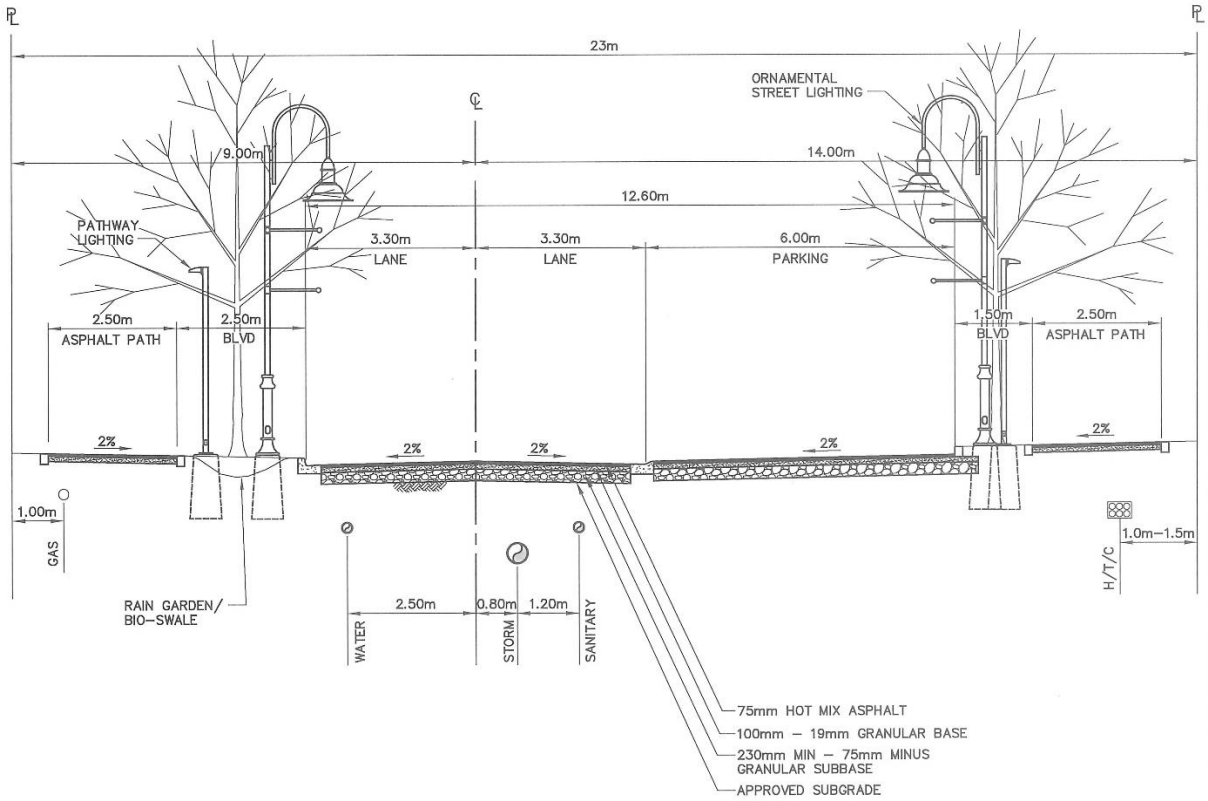

CAILLET ROAD
ENTRANCE SIGN
ADDITIONAL ROAD DEDICATION REQUIRED (+/-575 m2)
HYDRO POLE TO BE RELOCATED
WARE ROAD
JACKS ROAD
ADDITIONAL ROAD DEDICATION REQUIRED (+/-335 m2)
WILES ROAD
LANTZVILLE ROAD STREETSCAPE IMPROVEMENTS
PLAN VIEW - SOUTHEAST

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



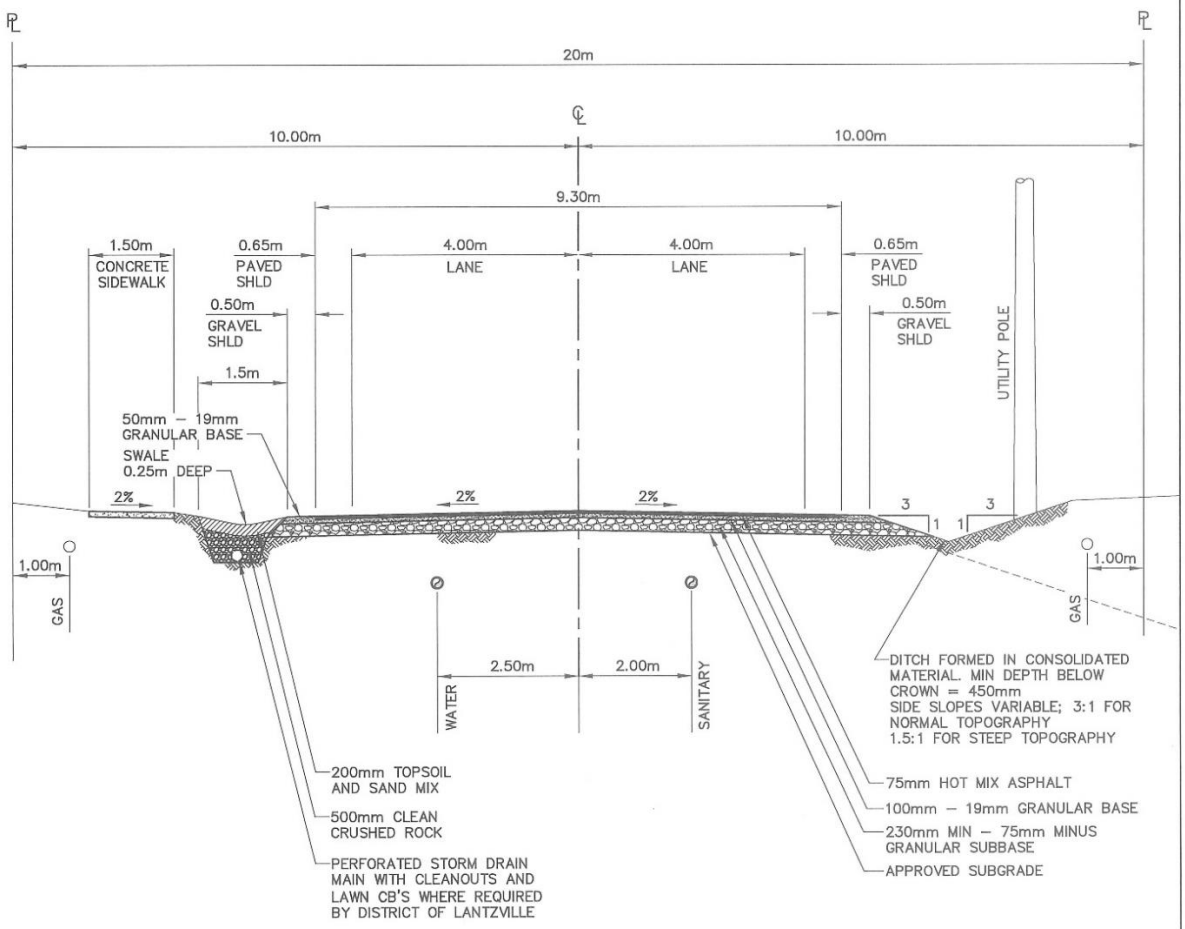
Lantzville Road (Village - Parallel Parking)	Revision Date: 2019	Drawing Number: Village2

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



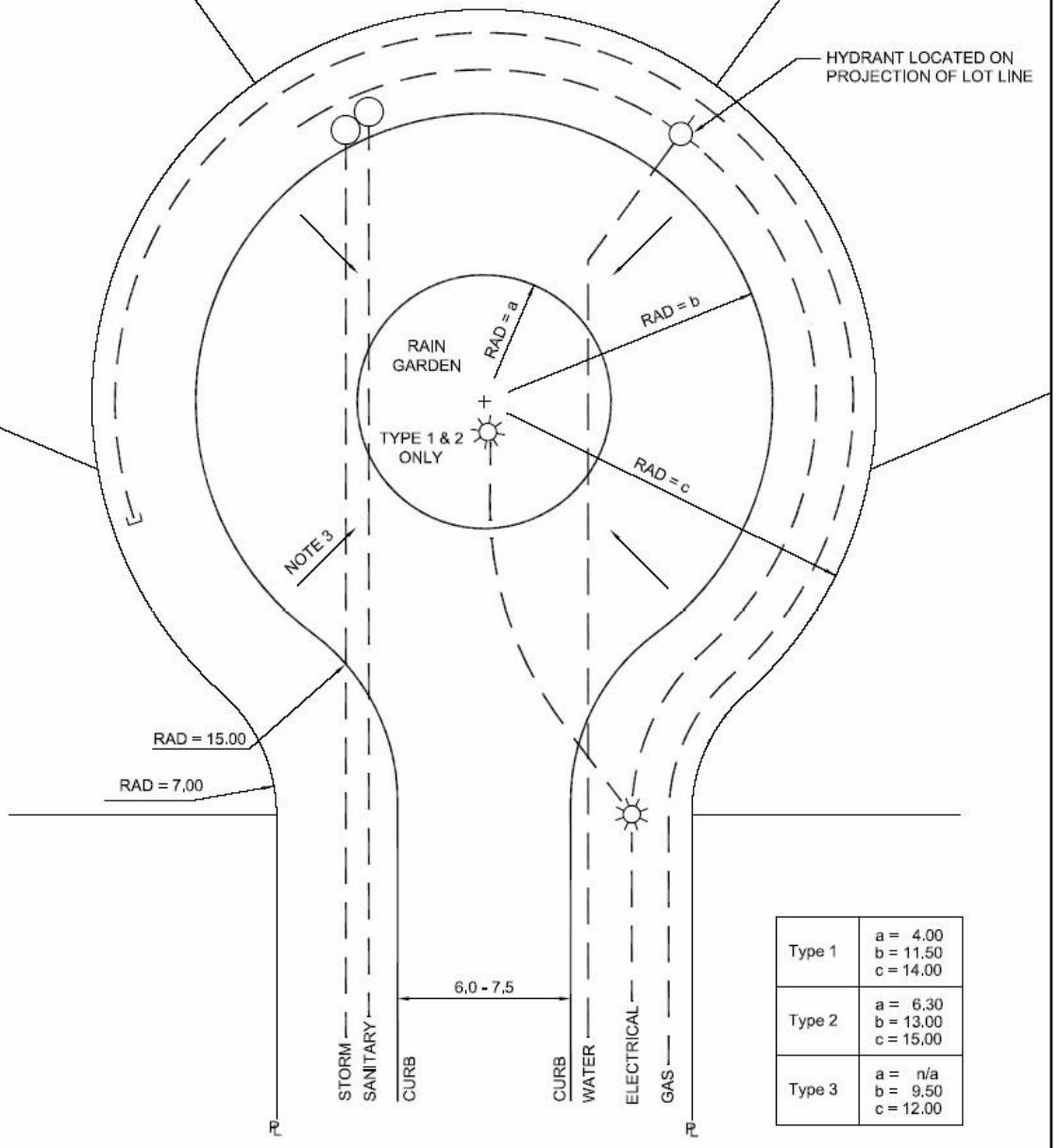
Lantzville Road (Village - Angle Parking)	Revision Date: 2019	Drawing Number: Village3

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	



Industrial Road	Revision Date: 2019	Drawing Number: IND1

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	Page



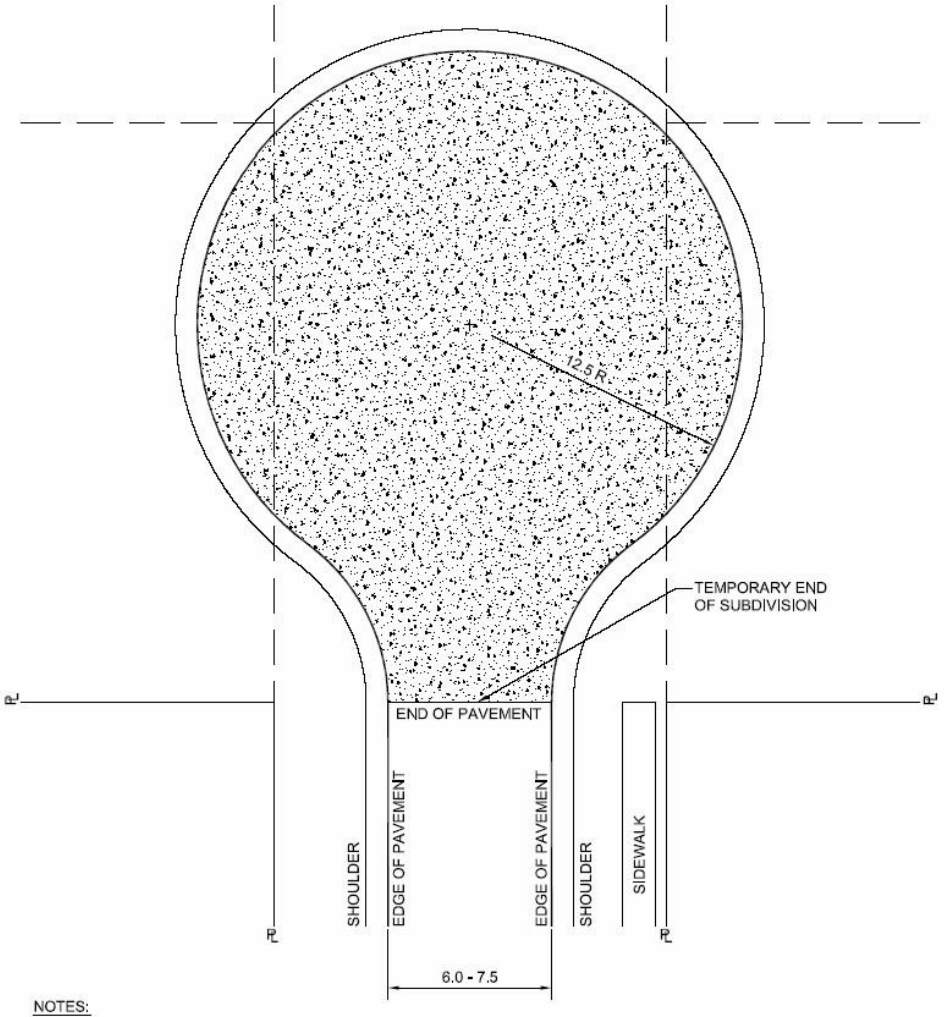
Type 1	a = 4.00 b = 11.50 c = 14.00
Type 2	a = 6.30 b = 13.00 c = 15.00
Type 3	a = n/a b = 9.50 c = 12.00

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE
2. SEE STD DETAIL DRAWING R7 FOR UTILITY OFFSETS
3. SLOPE SURFACE TO RAIN GARDEN, TYPES 1 & 2 ONLY

Cul de Sac	Revision Date: 2005	Drawing Number: R9SS

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	Page

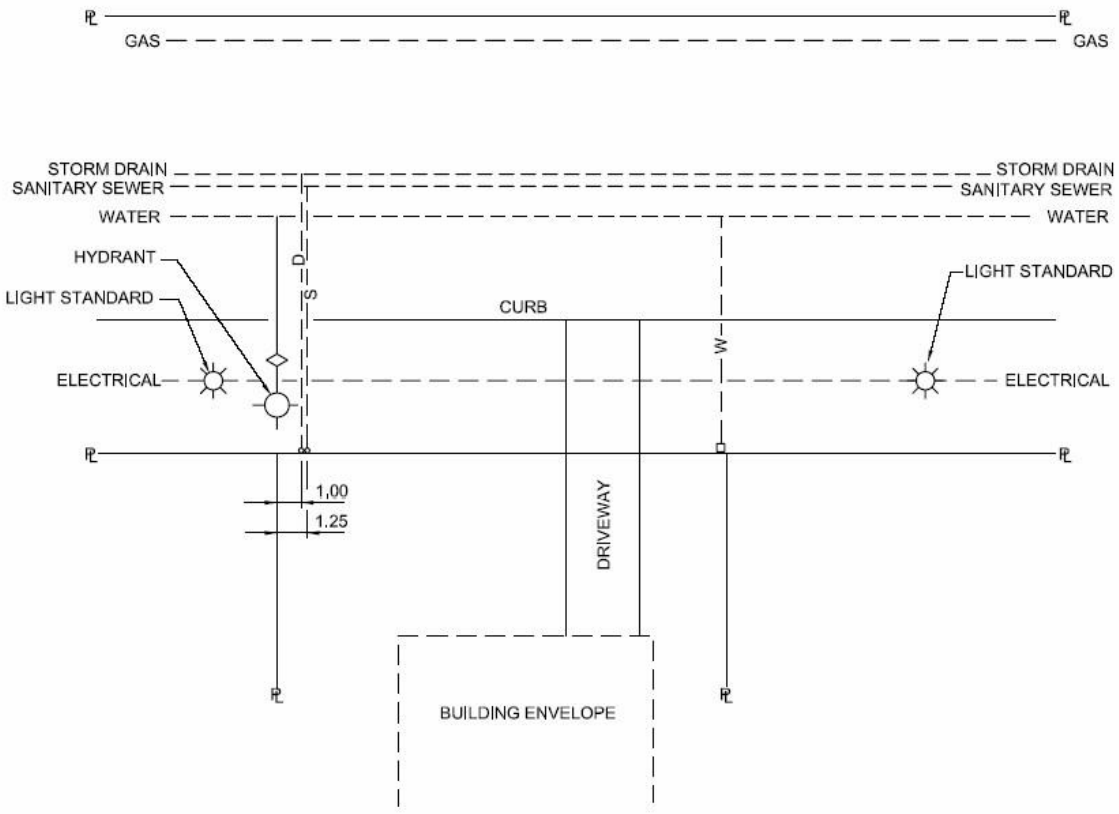


NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

Temporary Gravel Turn - Around	Revision Date: 2005	Drawing Number: R10SS

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	Page

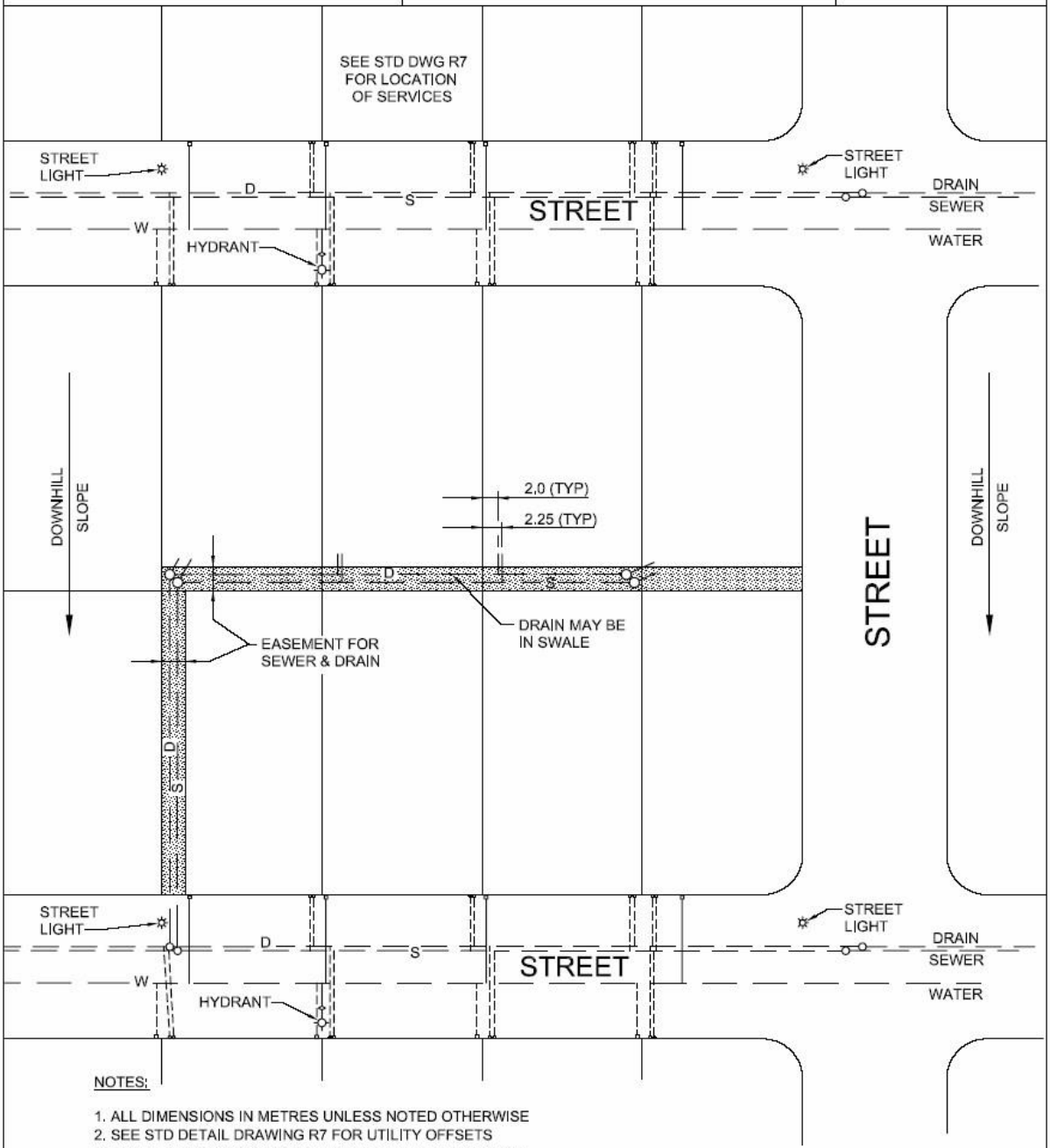


NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE
2. SEE STD DETAIL DRAWING R7 FOR UTILITY OFFSETS
3. TREES TO BE LOCATED BY D.O.L. ON OPPOSITE SIDE OF UTILITIES AS DRIVEWAY
4. SEWER AND DRAIN CONNECTIONS TO BE LOCATED AT LOWEST LOT CORNER

Service Locations	Revision Date: 2005	Drawing Number: R11SS

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	Page

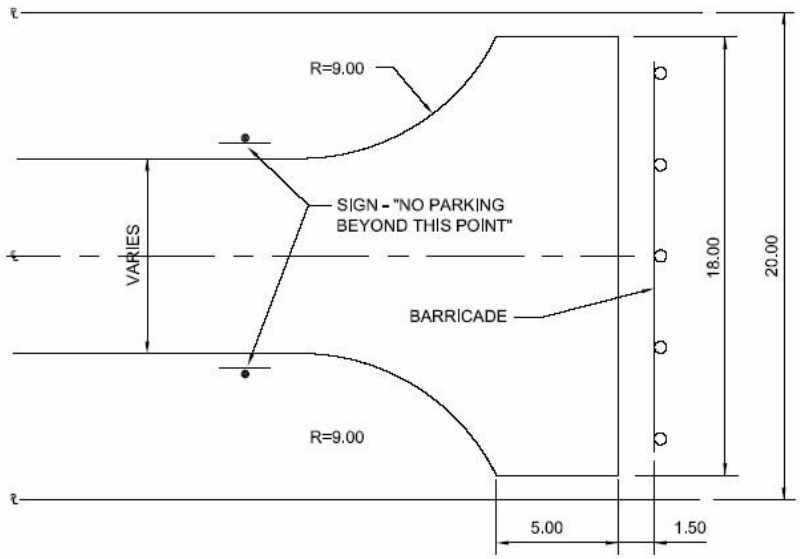


NOTES:

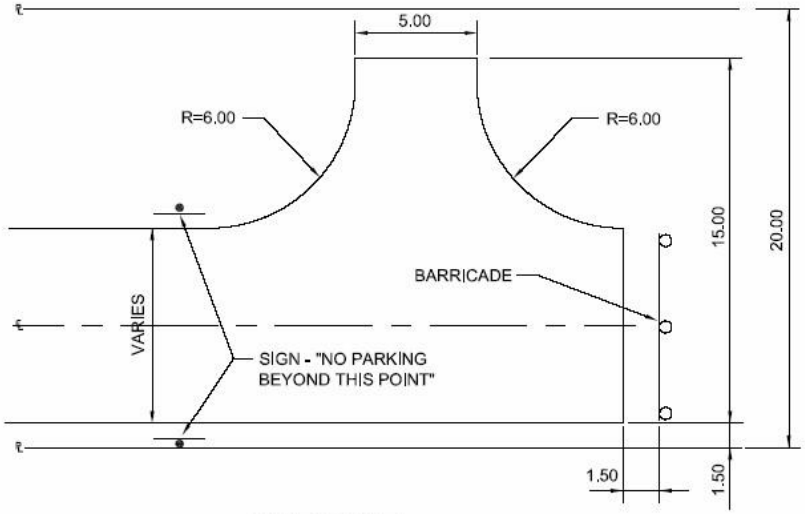
1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE
2. SEE STD DETAIL DRAWING R7 FOR UTILITY OFFSETS
4. REAR LOT SERVICING TO BE AVOIDED WHERE POSSIBLE

Preferred Locations of Building Services	Revision Date: 2005	Drawing Number: R12SS

District of Lantzville Engineering Specifications	SUPPLEMENTAL STANDARD DETAIL DRAWINGS	Page



HAMMERHEAD TYPE



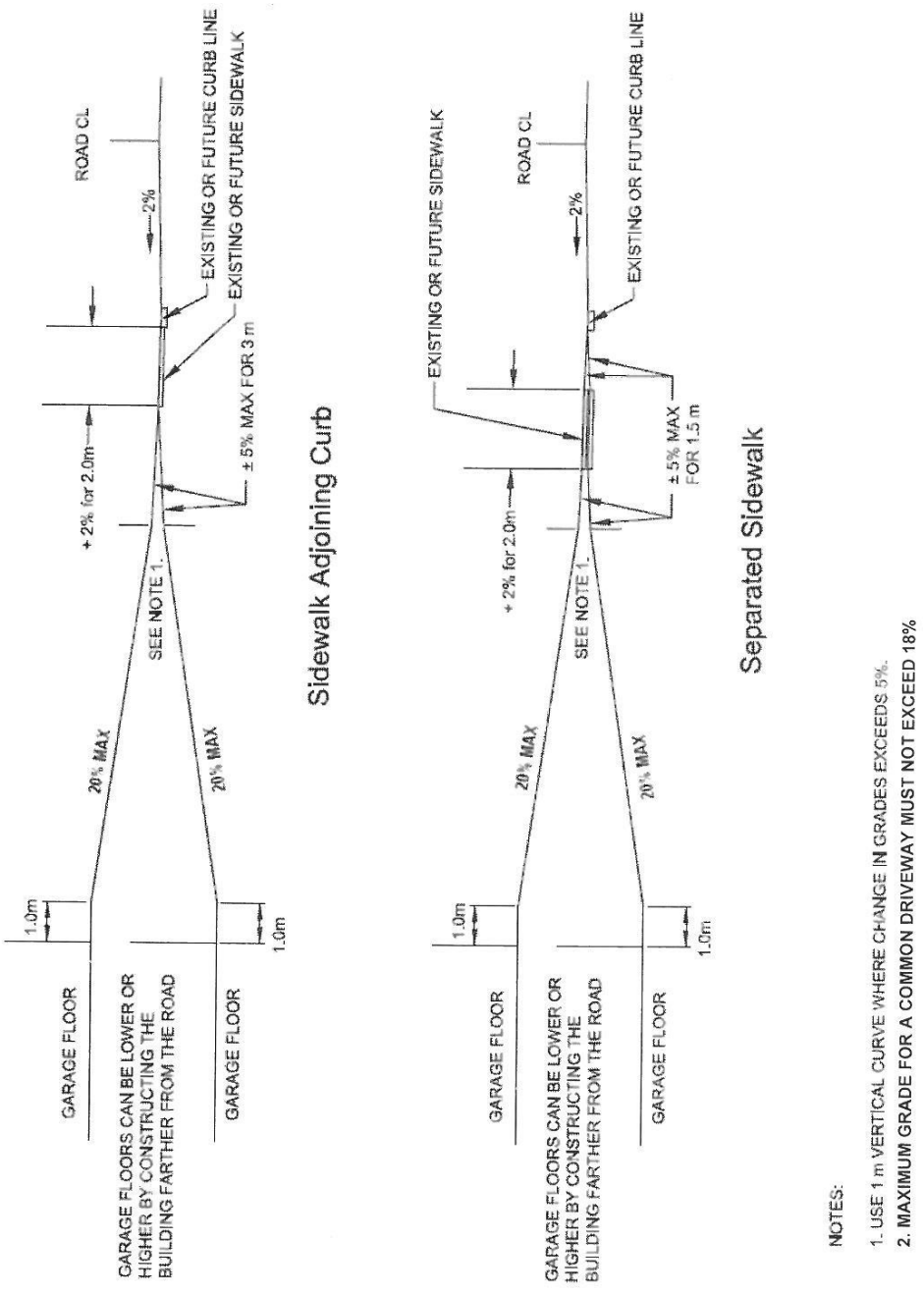
TEE TYPE

NOTES:

1. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE

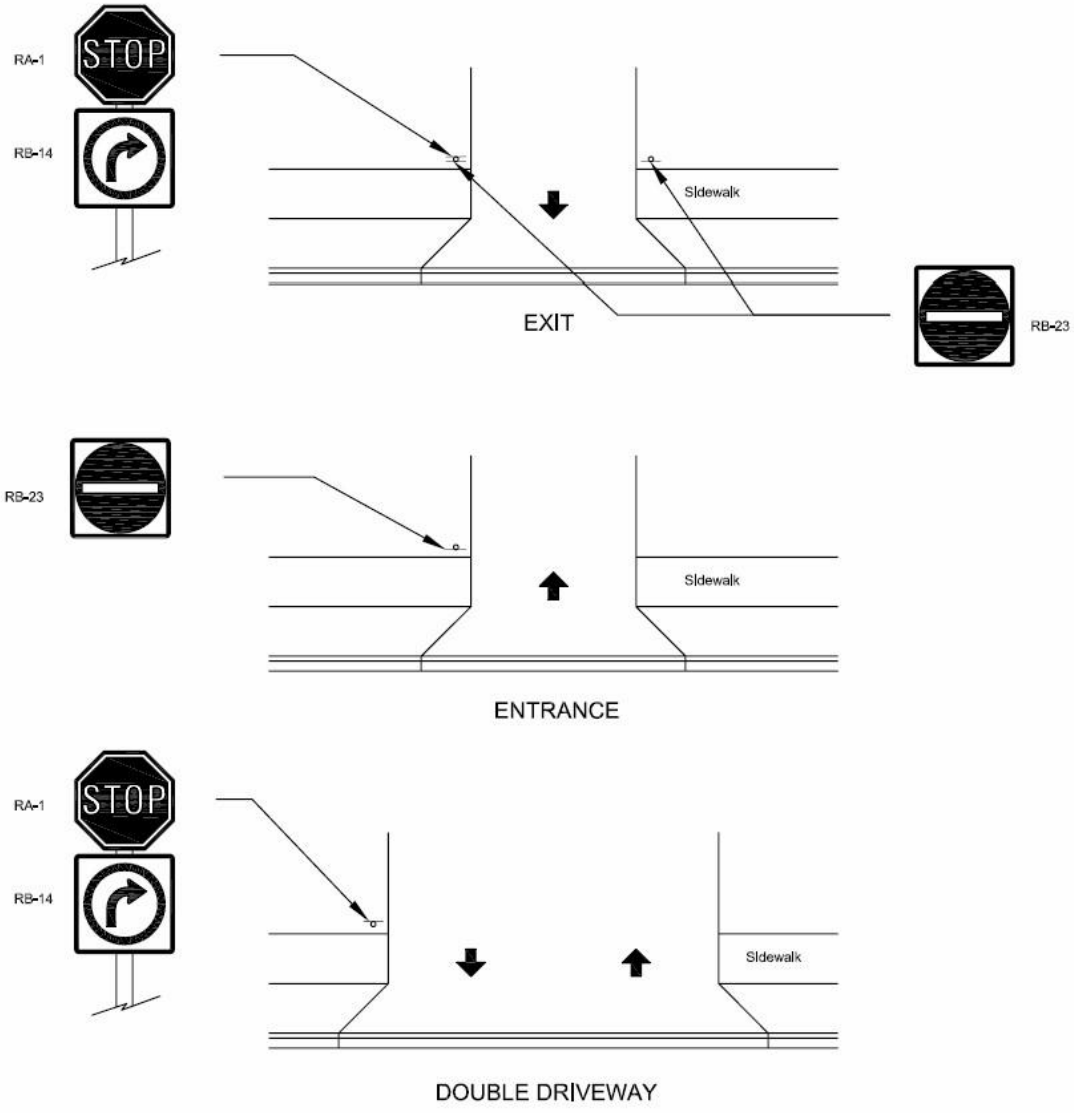
Turn Arounds	Revision Date: 2005	Drawing Number: R13SS

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



Driveway Grades	Revision Date: 2005	Drawing Number: R14SS

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



NOTES;
1. ALL SIGNS TO CONFORM TO "*UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA*" , IN SIZE, SHAPE, COLOUR AND REFLECTORIZATION.

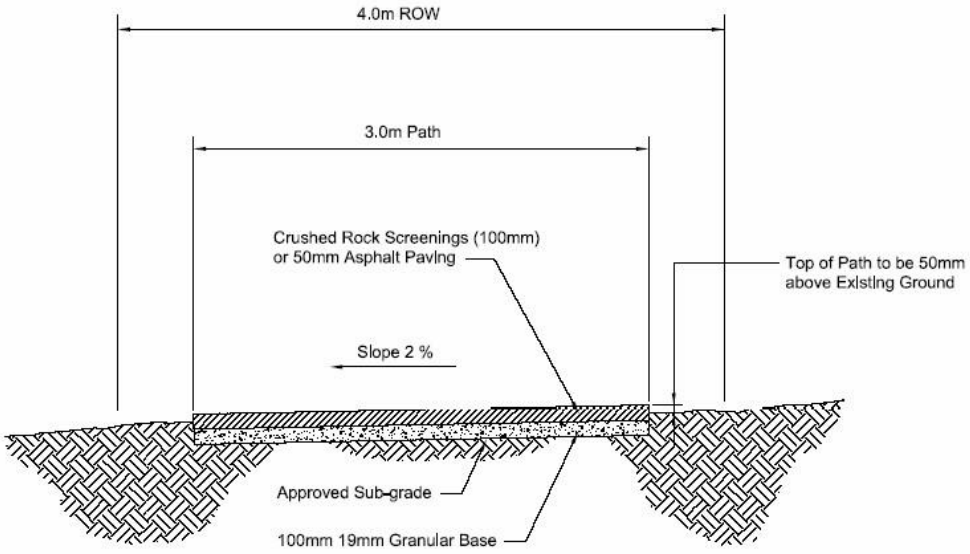
2. ALL SIGNS TO BE FABRICATED ON SHEET ALUMINUM, MOUNTED ON 50mm I.D. GALVANIZED POSTS, AND ANCHORED IN CONCRETE BASE AS PER MUNICIPAL SIGNING PRACTICES.

3. SIGN CORNERS TO BE ROUNDED.

4. BOTTOM OF SIGN TO BE 2.2m ABOVE GRADE.

Driveway Signage - Commercial or Multi-Family Developments	Revision Date: 2005	Drawing Number: R15SS

District of Lantzville Engineering Specifications	DESIGN SPECIFICATIONS DETAIL DRAWINGS	Page



Multi Use Trail	Revision Date: 2005	Drawing Number: R 16SS