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TOWN OF COMOX

BYLAW NO. 733

A BYLAW OF THE TOWN OF COMOX TO REGULATE THE SUBDIVISION OF LAND

PLEASE NOTE: THIS IS A CONSOLIDATED BYLAW PREPARED FOR CONVENIENCE ONLY AND IS NOT A CERTIFED COPY

WHEREAS Section 729 of the Municipal Act, being Chapter 290 of the Revised Statutes of British Columbia, 1979, provide that Council may be bylaw regulate the subdivision of land;

NOW THEREFORE the Council of the Town of Comox in open meeting assembled enacts as follows

PART 1 INTERPRETATION

1.01 TITLE:

This Bylaw may be cited for as "Comox Subdivision Bylaw, 1983"

1.02 PURPOSE:

The purpose of this bylaw is to permit phased and orderly development of land within the Municipality in accordance with the policies established by an Official Community Plan and is intended to provide for the economic and efficient development of the land.

1.03 APPLICATION:

This bylaw is applicable to all lands within the boundaries of the municipality.

1.04 DEFINITIONS:

In this bylaw, unless the context otherwise require,

"Applicant" means a person applying for the approval of a subdivision whether as an owner of the property proposed to be subdivided or an the agent of the owner;

"Approval" means approval in writing from the authority having jurisdiction;

"Approving Officer" means approving officer designated as such pursuant to the Land Titles Act or the Condominium Act;

"Continuous street frontage" means the distance between centre lines of two street intersections on a single side of the street;

"Controlled access highway" means a highway, the access to which is controlled by Provincial regulation or Municipal bylaw.

"Council" means the Council of the Town of Comox.

"Engineer" means the Municipal Engineer of the Town of Comox, the Public Works Superintendent, or his duly appointed representatives.

"Frontage" means that side of a lot boundary which immediately adjoins a highway, other than a land or walkway, and where two or more sides of a lot adjoin a highway, other than a land or walkway, and where two or more sides of a lot adjoin a highway, only one side being the shortest side shall be considered as frontage;

"Highway" includes a public street, path, walkway, trail, road, bridge, viaduct and any other way open to the use of the public, but does not include a private right-of-way on private property.

"Lane" means a highway more than 3 meters but less than 10 meters in width intended to provide secondary access to parcels of land.

"Lot" means a parcel of land registered in Land Titles Office;

"Lot area" means the area of land within the boundaries of the lot but excludes the area equivalent to the width of the panhandle by the length of the panhandle;

"Lot depth" means the shortest distance measured between front and rear lot lines of the lot;

"Municipality" means the municipality of the Town of Comox;

"Panhandle" means a narrow strip of land which as an integral part of a parcel provides frontege to a highway;

"Parcel" see "lot";

"Site area" means the same as lot area where only one lot is involved and means the total horizontal area within the lot lines of all the lots to be covered by a use. In the case of a strata title lot, site area shall mean the area of the parent lot prior to the creation of strata lots;

"Strata lots" means a strata lot as defined by the Condominium Act and amendments thereto, of the Province of British Columbia;

"Subdivision" means the division of land into two or more parcels, whether by plan, apt descriptive works, or otherwise, except that the works "subdivision plan" shall also be deemed to include a plan consolidating two or more parcels into a single plan;

"Town" means the Town of Comox;

Unless otherwise defined herein, any work or expression in this bylaw shall have the same meaning as any similar word or expression in the Land Titles Act.

VI SUBDIVISION DESIGN AND LAYOUT

6.01 AREA, FRONTAGE AND DEPTH REQUIREMENTS

The minimum lot depth for any single family, duplex or mobile home lot shall be 30 meters unless such parcels back onto designated municipal arterial roads in which case the minimum lot depth shall be 45 meters. **(#1062 - Feb. 17/93)**

Zone	Designation	Lot Area	Lot Frontage
R-1	Residential Zone-One	650 m2	21m
R-2	Residential Zone-Two	900 m2	21m

RM-1	Residential Multiple Zone-One	900 m2	30m
RM-2	Residential Multiple zone-Two	1900 m2	30m
MPRM-1	Marina Plaza Residential Multiple Zone-One	4050 m2	30m
MPRM-2	Marina Plaza Residential Multiple Zone-Two	2025 m2	30m
C-1	Commercial Zone-One	550 m2	15m
C-2	Commercial Zone-Two	550 m2	18m
C-3	Commercial Zone-Three	900 m2	18m
C-4	Commercial Zone-Four	900 m2	37m
C-6	Commercial Zone-Six	900 m2	30m
C-7	Commercial Zone-Seven	550 m2	15m
I-1	Industrial Zone-One	900 m2	30m
PA-1	Public Assembly Zone-One	750 m2	18m
PA-2	Public Assembly Zone-Two	900 m2	30m
MH-2	Mobile Home Zone-Two	465 m2	15m

(#945 - Dec. 12/89)

(2) Notwithstanding the provisions of Section 6.01 (1), the minimum frontage may be reduced for lots on a road curve with a radius of 80 meters or less subject to the required frontage being attained at the required front yard setback as set by the applicable zoning bylaw. In the event the width at this point is less than that required, the provisions of Section 731 of the Municipal Act will apply.

(3) The Approving Officer shall not approve parcels where the total length of line lines abutting highways is less than one-tenth of the total perimeter of the parcel.

(4) The Council may, by affirmative vote of at least two thirds of its members, exempt an applicant from the limitations of Section 6.01 (3). Where Council has exempted an applicant from such limitations and has delegated its powers under Section 731 (3) of the Municipal Act, the Approving Officer may permit panhandle lots provided that:

(a) The area and width of the panhandle strip be excluded from calculations when determining the minimum lot area and average width; and

(b) Minimum frontage for a single family lot is not less than 6 meters except where panhandle strips of two lots are adjacent in which case the minimum frontage may be reduced to 4.5 meters providing a reciprocal right-of-way is registered with the final plan of subdivision.

6.02 STRATA SUBDIVISION

(1) No minimum lot size shall apply where a parcel or a portion of a parcel is zoned Mobile Home Park, Residential Zone Two (R-2), Residential Multiple, or Commercial Zone One, Two or Three (C-1), (C-2), (C-3), as established by applicable zoning regulations and parcel is proposed for strata title subdivision plan under the Condominium Act and the number of lots is equal to our less than the density permitted in the Mobile Home Park, Residential Zone Two, Residential Multiple and Commercial Zones One, Two and Three zoning provisions respectively.

(2) No minimum lot size shall apply where a parcel is proposed for a strata title subdivision plan under the Condominium Act and the number of proposed lots is equal to or less than the density permitted by the minimum lot size requirement as established by other provisions of this bylaw.

(3) Where a strata plan is not a bare-land strata plan, the Approving Officer shall be the Council of the Town of Comox.

6.03 DESIGN AND LAYOUT REQUIREMENTS

(1) Every parcel to be created shall abut on a street.

(2) Parcels that abut a street at both the front and rear shall not be permitted unless, in the opinion of the Approving Officer, such an arrangement is essential:

(a) to provide access to other parcels

(b) to provide a coherent arrangement of streets

(c) to complement a future pattern of subdivision

(d) because one of the streets concerned is e controlled access highway

(e) because one of the streets concerned is a major street.

(3) The side lines of parcels shall be at right angles or radial to the street upon which the proposed parcels abut, unless the contrary be deemed essential by the Approving Officer.

(4) The Approving Officer shall:

(a) consider the sufficiency of the proposed streets as they relate to the configuration of the land, the present and future use of adjacent land, existing and planned streets, lanes and walkways, the likely nature of the use of the proposed streets and any local circumstance;

(b) require that proposed parcels which are adjacent to controlled access highways be served by local or collector streets having localized points of access to such highway, unless this is neither desirable nor feasible;

(c) ensure that necessary and reasonable access be provided to all new parcels and through the land to be subdivided to lands lying adjacent and beyond.

(5) The Approving Officer shall ensure that:

(a) streets are arranged to provide for efficient gravity drainage as far as topography permits;

(b) no junction or intersection of highways is designed so as to create an undue hazard to traffic;

(c) no more intersections of highways be created than are necessary to provide adequate access to parcels in the land to be subdivided and to adjacent lands, or are necessary to implement any applicable municipal plan;

(d) the maximum highway grade within a 30 meter radius of the intersection of the centre lines of intersecting streets is 5%;

(e) major streets are arranged as far as possible without jogs or sharp changes in alignment;

(f) the centre lines of intersecting streets meet at a single point;

(g) no intersection is located within 61 meters of any other intersection, measured from the points of intersection of their centre lines;

(h) reversed curbs in street alignment are separated by tangents and may require the replacement of sharp changes in alignment of major streets with tangents or a series of small changes in alignment;

(i) local streets are arranged as far as possible to discourage their use by through traffic;

(j) wherever possible, streets intersect at right angles, and in no case at an angle less than 70 degrees; and that this angle is maintained for a distance of at least 39 meters measured from the centre point of the intersection, unless in his opinion compliance would be impractical;

(o) where lands to be subdivided border the shore of any navigable water, access to such water shall be given by sufficient highways situated at distances not greater than 200 meters between highway centre lines;

(p) where lands to be subdivided have an impact on Brooklyn Creek, the recommendations of the Federal Department of Fisheries and Oceans and the Provincial Fish and Wildlife are obtained before granting approval.

(q) where lands to be subdivided are traversed by Brooklyn Creek, a minimum leave-strip of seven meters from the bank of the creek be dedicated to be left in a natural, undisturbed state.

(6) The Minister of Highways may, upon application supported by statutory declaration, grant relief, either wholly or in part, from a strict compliance with the provisions of Section 6.02 (5) (o).

(7) The Approving Officer shall ensure that lanes not less than 6.1 meters in width be provided in every case where, in his opinion, they are necessary.

(8) Street rights-of-way shall be determined by the nature of the road as expressed on the Official Community Plan or Council approved local area plan and shall be of the following width and grade:

(a) arterial streets shall be at least 25 meters in width with a maximum permissible grade of 8%; **(#989 - Jan 9/91)**

(b) major collector streets shall be at least 20 meters in width with a maximum permissible grade of 8%;

(c) local and cul-de-sac streets shall be at least 15 meters in width with a maximum permissible grade of 12%, or as permitted at the discretion of the

Approving Officer.

The minimum lot depth for any single family, duplex or mobile home lot shall be 30 meters unless such parcels back onto designated municipal arterial roads in which case the minimum lot depth shall be 45 meters. **(#1082 - Feb. 17/93)**

PART VIII PUBLIC OPEN SPACE

8.01

(2) Where land being subdivided adjoins a river, stream or other body of wster, the Approving Officer, as a condition of approving the subdivision, may require the dedication, without compensation, or a strip of land not exceeding 7 meters in width along the bank or shore to provide public access, if he believe it is in the public interest to do so.

PART X REPEALMENT

10.01 Bylaw no. 512 and all amendments thereto are hereby repealed.

PART XI ADOPTION

READ A FIRST AND SECOND TIME THIS 5TH DAY OF OCTOBER, 1983

READ A THIRD TIME THIS 4TH DAY OF JANUARY, 1984

RECONSIDERED AND ADOPTED THIS 18TH DAY OF JANUARY, 1984.

TOWN OF COMOX

CONSOLIDATED
SUBDIVISION AND DEVELOPMENT SERVICING BYLAW, 1261

AMENDMENT TRACKING
BYLAW No. 1261 SUBDIVISION and DEVELOPMENT SERVICING

Bylaw No.	Amendment No.	Adopted	Comments
1261		Jan 7, 1998	Comox Subdivision Bylaw, 1997, No. 1261
1294	1	Aug 5,1998	Requirement to provide updated water model prior to water connection
1332	2	Mar 8, 2000	Amended Warrant Deposit specification as 10% instead of 5%
1378	3	Nov 7, 2001	Amendment of Schedule “F” Specifications for Waterworks
1462	4	Nov 2, 2005	Add definition of Crescent St.; Amend Table C-1 specifying sidewalks; Amend Appendix F specifying Waterworks in regard to meters
1507	5	Jun 7, 2006	Road specifications for 471 Butchers Road and changes to underground wiring specifications
1514	6	Jul 5, 2006	On-site services permitted in Butchers Road Area
1528	7	Sep 20, 2006	Variance to storm standard for properties draining into the Anderton storm drain system from 1:10 year to 1:4 year storm during period of storm sewer upgrading
1550	8	Feb 7, 2007	Correction of storm standard
1551	9	Feb 7, 2007	Greenways Network; Pedestrian Connections; Road Standards and Geometric Design; Underground Wiring; Street Tree specifications
1567	10	Aug 15, 2007	Excess Servicing, Rock Pit Detail, Ornamental Street Lighting, Detention-Retention Pond Landscape Standards
1612	11	Jan 20, 2010	Road Standards; Greenway Class I and II; Require water meters in all residential; site specific storm standard
1653	12	Feb 16, 2011	Underground wiring requirements for DPA No. 14
1665	13	Aug 18, 2010	Onsite Servicing for Butchers Road and Point Holmes areas
1959	14	Aug 5, 2020	Permit overhead servicing for 2-lot residential infill subdivisions
1977	15	Oct 20, 2021	Implementation of Northeast Comox Stormwater Management Plan
2017	16	May 17, 2023	PLR Renewal changes to Section 4.7
2015	17	24-Jan-2024	Reduce pavement width requirement and remove requirements for curb, gutter and sidewalk for Cypress Ave. Replace Appendix “C”, Specifications for Highways, Table C-1 (Minimum Requirements, Roadway Widths, Curbs and Sidewalks)

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Explanatory Notes

The primary purpose of the bylaw is to establish standards for works and services which must be installed to serve subdivisions approved under the *Land Title Act*, R.S.B.C. 1996, c. 250 and the Bare Land Strata Regulation (B.C. Reg. 75/78) and building projects.

This bylaw is enacted under Sections 938, 939 and 940 of the *Local Government Act*, R.S.B.C., 1996, c. 323. At the time of adoption of the bylaw, other enactments regulating subdivision and development apply, including the enactments listed below. **(#1567 Aug 15/07)**

1. Part 26 of the *Local Government Act*, **(#1567 Aug 15/07)** governing excess or extended services and latecomer payments, provision of park land, changes to bylaws following an application for subdivision, Highway provision and widening, and relative residence subdivisions.

2. Part 7 of the *Land Title Act*, governing subdivision plan requirements, access requirements, appointment and power of the Approving Officer, subdivision of land subject to flooding, review of subdivision plans, appeals and registration.

3. The *Condominium Act*, R.S.B.C. 1996, c. 64, which regulates strata subdivision, including building strata plans, conversion of existing buildings, bare land strata plans and phasing of strata plans. The Bare Land Strata Regulations (B.C. Reg. 75/78, as amended) establish servicing requirements which include compliance with this bylaw.

4. Numerous other enactments governing special topics relating to subdivision, particular types of subdivision, or subdivision in special areas. These include, among others, the *Agricultural Land Commission Act*, R.S.B.C. 1996, c. 20 (subdivision in the agricultural land reserve), the *Forest Land Reserve Act*, R.S.B.C. 1996, c. 158 (subdivision in the forest land reserve), Part 9 of the *Land Title Act* (air space parcels), the *Real Estate Act*, R.S.B.C. 1996, c. 396 (prospectus requirements), Part 8 of the *Land Title Act* (interior boundary cancellations), the *Land Survey Act*, R.S.B.C. 1996, c. 247, and the *School Act*, R.S.B.C. 1996, c. 412 (school land acquisition).

5. The Town's building regulation bylaws under Part 21 of the *Municipal Act*.

The definitions in the *Interpretation Act* and the *Local Government Act* **(#1567 Aug 15/07)** and the rules in the *Interpretation Act* apply to this bylaw.

TOWN OF COMOX

BYLAW NO. 1261

A Bylaw for Regulating the Subdivision and Development of Land

The Council of the Town of Comox, in open meeting assembled, enacts as follows:

1.0 Title

1.1 This bylaw may be cited as "Town of Comox Subdivision and Development Servicing Bylaw, 1261".**(#1551 Feb 7/07)**

2.0 Applicability

2.1 This bylaw applies to all lands within the area incorporated as the Town of Comox.

30 Interpretation

3.1 **Severability**

If any section, subsection, clause, sub-clause or phrase of this bylaw is for any reason held to be invalid by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this bylaw.

3.2 **Units of Measure**

The equivalent Imperial units of measure shown in parentheses after metric units are for information purposes only and do not form part of this bylaw.

3.3 **Definitions**

In this bylaw

"**Administrator**" means the Administrator of the Town of Comox who is appointed by Council as such, and includes his or her lawful deputy.

"**Approving Officer**" means the person who is appointed by Council as such under the *Land Title Act*, and includes his or her lawful deputy,

"**Arterial Highway**" means a Highway, designated as such on Schedule C.1,

"Baffles" mean porous barriers installed inside a temporary sediment trap, rock dam, skimmer basin, or sediment basin to reduce the velocity and turbulence of the water flowing through the measure, and facilitate the settling of sediment from the water before discharge. **(#1567 Aug 15/07)**

"**Benefitting Lands**" means any lands identified as such in a Latecomer Agreement. **(#1567 Aug 15/07)**

"**Building Inspector**" means the person who is appointed by Council as such under the Town's building regulation bylaw, and includes his or her lawful deputy,

"**Certificate of Substantial Performance**" means a certificate issued by the Administrator indicating that Substantial Performance of the Works and Services has been achieved,

"**Certificate of Total Performance**" means a certificate issued by the Administrator indicating that Total Performance of the Works and Services has been achieved,

"**Collector Street, Class I or Class II**", as applicable, means a street so designated by Council in the Official Community Plan or otherwise, and includes a continuation of such a street or creation of a new such street under this bylaw as a condition of Subdivision or Development,

"**Completion**" in relation to Excess or Extended Services, means the date of delivery to the Public Works Superintendent of the written statement provided by the Consulting Engineer and referred to in Section 18.4. **(#1567 Aug 15/07)**

"**Consulting Engineer**" means a professional engineer who is a member of the Association of Professional Engineers and Geoscientists of the Province of British Columbia practicing in the consulting engineering industry with a declared area of practice in civil or geotechnical engineering and trained and experienced in designing and overseeing the construction of subdivision and development infrastructure. **(#1977 Oct 20/21)**

"Crescent Street" means a street with only two intersections, one at its starting point and one at its terminus, where both intersections are with the same street. **(#1462 Nov 2/05)**

"**Cul-de-Sac Street**" means a Street which terminates with a vehicular turning area,

"Detention Pond" means a low lying area that is designed to temporarily hold a set amount of water while slowly draining to another location. **(#1567 Aug 15/07)**

"**Develop**" means to construct, erect or place a building or structure on a parcel of land, in respect of which building or structure the owner of the parcel is required to obtain a building permit under the Town's building regulation bylaw,

"**Excess or Extended Services**" has the meaning set out in section 939(1) of the *Local Government Act*, **(#1567 Aug 15/07)**

"**Frontage**" means the length of a Parcel boundary that immediately adjoins a Highway other than a Lane or a Walkway. **(#1567 Aug 15/07)**

"**Frontage Street**" means a street which is parallel and adjacent to an Arterial Highway and which provides access to abutting properties,

"Greenways Network- Adjacent to Local Street" means a Highway shown on Map C-1 intended to carry pedestrian and non-motorized traffic only, except that a Greenways Network-Adjacent to Local Street may be designed to afford emergency vehicle use. **(#1551 Feb 7/07)**

"Greenways Network-Dedicated Walkway" means a Highway shown on Map C-2 intended to carry pedestrian and non-motorized traffic only, except that a Greenways Network-Dedicated Walkway may be designed to afford emergency vehicle use. **(#1551 Feb 7/07)**

"**Highway**" includes a boulevard, street, road, lane, walkways, greenway roads, sidewalk, bridge, viaduct, retaining wall, curb and gutters, traffic signals, boulevard crossing, transit bay, street lighting, underground wiring, bicycle trails or other trails required under Schedule C of this bylaw and any other way open to public use, but does not include a private right of way on private property,

"**Lane**" means a Highway more than 3 metres but not greater than 8 metres in width, intended to provide secondary access to Parcels of land, but a Lane is not a partial Street,

"**Latecomer**" means an Owner of Benefitting Lands,

"**Latecomer Agreement**" means an agreement under Section 939 of the *Local Government Act*. **(#1567 Aug 15/07)**

"**Latecomer Charge**" means the charge imposed under Section 18.8 of this Bylaw **(#1567 Aug 15/07)**

"**Latecomer Factor**" definition deleted **(#1567 Aug 15/07)**

"**Local Street, Class I or Class II**", as applicable, means a Street so designated by Council in the Official Community Plan or otherwise, and include a continuation of such a street or creation of a new such street under this bylaw as a condition of Subdivision or Development,

"Municipal Engineer" means the person appointed to the position of Director of Operations by the Council. **(#1977 Oct 20/21)**

"**Owner**" in respect of real property means the registered owner of an estate in fee simple, and includes

(a) the tenant for life under a registered life estate,

(b) the registered holder of the last registered agreement for sale,

(c) the holder or occupier of land held in the manner mentioned in Sections 356 and 357 of the *Local Government Act*, **(#1567 Aug 15/07)**

"**Panhandle Parcel**" means a Parcel which has a Frontage that comprises less than

(a) 10 percent of the Parcel's perimeter, or

(b) the Frontage required under the Town's zoning bylaw,

and incorporates a strip of land which provides the principal vehicular access between the balance of the Parcel and a Highway,

"**Parcel**" means any lot, block, or other area in which land is held or into which land is subdivided but does not include a Highway,

"**Parcel Width**" means the horizontal distance between side Parcel lines measured at right angles to the Parcel depth and six metres from the front Parcel line,

"Pedestrian Connection" means a Highway intended to carry pedestrian and non-motorized traffic only, except that a Pedestrian Connection may be designed to afford emergency vehicle use. **(#1551 Feb 7/07)**

"**Public Utility**" means any public or private system having facilities installed in a Highway or right of way for the purpose of providing a service to property, including water distribution, sewage and drainage collection, street lighting, electric power distribution, telephone, postal services, cable television, and gas distribution systems,

"Residential Zone" means a zone listed as such in s. 4.1 of Comox Zoning Bylaw 1850 and, for certainty, does not include any multi-family residential zone. **(#1977 Oct 20/21)**

"Retention Pond" means a storm water management pond designed to hold a specific amount of water indefinitely. **(#1567 Aug 15/07)**

"**Roadway**" means the portion of a Street that is improved, designed or used for vehicular or bicycle traffic or parking,

"**Security**" means a cash deposit, or unconditional irrevocable letter of credit issued by a Canadian Chartered Bank or Credit Union, to ensure the completion and warranty of Works and Services required by this bylaw,

"**Service Level**" means the standard of services required for Subdivisions or Development,

"**Servicing Agreement**" means an agreement in a form prescribed from time to time by the Approving Officer for the purposes of s. 509(2) of the Local Government Act. **(#1977 Oct 20/21)**

"**Street**" means a Highway that is not a Lane which affords a means of access to Parcels,

"**Subdivision**" means

(a) the division of land into two or more Parcels whether by plan, apt descriptive words, or otherwise, but excludes a strata plan which is not a bare land strata plan unless there is only one strata lot created in a building,
(b) the consolidation of Parcels into one Parcel by plan,

(c) the creation of a Highway or a portion of a Highway by plan,

but does not include the creation of a strata lot wholly within a building unless there is only one strata lot in the building,

"**Subdivision Approval**" means the execution of a Subdivision plan by the Approving Officer,

"**Substantial Performance**" means the stage of the design, construction and installation of Works and Services, as certified by the Administrator, when

(a) the Works and Services are ready for use or are being used for their intended purpose, and

(b) the total of the incomplete, defective and deficient Works and Services can be completed at a cost estimated by the Administrator of no more than three per cent of the cost of the Works and Services previously estimated by the Consulting Engineer,

"**Surveyor**" means a land surveyor licensed and registered as a land surveyor in the Province of British Columbia,

"**Total Performance**" means the stage of the design, construction and installation of Works and Services when all the Works and Services, including correction of all deficiencies but excluding any correction of deficiencies in completed Works and Services the need for which appears during the Maintenance Period, has been performed as required by this bylaw, as certified by the Administrator,

"Walkway" definition deleted **(#1551 Feb 7/07)**

"**Watercourse**" means any natural drainage course or source of water, whether containing water or not, and includes any lake, river, stream, creek, spring, ravine, swamp, gulch, or source of ground water, whether open or enclosed,

"**Works and Services**" means the Roadways, Walkways, sewage disposal, drainage, water and sewer systems, boulevards, street lighting, underground wiring and natural gas and all other works required to be provided for in this bylaw.

3.4 Unless otherwise defined herein or in the *Local Government Act* or the *Interpretation Act*, any word or expression in this bylaw shall have the meaning assigned to it in the *Land Title Act*. **(#1567 Aug 15/07)**

4.0 Preliminary Layout Review Information

4.1 Prior to submitting an application for Subdivision Approval the Owner must submit to the Approving Officer a completed document substantially in the form of Schedule A.1 entitled "Preliminary Layout Review Information".

4.2 The Schedule A.1 document referred to in section 4.1 must be accompanied by the Preliminary Layout Review fee prescribed by Development Application Procedures Bylaw, 1996, No. 1206.

4.3 The Approving Officer may require the Owner who submits the Schedule A.1 document to furnish the following information in addition to the information required in Schedule A.1:

such topographic, geotechnical and hydrological information as the Approving Officer may require; and

such additional information, including information respecting the natural environment, as may be required to ascertain the public interest and determine the suitability of the area

for subdivision or the suitability of the size, shape and orientation of the Parcels proposed.

4.4 If, after receipt of a Schedule A.1 form in respect of a Parcel, the Approving Officer does not issue a letter under section 4.5 within 6 months of the receipt, as a result of the failure of the Owner to provide items required under section 4.2 or 4.3, the Owner must submit a new Schedule A.1 form and fee before the Approving Officer further considers whether to issue a letter under section 4.5.

4.5 Subject to section 4.4, the Approving Officer must, in writing,

(a) suggest revisions to the layout and other conditions that would assist the Owner to apply for Subdivision Approval, or

(b) indicate that

(i) the proposed layout is not acceptable for submission with an application for Subdivision Approval; or

(ii) the proposed layout is acceptable for submission for Subdivision Approval, subject to satisfaction of such revisions and conditions as the Approving Officer may specify.

4.6 Receipt of the Preliminary Layout Approval Information by the Approving Officer

(a) does not exempt the Owner from applying for and securing Subdivision Approval under this bylaw prior to the deposit of the subdivision plan in the Land Title Office,

(b) does not bind the Approving Officer to grant Subdivision Approval,

(c) is subject to all Town bylaws and Town plans governing the proposed Subdivision, and

(d) is not receipt or acceptance of an application for Subdivision Approval, which application is made under section 5.0.

4.7 A letter issued by the Approving Officer under section 4.5(b)(ii)

(a) is valid for one year from the date of issuance, and

(b) may be renewed not more than twice, upon written application of the Owner and payment of the Preliminary Layout Renewal fee prescribed by Comox Planning Procedures Bylaw 1780, so as to be valid for not more than three years in total, and shall not be further renewed unless the Owner first submits a new form under section 4.1 and, other fee under section 4.2. **(#2017 May 17/23)**

5.0 Application for Subdivision Approval

5.1 Every application for Subdivision Approval must be made by the registered Owner or his agent authorized in writing.

5.2 An application for Subdivision Approval must be tendered, for examination and approval by the Approving Officer, to the Clerk and must

(a) be accompanied by

(i) a completed written application substantially in the form of Schedule A.2,

(ii) any application fee prescribed by Development Application Procedures Bylaw, 1996, No. 1206,

(iii) Subdivision plans prepared in accordance with the requirements of applicable provincial enactments,

(iv) a certificate that all taxes assessed and rates, charges, and fees imposed on the subdivided land have been paid, and where local improvement and utility taxes, rates or assessments are payable by installments, that all installments owing at the date of the certificate have been paid,

(v) a letter under section 4.5(b)(ii) that was issued or renewed by the Approving Officer not more than ninety days prior to the application for Subdivision Approval,

(vi) a completed Owner/Professional Engineer Services Agreement in the form of Schedule B.2, and

(vii) any other items specified by the *Land Title Act* or the *Condominium Act* or regulations under those Acts, and

(b) be signed by the Owner, or the Owner's agent authorized in writing by the Owner.

5.3 A Subdivision application fee is not refundable.

6.0 Inspections

6.1 The Administrator and the Approving Officer and all Town employees supervised by them, the Clerk, Building Inspector, Municipal Planner, Land Agent and any person Council designates to act in the place of an authorized officer, may enter at all reasonable times on any property that is subject to the directions in this bylaw, to ascertain whether the requirements of the bylaw are being met and the regulations in the bylaw are being observed.

7.0 Offences and Penalties

7.1 No person may prevent or obstruct, or attempt to prevent or obstruct, the entry of officials authorized under section 6.1 upon any property as authorized by this bylaw.

7.2 (a) Every person who violates a provision of this bylaw commits an offence and is liable on summary conviction to a penalty not exceeding ten thousand dollars ($10,000.00) and costs of prosecution.

(b) The penalties imposed under this subsection supplement and are not a substitute for any other remedy to an infraction of this bylaw.

8.0 General Requirements

8.1 No Parcel may be

(a) Subdivided, or

(b) Developed

unless the Subdivision or Development complies with the requirements set out in this bylaw, including the servicing standards prescribed in Schedule C, and in the case of development not involving a subdivision a reference in Schedule C to subdivision shall be interpreted as a reference to development.

8.2 Without limiting section 8.1, a Highway proposed to be dedicated by a plan of Subdivision must not be shown on the plan, dedicated, laid out or constructed unless the dimensions, location, alignment and gradient meet the requirements for Highways prescribed in Schedule C.

8.3 Works and Services required by this bylaw, the *Local Government Act*, **(#1567 Aug 15/07)** the Approving Officer or the Building Inspector must be designed, located, constructed and installed and documentation required in connection with such Works and Services must be prepared and provided to the Town at the expense of the Owner of the Parcel of land proposed to be Subdivided or Developed.

8.4 Works and Services constructed and installed under this bylaw or the *Local Government Act*, **(#1567 Aug 15/07)** or as required by the Approving Officer or Building Inspector

(a) become the property of the Town subject to no encumbrances, on issuance of the Certificate of Total Performance of the Works and Services by the Administrator, and

(b) must be located within dedicated Highways or statutory rights of way granted by the Owner to the Town pursuant to statutory right of way agreements in the form and substantially with the content prescribed in Schedule B.1.

9.0 Works and Services on Parcel and Adjacent Highway

9.1 An Owner of a Parcel who applies for a Subdivision or Development must provide, as a condition of Subdivision Approval or Development, as applicable,

(a) on a Highway immediately adjacent to any Parcel being Subdivided or Developed, up to the centre line of the Highway, and

(b) on the Parcel itself

the Works and Services that are required to be provided under this bylaw or the *Local Government Act*, **(#1567 Aug 15/07)** or by the Approving Officer or Building Inspector.

9.2 Section 15.0 of this bylaw applies to the completion of Works and Services under section 9.1.

10.0 Connections to and Use of Town System

10.1 Where an Owner of a Parcel proposed to be Subdivided or Developed constructs and installs the Works and Services required by this bylaw, the Owner must not connect the Works or Services to any of the sewage, drainage, highway or water works of the Town and the Town will not issue a Certificate of Total Performance for the Works and Services constructed by the Owner or any part thereof, until

(a) the proposed Subdivision has received Subdivision Approval by the Approving Officer, or the Development has received the final inspection referred to in the Town's building regulation bylaw,

(b) the Owner has, if applicable, caused

(i) the approved Subdivision Plan to be registered in the Land Title Office, and

(ii) to be registered in the Land Title Office all rights of way required where the Works and Services cross private property,

(c) the Administrator has issued in the form of Schedule B.5 a permit to connect for a specific service, and

(d) the Owner has delivered to the Administrator a warranty deposit in the amount required by the terms of the Servicing Agreement, to be dealt with by the Town in the manner provided under the Servicing Agreement as if the Owner and the Town had entered into a Servicing Agreement. **(#1977 Oct 20/21)**

10.2 Where an Owner of a Parcel proposed to be Subdivided or Developed constructs and installs the Works or Services required by this bylaw, the Owner must not use any Town system to which the Works and Services are connected, the Works and Services, or any part thereof, until

(a) the Owner has deposited with the Administrator reproducible and sealed as-built drawings of all or the applicable portion of the Works and Services, and Town compatible computer disks, prepared and certified by a professional engineer, and

(b) the Administrator has issued the Certificate of Total Performance for the Works and Services.

10.3 Every water distribution system and fire hydrant system required to be constructed and installed under this bylaw must be connected by trunk mains to the Town community water system, in accordance with the standards prescribed in Schedule C.

10.4 Except where the requirements of Schedule C and the Approving Officer or Building Inspector require a drainage collection system to terminate in the ground, every drainage collection system required to be installed under this bylaw must be connected by trunk mains to the drainage collection system of the Town in accordance with the standards prescribed in Schedule C.

10.5 Every sewage collection system required to be constructed and installed under this bylaw must be connected by trunk mains to the sewer system of the Town in accordance with the standards prescribed in Schedule C.

11.0 Highway

11.1 All Highways, including boulevards, streets, roads, lanes, walkways, greenway roads, sidewalks, bridges, viaducts, retaining walls, curbs and gutters, traffic signals, boulevard crossings, transit bays, street lighting, underground wiring, bicycle trails or other trails required under Schedule C of this bylaw, whether with respect to Subdivision or Development, must be constructed and installed in accordance with the standards prescribed in Schedule C.

12.0 Storm Drainage System

12.1 The Owner of land being Subdivided or Developed must provide storm drainage Works and Services, designed, constructed and installed in accordance with the standards prescribed in Schedule C.

13.0 Water Distribution System

13.1 The Owner of land being Subdivided or Developed must provide each Parcel of land within the proposed Subdivision, or land being Developed, with a water distribution system and a fire hydrant system, including service connections, designed and constructed in accordance with the standards prescribed in Schedule C.

13.2 Section 13.1 does not apply if the Development is for the construction of a building the occupancy of which does not require a water supply or for an addition to a building provided the building does not require a water supply **(#1514 Jul 5/06)**

14.0 Sewage Collection and Disposal

14.1 The Owner of any land being Subdivided or Developed must provide every Parcel in the proposed Subdivision, or the land being Developed, with a sanitary sewage collection and disposal system, including service connections, designed and constructed in accordance with the requirements and standards prescribed in Schedule C

14.2 Section 14.1 does not apply if the Development is for the construction of a building the occupancy of which does not generate sewage or for an addition to a building provided the building occupancy does not generate sewage **(#1514 Jul 5/06)**

15.0 Design, Construction and Installation of Works and Services

15.1 The minimum standards and the specifications for Works and Services for Subdivision and Development of lands are prescribed in Schedule C and Works and Services shall be constructed in accordance with Comox Drainage Infrastructure Protection Bylaw 1824. **(#1977 Oct 20/21)**

15.2 The Owner must retain, at the Owner's expense, a Consulting Engineer who is responsible for the design, layout, approval of materials, field inspection of installation, communication with the Owner's contractors, information for and certification of as-built drawings, for all Works and Services which are the responsibility of the Owner, subject to Schedule C.

15.3 All of the Works and Services for the Subdivision or Development are to be inspected and supervised for compliance with this bylaw during construction by the Owner's Consulting Engineer.

15.4 Full time resident inspection is required during construction and the Consulting Engineer, on a weekly basis, must submit copies of his or her daily inspection reports to the Town of Comox.

15.5 At the time of application for Subdivision Approval or Development, the Owner must complete and deliver to the Administrator a copy of the Owner/Professional Engineer Services Agreement form for each Subdivision or Development application, as prescribed in Schedule B.2. If the Works and Services include Works and Services under Section 1.5 North East Comox Special Requirements of Schedule C.1 Appendix E Specification for Storm Drainage, the Owner shall cause such form to be completed by a Consulting Professional trained and experienced in designing and overseeing the construction of stormwater management systems. **(#1977 Oct 20/21)**

15.6 As part of the as-built drawings required by section 10.2 the Owner must complete and deliver to the Administrator a copy of the Assurance of Professional Field Inspection and Compliance form, as prescribed in Schedule B.3. If the Works and Services include Works and Services under Section 1.5 North East Comox Special Requirements of Schedule C.1 Appendix E Specifications for Storm Drainage, the Owner shall cause such form to be completed by a Consulting Professional trained and experienced in designing and overseeing the construction of stormwater management systems. **(#1977 Oct 20/21)**

15.7 In the event there are changes to the agreement referred to in section 15.5, the Administrator must be notified in writing two working days in advance of the changes occurring.

15.8 Works and Services required under this bylaw must be designed, constructed and installed in conformity with the quality control and assurance requirements set out in Schedule C.2.

15.9 Every requirement for an Owner to design, locate, construct and install Works and Services or to do or provide any related thing under this bylaw is at the sole cost of the Owner.

16.0 Certificate of Total Performance

16.1 The Consulting Engineer will not issue a Certificate of Total Performance for the acceptance of the Works and Services until the conditions for the construction and installation of Works and Services have been fulfilled, including delivery to the Administrator of

(a) reproducible and sealed as-built drawings and Town compatible computer disks, prepared and certified by a professional engineer, certificate of bylaw compliance acceptable to the Administrator and

(b) written confirmation by the Consulting Engineer that all

(i) integrated survey monuments have been installed to the satisfaction of the Surveyor General and are being registered as per the *Land Survey Act*, and

(ii) survey pins have been installed on the Parcel.

17.0 Security and Servicing Agreement

17.1 All Works and Services required to be constructed and installed at the expense of the Owner of the land being Subdivided or Developed must be constructed and installed to the standards prescribed in this bylaw before the Approving Officer approves of the Subdivision or the Town's Building Inspector issues a building permit unless the Owner

(a) deposits Security with the Town, having regard to the cost of installing and paying for all the Works and Services, and

(b) enters into a Servicing Agreement pursuant to which the Security will be forfeited to the Town if the Works and Services have not been constructed and installed to the required standards by the time specified in the agreement. **(#1977 Oct 20/21)**

17.2 The Security shall be in the amount of 125 per cent of the cost of constructing and installing the Works and Services, as estimated by the Consulting Engineer.

18.0 Excess or Extended Services (#1567 Aug 15/07)

18.1 Section 18.0 applies to Excess or Extended Services required as part of the Subdivision or Development process.

18.2 The Owner must, where Excess or Extended Services are required or otherwise provided, deliver the following information to the Approving Officer or the Building Inspector, as the case may be, with the first submission of the design drawings for the proposed Subdivision or Development

(a) a plan for each Excess or Extended Service prepared by the Consulting Engineer showing the minimum size and length of any infrastructure required to serve the Subdivision or Development only, and the size and length of the infrastructure required to serve the entire catchment or design area shown in brackets beside the minimum size required to serve the Subdivision or Development only, and

(b) for each Excess or Extended Service, the Consulting Engineer's estimate of the cost of the Excess or Extended Service and the Consulting Engineer’s proposal as to the Benefiting Lands that should be identified in any Latecomer’s Agreement and the amount of the latecomer charges that should be imposed.

18.3 The plans required in section 18.2 must be provided in the following format:

(a) 1:2500 Town Base map must be used,

(b) location of and details of Excess or Extended Service must be shown,

(c) each type of infrastructure must illustrated on a separate sheet,

(d) the Owners’ proposal as to the identification of Benefiting Lands must be provided, for each type of infrastructure, in the form of a map of the Benefiting Lands and a list of legal descriptions of parcels comprising Benefiting Lands,

(e) each sheet must be clearly labeled in the bottom right corner indicating,

(i) development,
(ii) project number,
(iii) service,
(iv) scale,
(v) date, and
(vi) Consulting Engineer seal and signature, and

(f) each sheet must be labeled consecutively for attachment to the Latecomer Agreement.

18.4 The actual costs of Excess or Extended Services shall be set out in a written statement from the Consulting Engineer certifying the final costs of the Excess or Extended Services including applicable taxes, and that the Excess or Extended Services have been designed, constructed and installed to the standards and specifications set out in the bylaws of the Town such that they have been fully tested, are functional and can be used for their intended purpose. The Council deems the cost to the Town of providing any Excess or Extended Services that are the subject of such a certification to be excessive.

18.5 The Council delegates to the Public Works Superintendent the duties of the Council under Section 939 of the *Local Government Act* to determine the cost of Excess or Extended Services on the basis of the written statement provided by the Consulting Engineer and referred to in Section 18.4, to identify Benefiting Lands in relation to each Excess or Extended Service on the basis of the information provided by the Consulting Engineer under Section 18.2, and to determine which part of the Excess or Extended Services will benefit each of the parcels of Benefiting Lands and the value of such benefit.

18.6 The Council delegates to the Public Works Superintendent the power to execute Latecomer Agreements on behalf of the Town.

18.7

(a) An Owner or an owner of Benefiting Lands who is affected by a decision of the Public Works Superintendent under Section 18.5 is entitled to have Council reconsider such decision without charge. The Owner may initiate a Council reconsideration by providing to the Corporate Officer notice in writing, objecting to the decision. The notice must specifically state the Owner's reasons for each objection, which shall not consist solely of an expression of opinion by the Owner. Notice must be received by the Corporate Officer within 14 days of the date of the Public Works Superintendent's decision being communicated to the Owner.

(b) Upon receipt of a notice, the Corporate Officer must refer the matter to Council to set a date for Council to hear from the Owner, any other affected person and the Public Works Superintendent and to reconsider the decision.

(c) Council may, on a reconsideration, either affirm the decision of the Public Works Superintendent, or modify the decision.

18.8 Every owner of Benefiting Lands connecting to the Excess or Extended Services must pay a Latecomer Charge in the amount specified in respect of that parcel in any Latecomer Agreement, plus interest at the Royal Bank of Canada prime interest rate as of the day of Completion and thereafter at the Royal Bank of Canada prime interest rate as of the anniversary of Completion. In the case of an existing building, this will be at the time of application for a connection. In the case

of a parcel being Subdivided or Developed, this will be at the time of issuance of a building permit or final Subdivision approval, whichever occurs first.

19.0 Schedules

19.1 The following schedules are attached to and form part of this bylaw:

Schedule A	Application Forms
	A.1 Application for Preliminary Layout Review
	A.2 Application for Final Subdivision Approval
Schedule B	Standard Forms
	B.1 Statutory Right of Way
	B.2 Owner/Professional Engineer Services Agreement
	B.3 Assurance of Professional Field Inspection
	B.4 Servicing Agreement
	B.5 Permit to Connect
Schedule C	Engineering Design Standards and Construction
	C.1 Subdivision and Development Specifications
	C.2 Quality Control and Assurance
(#1567 Aug 15/07)	**Removed Schedule D**

20.0 Repeal

20.1 Parts II, III, IV, V, VII, VIII, and IX of Town of Comox Subdivision Bylaw No. 733, 1984 are repealed.

READ A FIRST TIME this	3rd	day of	DECEMBER, 1997.
READ A SECOND TIME this	3rd	day of	DECEMBER, 1997.
READ A THIRD TIME this	17th	day of	DECEMBER, 1997.
ADOPTED this	7th	day of	JANUARY, 1998.

George Kirkwood
Mayor:

Helen Dale
Clerk:

SCHEDULE A.1
PRELIMINARY LAYOUT REVIEW INFORMATION

The information requested in this form is required to expedite a proposed application for subdivision and assist the staff in preparing a recommendation. The personal information is collected under the authority of the *Municipal Act* and the Town's bylaws and is subject to the *Freedom of Information and Protection of Privacy Act*. This form must be completed in full and submitted with all required information, Application Fee and Certificate of State of Title or of Indefeasible Title for the subject property.

Registered Owner

1. (1) Registered Owner's Name _____

Address _____ Postal Code _____

Telephone: Business _____ Home _____ Fax _____

(2) Owner's Agent _____

Contact _____

Address _____ Postal Code _____

Telephone: Business _____ Home _____ Fax _____

(3) A copy of a State of Title Certificate, or a copy of a Certificate of Indefeasible Title, dated no more than thirty (30) days prior to submission of this form, with copies of all rights-of-way, easements, and restrictive covenants that are registered against the property (available from the Government Agent, [insert address and phone number]), must accompany the application as a proof of ownership.

(4) A Letter of Authorization (if the applicant is not the owner).

Fee

2. A Fee as prescribed by Development Application Procedures Bylaw, 1996, No. 1206 must be made payable to the "Town of Comox" and must accompany this form.

Other Applications

3. Describe the other applications made in respect of the same subject property at the same time or approximately the same time as this subdivision application:

		OFFICIAL USE ONLY
(a) Official Community Plan _____	Date applied: _____	No._____
(b) Zoning _____	Date applied: _____	No._____
(c) Development Variance Permit _____	Date applied: _____	No._____
(d) Development Permit _____	Date applied: _____	No._____
(e) Agricultural Land Reserve _____	Date applied: _____	No._____

Property Proposed to be Subdivided

4. (1) Legal Description in Full

Plan:_____ Lot:_____ Block: _____ Section: _____ Township: _____

P.I.D.: _____

(2) Location (street address of property, general description or map)

_____

_____

(3) Size of Property (area (ha or m²), number of parcels)_____

(4) Current Designation (Official Community Plan)_____

Current Zoning _____

(5) Proposed Designation (if applicable)_____

Proposed Zoning (if applicable)_____

(6) Development Permit Area Designation (if applicable)_____

(7) Description of the Existing Use/Development

(8) Description of the Proposed Use/Development

(9)Services Currently Existing or Readily Available to the Property (check applicable area)

Services	Currently Existing YES	NO	Readily Available* YES	NO
Road Access	—	—	—	—
Water Supply	—	—	—	—
Sewage Disposal	—	—	—	—
Hydro	—	—	—	—
Cable Television	—	—	—	—
Telephone	—	—	—	—
Natural Gas	—	—	—	—
School Bus Service	—	—	—	—
Transit Service	—	—	—	—
Canada Post Service	—	—	—	—

NOTE: *Readily Available means existing services can be easily extended to the subject property.

(10) Proposed Water Supply Method

(11) Proposed Sewage Disposal Method

(12) Proposed Drainage Method

(13) Roads on or near Subject Property, and Proposed Access

(14) Approximate Commencement Date of Proposed Project

(15) Watercourses on or adjacent to Subject Property

(16) Description of Trees on Property

(17) Features described on the "Natural or Hazardous Condition" Maps contained in the Town of Comox's Official Community Plan.

Attachments

5. The Owner/Agent must provide three copies of the following plans with this form folded to letter size, plus one photo-reduced copy at 8 1/2 x 11, 8 1/2 x 14 or 11 x 17 format. All plans are to show the North arrow. All dimensions, etc., should be in metric. The Municipal Engineer, Approving Officer, or Building Inspector may require information in addition to the following:

(1) A dimensioned sketch plan drawn to scale of 1:2500 showing the parcel(s) or part of the parcel(s) to be subdivided, area, the full legal description, number or letters assigned to each proposed lot, and the location of existing buildings, structures and uses. The boundary of the subdivision *must* be outlined in red. Any buildings to be demolished on approval of the subdivision should be so noted.

(2) A dimensioned sketch plan drawn to scale of 1:2500 showing the arrangement of the parcel(s) and highway(s) which would be created including the widths of the proposed highway(s), the approximate dimensions of the proposed parcel(s), all large or desirable trees on or near proposed roadways, and any proposed alterations of lot lines or subdivision of any existing parcel(s).

(3) A dimensioned sketch plan drawn to scale of 1:2500 showing existing property line(s) and highway(s) to be eliminated by the proposed subdivision.

(4) A dimensioned sketch plan drawn to scale of 1:2500 showing the relationship of the proposed subdivision to adjacent highway(s) and the connection(s) of proposed new highway(s).

(5) A dimensioned sketch plan drawn to scale of 1:2500 showing existing buildings and access from streets and other highways accurately located and identified.

(6) A dimensioned sketch plan drawn to scale of 1:2500 showing utility and other easements located and identified.

(7) A dimensioned sketch plan drawn to scale of 1:2500 showing topography at a 1 m contour interval for slopes greater than 5% and at a 2 m contour interval for slopes less than or equal to 5%, slopes in excess of 30%, watercourses, water frontages, and pertinent topographic and natural features.

(8) A dimensioned sketch plan drawn to scale of 1:2500 showing the intended use of each parcel to be created by the subdivision.

(9) A dimensioned sketch plan drawn to scale of 1:2500 showing the location of proposed sewage treatment.

6. Photographs showing all views of the site.

(Date) (Applicant's Signature)

OFFICE USE ONLY

Date Application Received: _____ File Number_____

Received by:_____

Application Fee and Receipt Number: _____

Cross Reference File(s): _____

SCHEDULE A.2
APPLICATION FOR SUBDIVISION APPROVAL

The information requested in this form is required to expedite a proposed application for subdivision and assist the staff in preparing a recommendation. The personal information is collected under the authority of the *Municipal Act* and the Town's bylaws and is subject to the *Freedom of Information and Protection of Privacy Act*. This form must be completed in full and submitted with all required information, Application Fee and Certificate of State of Title or of Indefeasible Title for the subject property.

I/We hereby apply for a subdivision of the property described as

(insert legal description):

Plan:_____ Lot: _____ Block: _____ Section: _____ Township: _____

P.I.D.: _____

and located at (street address or general location)

_____

_____

into (insert number of parcels)_____

Required application fee of $_____ and the documents required under section 5.2 of this bylaw [and the completed Official Community Plan Amendment and Rezoning Amendment Information Form, if applicable] are attached.

ALSO TO BE SUBMITTED:

1. Mylar Survey Plan showing date of completion within the last three months or having a re-inspection endorsement made within the last 3 months. Ensure that if rights-of-way, road reservations or covenants are involved, the necessary endorsement is on the plan. The subdivision plan is to indicate the approved street names on all new roads to be dedicated.

2. One transparency copy and three paper prints of the survey plan and three copies of any of the right-of-way plans.

3. Where applicable, the original and two copies of the pertinent right-of-way agreements in favour of the Town of Comox executed by the subject property owner. (A sample agreement may be obtained from the Town's Planning Department.)

4. Where applicable, the original and two copies of the pertinent restrictive covenants

in favour of the Town of Comox executed by the subject property owner. (A sample agreement may be obtained from the Town's Planning Department.)

5. Where applicable, the original and two copies of the Servicing Agreement between the subdivider and the Town of Comox executed by the applicant. (A sample agreement may be obtained from the Town's Planning Department.)

6. Balance of application fee.

7. Monies for pertinent levies and charges. Please note that Development Cost Charges must be paid by certified cheque.

8. Proof that current property taxes and all assessed property taxes have been paid. (Tax certificate from the Town of Comox.)

_____ _____

(Date) (Applicant's Signature)

THIS APPLICATION IS MADE WITH MY FULL KNOWLEDGE AND CONSENT

_____ _____

(Date) (Registered Owner's/Authorized Signatory's Signature)

Where the Applicant is NOT the REGISTERED OWNER the Application must be signed
- In the case of an individual person or persons, by every REGISTERED OWNER or the Registered Owner's SOLICITOR
- In the case of a corporation, by the Corporation's AUTHORIZED SIGNATORY or SIGNATORIES.

OFFICE USE ONLY

Date Application Received: _____ File No.: _____

Received by: _____

Application Fee and Receipt Number: _____

Cross Reference File(s): _____

SCHEDULE B.1
STATUTORY RIGHT OF WAY

LAND TITLE ACT
FORM C

(Section 233)

Province of British Columbia
GENERAL INSTRUMENT-PART 1 (This area for Land Title Office use) Page 1 of ___ Pages

1. Application: (Name, address, phone number and signature of applicant, applicant's solicitor or agent)

2. PARCEL IDENTIFIER(S) AND LEGAL DESCRIPTION(S) OF LAND:*
(PID)
(LEGAL DESCRIPTIONS)

[Insert legal description]

3. NATURE OF INTEREST:*

Description	Document Reference (page and paragraph)	Person Entitled to Interest
Statutory Right of Way Agreement	Entire Document Pages 3 through ____	Transferee

4. TERMS: Part 2 of this instrument consists of (select one only)

(a) File Standard Charge Terms ___ D.F. No.
(b) Express Charge Terms _X_ Annexed as Part 2
(c) Release ___ There is no Part 2 of this Instrument

A selection of (a) include any additional or modified terms referred to in Item 7 or in a schedule annexed to this instrument. If (c) is selected, the charge described in Item 3 is released or discharged as a charge on the land described in Item 2.

5. TRANSFEROR(S):*

[insert NAME and incorporation number]

6. TRANSFEREE(S): (including postal address(es) and postal code(s))*

TOWN OF COMOX, 1809 Beaufort Avenue, Comox, British Columbia, V9M 1R9

LAND TITLE ACT
FORM C

(Section 233)

Province of British Columbia
GENERAL INSTRUMENT-PART 1

7. ADDITIONAL OR MODIFIED TERMS:*

N/A

8. EXECUTION(S):** This instrument creates, assigns, modifies, enlarges, discharges or governs the priority of the interest(s) described in Item 3 and the Transferor(s) and every other signatory agree to be bound by this instrument, and acknowledge(s) receipt of a true copy of the filed standard charge terms, if any.

Officer Signature(s)	Execution Date	Party(ies) Signature(s)
_____ Name:	_____	[INSERT NAME] by its authorized signatories:
(as to both signatures)		_____ Name:
		_____ Name:
_____ Name:	_____	TOWN OF COMOX by its authorized signatories:
(as to both signatures)		_____ Mayor:
		_____ Clerk:

OFFICER CERTIFICATION:
Your signature constitutes a representation that you are a solicitor, notary public, or other person authorized by the Evidence Act, R.S.B.C. 1996, c. 124, to take affidavits for use in British Columbia and certifies the matters set out in Part 5 of the Land Title Act as they pertain to the execution of this instrument.
* If space insufficient, enter "SEE SCHEDULE" and attach schedule in Form E.
** If space insufficient, continue executions on additional page(s) in Form D.

TERMS OF INSTRUMENT - PART 2

STATUTORY RIGHT OF WAY AGREEMENT

This Agreement dated for reference _____ 199_____, is

BETWEEN:

[Insert NAME]
[Insert ADDRESS]

(the "Grantor")

AND:

TOWN OF COMOX, a municipality incorporated under the *Municipal Act*, R.S.B.C. 1996, c. 323 and having its municipal office at 1809 Beaufort Avenue, Comox, British Columbia, V9M 1R9

(the "Grantee")

GIVEN THAT:

1. The Grantor owns certain lands and premises ("Lands") in the Town of Comox, British Columbia, legally described as:

[insert LEGAL DESCRIPTION];

2. The Grantor has agreed to grant to the Grantee a statutory right of way to facilitate the construction, installation, improvement, extension, removal, alteration, repair, maintenance, operation, and replacement of certain sewer, water, drainage, gas, electrical or other works, or any of them, including all pipes, valves, fittings, hydrants, wires, conduits, poles, casings, lines, meters, appliances, facilities, attachments, devices, and other ancillary or incidental things, or any of them, ("Works");

3. This statutory right of way is necessary for the operation and maintenance of the Grantee's undertaking;

THIS AGREEMENT IS EVIDENCE that in consideration of $10.00 now paid by the Grantee to the Grantor, and other good and valuable consideration (the receipt and sufficiency of which the Grantor hereby acknowledges), and of the mutual covenants

and agreements set out in this Agreement, the Grantor and Grantee covenant and agree, and the Grantor hereby grants to the Grantee, as follows:

1. Pursuant to Section 218 of the *Land Title Act* the Grantor grants, conveys and confirms to the Grantee, in perpetuity, the full, free and uninterrupted right, liberty, easement and statutory right of way, for the Grantee and its licensees, employees, agents, officials, contractors, and workers [optional, for roadway where no dedication: "and assigns, including the general public"] at all times hereafter, by day and by night at their will and pleasure, to enter, go, be on, pass and re-pass, with or without vehicles, personal property or equipment, upon, over, under and across that portion of the Lands outlined in heavy black on the reference or explanatory plan of statutory right of way in respect of the Lands deposited for registration, or registered, in the Land Title Office under number [INSERT], a reduced copy of which forms Appendix A hereto ("Right of Way"), to

   (a) lay down, entrench, construct, and install the Works upon the Right of Way and to repair, operate, maintain, alter, remove, bury, cleanse, string or replace the Works from time to time in the Grantee's discretion;

   (b) to have unobstructed access to and from the Right of Way at any and all times;

   (c) make surveys and tests;

   (d) establish grades and levels;

   (e) excavate or otherwise alter the contours of the Right of Way and to backfill trenches;

   (f) store all personal property (including equipment) necessary to carry out the activities referred to in section 1(a), provided that the Grantee shall consult the Grantor as to the duration and location of such storage, which is to be limited to the time and place necessary to complete the work for which it is needed;

   (g) remove from the Right of Way such structures, improvements, fixtures, fences, gates, cattle guards, trees, shrubs, plants, and other obstructions whatsoever, as, in the Grantee's opinion, is necessary in order to carry out the activities referred to in section 1(a); and

   (h) do all other things on the Right of Way as may be reasonably required in connection with the foregoing.

2. The Grantor must

   (a) not do or permit to be done any act or thing which in the opinion of the Grantee may interfere with, injure, impair the operating efficiency of, or obstruct access

to or the use of, the Right of Way or the Works;

(b) trim or, if the Grantee thinks it necessary, cut down any tree or other growth on the Lands which in the opinion of the Grantee constitutes or may constitute a danger or obstruction to those using the Right of Way or to the Works;

(c) execute all further documents and things whatsoever for the better assuring unto the Grantee of the Right of Way hereby granted;

(d) permit the Grantee to peaceably hold and enjoy the rights hereby granted;

(e) maintain, care for and clean the surface of the Right of Way and remove grass and other growth from the surface of the Right of Way as required by the Grantee and do all other things deemed by the Grantee to be reasonably necessary for the safe use and preservation of the Right of Way;

(f) maintain and care for the Right of Way and keep it clean from garbage and noxious debris;

(g) diminish or increase the soil cover over any of the Works in the Right of Way and in particular, without limiting the foregoing, must not construct open drains or ditches along or across any of the Works in the Right of Way.

3. The Grantee must and may peaceably hold and enjoy the rights, liberties, and right of way hereby granted without hindrance, molestation, or interruption by the Grantor or any person, firm, or corporation claiming by, through, under, or in trust for the Grantor.

4. The Grantor, on every reasonable request and at the Grantee's cost, must do or execute or cause to be done or executed all such further and other lawful acts, deeds, things, conveyances and assurances in law whatsoever for better assuring to the Grantee the rights, liberties, and statutory right of way hereby granted.

5. The Works installed by the Grantee in, on, or under the Right of Way remain chattels and the property of the Grantee, despite the fact that the same may be annexed or affixed to the freehold, and the Works may at any time be removed in whole or in part by the Grantee in its discretion.

6. (a) In the exercise of its powers under this Agreement, the Grantee may remove anything placed on the Right of Way by the Grantor but, except for the Works, must, so far as possible and subject to sections 1 and 2 hereof, restore the Right of Way to substantially its original condition, so far as is reasonably

practicable, promptly after completing the Works.

(b) Despite section 6(a), nothing in this Agreement requires the Grantee to restore any trees or surface growth but the Grantee must leave the lands in a condition that will not inhibit natural regeneration of such growth.

7. The Grantee must do all Works and other things authorized under this Agreement to be done by it over, through, under, and upon the Right of Way in a good and workerlike manner so as to cause no unnecessary damage or disturbance to the Right of Way or to any improvements thereon.

8. Nothing in this Agreement restricts the Grantor from using the Right of Way in any manner which does not interfere with or endanger the activities referred to in section 1(a) or the security or unobstructed access to the Works, but the Grantor must not erect, construct or install any building, improvement, structure (including a manufactured home, pipe or wire), driveway or patio (other than asphalt driveways or patios) on the Right of Way, or permit anything to be placed or exist on it or done on it, that may injure, interfere with or obstruct the Works or prevent reasonable access to the Works by the Grantee. The Grantor must not carry on blasting on or adjacent to the Right of Way without the Grantee's prior written consent. Whenever reasonably possible, the Grantee may cross over the remainder of the Lands to gain access to the Right of Way to perform work on it and, in any event, may use a strip of land three metres in width on either side of, and running parallel to and the length of, and being adjacent to, the Right of Way for the purpose of performing work on the Right of Way, provided that the Grantee must exercise reasonable care to minimize any damage to the Lands or improvements on the Lands outside the Right of Way and, if such damage is caused, must remedy it promptly at its cost.

9. If the Grantor defaults in observance or performance of its obligations under this Agreement, the Grantee, after 20 days' prior written notice to the Grantor specifying the default and at any time in case of emergency, may (but is not obliged to) rectify the default, and the Grantor must pay to the Grantee, on demand, its reasonable costs in connection with so rectifying.

10. The Grantor must not diminish or increase the soil cover over any pipe or other Works installed in the Right of Way without the Grantee's prior written consent.

11. No right herein granted to or reserved by the Grantee requires the Grantee to clean, repair, or maintain the Works or the Right of Way, unless the Grantee is expressly required under this Agreement to perform such cleaning, repairing, or maintenance.

12. This Agreement is to be construed as running with the Lands but no part of the fee of the soil passes to or is vested in the Grantee under or by this Agreement and the Grantor may fully use the Right of Way subject only to the rights and restrictions in set forth in this Agreement.

13. The Grantor must, after execution hereof by it at the expense of the Grantor, do or cause to be done all acts necessary to grant priority to this Agreement over all financial charges and encumbrances which are registered, or pending registration, against the title to the Lands in the Land Title Office save and except those as have been specifically approved in writing by the Grantee or have been granted in favour of the Grantee.

14. Despite anything contained in this Agreement the Grantee reserves all rights and powers of expropriation otherwise enjoyed by the Grantee.

15. Waiver of any default by either party is not to be deemed to be a waiver of any subsequent default by that party.

16. This Agreement runs with the Lands and every part or parts thereof, and attaches to and runs with the Lands and each and every part to which the Lands may be divided or subdivided whether by subdivision plan, strata plan, or otherwise.

17. Whenever it is required or desired that either party must deliver or serve a notice on the other, delivery or service is deemed to be satisfactory if and deemed to have occurred when:

(a) the Clerk of the Grantee or the Grantor, as the case may be, has been served personally, on the date of service; or

(b) mailed by prepaid registered mail, on the date received or on the sixth day after receipt of mailing by any Canada post office, whichever is the earlier, so long as the notice is mailed to the party at the address provided herein or to whatever address the party may from time to time provide to the other party.

18. (a) Wherever the singular or masculine is used in this Agreement, the same is deemed to include the plural or the feminine or the body politic or corporate as the context so requires.

(b) Where the Grantor includes more than one person, all covenants in this Agreement on the part of the Grantor shall be construed as joint and several.

19. Every reference to each party is deemed to include the heirs, executors,

administrators, successors, assigns, employees, agents, officers, and invitees of such party wherever the context so requires or allows.

20. Any opinion which the Grantee is entitled by virtue of this Agreement to form may be formed on behalf of the Grantee by the Grantee's Municipal Engineer, in which event the opinion of that person is deemed to be the opinion of the Grantee for the purposes of this Agreement.

21. If any section, subsection, sentence, clause or phrase in this Agreement is for any reason held to be invalid by the decision of a court of competent jurisdiction, the invalid portion is to be severed and the decision that it is invalid shall not affect the validity of the remainder of the Agreement.

22. Where, on the reference date of this Agreement, the Grantor is not the sole registered owner of the Lands, this Agreement shall nevertheless bind the Grantor to the full extent of the Grantor's interest in the Lands, and where the Grantor acquires a greater or the entire interest in fee simple, this Agreement extends to the after-acquired interests.

23. This Agreement enures to the benefit of and is binding on the parties hereto notwithstanding any rule of law or equity to the contrary.

24. This Agreement may be assigned by the Grantee without the consent of the Grantor.

25. Despite anything contained in this Agreement, neither the Grantor named in this Agreement nor any future owner of the Lands or any portion thereof is liable under any of the covenants and agreements contained in this Agreement where such liability arises by reason of an act or omission occurring after the Grantor named in this Agreement or any future owner ceases to have a further interest in the Lands.

26. Wherever this Agreement creates a power or obligation of the Grantee to make a decision or to exercise any contractual right or remedy, the Grantee may do so in accordance with the provisions of this Agreement and no public law duty, whether arising from the principles of procedural fairness or the rules of natural justice, shall have any application.

27. This Agreement is to be governed and construed according to the laws of the Province of British Columbia.

As evidence of their agreement to be bound by the above terms, the parties each have executed and delivered this Agreement under seal by executing Part 1 of the *Land*

Title Act Form C to which this Agreement is attached and which forms part of this Agreement. Further, the Town of Comox Approving Officer acknowledges that this is the instrument creating the condition or covenant entered into under Section 218 of the *Land Title Act* by the registered owner(s) referred to in this instrument and shown on the print of the plan initialled by me and annexed to this instrument.

_____

Approving Officer
Town of Comox

Appendix A - Reduced copy of Explanatory Plan

SCHEDULE B.2

OWNER/PROFESSIONAL ENGINEER SERVICES AGREEMENT

Date: _____
File: _____

Town of Comox

Attention: Approving Officer (if Subdivision)
Building Inspector (if Development)

Re: Proposed Subdivision or Development of _____

_____
Legal Description of Project (Print)

This letter is to confirm to the Town that an engineer-Owner Agreement has been executed between:

Engineer)
Name)
Address)
Phone No.)
Fax No.)

And

Owners/)
Developer)

in connection with the above referenced development. The agreement was executed on_____, 20_____ and provides for Engineering services as follows:

INITIAL BELOW

1. Consulting, advisory and predesign services. _____

2. Schematic and design development services. _____

3. Preparation of design drawings for approval in accordance with applicable sections of the Town of Comox bylaws. _____

4. Construction layout. _____

5. Resident inspection and sampling to ascertain whether the contractor is carrying out the work in conformity with the approved for construction drawings and the Town of Comox bylaws. Fulltime resident inspection is required during the construction and installation of Works and Services. Schedule C.2 prescribes quality control and assurance. _____

6 Erosion and sediment control. _____

7. Excavation. _____

8. Interpreting specifications when requested by the Owner or Contractor. _____

9. Perform certifications on cost of the work. _____

10. Attend meetings. _____

11. Maintaining project documentation. _____

12. Preparation and submission of certified as-constructed drawings and sepia mylar and/or autocad disk works. _____

13. Final project review to approval. _____

(If the works and services include works and services under Section 1.5 North East Comox Special Requirements of Schedule C.1 Appendix E Specification for Storm Drainage of Town of Comox Subdivision and Development Servicing Bylaw No.1261, include the following statement) _____

14. I confirm that I have read and reviewed North East Comox Neighborhood Stormwater Management Plan - Phase 3 of 3, March 1, 2018, McElhanney Consulting Services Ltd. **(#1977 Oct 20/21)**

If for any reason the said agreement is altered, modified or terminated in any manner, it is the duty of the Consultant to inform the Approving Officer or Building Inspector of the changes forty-eight (48) hours in advance of their taking effect.

Signed and Sealed

Engineer_____ [Engineer's Seal]

Owners_____

SCHEDULE B.3

ASSURANCE OF PROFESSIONAL FIELD INSPECTION AND COMPLIANCE FORM

Note: This letter must be submitted before completion of a Work of Service required under this bylaw but before the subdivision plan is signed or, if applicable, before a final building permit inspection is made by the Town of Comox.

To: Municipal Engineer Date:_____

Town of Comox File:_____

Dear Sir or Madam:

Re: Proposed subdivision of _____

_____

Legal Description of Project (Print)

I hereby give assurance that

(a) I have fulfilled my obligations for field review as required by the Town of Comox bylaws and permits governing the subdivision and development of land, and

(b) Those components of the project opposite my initials in the previously submitted Schedule B.2 comply in all material respects with

(i) the applicable requirements of the Town of Comox bylaws, including Town of Comox Subdivision and Development Servicing Bylaw No.1261, and other applicable standards respecting the works, and **(#1977 Oct 20/21)**

(ii) The plans and supporting documents submitted in support of the application for subdivision or building permit, **(#1977 Oct 20/21)**

(If the project includes works and services under Section 1.5 North East Comox Special Requirements of Schedule C.1 Appendix E Specification for Storm Drainage of Town of Comox Subdivision and Development Servicing Bylaw No.1261, include the following statement as paragraph b.1)

(b.1) without limiting paragraph (b) of this Schedule B.3, where the preparation of design drawings referred to in the previously submitted Schedule B.2 included works and services under Section 1.5 North East Comox Special Requirements of Schedule C.1 Appendix E Specification for Storm Drainage of Town of Comox Subdivision and Development Servicing Bylaw No.1261, those components of the project comply in all material respects with the requirements of Section 1.5

North East Comox Special Requirements of Schedule C.1 Appendix E Specification for Storm Drainage of Town of Comox Subdivision and Development Servicing Bylaw No.1261. **(#1977 Oct 20/21)**

(c) I have enclosed the as-constructed plans and supporting documents prepared by me for this project, and

(d) I am a Professional Engineer and member of the Association of Professional Engineers and Geoscientists of the Province of British Columbia practicing in the consulting engineering industry with a declared area of practice in civil or geotechnical engineering and trained and experienced in designing and overseeing the construction of subdivision and development infrastructure. **(#1977 Oct 20/21)**

(If the project includes works and services under Section 1.5 North East Comox Special Requirements of Schedule C.1 Appendix E Specification for Storm Drainage of Town of Comox Subdivision and Development Servicing Bylaw No.1261, include the following statement as paragraph d.1)

(d.1) I am trained and have experience in designing and overseeing the construction of stormwater management systems. **(#1977 Oct 20/21)**

(e) Attached is proof of my professional liability insurance effective in respect of and applicable to my work referred to in paragraphs (a) to (d) above.

(Each registered professional engineer shall complete the following)

_____
Name (Print)

_____ _____
Signed Date

_____
Address (Print)
_____

_____

_____
Phone

text deleted (#1977 Oct 20/21)
I understand that the Town of Comox and others will be relying on our expertise in preparing the drawings and performing the services referred to in this letter.

_____
(Print Name of Firm)

NOTE: The above letter must be signed by a registered professional engineer.

SCHEDULE B.4

SERVICING AGREEMENT

Schedule deleted **(#1977 Oct 20/21)**

SCHEDULE B.5
PERMIT TO CONNECT

LOCATION:_____

LOT_____SECTION_____PLAN_____

BUILDING PERMIT #_____PLUMBING_____

The Public Works Superintendent must be contacted regarding the location and the depth of sanitary sewer, storm drain and water supply prior to excavating for the buildings.

_____ DATE

_____ PUBLIC WORKS SUPERINTENDENT

_____ DATE

_____ OWNER'S SIGNATURE

SERVICE	SIZE	PREVIOUSLY INSTALLED	TO BE INSTALLED	PAVEMENT CUT & REPLACE-MENT	COST
SANITARY					
STORM					
WATER					
OTHER					
TOTAL					

SCHEDULE C.1
TOWN OF COMOX SUBDIVISION AND DEVELOPMENT SPECIFICATIONS

(to be inserted)

SCHEDULE C.2
QUALITY CONTROL AND ASSURANCE

This schedule sets out the minimum requirements for quality control and quality assurance for works constructed under this bylaw.

The Town of Comox Subdivision and Development Specifications set out the standards under which the quality of the works will be measured and tested.

The quality of the works must be controlled to meet the approved specifications.

Quality control of the works will be achieved by the contractor adhering to the Specifications and by the owner's engineer inspecting and testing the work as it progresses.

The owner's engineer must provide full time resident inspection of the following activities:

Placement of bedding
Pipe laying
Backfilling
All compaction of fill and foundations
Placement of road and sidewalk subgrade
Placement of road and sidewalk sub-base
Asphalt paving
Placement of concrete including finishing of sidewalks and other pavements
Placement of fill for foundations

Full time inspection requires the assignment of a qualified inspector to the specific location when the work is being performed.

Inspection of completed components of the work must be provided before the next activity for the following:

Material supply	upon receipt at the site or storage area before being used
Concrete work	
Foundations ready (base course ready)	before erection of forms or placing of embedments

Rebar	before placement of concrete and before placement of front forms of walls
Embedments ready	before obscuring
Forms complete	final checkout before pour
Stripped	
Prepared for next lift	
Mechanical Installations	
Bases	as for concrete
Piping and ducting	as for embedments
Remainder	as per manufacturer's requirements
Electrical	
Conduit	as for embedments
Buried components (e.g. thrustblocks, fittings, valves, manholes, restrainers, etc.)	Prior to burial or obscuring

Some elements of the work are to be covered by either continuous or spot inspections at the discretion of the owner's engineer. Those items include:

Landscaping
Mechanical installations, General
Wiring - cable pulling
Electrical connections

Spot inspections must be timed to ensure that initial construction procedures are such as to achieve the results specified and that such procedures are maintained through the course of construction.

The inspections set out herein are to be supplemented by such testing as is required by the Specifications, and such further inspections as are deemed necessary by the

owner's engineer to enable him to meet the reporting and certification requirements of this bylaw.

Reporting

The owner's engineer must submit to the Town the following records (as part of the Quality Assurance Process):

Daily Reports - to be submitted weekly	record the Inspections, performance of tests, construction activities, progress, problems and resolutions
Test Reports	reports from testing agencies will be forwarded to the Town by the owner's engineer as received
As-Built Drawings	"as-built drawings" will be certified by the owner's engineer and will be forwarded to the Town as a prerequisite to the acceptance and placing into service by the Town of the works
Inspection by Town	the Town may inspect the work from time to time, but such inspections must not relieve the owner or his engineer from responsibility for the quality of work and compliance with all applicable bylaws of the Town

TOWN OF COMOX

SUBDIVISION AND DEVELOPMENT SPECIFICATIONS

JANUARY 1998

SCHEDULE C.1

This is a consolidated version of Bylaw 1261 prepared for convenience purposes only

Date: January 1998

TOWN OF COMOX

SUBDIVISION SPECIFICATIONS

INDEX

Date: January 1998

This is a consolidated version of Bylaw 1261 prepared for convenience purposes only

TOWN OF COMOX
SUBDIVISION AND DEVELOPMENT SPECIFICATIONS

APPENDIX A
GENERAL SPECIFICATIONS AND PROCEDURES
FOR THE INSTALLATION OF MUNICIPAL SERVICES

This is a consolidated version prepared for convenience purposes only.

APPENDIX "A"

GENERAL SPECIFICATIONS AND PROCEDURES FOR THE INSTALLATION OF MUNICIPAL SERVICES

General

1.1. These specifications apply to the design and installation of services in new subdivisions and/or developments and the servicing of, and within, existing lots. They apply to the design and installation of storm drains, sanitary sewers, waterworks, roadways, curbs, gutters, sidewalks, underground power, telephone, cable television, street lighting and other services or structures required to be installed by the Owner.

1.2 The headings and sub-headings are for the convenience of the reader only. The intent of each part shall be as stated in the text. Copies which may be distributed are for information only. It is the responsibility of the owner to ensure that all Town of Comox specifications and bylaws are adhered to.

1.3 The words "shall" and "must" and "is required" indicate the imperative. The word "should" indicated the desired or intended result without being mandatory. The work "may", and like expressions, indicate a choice, an election, or a permitted procedure according to the context.

Detailed Specifications

2.1 The following specifications shall apply to all or any of the respective services.

Appendix

A	-	General Specifications and Procedures for the Installation of Municipal Services.
B	-	Specifications for Engineering Drawings.
C	-	Specifications for Highways.
D	-	Specifications for Sewage Collection and Disposal.
E	-	Specifications for Storm Drainage.
F	-	Specifications for Water Works.
G	-	Specifications for Underground Wiring and Street Lighting.
H	-	Specifications for Street Tree Planting and Storm Water Pond Landscaping **(#1567 Aug 15/ 07)**

2.2 All services shall be designed and installed as detailed in the foregoing specifications and according to the procedure set out in this Appendix.

2.3 No departure from these specifications shall be permitted without the prior written approval of the Administrator.

Indemnity, Insurance and Guarantee

3.1 Where the Owner is to provide services in, on or to land in accordance with these specifications and/or the Town of Comox Subdivision and/or development Bylaw, he shall, except to the extent the same is caused by the gross negligence of the Town or its servants or agents, save harmless and effectually indemnify the Town against:

3.1.1 All actions and proceedings, costs, damages, expenses, claims and demands whatsoever and by whomsoever brought by reason of the construction and installation of all services herein described.

3.1.2 All expenses and costs which may be incurred by reason of the execution of the said work resulting in damage to any property owned in whole or in part by the Town or which the Town by duty or custom is obliged, directly or indirectly, in any way or to any degree, to construct, repair or maintain.

3.1.3 All expenses and costs which may be incurred by reason of liens for non-payment of labour or materials, Workers' Compensation assessments, unemployment insurance, Federal or Provincial Tax, and for encroachments owing to mistakes in survey.

3.2 The Owner shall at his sole expense throughout the currency of the work carry comprehensive liability insurance in the amount of a least Two Million Dollars ($2,000,000.00) in the case of the subdivision and/or development of one acre or less, and at least Five Million Dollars ($5,000,000) in the case of subdivision and/or developments in excess of one acre with insurance companies licenced to carry on business in the Province of British Columbia in partial discharge of its obligation under Clause 7.1 of this section and in every such policy of insurance the Town shall be named as an additional insured with proceeds payable as the interests of the Town and Owner may appear. Prior to commencement of the work the Owner shall furnish the Town with a certified copy of every policy of insurance herein required.

3.3 The Owner shall indemnify and save harmless the Town against all expenses and costs which may be incurred by the Town as a result of faulty workmanship and defective material in any of the works installed by the Owner provided that such fault or defect is called to the attention of the Owner in writing within one year of the date of the Certificate of Total Performance.

Responsibility to the Public

4.1 The Owner shall provide all such barricades, lighting and signs as are necessary to protect the public while the works are being installed. In order to maintain traffic movements with the least possible inconvenience, the Owner shall construct and maintain where necessary such detours and barriers as may be required to allow the public to pass safely around the works being installed.

4.2 Highways shall not be closed to traffic unless such closure has first been approved by the Administrator. The Consultant shall immediately notify the Administrator, the R.C.M.P., the ambulance service, the Public Transit System, and the Fire Department each time a highway is closed or re-opened.

4.3 The Owner shall, at his own expense, provide for the protection and uninterrupted service of all water courses, sewers, water pipes, drains, conduits, gas pipes, conductors and other services encountered during the progress of the work. Pipes and structures shall be properly supported or shored to prevent settlement, and excavation in their vicinity shall be done with care. The Owner shall at his own expense at once arrange for the repair through the appropriate authority and made good any injury which may occur to any of these services or to any sidewalk, other structures or property, as a result of his operations.

4.4 Prior to commencing any work on the site, the developer will prepare a plan showing how all surface water runoff/drainage shall be controlled during the clearing of the land and until all construction is completed (including roads, sewers, houses, final grading and placement of lawns, etc.), to ensure that no water borne silt, debris or surface flow enters the municipal storm drainage system or any natural water course. The owner is required to satisfy the land development guidelines of the Ministry of Environment and the Department of Fisheries and Oceans.

Rebate of Federal Sales Tax

5.1 After issuance of the "Certificate of Total Performance" the Town will cooperate with the Owner by signing and certifying such correct documents as are presented to it to assist the Owner in obtaining the rebate of Federal Sales Tax on all materials used in the installation of water and/or sanitary sewer works. The Owner shall be responsible for determining from the Federal Tax Department which materials are exempt from Federal Tax and how the rebate is to be claimed. No claim for payment shall be made by the Owner for loss resulting from failure on the part of the Owner to obtain a tax rebate on materials.

Abbreviations

6.1 When references are made to the following capitalized abbreviations, they refer to Specifications, Standards, or Methods of the respective Association.

The numbers and letters following the abbreviations denote the Association's serial designation for the Specification or Standard to which reference is made.

All references to these Specifications, Standards, or Methods shall, in each instance, be understood to refer to the latest adopted revision including all amendments.

ASTM - American Society for Testing Materials, 1916 Race Street, Philadelphia, PA

AWWA - American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado.

CSA - Canadian Standards Association, 178 Rexdale Boulevard, Rexdale, ON

RTAC - Roads and Transportation Association of Canada, 1765 St. Laurent Boulevard, Ottawa, ON

NOTE: The addresses may change from time to time and it is the responsibility of the owner to ensure that all information used is current.

Date: January 1998

This is a consolidated version of Bylaw 1261 prepared for convenience purposes only

TOWN OF COMOX
SUBDIVISION AND DEVELOPMENTS SPECIFICATIONS

APPENDIX B
SPECIFICATIONS FOR ENGINEERING DRAWINGS

This is a consolidated version prepared for convenience purposes only.

APPENDIX 'B'

SPECIFICATIONS FOR ENGINEERING DRAWINGS

General

1.1 These specifications pertain to the preparation of the preliminary drawing and the complete set of drawings for the subdivision and/or development, or a phase thereof, including, as appropriate, the following:

> Storm drains, sanitary sewers, waterworks, roadways, curbs, lighting, sidewalks, underground power, telephone and cable television, culverts, bridges and other permanent structures.

Preliminary Drawing

2.1 The preliminary drawing of the proposed plan of subdivision and/or development should be at a scale of 1:1000 or larger, but other scales may be utilized subject to the approval of the Approving Officer. The preliminary drawing need not comply with all of the requirements of this Appendix B, but it shall show:

2.1.1 The outside boundary of the property to be subdivided and/or developed, and the boundaries between phases (if any) of the proposed subdivision and/or development.

2.1.2 The relationship of the subdivision and/or development to any adjacent existing or proposed highways.

2.1.3 The dimensional location and use of any existing buildings or other structures.

2.1.4 The locations of any watercourses and of any existing water or sewer services on private property within the proposed subdivision and/or development.

2.1.5 The locations and dimensions of all existing and proposed lot lines.

2.1.6 The scale and date of the drawing and the direction of north.

Drawings

3.1 The complete set of drawings shall clearly show the locations of all services, using offsets from property lines or boundaries of rights-of-way. The general arrangement of the highway cross-section and the utilities to be constructed within the right-of-way shall be in accordance with the Standard Plans. When existing utilities are already in place and not conforming to these standard arrangements, this requirement is waived and a special design is required.

3.2 Elevations shall be relative to geodetic datum. Bench mark locations and elevations may be obtained from the Town. A minimum of 2 reference bench marks with elevations shall be shown on each design drawing except in integrated survey areas.

3.3 All dimensions shall be shown to the nearest 10 mm. All elevations shall be shown to the nearest 10 mm except critical sewer elevations which shall be shown to the nearest 5 mm.

3.4 Where a Town of Comox standard plan exists it shall be sufficient to refer to the appropriate plan by reference number and date of issue. Where a standard plan does not exist, or is unsuitable for a particular case, detail drawings shall be prepared to conform generally with these specifications and so as to portray accurately the various elements of the installation.

3.5 Drawings shall bear the seal of a Professional Engineer licenced to practice in British Columbia.

Lettering on drawings shall be mechanically produced with the minimum size equivalent to 18 Leroy.

All drawings shall be in metric measurement.

3.6 The Consultant shall submit such plans as may be required to Provincial Agencies having jurisdiction over the subject improvements. Copies of the Provincial permits and a print of each approved drawing shall be submitted to the Town. The Consultant shall submit statements from the affected private utility companies which certify that the drawings have been coordinated and all necessary easements have been agreed upon.

Preparation of Drawings

4.1 Drawings should normally be prepared on standard sheet size A1 which has 841 mm X 594 mm outside dimensions. The Town's standard legend shall be utilized. Standard sheets with legend imprinted may be purchased from the Town.

4.2 The title and revision block shall be located in the lower right corner of the drawing and shall contain a space where the Town reference number may be entered. The following information shall be shown on all plans when applicable.

- plan number, title block and north arrow
- existing and proposed rights-of-way and easements
- lot lines substantially as shown on the approved preliminary layout plan
- lot and plan numbers

4.3 The following scales should normally be used:

		Preferred		Acceptable
Location	Horizontal	1:5000		
Overall Development Plan	Horizontal	1:1000	or	1:500
Topographic and Existing Structures Plan	Horizontal	1:1000	or	1:500
Catchment Area and Storm Water Control Plan	Horizontal	1:1000	or	1:2500
Lot Grading Plan	Horizontal	1:1000	or	1:500
Plan/Profile	Horizontal 1:500 Vertical	1:50	or	1:100
Cross-Sections	Horizontal 1:100 Vertical	1:100		
Structural Details		1:20	or	1:10

4.4 Standard profile sheet A1, 2 mm x 20 mm grid on 10/20 tracing paper, shall be used for:

a) Full profile
b) 1/2 plan, 1/2 profile grid

Both plan and profile must be referenced to a property line or highway boundary preferably near or at 0 + 00 chainage.

The upper half of the plan/profile sheet shall be the plan view.

Description of Drawings

5.1 A complete set of drawings shall consist of the following:

-Location Plan
-Overall Development Plan
-Topographic and Existing Structures Plan
-Catchment Area and Storm Water Control Plan
-Lot Grading Plan including Minimum Basement Elevation and Storm Drain Elevation at Property Line
-Roadworks, Waterworks, Sanitary and Storm
-Sewer Plan and Profile
-Detail Plans
-Ornamental Street Lighting Plans (if to be constructed)
-Private Utility Plans and Profiles
-Where good cause can be shown, one or more of the above plans may be exempted upon receipt of written approval from the Administrator.

Overall Plans of the Subdivision and/or Development

6.1 The Location Plan shall show the location of the project relative to the surrounding district. This plan should be drawn on the cover sheet.

6.2 The Overall Development Plan shall show:

-all existing and proposed legal lines, easements, roadworks, public and private utilities and utility poles in the subject phase and any future phases.
-plan and profile reference numbers.

6.3 The Topographic and Existing Structures Plan shall show the locations of all buildings and structures, the ones to be retained; all natural boundaries such as steep banks, watercourses and areas of unstable soil on and adjacent to the subdivision. Where the slope of the existing ground is in excess of fifteen (15) percent contour lines at two (2) metre or less spacing shall be shown.

6.4 The Catchment Area and Storm Water Control Plan shall show the whole of the drainage catchment area to the point of discharge to a trunk storm sewer or natural watercourse. The plan shall show the design runoff coefficient, area and flow. Effects on downstream drainage structures shall be shown as far as the receiving trunk storm sewer or watercourse.

This plan shall show the location of the major stormflow route(s).

6.5 The Lot Grading Plan shall show the post-development ground elevation at each corner of the lots and at any breakpoints, the elevations of centre-line of roadways, and the locations of storm drain inlets. For each lot it shall show the minimum habitable floor elevation of the building to be constructed thereon and, where necessary, details of the grading around it to direct surface water away from the building and any other necessary grading or drainage features. Where such building is adjacent to or liable to be affected by a major flow flood path, the highest elevation of the major hydraulic grade line opposite such building shall be shown.

Where any design ground elevations are below top of curb, the plan shall show the method of disposition of surface water.

Roadworks Plans & Profile

7.1 Plans and profiles shall be shown for all proposed roadways. Where a new roadway is the continuation of an existing roadway or where the work may be extended at a future date the plans and profiles shall extend 60 metres beyond the work to be constructed.

7.2 The following information shall be shown in the plan:

- all highways including sidewalks, walkways and emergency access routes.
- the roadway, sidewalk, walkway and emergency access widths; and their offsets from property line. The roadway width shall be measured between the curb faces. Where a sidewalk is constructed adjacent to a vertical curb, the curb width shall form part of the sidewalk width.
- details of intersections with spot pavement and gutter elevations at all critical points.
- curb returns and cul-de-sac bulbs.
- hydrant and pole locations.
- locations of catch basins referenced to centreline chainage.
- typical cross-section if different from standard plan.
- locations of street name signs and traffic control signs.
- locations of traffic islands, retaining walls, guardrails and barricades.

7.3 The following information shall be shown on the profile:

- the existing ground profile and finished pavement profile at true centreline length projected above the plan in as close a relationship as possible.
- percent grade to two decimal places.
- station and elevations of BVC, EVC and VPI.
- length of vertical curve.
- elevations along the vertical curve at intervals not exceeding 7.5 metres.
- elevations and stations of low or high spots of vertical curves.
- where the levels of existing ground vary considerable across the right-of-way, cross-sections shall be shown at intervals not exceeding 15 metres.

On crossfall sections, a profile should be shown for each gutter and the elevation of each gutter should be shown either on the profile or in tabular form.

Waterworks Plans & Profiles

8.1 Where both roadworks and waterworks construction are required, the two plans and profiles may be combined.

8.2 The following information shall be shown on the waterworks plan:

-locations of existing and proposed pipe centreline, pipe size, type and class, hydrants, valves, fittings and all related appurtenances in relation to highway, easement and adjacent property and lot lines.
-location where the mains terminate.
-the extent of work required by the Municipality in making the connection to the existing water main.
-locations of service connections. Connections not conforming to the standard offset require a reference to a lot line. In general, water services shall be installed as shown on Standard Drawing SF-6.

8.3 A water main profile is only required where there is a conflict with other utilities and/or the pipe is not to be laid at a constant depth below the finished grade. Watermain profiles may be required by the Ministry of Health

The following information shall be shown on the profile:

- the profile line of the existing and finished grade above the pipe, and the crown profile of the pipe.
- pipe deflections and bends.
- other utilities crossing the water main.

Sanitary and Storm Sewer Plans & Profiles

9.1 The sewer plans shall show the tie-in to existing systems and provision for future extensions where appropriate. Sanitary sewer manholes shall have alphabetical identifications. Storm sewer manholes shall have numerical identifications.

9.2 The following information shall be shown on the sewer plan:

- locations of the pipe centreline, manholes, cleanouts, and other appurtenances in relation to highway, easement and adjacent property and lot lines.
- locations and invert elevations of service connections at property line. Connections not conforming to the standard offset require a distance from an iron pin or lot line.
- existing and proposed power and telephone poles.
- dimensions of easements.
- elevations of the existing ground at the centre of the lot.
- horizontal curve information as detailed under Roadworks when curved sewers are proposed.
*- locations of ditch lines, culverts and ditch inverts when they are to be retained.
*- culvert diameter and invert elevations, details of intake and outlet structures.
- structural details of all manholes not covered by Town standard plans.
- existing buildings to be connected to the sewers, and existing building sewer outlets, if any.

* Show only on storm sewer plans.

9.3 The following information shall be shown on the profile:

- the profile line of existing and proposed finished grade above the pipe, and the inverts of the proposed sewers.
- size, type and class of pipe.
- distance between manholes.
- distance between manholes and cleanouts.
- percent grades to two decimal places.
- invert elevations of inlet, outlet and branch lines at manholes.
- other underground utilities crossing the sewers.

Ornamental Street Lighting Plans

10.1 The following information shall be shown on the Street Lighting Plan:

- street light pole locations.
- street light conduit locations and offsets.
- street light service panel locations.
- location of power source.
- locations of existing and proposed hydro and telephone poles.
- size of ducts, type and size of wire.

Private Utility Plans & Profile

11.1 B.C. Hydro, B.C. Telephone and gas company plans shall be prepared by the appropriate utility company.

As-Built Drawings

12.1 As-Built drawings on mylar transparencies shall be submitted to the Administrator no later than four (4) weeks following substantial completion. If the as-built drawings are not complete at the time that the developer wishes to obtain final approval, a bond will be required to ensure completion of these drawings in an amount not less than 1% of the construction cost.

The As-Built drawings shall be certified by the Consultant to be a true record of the installation and shall be sealed by him.

Standard Plans

13.1 The standard plans and latest revision dates of each are shown in Table B-1.

TABLE B-1

Drawing #	Title	Drawing Date	Amending Bylaw
	STANDARD PLANS		
SB-1	Gravel Highway X-Section	Jul 22/91	
SC-1	Urban Highway X-Section	Jul 22/94	
SC-2	Rural Highway X-Section	Jul 22/91	#1612 Jan 20/10
SC-3	Cul-de-Sac	Jul 23/93	
SC-4	Deleted		
SC-5	Utility Alignments for Underground Wiring	Jul 22/91	
SC-6	Street Name and Stop Sign	Jul 22/91	
SC-7	Barrier Curb and Gutter	Mar 31/94	
SC-8	Rollover Curb and Gutter	Mar 31/94	
SC-9	Sidewalk	Mar 31/94	
SC-10	Combined Sidewalk Curb and Gutter	Jul 23/91	
SC-11	Land and Driveway Crossing	Oct 13/95	
SC-12	Pedestrian Ramp	Jul 23/91	
SC-13	Pedestrian Connection (page 1 of 2)	Jul 23/91	#1551 Feb 7/07
SC-13A	Pedestrian Connection (page 2 of 2)	Jul 23/91	#1612 Jan 20/10
SC-14	Curb and Gutter Base Preparation Questionnaire	Jul 23/91	
SC-15	Deleted		#1551 Feb 7/07
SC-16	Conceptual Plan Intersection of Development Road and Butchers Road	Feb 8/06	#1507 Jun 7/06
SD-1	Pipe Bedding	Jul 19/91	
SD-1A	Utility Trench	Jun-93	
SD-2	Pavement Restoration	Jun-93	
SD-2A	Utility Trench Restoration in Asphalt Roads	Jun-93	
SD-3	Culvert Headwall	Jul 17/91	
SD-4	Manhole Type A	Jul 22/91	
SD-5	Manhole Type B	Jul 17/91	
SD-6	Drop Manhole	Jul 17/91	
SD-7	Cleanout	Jul 17/91	
SD-8	Sewer Service Connection	Aug 14/91	
SD-8A	Sanitary Drain Inspection Chamber	Jul 91 Rev. May 93	
SD-9	Catch Basin with Flat Grate	Aug 14/91	
SD-10A	Catch Basin with Combined Inlet (page 2 of 2)	Jul 31/91	
SD-10B	Catch Basin with Combined Inlet (page 1 of 2)	Jul 31/91	
SE-1	Rainfall Intensity Duration Frequency Curve	Jan-05	
SE-2	Rock Pit Detail		#1567 Aug 15/07
SE-3	Service Connection with Disconnected Roof Leaders	February 2021	#1977 Oct 20/21
SE-4	Sediment Catch basin	February 2021	#1977 Oct 20/21
SE-5	Infiltration Trench Control Manhole	February 2021	#1977 Oct 20/21
SE-6	Boulevard Infiltration Trench	February 2021	#1977 Oct 20/21
SE-7	Boulevard Infiltration Trench Accepting Planting Species	February 2021	#1977 Oct 20/21
SE-8	Street Infiltration Trench	February 2021	#1977 Oct 20/21
SE-9	Clean Out	February 2021	#1977 Oct 20/21
SE-10	Curbing Options at Boulevard Infiltration Trenches	February 2021	#1977 Oct 20/21

Drawing #	Title	Drawing Date	Amending Bylaw
SE-11	Typical Lot Grading (Rear to Front)	February 2021	#1977 Oct 20/21
SE-12	Typical Lot Grading (Front to Rear)	February 2021	#1977 Oct 20/21
SE-13	Dry Detention Pond Sign Detail	February 2021	#1977 Oct 20/21
SE-14	Dry Detention Pond Plan & Sections	February 2021	#1977 Oct 20/21
SE-15	Dry Detention Pond Outlet Control Structure Sections and Details	February 2021	#1977 Oct 20/21
SF-1	Hydrant	Feb 2/98	
SF-2	Valve Box	Jul 18/91	
SF-3	Water Service Connection	Jan 26/05	#1462 Nov 2/05
SF-4	Blowoff	Jul 18/91	
SF-5A	Thrust Blocking (page 2 of 2)	Jul 30/91	
SF-5B	Thrust Blocking (page 1 of 2)	Jul 30/91	
SF-6	Preferred Locations of Building Service	Jul 16/91	
SF-7	Service Location and Tree Envelopes	Sep 14/92	
SG-1	Concrete Base for Street Light Standard	Jul 19/91	
SG-2	Concrete Base for Distribution Base Standard	Jul 19/91	
SG-3	Wiring Schematic for Street Light	Jul 19/91	
SG-4	Distribution Base and Equipment	Jul 23/91	
SG-5	Wiring Schematic for Distribution Base	Jul 29/91	
SG-6	Decorative Post Top Street Light Standard		#1567 Aug 15/07
SH-1	Tree Planting Detail	Sep 14/92	
SH-2	Detention and Retention Pond Irrigation (typical)		#1567 Aug 15/07
SH-3	Detention and Retention Pond Landscaping (typical)		#1567 Aug 15/07
SH-4	Storm Water Pond Baffle Detail		#1567 Aug 15/07
	TABLES		
Table C-I	Minimum Requirements: Roadway Widths, Curb and Sidewalks		#1612 Jan 20/10
Table C-II	Geometric Design Limits		#1551 Feb 7/07
Table G-1	Hardware for Ornamental Street Lighting		#1567 Aug 15/07
Table H-I	Recommended Street Trees (2 pages)		
Table H-II	Non-Recommended Street Trees		
Table H-III	Very Small Trees		
Table H-IV	Recommended Street Trees		#1551 Feb 7/07
Table H-5	Recommended Plantings for Storm Water Ponds		#1567 Aug 15/07
	MAPS		
Map C-1	Greenways Network-Adjacent to Local Street		#1612 Jan 20/10
Map C-2	Greenways Network-Dedicated Walkways		#1612 Jan 20/10
Map D-1	Land Capable of Development Using an On-Site Sanitary Sewer System (map 1 of 2)		#1514 Jul 5/06
Map D-2	Land Capable of Development Using an On-Site Sanitary Sewer System (map 2 of 2)		#1665 Aug 18/10
Map E-1	Anderton Storm Drainage Sub-Area		#1528 Sep 20/08
Map F-1	Land Capable of Development Using an On-Site Water System		#1514 Jul 5/06
	FIGURES		
Fig C-1	Greenway Adjacent to a Street Class I		#1612 Jan 20/10
Fig C-2	Greenway Adjacent to a Street Class II		#1612 Jan 20/10

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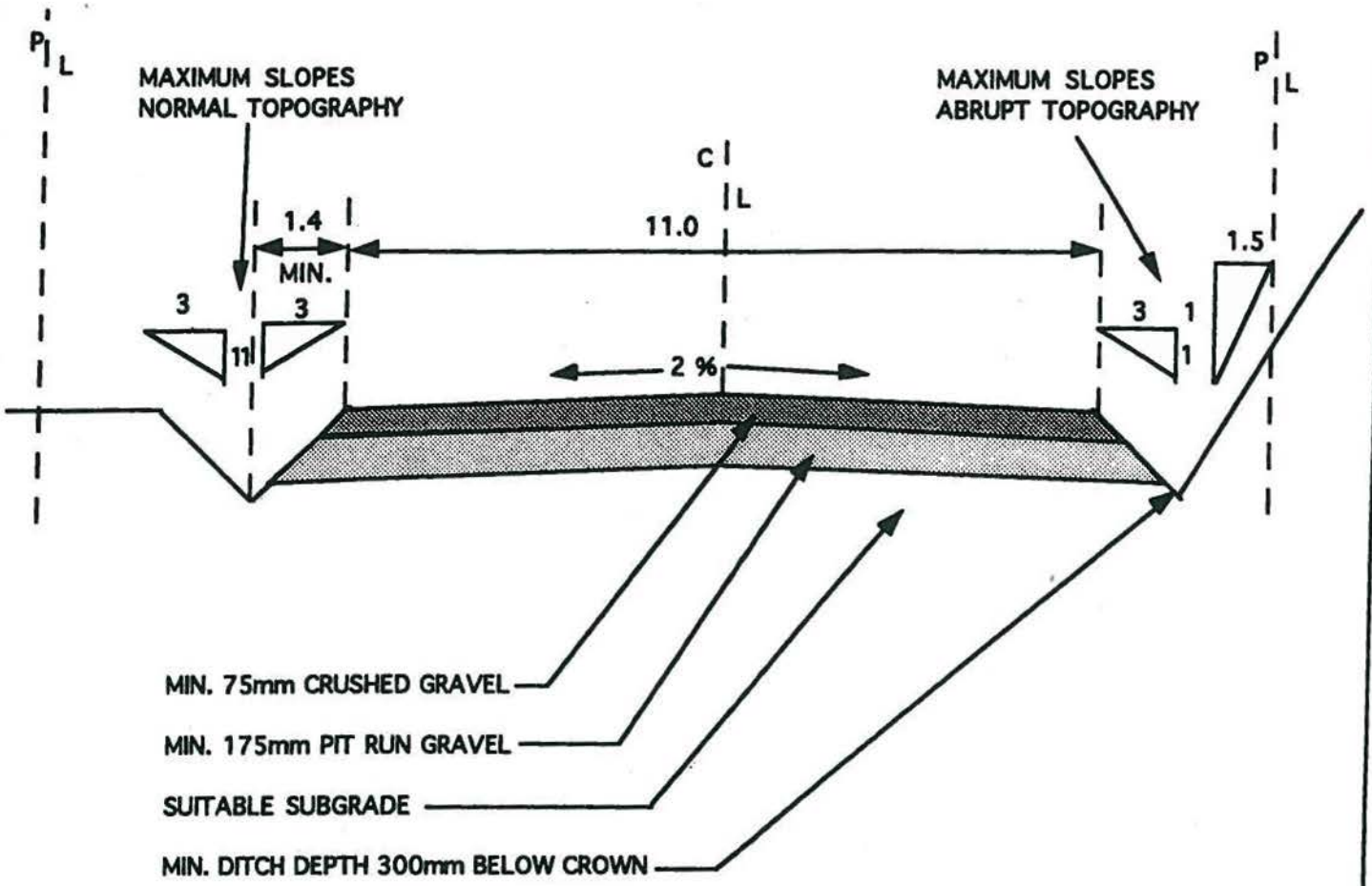

THIS PLAN IS INTENDED TO PROVIDE A SUITABLE ROADWAY DESIGN WITH ADEQUATE SUBGRADE AND GRANULAR BASE SO THAT THE SURFACE MAY BE UPGRADED TO PAVED RURAL X - SECTION (PLAN SC - 2) WITHOUT FURTHER EXCAVATION AND BACKFILL. TOP OF ROADWAY PROFILE SHOULD CONFORM TO APPENDIX C OF THIS BY - LAW.

A SUITABLE SUBGRADE CONFORMS TO SECTIONS 24 AND 25 OF APPENDIX C, AND DOES NOT CONTAIN ORGANIC MATERIALS OR TOPSOIL.

ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE

TOWN OF COMOX			TITLE: GRAVEL HIGHWAY X - SECTION	STANDARD DWG. NO. SB - 1
DRAWN BY: GB	DATE: 91/07/22	APPROVED BY: FP		

Date: January 1998

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TOWN OF COMOX
SUBDIVISION AND DEVELOPMENTS SPECIFICATIONS

APPENDIX C
SPECIFICATIONS FOR HIGHWAYS

For list of Standard Plans see Appendix B, Page 10.

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TOWN OF COMOX

APPENDIX 'C'

SPECIFICATIONS FOR HIGHWAYS

This appendix consists of three parts
- Design
- Materials
- Construction

DESIGN

Highway Alignment

0.1 East west road alignment shall take precedency, to facilitate the passive heating and cooling of buildings. **(#1977 Oct 20/21)**

Classification And Width

1.1 For each zoning classification, the minimum widths of rights-of-way and pavement and the requirements for sidewalks and curbs shall be those shown in Table C-I.

1.2 Where a highway passes through more than one zone, the zone having the most significant impact on the highway as judged by the Approving officer will dictate the applicable highway standard. Where a highway separates areas of different zoning the higher standard should normally apply.

1.3 Cul-de-sacs should normally be used only in single family residential areas.

Geometric Design

2.1 The geometric design of roadways should be in accordance with "Geometric Design Standards for Canadian Roads and Streets, RTAC 1976", and amendments thereto, unless otherwise specified in this By-law.

The geometric requirements for roadway design within and adjacent to the subdivision and/or development may differ according to the predom adjacent land use and topography, but should generally be those set out in Table C-II.

2.2 The absolute maximum grades shown in Table C-II may only be used where:

2.2.1 the desirable grade cannot be obtained due to topographic constraints, or
2.2.2 the geometric design of an intersection can be improved by increasing the grade on the minor roadway to avoid compromising the design of the major roadway.

2.3 The preferred minimum longitudinal grade is 0.5%. The absolute minimum is 0.4% which may be used only for short distances. This applies to all roadways.

2.4 The grade of a downhill cul-de-sac shall not exceed 10%.

The grade around the gutter line of the bulb of a cul-de-sac shall not be less than 0.4% nor greater than 5%.

The area between the bulb centrepoint and the intersecting roadway shall have positive drainage. When cul-de-sacs are proposed, a plan showing gutterline and pavement spot elevations must be submitted for approval.

2.5 The approach grade of a minor roadway within 15 metres of an intersection measured from the gutterline of the major roadway shall not exceed 4%.

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

2.6 The maximum design grades for driveways shall be:

Industrial, commercial and institutional property	12%
Multiple residential property	15%
Single family and duplex property	20%

Grade changes in driveways shall be designed with adequate vertical curves so as to prevent vehicle bottom contact or hang up. The vertical curve nearest the roadway shall not begin closer to the roadway than the private property side of the existing or future sidewalk.

2.7 Where extreme topography exists, roadways may be designed with cross-falls from 1% to 4%. Cross-falls shall be considered only when other designs are impractical.

When crossfall occurs at an intersection, the variation in the crown of the major roadway shall be made by smooth transition over 15 metres minimum each side of the intersection. The crown of the minor roadway shall be varied to suit the profile of the major road. The maximum rate of cross-fall variation shall be 1% per 10 metres on a collector and 2% per 10 metres on a local. Extra care and consideration must be given to the pavement drainage when selecting the length of transition.

2.8 On lanes, pedestrian connections, and greenways network – dedicated walkways and in any other similar developments, drainage may be accomplished by a centerline valley or a cross-fall at 2% opposite to the fall of the land. (#1551 FEB 7/07

2.9 Horizontal curves should be avoided coincident with sharp vertical curves.

Vertical curves may be omitted where the algebraic difference in grades does not exceed 2% for local roadways and 1% for other roadways.

Intersections

3.1 Highways should normally intersect at right angles. The angle of intersection may be reduced to a minimum of 80 degrees where no other alternative exists due to site characteristics.

3.1.1 The minimum spacing between intersections along a highway should be 60 metres measured from the intersection centre-lines. A lesser distance may be approved by the Administrator where no other alternative exists due to site characteristics.

Highway intersections should be avoided near the crests of hills.

3.1.2 All property corners at an intersection shall be provided with a minimum 6 metre radius or equivalent corner cut-off.

Curb return radii at an intersection shall have a minimum radius of 10.5 metres. A larger radius may be required to facilitate the movements of larger vehicles in industrial and commercial areas, or buses.

3.1.3 All intersection centrelines shall be referenced to the centreline station chainage.

Cul-de-Sacs

4.1 Permanent cul-de-sacs shall conform to the minimum standards stated in this By-law and shown on Standard Plan SC-3. The dimensions may be increased to meet traffic and vehicular requirements where the cul-de-sac is eccentric.

4.2 Temporary cul-de-sacs which are more than 150 metres long and are to be extended in the future shall be designed with gravel turn-arounds beyond the right-of-way dedication. This requirement may be waived when the tentative construction schedule indicates that the next phase of development will commence within nine months from the date on which the current construction drawings are submitted to the Town for approval. Gravel turn-arounds shall be constructed in accordance with Standard Plan SB-1.

4.3 Barricades must be located at the ends of the temporary cul-de-sacs where physical access to the future highway is possible.

Lanes

5.1 Where lanes must be provided they should run straight from highway to highway without corners or T-intersections. When corners cannot be avoided, a 3 metre by 3 metre triangular right-of-way widening shall be dedicated.

5.2 A curb shall be constructed along the low side of a lane which is cross-falled.

Driveways

6.1 Driveway and lane crossings shall conform to the Standard Plan SC-11. The near side of a driveway shall be located no closer than 6 metres from the property corner of a highway intersection.

Pedestrian Connections

7.1 Pedestrian Connection widths shall be as specified in this Bylaw and Pedestrian Connections shall conform to Standard Plan SC-13.

7.2 A curb shall be constructed along the low side of any Pedestrian Connection which is cross-falled. Catch basins as required shall be located to intercept the water flowing in the centre valley or adjacent to the curb of a Pedestrian Connection.

7.3 Pedestrian Connections shall be surfaced with concrete or asphalt.

7.4 A Pedestrian Connection connecting the turning area of a Cul-de-Sac Street to an adjacent street shall be provided where a Cul-de-Sac Street is longer than 120 metres in length, as measured to the centre of the turning area; where a Pedestrian Connection is provided, the length of a Cul-de-Sac Street may be increased to 230 metres.

7.5 A Pedestrian Connection connecting a street to an adjacent street shall be provided at the mid-point of a street where continuous street frontage exceeds 370 metres; where a Pedestrian Connection is provided, frontage may be increased to a maximum of 500 metres. **(#1551 FEB 7/07)**

TABLE C-1
MINIMUM REQUIREMENTS, ROADWAY WIDTHS, CURBS AND SIDEWALKS

	Road Allowance Width (m)				radius of Cul-de-sac	Pavement Width (m)						radius of Cul-de-sac	Shoulder Width	Type of Curb	No. of Sidewalks
Land Use	**Cul***	**Loc***	**Coll***	**Lane***	**(m)**	**Cul***	**Loc***	**Min. Coll***	**Maj. Coll***	**Arterial**	**Lane***	**(m)**	**(m)**	**Curb**	**By Owner**
Urban Roads ✦ ‡	20	20	20	6	17	9	9◆	11	13	14	5.5	12.5		Roll** ◆ ✦ Ω	Commercial, Multi-Family: both sides ✦ ‡ Ω Single-Family with secondary suite allowance: Both sides except cres & cul ‡ ✦ Ω single family no secondary suite allowance: 1 side ● ◆ ✦ Ω
Industrial	20	20	20	7.5	17		11	13			7			Vert**	
Arterials			25							14				Vert**	1 side
Pedestrian Connections	required where a cul-de-sac street is longer than 120 m, or where continuous street frontage exceeds 370 metres			2.5							2.5			Asphalt or concrete	
Dedicated Walkways - Map C-2 ■				14-20, avg 15											
Dedicated Walkways - Map C-2 ⌂				6-9, avg 7											

* Highway Classification Cul – Cul-de-Sac Loc – Local Coll - Collector Lane - Lane	**Curb Type Roll - Rollover Curb Vert - Vertical Face Barrier Curb	‡ Sidewalk on one side on crescent streets which are not an arterial or collector street, all cul-de-sac streets and McDonald Road South of Guthrie Rd.	● Sidewalk both sides on major collectors and arterials.
◆ For the portion of Butchers Road from the intersection of any new road on Lot 18, District Lot 186, Comox District, Plan 449, except that part in Plan VIP75657 (471 Butchers Road) south to Lazo Road, the minimum pavement width shall be 5.5 m and shall have no curb, gutter or sidewalk. The development of the intersection shall be in shall have no curb, gutter or sidewalk. The development of the intersection shall be in accordance with Drawing SC-16		■ Where shown on Map C-2 as Dedicated Walkway 14-20 m width, dedication of a highway varying in width from 14 metres to 20 metres, and having an average width of 15 metres is required.	⌂ Where shown on Map C-2 as Dedicated Walkway 6-9 m width, dedication of a highway varying in width from 6 metres to 9 metres, and having an average width of 7 metres is required.
✦ For Kye Bay Road south of Wireless Road, and Simon Crescent road construction standards contained in Standard Drawing SC-2 Rural Highway x-section apply, including no curb, gutter or sidewalk.		Ω For Cypress Ave, pavement width shall be 6.0 m and shall have no curb, gutter, sidewalk or paved on-street parking.	

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TABLE C-II

GEOMETRIC DESIGN LIMITS

	HIGHWAY CLASSIFICATION	MINIMUM DESIGN SPEED (km/hr)	MAXIMUM GRADIENT		MIN. STOPPING DISTANCE (m)	MIN. K VALUE		MINIMUM HORIZONTAL CL RADIUS (m)
			DESIRED (%)	ABSOLUTE (%)		CREST	SAG	
RESIDENTIAL MULTIPLE	LOCAL	50	12	15	45	4	7	35
	COLLECTOR	50	10	10	65	7	11	90
RESIDENTIAL MULTIPLE	LOCAL COLLECTOR	50	10	12	65	7	11	90
COMMERCIAL, INDUSTRIAL & PUBLIC ASSEMBLY ZONE	COLLECTOR	50	10	10	65	10	11	90
ALL	ARTERIAL	50	8	8	65	10	11	90
ALL	PEDESTRIAN CONNECTIONS AND GREENWAYS NETWORK- DEDICATED WALKWAYS (#1551 Feb 7/07)	-	15	20	-	-	-	-
ALL	LANES	30	12	12	45	4	7	35

NOTE: The posted speed limit for vehicles at any time may be much slower than the design to which the roadway is built, but should not be faster. "Designs must anticipate future vehicular characteristics and operation patterns". (Transportation and Traffic Engineering Handbook, I.T.E. 1976, pp. 599 et seq).

/smw

Greenways Network

8.1 Adjacent to Local Street **(#1612 JAN 20/10)**

8.1.1 Where shown on Map C-1Greenways Network-Adjacent to Local Street, the street profile of a Class 1 Greenway as shown in Figure C-1 applies, except on Lot 1, District Lot 93, Comox District, Plan 2175, Except Amended Parcel A (DD 20783N) and Except Those Parts In Plan 1507R, 834 RW and 32578, and Except That Part Lying South West of Plan 834 RW where a Class 2 Greenway as shown in Figure C-2 applies. In the event of a conflict with other specifications, the specifications of this section shall take precedence over any other specifications.

Figure C-1 Greenway Adjacent to a Street Class 1 **(#1612 JAN 20/10)**

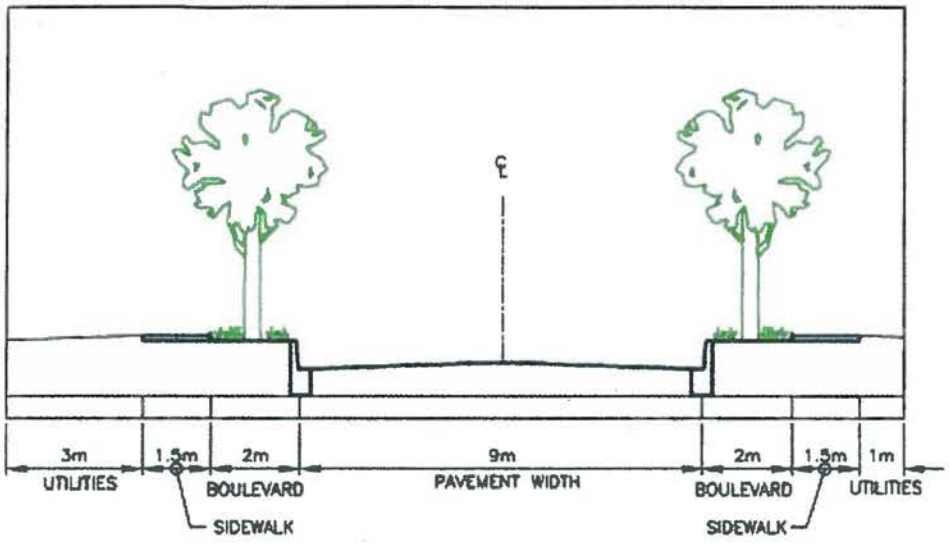
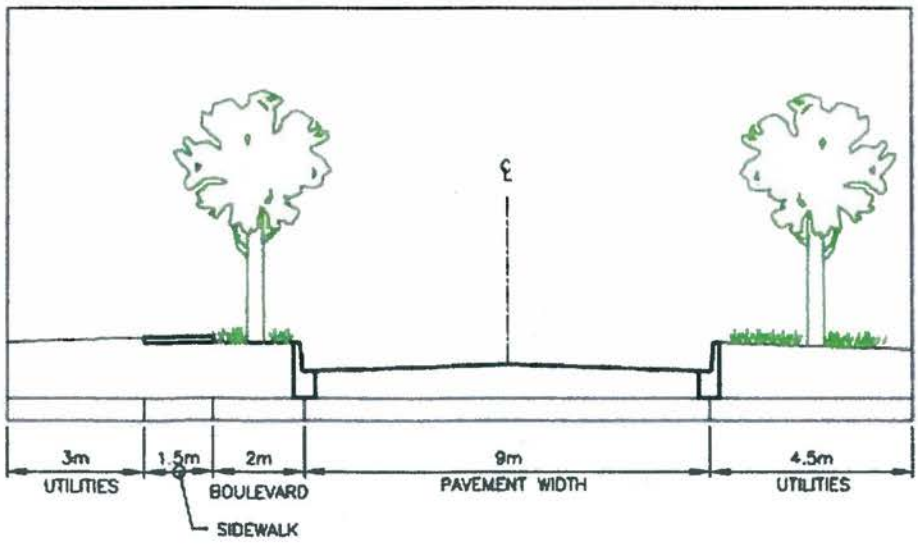


Figure C-2 Greenway Adjacent to a Street Class 2 **(#1612 JAN 20/10)**



8.1.2 Greenways Network Boulevards must be planted with street trees in accordance with Table H-IV.

8.1.3 Greenways Network Boulevards, shall be serviced with underground irrigation, including meter, meter setter and controller.

8.1.4 To allow for canopy trees, street lighting conduits within Greenways Network Boulevards must be 0.3 m back of the curb line, and must sweep to the light standard; in the event of conflict with other specifications, this specification shall apply and take precedent over any other specifications.

8.2 Dedicated Walkways

8.2.1 Where shown on Map C-2, the width and location of Dedicated Walkways shall be varied to accommodate environmentally sensitive areas, required engineering, include existing trees and natural features of public value, and to create public focal points and visual diversity. In the event of conflict with other specifications, the Dedicated Walkways specifications shall apply and take precedent over any other specification. **(#1612 JAN 20/10)**

8.2.2 Dedicated Walkways must be rough graded and serviced with a stormwater management system to the satisfaction of the Approving Officer so as to provide for, where shown on Map C-2 as Dedicated Walkway 6 m to 9 m width, a 1.5 metre hard-surfaced trail, or where shown on Map C-2 as Dedicated Walkway 14 m – 20 m width, a 3.0 metre hard-surfaced trail.

Curbs

9.1 Curbs shall conform to Standard Plans SC-7 & 8. A reverse gutter shall be used when the roadway cross-fall slopes away from the curb.

Sidewalks

10.1 Sidewalks should generally be located adjacent to the curb, except on urban collector and arterial roads, where separate sidewalks may be required. Sidewalks should normally cross-fall towards the roadway at 2%.

10.2 Sidewalks shall conform to Standard Plans SC-9 and 10.

Pedestrian Ramps

11.1 Pedestrian ramps shall be provided in curbs and sidewalks at all intersections and crosswalks and shall be in accordance with the Standard Plan SC-12.

Structural Design

12.1 Roadways shall be designed in accordance with this By-law, and with "A Guide to the Design of Flexible and Rigid Pavements in Canada - RTAC 1971" and amendments.

12.2 Pavement design shall include consideration of the subgrade soil type, moisture conditions and subgrade drainage provisions.

Design life shall be for a minimum of 20 years.

12.3 Regardless of the method used for pavement structure design, pavement structures shall be at least equal to or better than the minimum pavement structures below:

Land Use	Highway Classification	Min. Depth of Pitrun Gravel (mm) (Subbase)	Depth of Crushed Gravel (mm) (Base)	Depth of Asphaltic Pavement (mm) (Surface)
ALL	LOCAL	230	75	50
ALL	COLLECTOR	230	100	75
ALL	ARTERIAL	300	130	75
ALL	LANES	230	75	50
ALL	Pedestrian Connections	-	100	50

(#1551 FEB 7/07)

12.4 Urban roadway sections shall be in accordance with Standard Plan SC-1, and rural roadway sections with SC-2.

12.5 In-situ granular materials may be used in lieu of imported pitrun gravel when such material complies with the appropriate specification in this By-law.

Earthwork

13.1 The maximum slope of side slopes shall not be steeper than:

- For soils which are not classified as rock, in cuts and fills:

Desirable	3 horizontal to 1 vertical
Maximum	1.5 horizontal to 1 vertical

- For Rock in a cut:

Maximum	1 horizontal to 4 vertical

13.2 In special cases, such as those involving the protection of private property, retaining walls may be required. The construction drawings shall show structural details and surface finish of the walls.

13.3 Subgrade rock in roadways and ditches shall be shattered and excavated a minimum of 300 mm below the subsurface.

Materials

General

14.1 All manufactured materials shall be new and of first class quality, free from defects in manufacture, storage and handling.

All materials must be approved by the Consultant prior to placement. Once bulk materials from a particular source or mixing equipment has been approved, neither the source nor the equipment shall be changed without the approval of the Consultant.

Earth and Topsoil

15.1 Topsoil is surface material containing organic components which, in the opinion of the Consultant, may make it suitable for landscaping purposes or may make it unsuitable for bearing purposes.

15.2 Earth fill shall be common excavation or borrow material containing less than 15% by volume of rock larger than 150 mm in size, and free of organic and deleterious materials.

Sand and Gravel

16.1 Pit run gravel shall be clean, uniform, run of pit sand and gravel which will pass through a 150 mm screen and is free from organic materials, soft or disintegrated particles, clay and silt balls. Pit run gravel should be reasonably well graded and of consistent quality.

16.2 Aggregate sand for base courses shall be a natural or manufactured coarse sand having sharp irregular particles suitable for compaction. Sand for inclusion in asphaltic and Portland cement concretes shall conform to the requirements specified for those uses.

16.3 Crushed gravel for use as base course shall be composed of screened inert durable crushed aggregate, uniform in quality and free from soft or disintegrated particles, clay or silt balls, or an excess of flat or elongated pieces. It shall be capable of withstanding the effects of handling, spreading and compaction without excessive degradation or production of deleterious fines.

16.3 (Cont'd.)

In the absence of satisfactory performance records, the soundness of crushed gravel aggregate shall be tested in accordance with ASTM C 88 using magnesium sulphate. Aggregate so tested shall be considered unsatisfactory if the loss after five cycles exceeds 20% for coarse aggregates and 25% for fine aggregates.

Crushed gravel aggregate shall conform to the following gradation limits when tested accordingly to ASTM C 136:

Canadian Standard Sieve Series	Gradation Limits (% passing by weight)
19.0 mm	100
4.75	40 - 65
1.18	20 - 45
0.425	10 - 30
0.075	0 - 10

Not less than 50% of all material retained on the 4.75 sieve, as determined by particle count, shall have at least one fractured face. The Consultant shall test samples from sources of crushed gravel base course material, and shall determine which sources and equipment are to be used and what blending is required, and shall submit a proposed gradation curve to the Administrator for approval prior to construction. Once approved, the material, as placed, should not deviate markedly from the design curve, and shall in no case be outside the limits stated above.

Asphalt Pavement

17.1 Aggregate for asphaltic concrete shall consist of natural sands, gravels, and crushed rock of clean, hard particles, free from clay lumps, coatings, thin elongated or laminated pieces and cemented inorganic materials, with a physical structure not affected by water or the elements, and in accordance with the following gradation when tested in accordance with ASTM C 136.

17.1 (Cont'd.)

Canadian Standard Sieve Size	Gradation Limits (% passing by weight)
19.0 mm	100
13.2	80 - 100
9.5	70 - 90
4.75	50 - 70
2.36	35 - 50
1.18	26 - 40
0.600	18 - 29
0.300	13 - 23
0.150	8 - 16
0.075	2 - 8

Not less than 60% of the material passing the 19mm sieve and retained on the 4.75 sieve shall have two faces fractured. The percentage shall be determined by weight.

The strength and toughness of the aggregate shall be such that the percentage of wear as determined by the Los Angeles Abrasion test, ASTM C 131 does not exceed 40%.

Should the owner provide an aggregate which will meet the overall maximum size and asphalt design requirements set out in paragraph 16.3, such aggregate may be accepted by the Consultant, notwithstanding the fact that its grading curve and fracture ratio does not fall within the limits prescribed in the foregoing.

17.2 All bituminous materials shall conform to Asphalt Institute Specifications for each type and grade required. Asphaltic cement shall by Type B, with a penetration grade in accordance with ASTM D5 of 85-100, unless otherwise ordered by the Consultant.

Bituminous primer shall be MC-0 cutback asphalt unless otherwise ordered by the Consultant.

Tack coat shall be SS-1 or SS-1h asphalt emulsion unless otherwise ordered by the Consultant.

Edge coating shall be Bitumulus HRM-SS1 by Chevron or approved equal.

17.3 The hot mix asphaltic concrete shall be an intimate mixture of the specified aggregate and asphaltic cement. The Consultant shall provide the necessary Marshall test results showing the optimum asphalt content. This content shall be maintained at all times in the mix with a variation not exceeding 0.3 percent by weight. The mix shall meet the following requirements:

Hot Mix Asphaltic Concrete

Maximum Aggregate Size	20 mm
Marshall Stability, blows each face	75
Marshall Stability, Kg at 60°C	340 kg
Flow Index	2-4 mm
% Voids in Mineral Aggregate, Min.	14%
% Air Voids in Compacted Mix	3-5%
% Moisture Content, Max.	0.5%

Voids in mineral aggregate and voids in total mix shall be calculated on the basis of ASTM Bulk Specific Gravity. An allowance shall be made for the quantity of bitumen absorbed into the aggregate.
Should the Owner have recent test data for asphaltic mix using aggregates from the same source and meeting the design criteria, the Consultant may accept such test data in lieu of the Marshall design requirement.

17.4 The mixing plant and the operation shall conform to the requirements for mixing plants, ASTM 995-55. The Consultant and the Administrator shall have access to the plant at all times.

The mixing temperature of the aggregate shall be in the range of 120°-175°C. The mixing temperature of the asphalt cement shall be in accordance with the temperature viscosity curve but shall not exceed 175° at any time.

Portland Cement Concrete

18.1 Cement shall be normal Portland cement, type I, conforming to CSA specification CAN 3-A5 for plain and reinforced concrete.

18.2 Aggregate for Portland cement concrete shall consist of clean crushed stone or gravel and a clean well-graded sand conforming to CSA A23.1-M90.

18.3 Water for Portland cement concrete shall be clean and free from oil, acid and injurious amounts of alkali, organic matter or other deleterious substances, and conform to CSA A23.1-M90.

18.4 The Consultant shall prepare a mix design to provide concrete of a suitable consistency and air content for the intended use and having the required strength.

The minimum quantity of Portland Cement for a 25 MPa concrete mix shall be:

Maximum Aggregate Size (mm)	Minimum Cement Content (kg/m^3)
10	340
20	310
40	285

All concrete exposed to weather, water or soil shall have 4 to 6% entrained air by volume.

The minimum 28 day compressive strength shall be in accordance with the specification and/or standard plan for the intended use. Concrete for use in concrete roadways shall be a special design with a flexural strength of not less than 40 MPa when tested in accordance with CSA A23.2-M90. Concrete curbs, gutters and sidewalks shall have a 28 day compressive strength of 32MPa as shown on standard drawings SC-7 to SC-11 inclusive. Concrete not otherwise specified shall have a 28 day compressive strength of at least 25 MPa.

18.5 The following admixtures may be added to the concrete mix, when ordered by the Consultant, in accordance with the manufacturer's instructions and in accordance with the approved mix design:

- Air entraining agent conforming to CSA CAN 3-266.1
- Water reducing agent conforming to CSA CAN 3-266.2
- Pozzolanic Mineral Admixtures conforming to CSA CAN 3-A23.5
- Calcium chloride not exceeding 2% of cement by weight, conforming to ASTM D 90.

Calcium chloride shall not be used in exposed concrete where appearance is important.

Fly ash, where used, should not exceed 15% of cement by weight unless specifically ordered by the Consultant for a particular structure. Fly ash shall not exceed 20% of cement by weight at any time.

No other additives shall be permitted.

18.6 All concrete shall be cured in accordance with CSA CAN 3-A23.1 unless otherwise ordered by the Consultant.

18.7 Concrete shall be supplied to the work in ready-mix trucks in accordance with CSA CAN 3-A23.1 unless otherwise ordered by the Consultant.

18.8 After the amount of water specified in the design mix has been added to the dry ingredients during batching, concrete should not be retempered by the addition of further water. Should exceptional circumstances exist, the Consultant may order the addition of further water, without exceeding the amount permitted in CSA CAN 3-A23.1. In no case shall any further water be added later than 60 minutes after the first addition of water to the dry ingredients. Concrete which has not been discharged and placed before the expiry of 90 minutes after the first addition of water shall be rejected. This time may be reduced by the Consultant due to hot weather or design considerations, but in no case shall it be extended.

Security Fencing

19.1 Fencing adjacent to walkways shall be open mesh security type fencing in accordance with Standard Plan SC-13. Line posts shall be 60 mm galvanized steel posts with "100 wall" thickness. End posts shall be 73 mm, "100 wall". Top rail shall be 41 mm diameter, "100 wall". Fence fabric shall be 50 mm galvanized wire mesh with a minimum thickness of 9 gauge. The ground tension wire shall be 6 gauge galvanized steel.

CONSTRUCTION AND TESTING

General

20.1 This specification is a statement of minimum requirements. The Consultant shall provide such detailed specifications as may be required to ensure the works are accomplished in a satisfactory manner, within the required limits.

20.2 The subdivider shall notify the Administrator prior to the commencement of roadwork construction, and again prior to the commencement or resumption of paving. The giving of notice under this section does not relieve the subdivider from the giving of such other notices as may be required by statute, regulation or by-law.

20.3 Roadway construction, once begun, shall be pressed forward expeditiously. Subgrade layers and courses which are not promptly covered by succeeding layers or works and which may be exposed to adverse weather, water or traffic shall not later be covered until they have been retested and approved. Construction shall not be undertaken during snow, heavy or freezing rain or other unsuitable conditions. Dust control measures shall be taken by the subdivider and/or developer so as to prevent dust generated by his operations from becoming a nuisance to nearby residents or motorists.

Borrow, Waste and Truck Routes

21.1 The developer shall submit to the Administrator for approval the location of off-site borrow, waste and stock pile sites, and the proposed haul routes insofar as they affect municipal streets. The Administrator may order from time to time that certain streets be used or not be used by the subdivider and/or developmer for hauling material. The subdivider and/or developer shall confine his haul to the approved streets. He shall not change locations of off-site materials sites or haul routes without the approval of the Administrator.

21.2 Borrow pits within the municipality shall be left in a free-draining condition. Waste piles shall not be left in a condition that impedes drainage or that constitutes a nuisance.

Clearing and Grubbing

22.1 Clearing and grubbing shall include complete removal and disposition of all those trees, stumps and roots which are not shown on the plans to be retained.

Topsoil

23.1 Topsoil shall be conserved and, if suitable, should be re-used to landscape boulevards. Excess topsoil may be removed, subject to Municipal By-law.

Roadway Excavation

24.1 The excavation shall be made and left in a self-draining condition. Unsuitable material shall be removed and disposed of outside the highway right-of-way limits. All slopes shall be trimmed and all loose material removed.

24.2 Solid rock and large boulders shall be removed to a depth of a least 300 mm below the finished subgrade elevation. Rock excavation, where required, shall continue at least 1.8 m beyond back of curb or sidewalk in urban roadway sections, and 1.8 m beyond the toe of shoulder in rural sections. Rock shall be excavated in such a manner as to drain to the outside of the roadbed without significant depressions which would pond and hold water under the roadway.

24.3 On completion of the excavation, the upper 150 mm of subgrade shall be compacted, if necessary, so as to obtain a minimum of 95% of the maximum density as determined by the Modified Proctor Method, ASTM D1557-91. In lieu of compaction, the Consultant may order installation of additional pit run fill.

Roadway Fill

25.1 Areas to be filled shall be cleared and grubbed. Topsoil should be removed for the full width of fill. Existing slopes shall be benched or scarified before filling.

25.2 Fill shall be placed in uniform layers as ordered by the Consultant, but not exceeding a compacted thickness of 230 mm per layer. Fill shall be compacted to a density of at least 95% of maximum density as determined by the Modified Proctor Method, ASTM 1557-91. A field density test shall be performed at least every 150 m.

25.3 Fill shall extend 2.5 m beyond the back of curb or sidewalk in urban roadway sections and 1.8 m beyond the edge of pavement of rural roadway sections. The surface shall be shaped so as to be self-draining during construction and until covered.

Pit Run Gravel

26.1 Pit run gravel shall be installed in uniform layers. The compacted thickness of each layer shall not exceed 230 mm.

26.2 Pit run gravel shall be compacted to a density of at least 95% of the maximum density as determined by the Modified Proctor Method ASTM 1557-91. A field density test shall be taken at least every 150 m.

26.3 Pit run gravel shall not be placed on a frozen, muddy, or rutted subbase. The pit run course shall be shaped and maintained so as to be self-draining until covered.

Crushed Gravel Base

27.1 Crushed gravel shall be placed in uniform layers not exceeding a compacted thickness of 150 mm per layer.

27.2 The crushed gravel base shall be compacted to a density of at least 95% of the maximum density as determined by the Modified Proctor Method ASTM D1557-91. A field density test shall be taken at least every 150 m.

27.3 Crushed gravel shall not be placed on a frozen or rutted base. The crushed gravel course shall be shaped and maintained so as to be self-draining until covered.

27.4 The compaction of the crushed gravel base course adjacent to street hardware, such as valve boxes and manholes, shall not be less than that of the nearby portions of the same course.

Other Grading and Drainage

28.1 Should subsurface water create an unstable condition in the foundation subgrade or succeeding courses at any time during the construction or guarantee periods, such water shall be diverted or intercepted and conducted away from the work area.

28.2 Culverts shall be installed as shown on the drawings and shall be cleaned and maintained by the developer until the Certificate of Acceptance is issued. Culvert headwalls shall be installed in accordance with standard plan SD-3.

Asphalt Priming

29.1 Priming of the crushed gravel base course will not normally be required. Where specified, primer shall be applied at a rate of 1 to 2 L/m^2. Traffic shall be prevented from travelling on a primed surface until it is covered or the primer has been absorbed.

29.2 The application of a tack coat between successive layers of asphalt paving will not normally be required. Where specified, a tack coat shall be applied at a rate of 0.25 L/m^2.

29.3 Vertical surfaces which may have new asphalt placed against them shall be sprayed or painted with bituminous edge coating. Transverse and longitudinal joints with existing adjacent lifts of asphaltic concrete shall be similarly sprayed or painted unless the existing asphalt temperature is above 50°C.

Asphalt Paving

30.1 Hot mix asphalt pavement shall be placed to the lines, grades and slopes shown on the drawings. Asphalt pavement shall not be placed when the air temperature is below 5°C, or is likely to fall below 5°C before the required density has been obtained. No loads shall be dispatched from the mixing plant so late in the day that the required compaction cannot be obtained during daylight hours.

30.2 Each layer of asphalt pavement shall be not less than 35 mm nor more than 65 mm compacted thickness unless otherwise ordered by the Consultant.

30.3 When asphalt pavement is laid in two or more lifts, the longitudinal and transverse joints of a higher lift shall be staggered so as not to coincide with the joints in lower lift, or with the joints in the adjacent mat of the same lift.

30.4 At no time shall the temperature of hot asphaltic mix in truck box or in the spreader hopper be less than 120°C.

30.5 Street hardware shall be recessed slightly below the general elevation of the adjacent finished top of asphalt pavement, but the depth should not exceed 6 mm.

30.6 All equipment used to deposit, spread and compact the asphalt pavement shall be in good clean condition and free from oil and fuel leaks.

Testing Asphalt Pavement

31.1 The surface of the finished asphalt pavement shall be smooth, true to grade, and shall show no irregularities exceeding 6 mm. Irregularities shall be measured using a 3 m straight edge laid at any point in any direction on the finished surface.

31.2 The minimum density of compacted asphalt pavement shall be:

- April 1st to September 15th — 97% of Optimum Density
- After September 15th — 98% of Optimum Density

The Optimum Density shall be determined by averaging the results from tests performed on briquettes made during the construction of the pavement. At least one set of tests to determine the properties of the mix produced during construction shall be performed and compared to the properties of the Marshall Design mix.

31.3 Core tests shall be performed on every full-width paving project at the rate of not less than one core for every 1000 m^2 of mat. At least two core tests shall be performed for each project.

For every core test, there shall be a timely report made to the Administrator of the mat thickness and density. For specific locations, such additional tests shall be made as required by the Administrator and reports submitted to him. Should the average of all mat thickness or densities fail to meet the required thickness or density, the entire project shall be deemed to be unacceptable. Should any two or more consecutive thicknesses or densities fail to meet the requirements, the mat represented by those tests shall be deemed to be unacceptable. Should any other pavement properties fail to meet the required standards, the project or any part of it may be deemed by the Administrator to be unacceptable.

31.4 Additional testing of unacceptable portions of mat may be ordered by the Consultant. Should such additional tests also prove unsatisfactory, the Consultant shall recommend to the Administrator suitable remedial measures. The Administrator may approve certain remedial construction or may require removal and replacement of the portions of mat which have not met the specifications.

Concrete Paving

32.1 Paving of roadways with Portland Cement Concrete shall be done according to a special design in each case. The criteria for smooth surface, accuracy of grade and maximum surface irregularity shall not be less stringent than for asphaltic concrete.

Sidewalks and Curbs

33.1 Sidewalks shall be installed to the lines, grades and slopes shown on the drawings, in accordance with standard plans SC-9 and SC-10. Curbs and gutters shall be placed to the lines and grades shown on the drawings, in accordance with standard plans SC-7 and SC-8. Pedestrian ramps and driveways shall be installed at the locations shown on the drawings and in accordance with standard plans SC-11 and SC-12.

33.2 Excavation for curbs and sidewalks shall extend not less than 300 mm beyond the proposed edge of concrete. Sidewalk base shall be crushed gravel conforming to the requirements of paragraph 15.3 of the section unless otherwise ordered by the Consultant. The base shall be installed and compacted for the full width of the excavation. Curb base shall be compacted pit run gravel, and shall extend not less than 300 mm beyond edge of concrete.

33.3 The forming and pouring of Portland Cement Concrete sidewalks, curbs and gutters shall be carried out in accordance with CSA CAN3-A23.1. Construction joints, expansion and contraction joints and concrete finishing shall be done as required by the standard plans, in accordance with the CSA standard noted. Concrete placing shall be curtailed at such time as will ensure completion of edging and finishing during daylight hours.

33.4 Street hardware such as valves and catch basins shall be installed or adjusted in accordance with the drawings and standard plans, but shall not project above the general level of adjacent concrete surface.

33.5 Concrete extrusion equipment such as slip-form curbing machine must be approved in advance by the Consultant. The machine shall not be substituted without the Consultant's approval. At any time that the extruded concrete curb or sidewalk produced by such machine does not retain its correct shape or proper surface or uniform line and grade, the machine shall be removed from the work forthwith and shall not be allowed to return until it has been demonstrated at some location remote from the work that the difficulties have been corrected to the satisfaction of the Consultant.

33.6 All freshly placed concrete shall be protected from premature drying and from extremes of temperature and shall be maintained with minimal moisture loss at a relatively constant temperature in accordance with CSA-CAN3-A23.1 and the manufacturer's recommendations. Concrete temperature, measured at the surface, should not be allowed to drop below 10°C during the first 72 hours.

Liquid membrane-forming compound may be used in accordance with ASTM C 309.

33.7 Construction equipment shall not be operated across or adjacent to a fresh curb or sidewalk until 7 clear days after the concrete has been poured.

33.8 Within seven days of pouring, material shall be placed against the back of curb for its full height to provide substantial backing and prevent accidental dislodging or damage. Curb backing shall be maintained until the boulevard is installed.

Testing Concrete

34.1 Portland Cement concrete shall be tested for slump, compressive strength and air content. Concrete used in roadway pavement shall, in addition, be tested for flexural strength.

34.2 The first set of tests each day or each project shall be made on samples from the first load of concrete delivered to the site. Thereafter for every 300 m of curb or sidewalk the Consultant shall take at least one set of tests. Each set of tests shall consist of a slump test, an air test and casting of at least one cylinder for a compressive strength test. There shall be at least two such tests with a minimum of three cylinders for each project. In any event there shall be a minimum of one set of tests with a minimum of three cylinders cast for each day's pour of a specified strength. Samples shall be obtained, handled and tested in accordance with CSA-CAN3-A23.2.

34.3 For extruded curbing installed by a slip-form curbing machine using a no-slump mix design, the slump test is not required.

34.4 Should a measured slump or air content test fall outside the specified limits, the test shall be repeated immediately. In the event of a second failure, the concrete shall be considered to have failed to meet the requirements of this By-law, and to be unacceptable.

34.5 A compression test is the average of at least two cylinders from the same or adjacent samples of concrete.

34.5.1 The average of all concrete cylinder compression tests for the particular phase of subdivision under construction shall equal or exceed the specified strength.

34.5.2 Not more than 15% of all cylinders tested shall fall below the specified strength.

34.5.3 No single test shall fall below 80% of the specified strength.

34.5.4 No three consecutive tests (based on time of pouring) shall fall below the specified strength.

Should the concrete fail to meet the minimum requirements of sub-paragraphs 33.5.1 and 33.5.2, the entire project shall be deemed to be unacceptable. Should it fail to meet 33.5.3 or 33.5.4, the portion of the project represented by those tests shall be unacceptable. Additional testing of unacceptable portions of curb and/or gutter may be ordered by the Consultant. Should such additional tests also prove unsatisfactory, the unacceptable concrete shall be removed and replaced.

34.6 Unacceptable concrete and frozen concrete shall be removed promptly from the work site.

Boulevards

35.1 The boulevards shall be graded and shaped to the lines, grades and slopes shown on the drawings, ensuring that the elevations at the property line conform to the Lot Grading Plan.

35.2 Where final grading and placing of topsoil is not carried out directly after pouring of curb and/or sidewalk, the boulevard shall be graded so as to provide positive drainage across the boulevard to the gutter without ponding of water against the curb or sidewalk so as to soften or undermine the curb foundation.

Security Fencing

36.1 Security fencing shall be installed in accordance with standard plan SC-13. Mesh shall be tied to vertical posts at least every 300 mm, and to top rail and ground wire at least every 450 mm. The ground tension wire shall be tied to both mesh and posts.

A clear opening of not less than 50 mm shall be left between the bottom of the mesh and the ground to permit mowing and prevent trash buildup. Concrete post footings shall be flush with the pavement.

Clean-Up and Restoration

37.1 The construction site shall be cleaned up as the work proceeds with the removal of excess material, broken concrete and all materials, equipment and construction refuse from various sections of the project as they are completed.

All adjacent streets, walkways, driveways, drainage facilities and other surface properties that have been removed or disrupted shall be replaced or restored to a condition equivalent to that which existed before the work began.

INSERT:

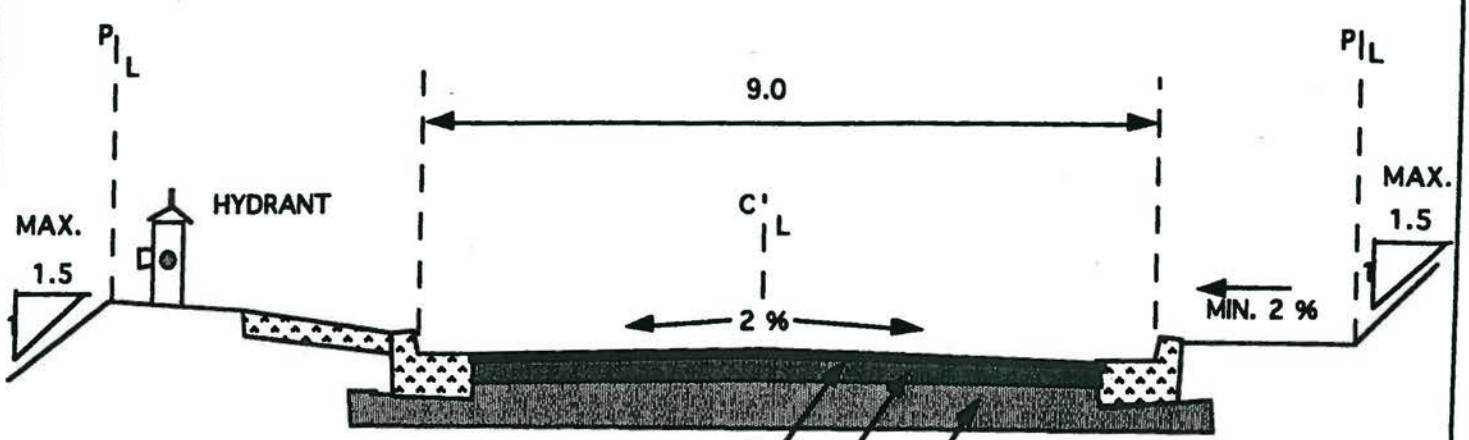
Tables

C-I	Minimum Requirements, Roadway Widths, Curbs and Sidewalks
C-II	Geometric Design Limits

Standard Drawings

SC-1	Urban Highway X-Section
SC-2	Rural Highway X-Section
SC-3	Cul-de-Sac
SC-5	Utility Alignments for Underground Wiring
SC-6	Street Name and Stop Sign
SC-7	Barrier Curb and Gutter
SC-8	Rollover Curb and Gutter
SC-9	Sidewalk
SC-10	Combined Sidewalk, Curb and Gutter
SC-11	Land and Driveway Crossing
SC-12	Pedestrian Ramp
SC-13/13A	Walkway (2 pages)
SC-14	Curb and Gutter Base Preparation Questionnaire
SC-15	Greenway Road X-Section
SC-16	Conceptual Plan Intersection of Development Road and Butcher Road **(#1507 Jun 7/06)**

This is a consolidated version prepared for convenience purposes only.



COLLECTOR

75mm HOT MIX ASPHALT

100mm CRUSHED GRAVEL

MIN. 230mm PIT RUN GRAVEL

LOCAL

50mm HOT MIX ASPHALT

75mm CRUSHED GRAVEL

MIN. 175mm PIT RUN GRAVEL

SUBGRADE SHAPED AND COMPACTED

ARTERIAL

75mm HOT MIX ASPHALT

130mm CRUSHED GRAVEL

MIN. 300mm PIT RUN GRAVEL

SECTION SHOWN FOR TYPICAL LOCAL HIGHWAY.

BOULEVARD TO BE FINISHED WITH MIN. 75mm GOOD QUALITY TOPSOIL.

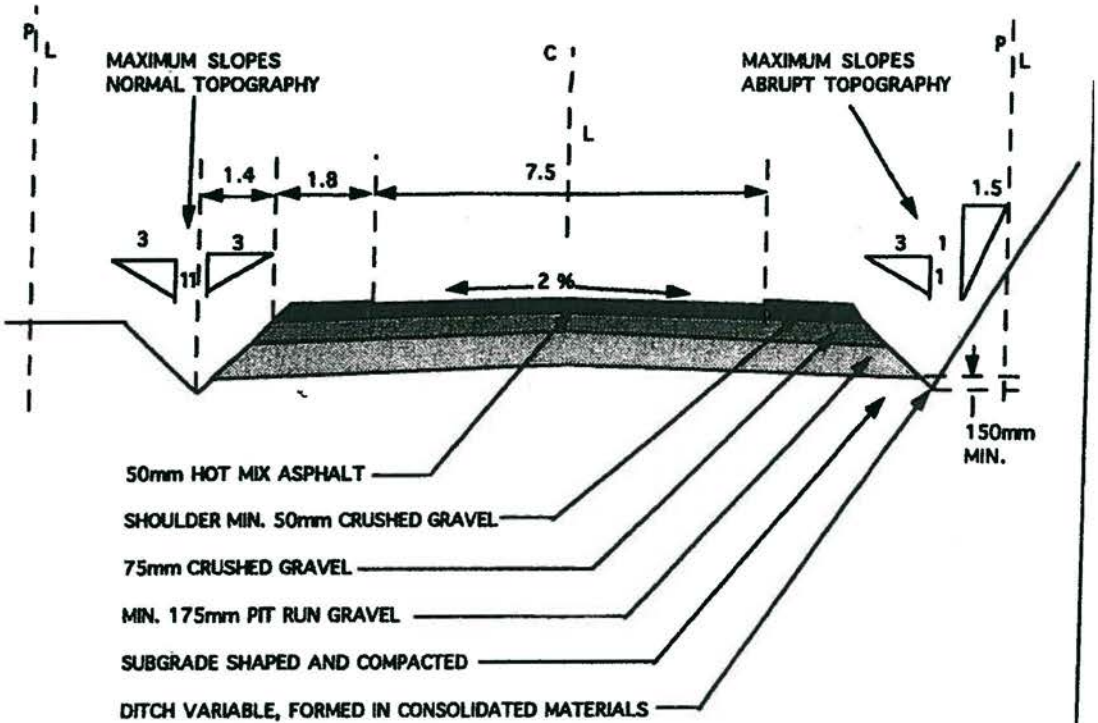
ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE

TOWN OF COMOX			TITLE: URBAN HIGHWAY X - SECTION	STANDARD DWG. NO. SC - 1
DRAWN BY: TM	DATE: 94/07/22	APPROVED BY: FP		

(#1612 JAN 2010)

Ditch and areas between ditch and property line are to be hydroseeded with an Erosion Control Mix of hydroseed, and, if necessary, soil amendment prior to hydroseeding.



NOTE - SECTION SHOWN FOR TYPICAL LOCAL HIGHWAY

ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: RURAL HIGHWAY X - SECTION	STANDARD DWG. NO. SC - 2
DRAWN BY: GB	DATE: 91/07/22	APPROVED BY: FP		

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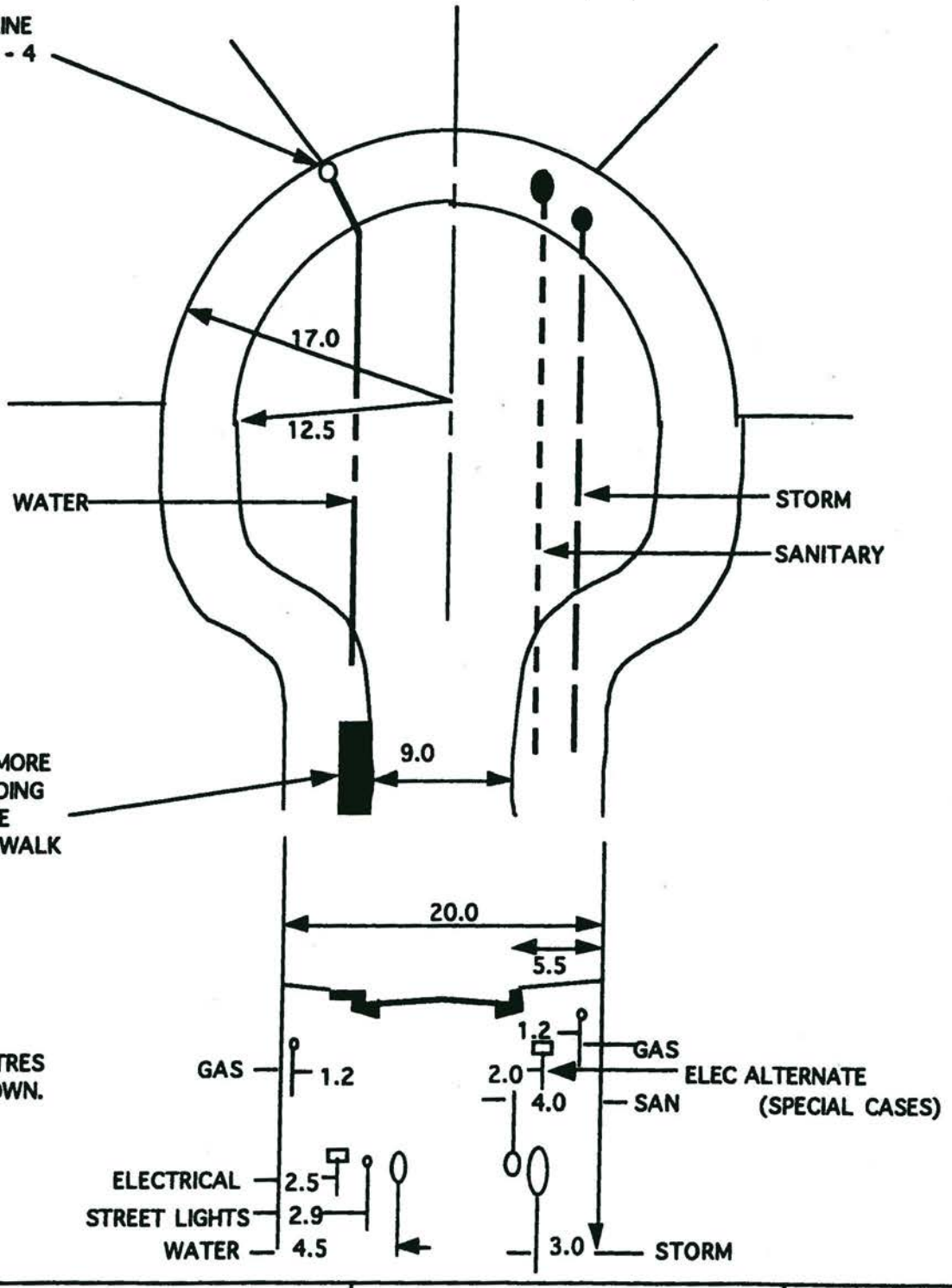

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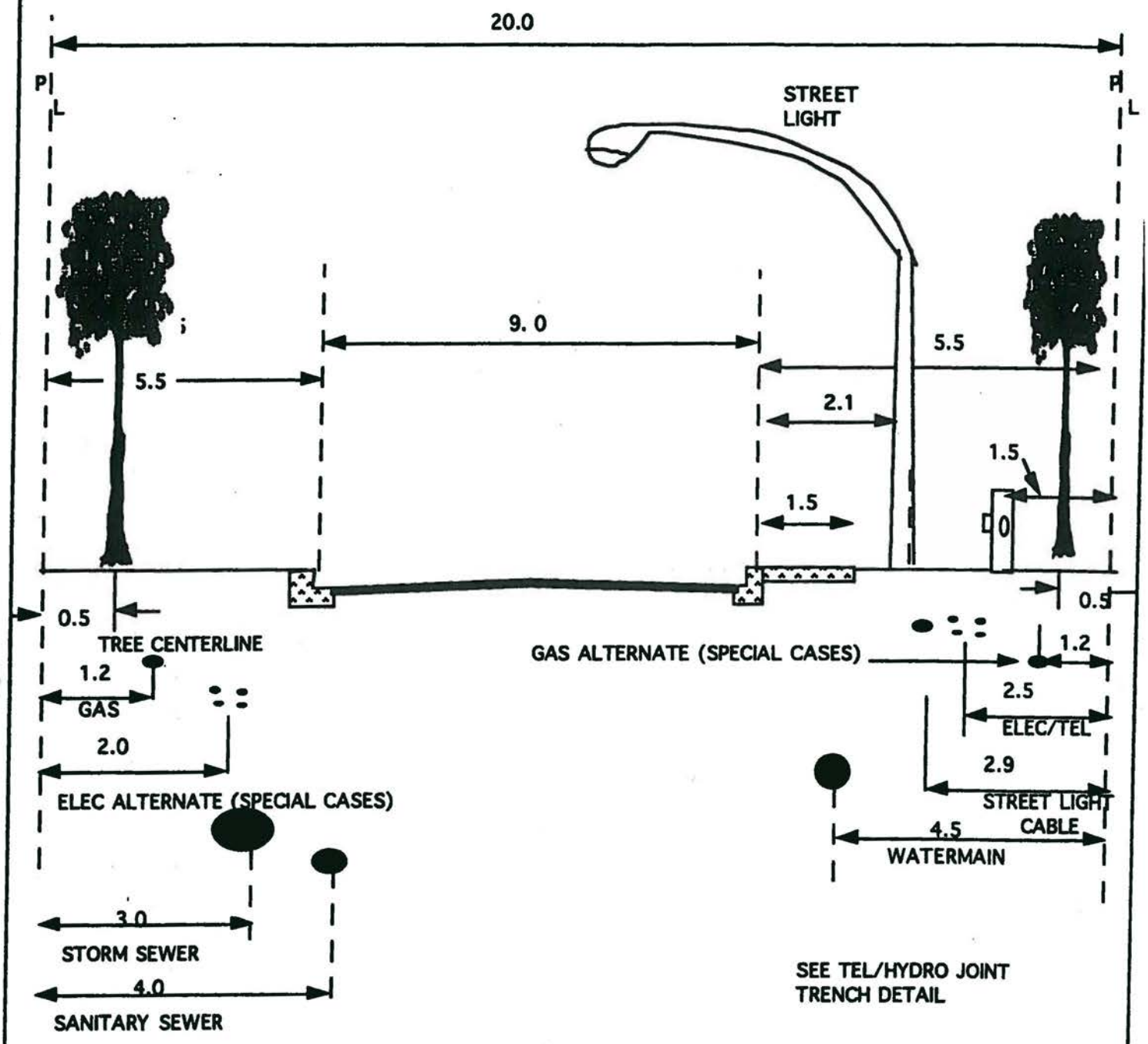
			CUL DE SAC	SC - 3
DRAWN: GB	DATE: 93/07/23	APPROVED BY: FP		



ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: UTILITY ALIGNMENTS FOR UNDERGROUND WIRING	STANDARD DWG. NO. SC - 5
DRAWN BY: GB	DATE: 91/07/22	APPROVED BY: FP		

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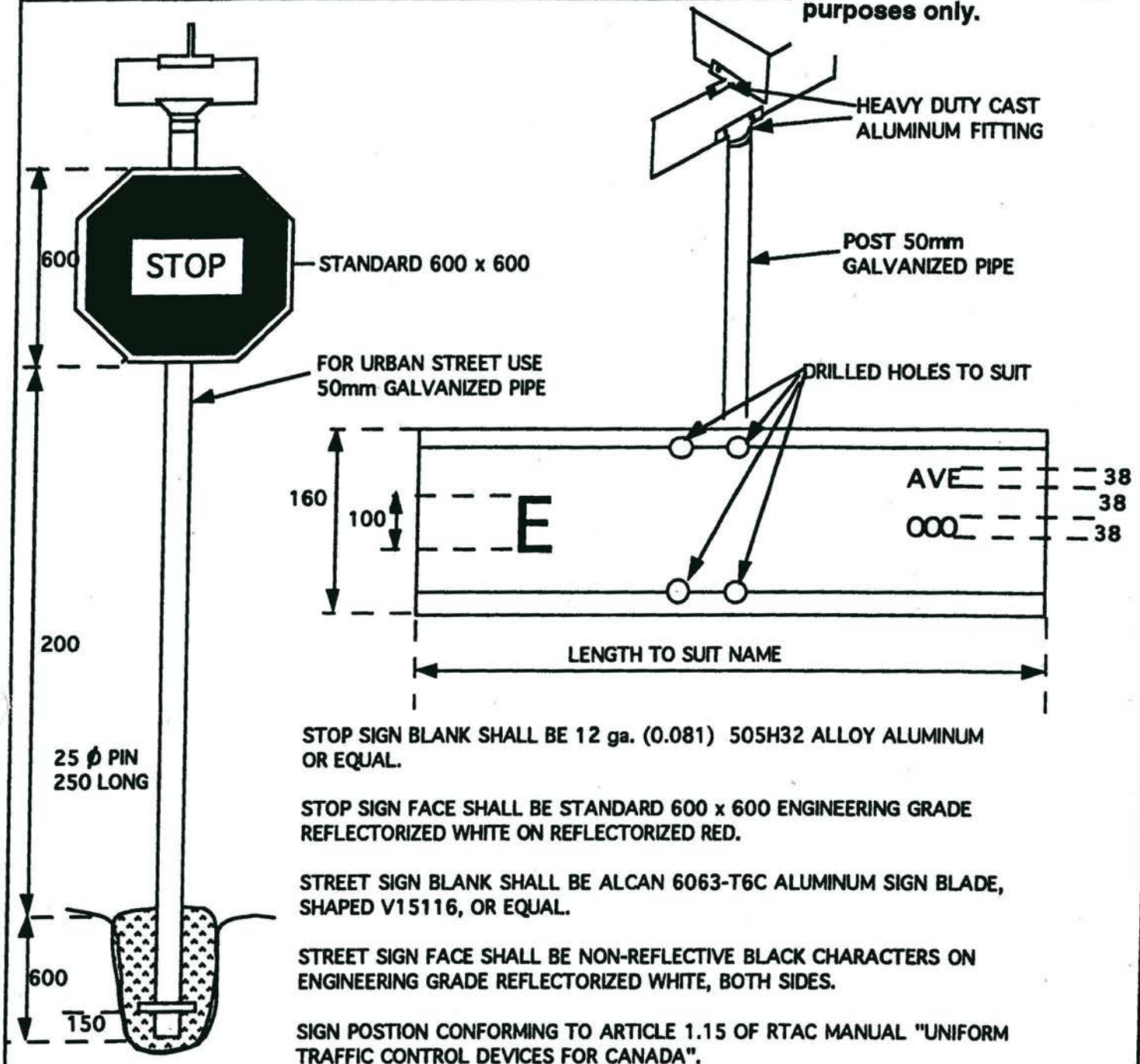
purposes only.



STOP SIGN BLANK SHALL BE 12 ga. (0.081) 505H32 ALLOY ALUMINUM OR EQUAL.

STOP SIGN FACE SHALL BE STANDARD 600 x 600 ENGINEERING GRADE REFLECTORIZED WHITE ON REFLECTORIZED RED.

STREET SIGN BLANK SHALL BE ALCAN 6063-T6C ALUMINUM SIGN BLADE, SHAPED V15116, OR EQUAL.

STREET SIGN FACE SHALL BE NON-REFLECTIVE BLACK CHARACTERS ON ENGINEERING GRADE REFLECTORIZED WHITE, BOTH SIDES.

SIGN POSTION CONFORMING TO ARTICLE 1.15 OF RTAC MANUAL "UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA".

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: STREET NAME AND STOP SIGN	STANDARD DWG. NO. SC - 6
DRAWN BY: GB	DATE: 91/07/22	APPROVED BY: FP		

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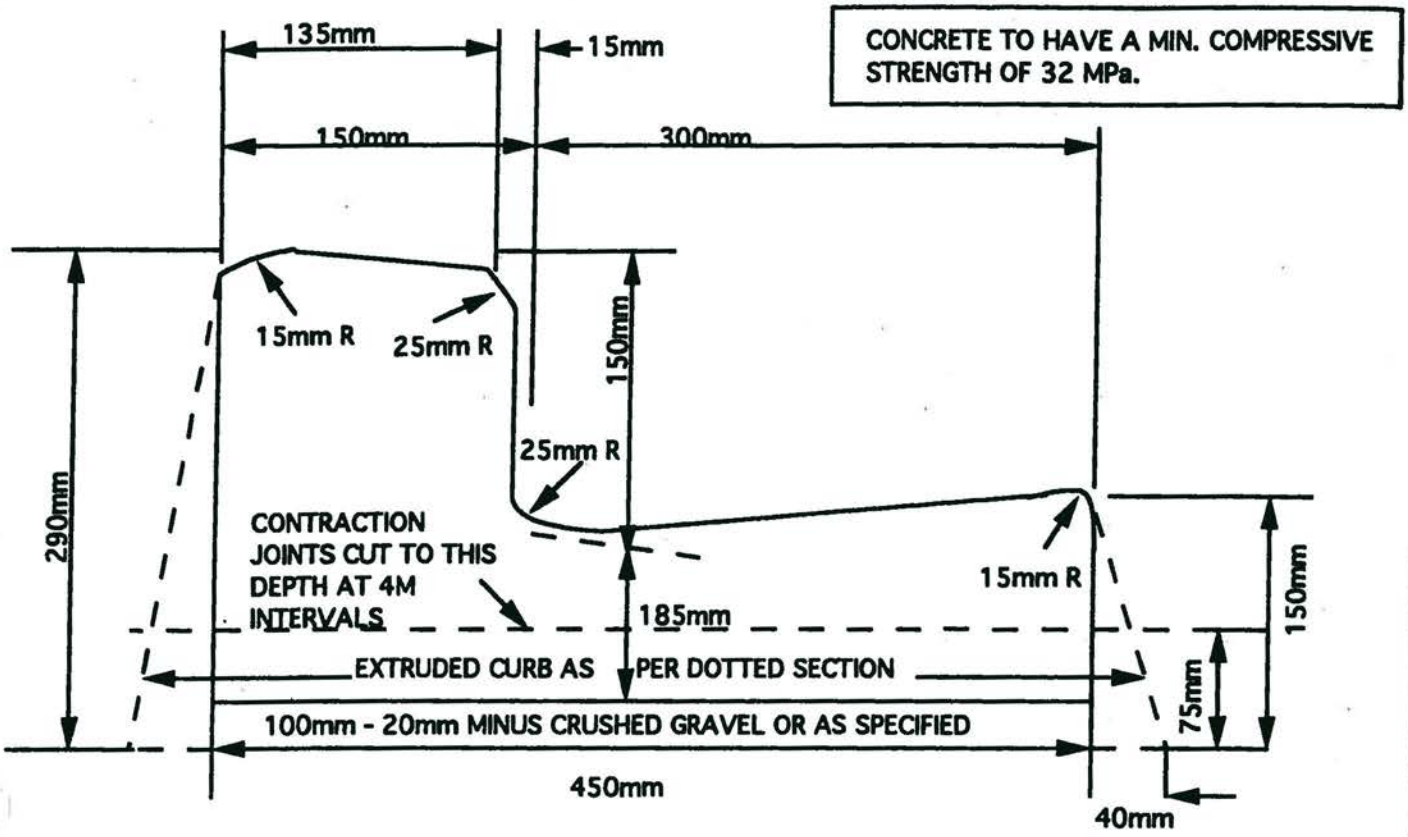


SECTION

CONCRETE TO BE CLASS C-2 WITH A 28 DAY COMPRESSIVE STRENGTH OF 32 MPa.

BRUSHED FINISH.

15mm EXPANSION JOINT AT TANGENT POINTS AND AT THE END OF EACH DAYS POUR.

1/3 DEEP TOOLED CONTRACTION JOINT EVERY 3 METERS.

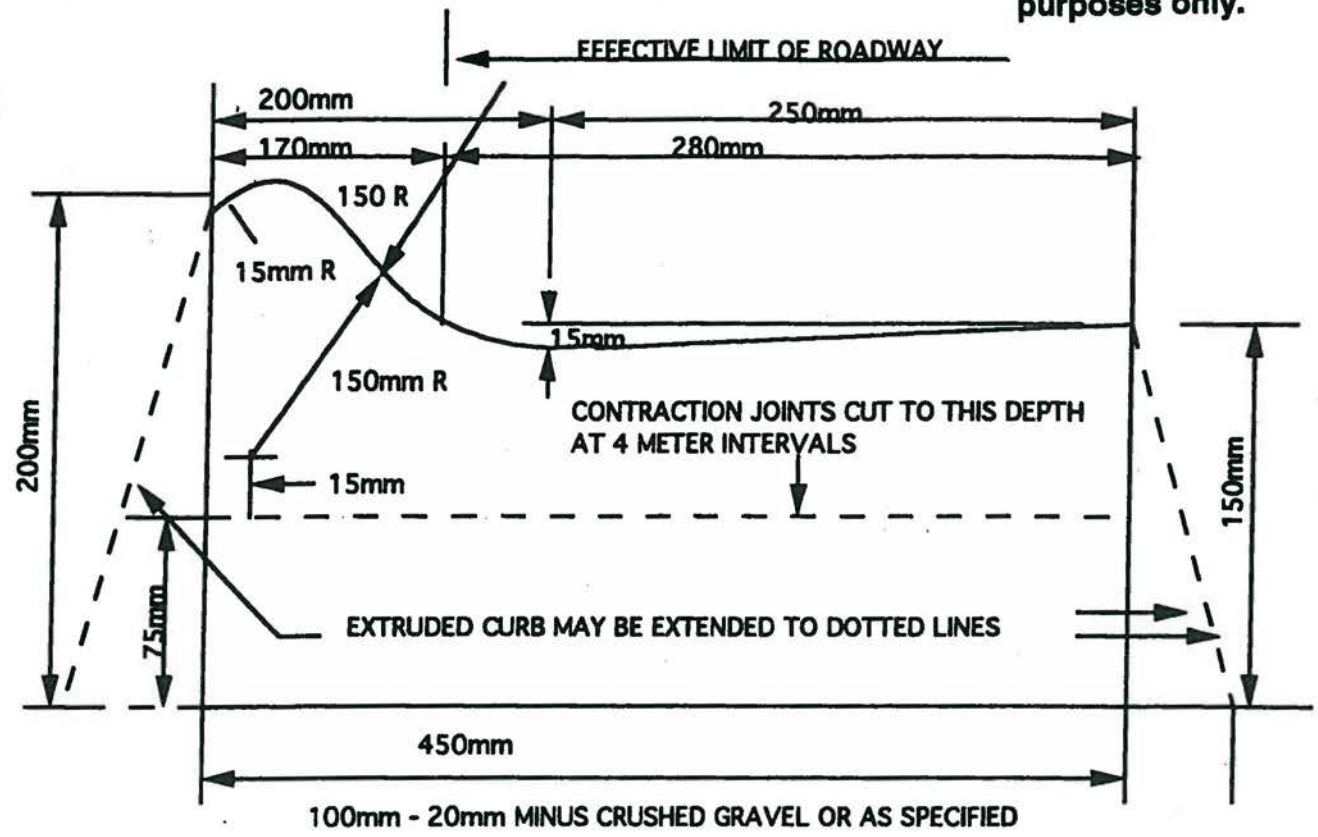
MINOR VARIATIONS IN CROSS SECTIONS WILL BE CONSIDERED TO ACCOMMODATE EXTRUDING OR SLIPFORM MACHINES.

ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE BARRIER CURB AND GUTTER	STANDARD DWG. NO. SC - 7
./N BY: TM	DATE: 94/03/31	APPROVED BY:		

This is a consolidated version prepared for convenience purposes only.



CONCRETE TO HAVE A COMPRESSIVE STRENGTH OF 32 MPa AT 28 DAYS;
TO CONTAIN 4 TO 6% AIR; AND TO HAVE A SLUMP NOT EXCEEDING 100mm OR 25mm
FOR HAND-PLACED AND EXTRUDED CONCRETE RESPECTIVELY.

CONCRETE TO BE CLASS C-2 WITH A 28 DAY COMPRESSIVE STRENGTH OF 32 MPa.

BRUSHED FINISH.

15mm EXPANSION JOINTS AT TANGENT POINTS AND AT THE END OF EACH DAYS POUR.

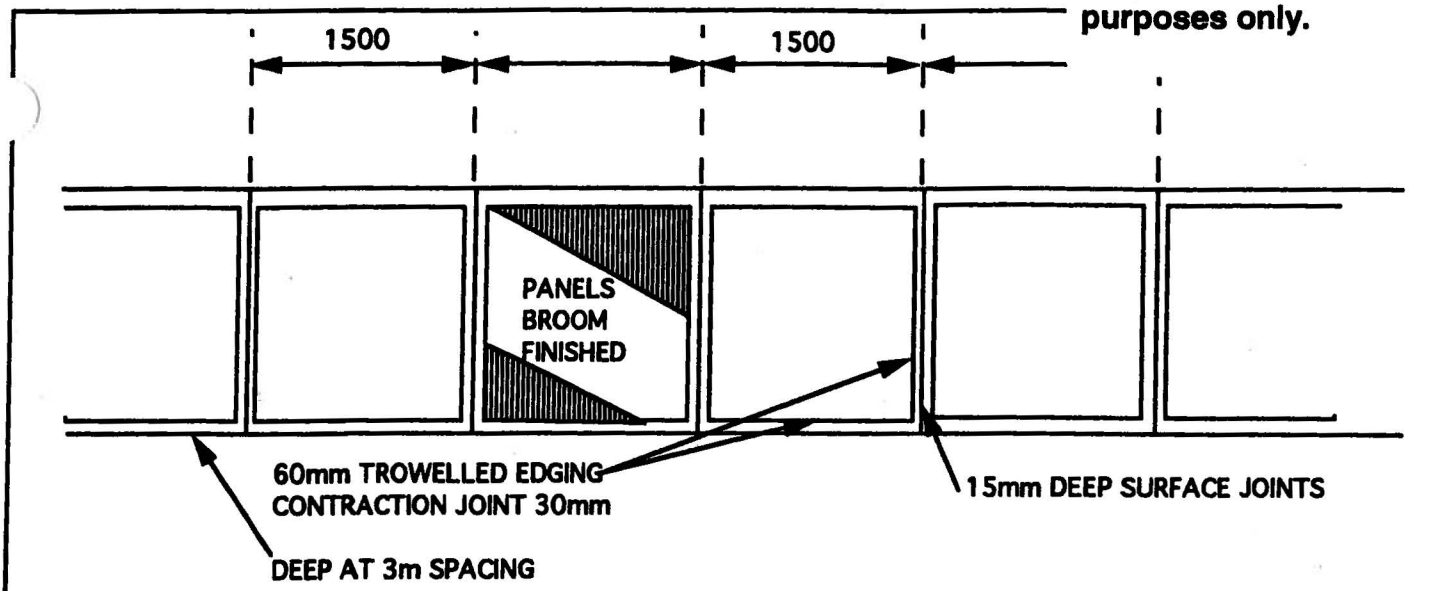
1/3 DEEP TOOLED CONTRACTION JOINTS EVERY 3 METERS.

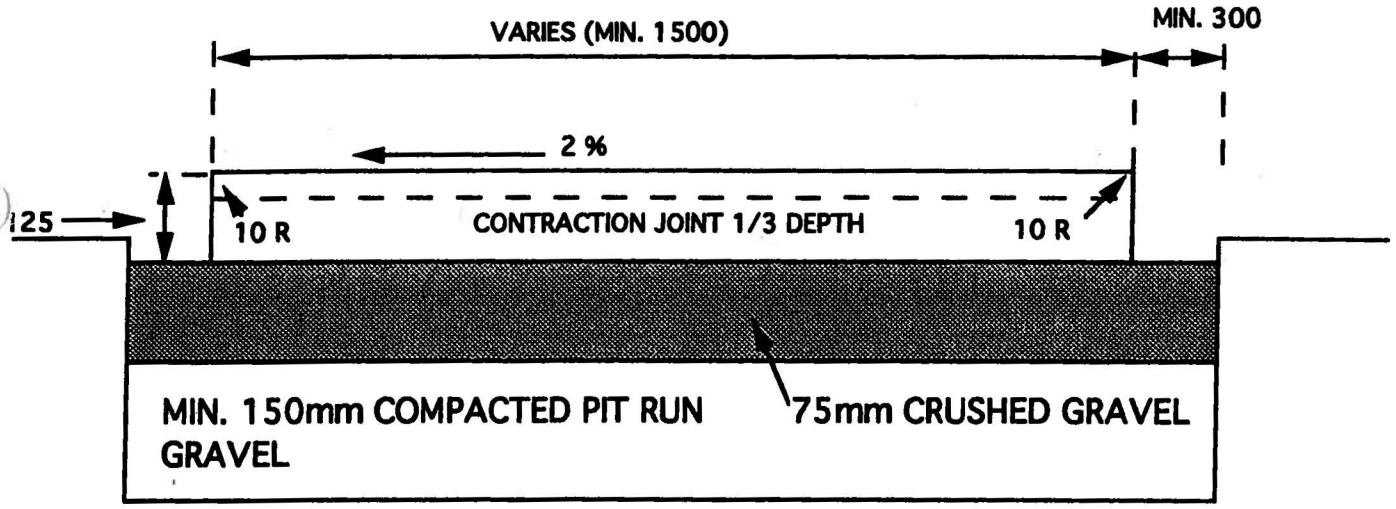
MINOR VARIATIONS IN CROSS SECTION WILL BE CONSIDERED TO ACCOMMODATE EXTRUDING OR SLIPFORM MACHINES.

ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE ROLLOVER CURB AND GUTTER	STANDARD DWG. NO. SC - 8
DRAWN BY: TM	DATE: 94/03/31	APPROVED BY:		





CONCRETE TO BE CLASS C-2 WITH A 28 DAY COMPRESSIVE STRENGTH OF 32 MPa.

15mm EXPANSION JOINTS AT TANGENT POINTS AND AT THE END OF EACH DAYS POUR.

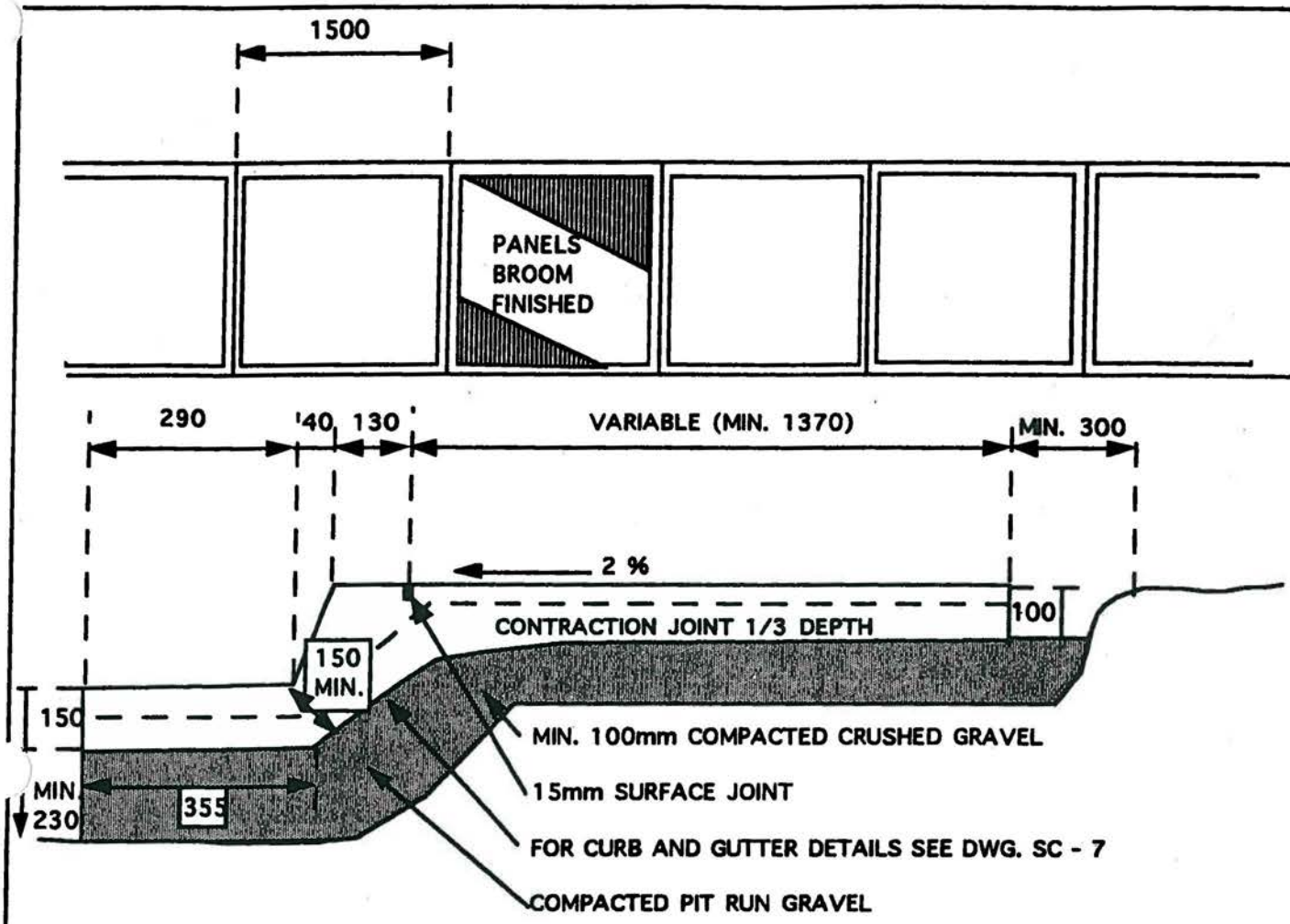
MINOR VARIATIONS IN CROSS SECTIONS WILL BE CONSIDERED TO ACCOMMODATE EXTRUDING OR SLIPFORM MACHINES.

ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE	STANDARD DWG. NO.
			SIDEWALK	SC - 9
DRAWN BY: GB	DATE: 94/03/31	APPROVED BY:		

This is a consolidated version prepared for convenience purposes only.



CONCRETE TO BE CLASS C-2 WITH A 28 DAY COMPRESSIVE STRENGTH OF 32 MPa.

15mm EXPANSION JOINTS AT TANGENT POINTS, AND AT THE END OF EACH DAYS POUR.

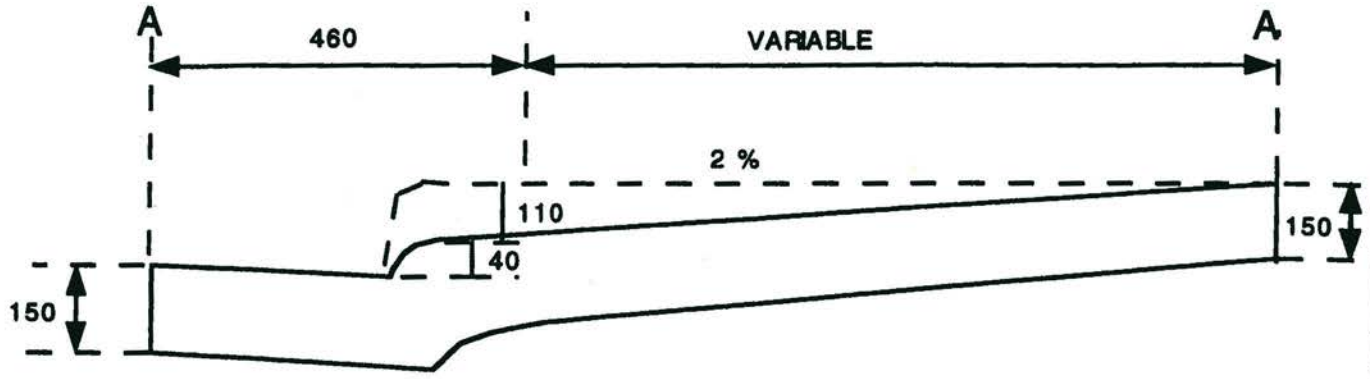
MINOR VARIATION IN CROSS SECTION WILL BE CONSIDERED TO ACCOMMODATE EXTRUDING OR SLIPFORM MACHINES.

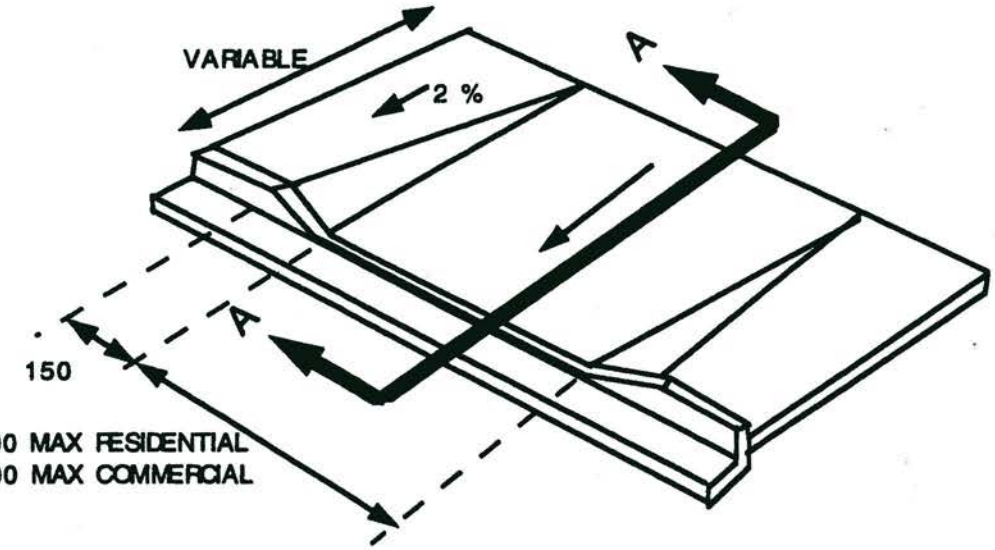
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: COMBINATION SIDEWALK CURB AND GUTTER	STANDARD DWG. NO. SC -10
DRAWN: GB	DATE: 91/07/23	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.





4000 MIN - 6000 MAX RESIDENTIAL
6000 MIN - 9000 MAX COMMERCIAL

CONCRETE TO BE CLASS C-2 WITH A 28 DAY COMPRESSION STRENGTH OF 32 MPa.

BACK OF WALK MAY BE DRESSED A MAX. OF 100mm WITH THE APPROVAL OF MUNICIPAL ENGINEER.

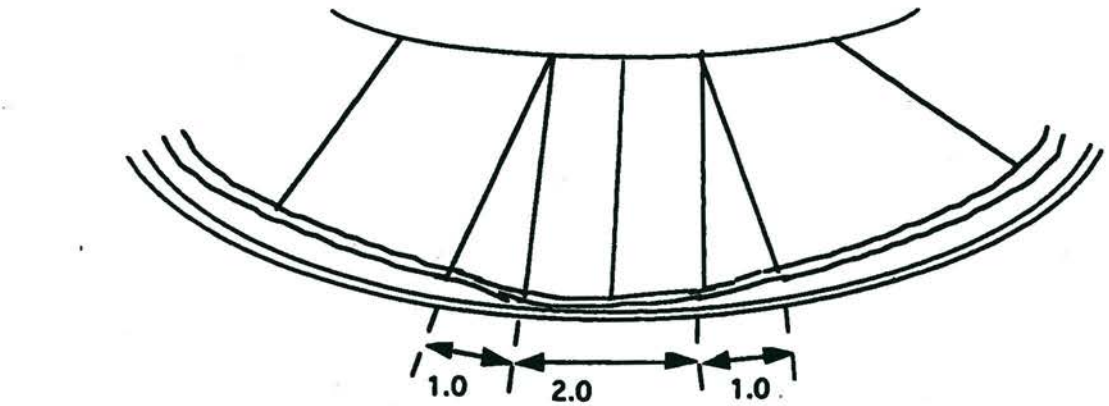
MINOR VARIATION IN CROSS SECTION WILL BE CONSIDERED TO ACCOMMODATE EXTRUDING OR SLIPFORM MACHINES.

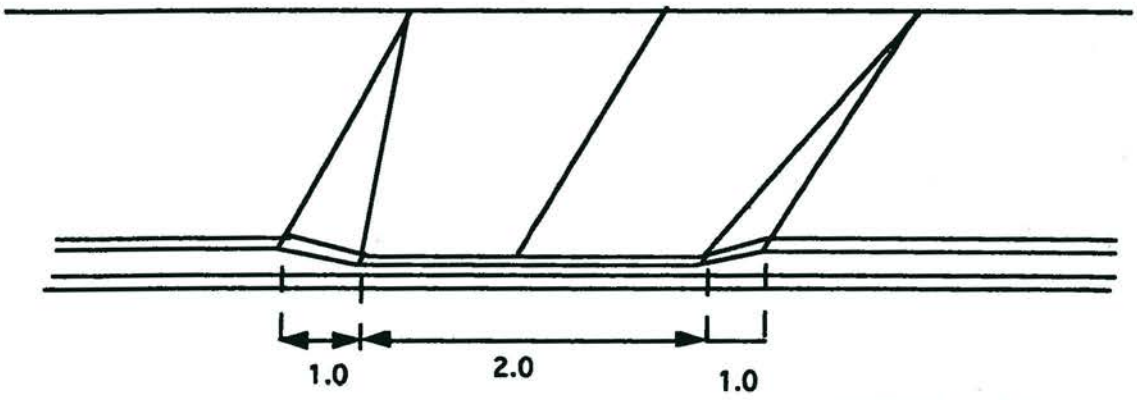
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

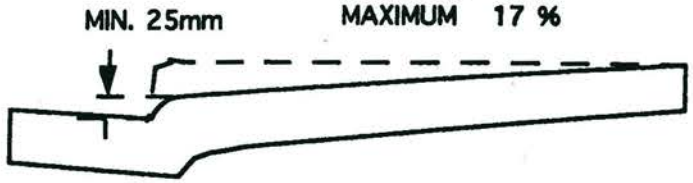
TOWN OF COMOX			TITLE	STANDARD DWG. NO.
			LANE AND	
DRAWN BY: GB	DATE: REV. OCT 13/9 5	APPROVED BY: FP	DRIVEWAY CROSSING	SC -11

This is a consolidated version prepared for convenience purposes only.





MINIMUM 2 %
DESIRABLE 9 %
MAXIMUM 17 %



DESIGN MAY BE ADJUSTED TO SUIT LOCATION BUT SHOULD BE CONSISTENT WITH THIS STANDARD.

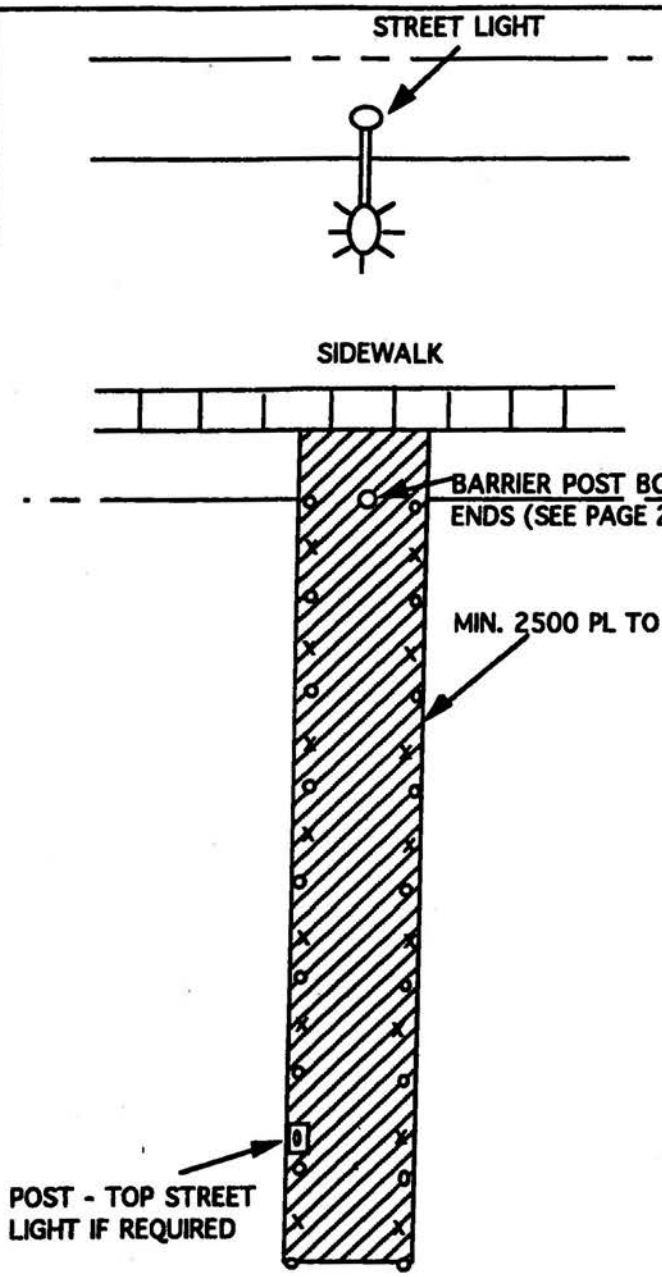
ALL RAMPS TO BE SHAPED BY CONTINUOUS SCREEDING FROM END TO END USING STRAIGHT SCREED
RESTING ON FORMS FRONT AND BACK. SURFACE TO BE VERY COARSE BROOM FINISHED, DIFFERING IN TEXTURE AND APPEARANCE FROM ADJACENT SIDEWALKS.

ALL DIMENSIONS IN METRES UNLESS OTHERWISE SHOWN.

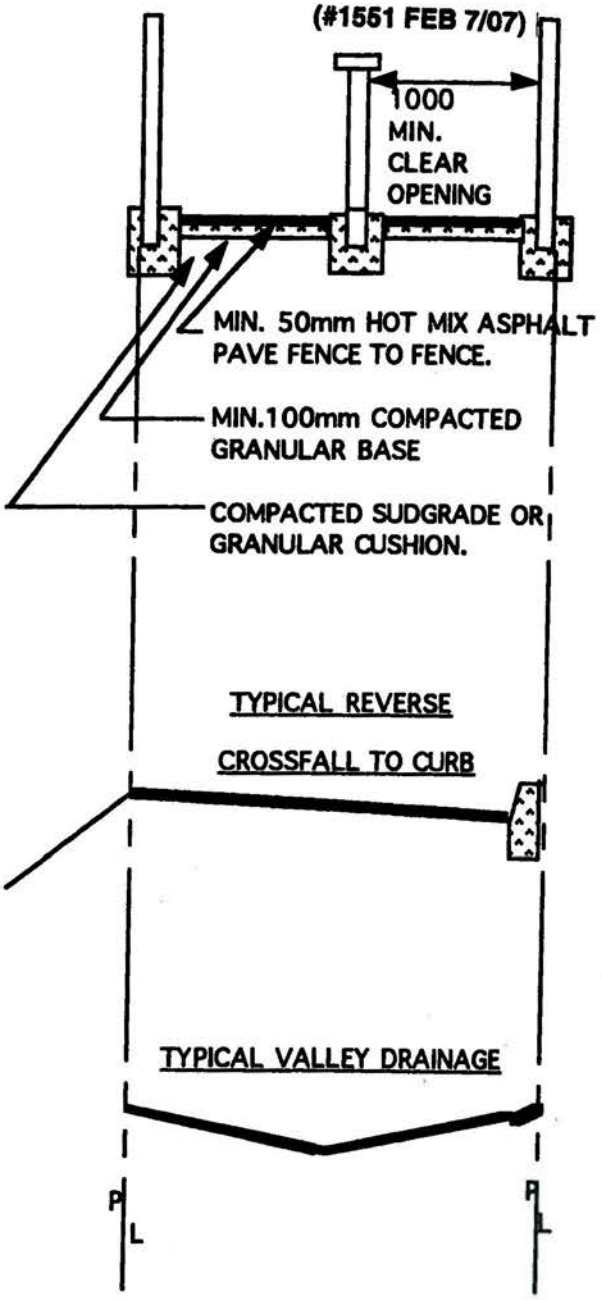
NOT TO SCALE.

TOWN OF COMOX			TITLE: PEDESTRIAN RAMP	STANDARD DWG. NO. SC -12
DRAWN BY: GB	DATE: 91/07/23	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.



(#1551 FEB 7/07)



FENCE DETAILS ON PAGE 2.

ABSOLUTE SLOPE OF WALKWAY TO BE MIN. OF 2% WITH POSITIVE DRAINAGE.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: PEDESTRIAN CONNECTION	STANDARD DWG. NO. SC -13
DRAWN BY: GB	DATE: 91/07/23	APPROVED BY: FP		

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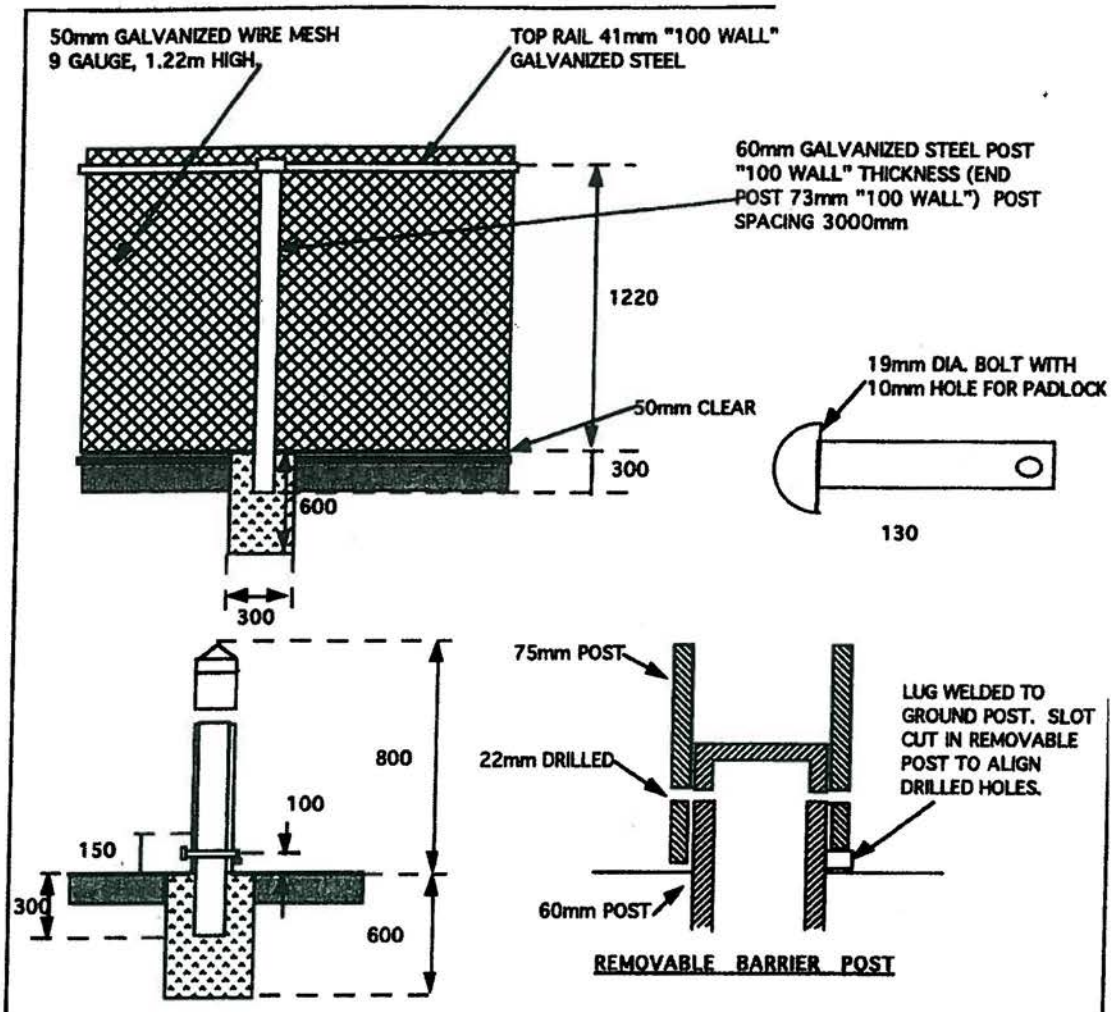
(#1612 JAN 2010)

Where a pedestrian connection is provided in a designated greenway the mesh, posts and rail shall be black.

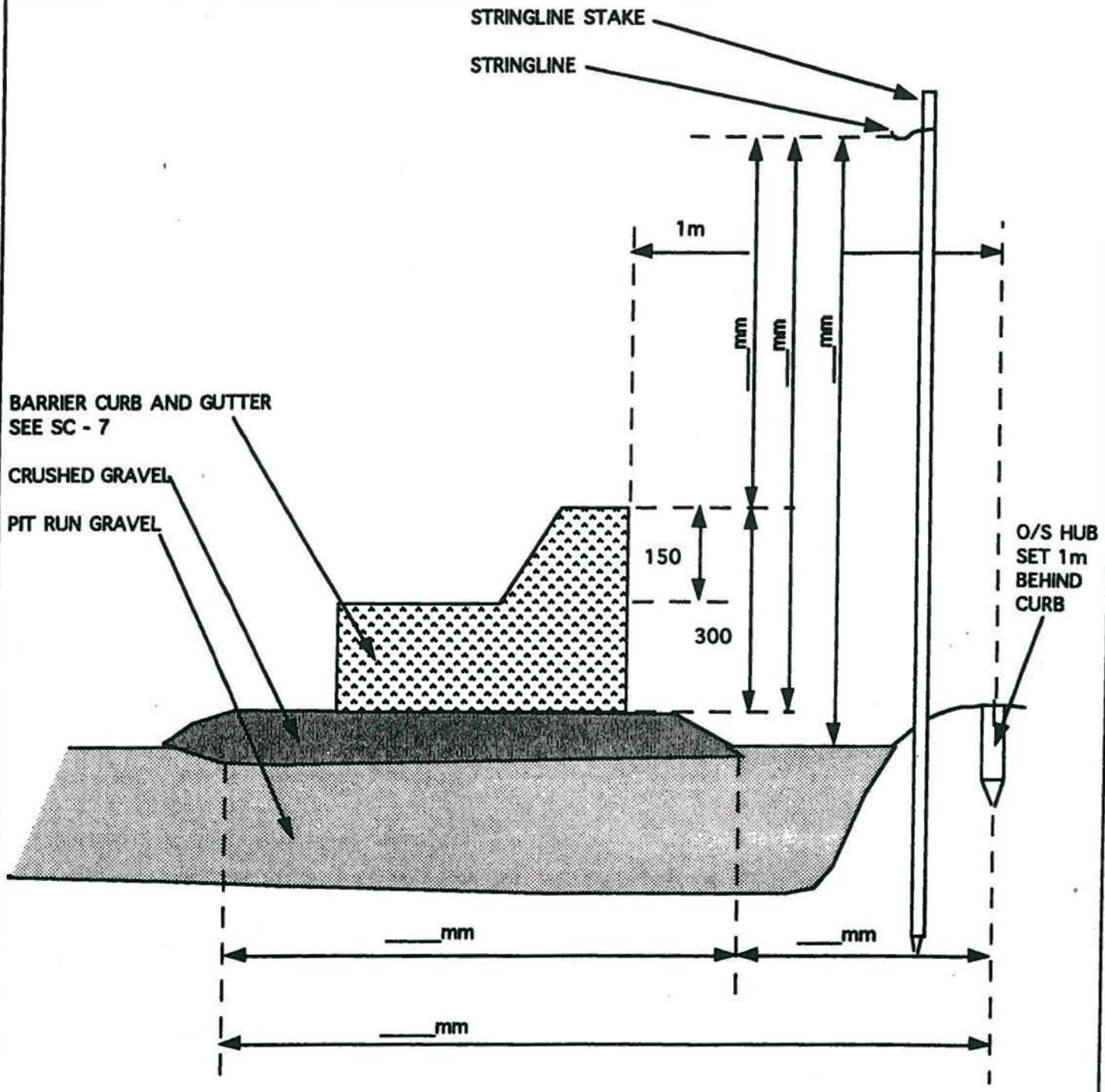


ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE	STANDARD DWG. NO.
DRAWN BY: GB	DATE: 91/07/23	APPROVED BY: FP	**PEDESTRIAN CONNECTION**	SC -13A

This is a consolidated version prepared for convenience purposes only.



TOWN OF COMOX			TITLE: CURB AND GUTTER BASE PREPARATION QUESTIONNAIRE	STANDARD DWG. NO. SC -14
DRAWN BY: GB	DATE: 91/07/23	APPROVED BY: FP		

AMENDED BY
Bylaw 1507 – Comox Subdivision Amendment No. 4, 2006

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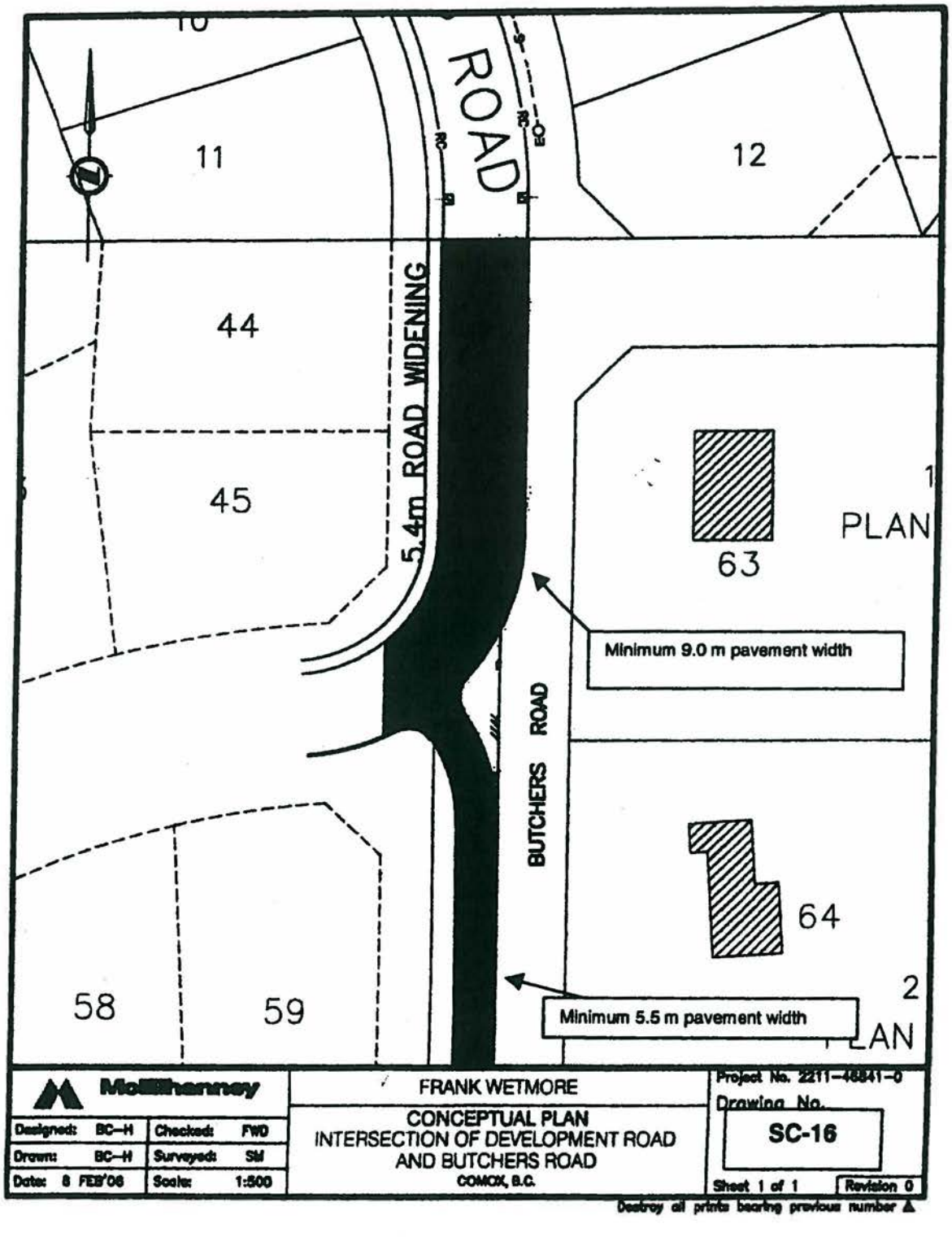
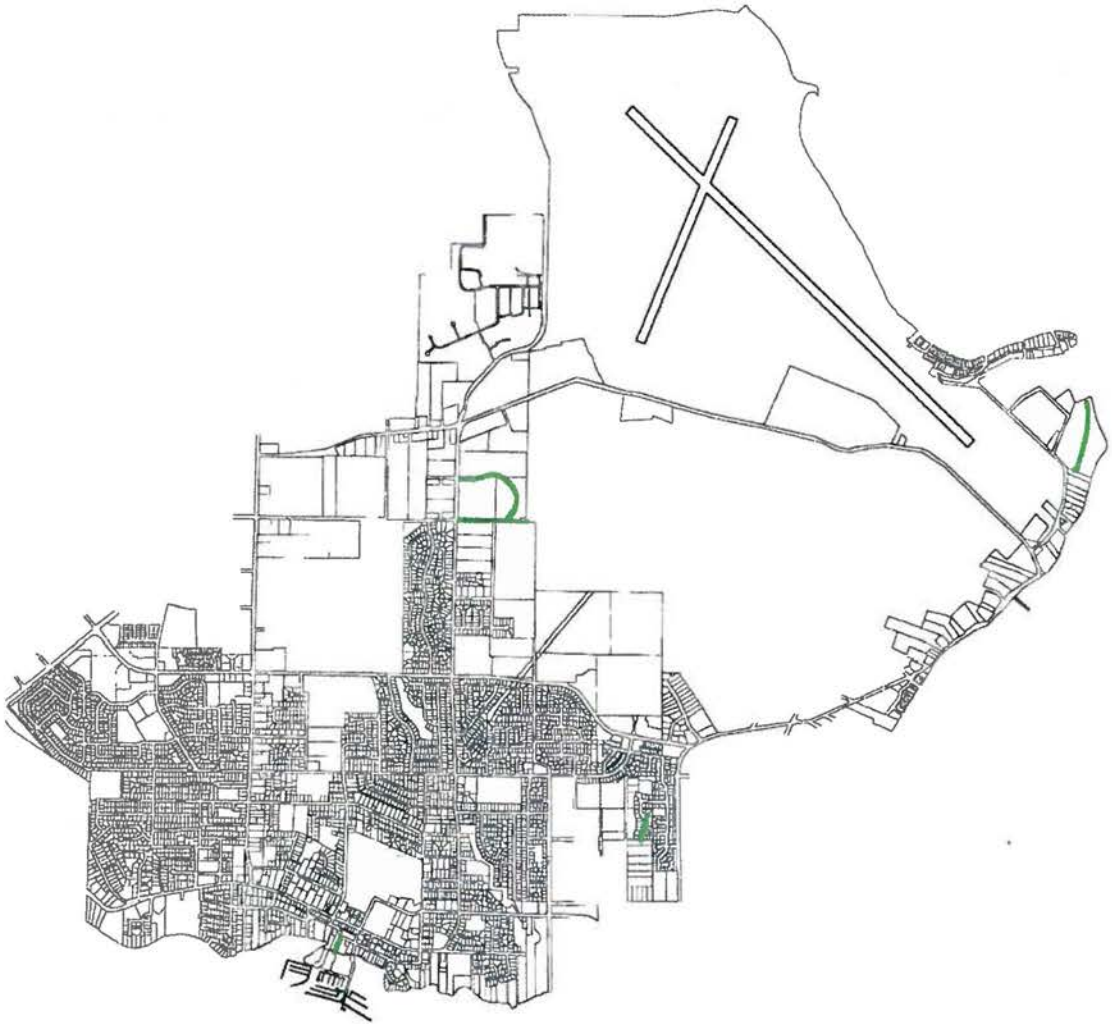


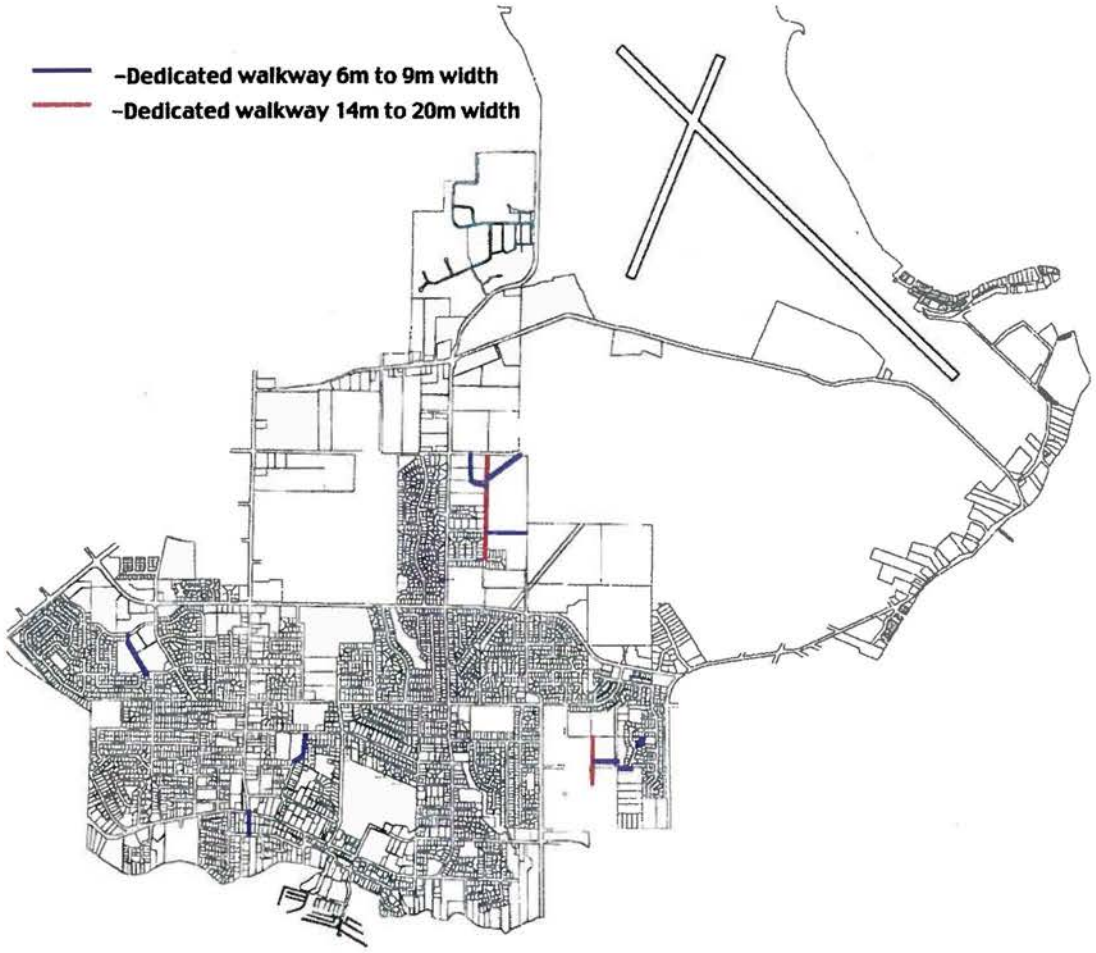
MAP C-1 (#1612 JAN 20/10)

GREENWAYS NETWORK – ADJACENT TO LOCAL STREET



Adjacent to Local Street

MAP C-2 (#1612 JAN 20/10)
GREENWAYS NETWORK – DEDICATED WALKWAYS



Date: January 1998

This is a consolidated version of Bylaw 1261 prepared for convenience purposes only

TOWN OF COMOX
SUBDIVISION AND DEVELOPMENTS SPECIFICATIONS

APPENDIX D
SPECIFICATIONS FOR SEWAGE COLLECTION AND DISPOSAL

For list of Standard Plans see Appendix B, Page 10.

APPENDIX "D"

SPECIFICATIONS FOR SEWAGE COLLECTION AND DISPOSAL

This Appendix consists of 5 Parts:

- Design
- Materials
- Trenching and Backfilling
- Installation and Testing
- Provisions for On-Site Sewage Disposal Systems **(#1514 July 5/06)**

DESIGN

Requirements of a Sewerage System

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

1.2 The presence of an existing Town sewer does not imply that such is a suitable or adequate point of discharge. Where downstream facilities are inadequate to handle the increased flow from the proposed subdivision and/or development a special design is required.

Quantity of Sewage

2.1 Sewage flows shall be based upon population or sewage quantities as follows:

2.1.1 - Annual average daily flow 360 Litres per capita per day.

2.1.2 - Table of Other Daily Sewage Quantities

School, pupils and staff	45 L/c/d
Hotel, full service	1,000 L/room
Motel	350 L/unit
Restaurant and pub	150 L/seat
Other retail and office	120 L/employee
Industrial	11,000 L/ha

2.1.3 - Peaking factor according to the Harmon formula:

$$PF = 1 + \frac{14}{4 + \sqrt{P}}$$

where PF = peaking factor
P = population in thousands

Sewage from non-residential sources shall be converted to population equivalents when determining the peaking factor.

2.1.4 - Allowances for infiltration 0.06 L/s/ha minimum.

Capacity of Sewers

3.1 Sanitary sewers shall be designed to accommodate (per capita flow) X (population) X (peaking factor) + (infiltration). At maximum design flow, the depth of sewage in each main shall not exceed:

- For 100 to 200 mm pipe	0.5 of full depth
- For 250 mm pipe	0.7 of full depth
- For 300 mm pipe and larger	0.8 of full depth

3.2 The minimum size of a sanitary sewer main shall be 150 mm. The use of 150 mm pipe shall be limited to the extreme 375 m of dead-ended non-extendable branches. Elsewhere the minimum size shall be 200 mm. The minimum grade shall be that which will result in a minimum velocity of 0.60 m/s when flowing full or half-full.

3.3 Flows shall be determined by the Manning formula, using the velocity, using the velocity determined by:

$$V = \frac{r^{2/3} \, s^{1/2}}{n}$$

where V = Velocity of flow metres/second
r = Hydraulic radius, metres
s = Slope, metres/metre
n = Roughness coefficient

The value of the roughness coefficient shall be 0.010 for PVC pipe and 0.013 for other pipes.

Location, Alignment and Grade

4.1 Sanitary sewers shall be of sufficient depth to drain the properties they are intended to serve, but in no case shall the depth of cover be less than one metre below finished grade.

4.2 Sanitary sewers should normally be located within public road allowances. They should be laid in a straight line at a uniform grade and on a constant offset, from manhole to manhole. Where the road allowance curves the sewer may be laid on a horizontal circular curve at a constant offset, unless otherwise prohibited by this specification. The offsets shall be in accordance with Standard Plan SC-4. Where abrupt topography so requires, a vertical curve may be used.

4.3 Where topography does not permit installation within a road allowance, the sanitary sewer may be installed in a walkway or, if that is impracticable, within a utility right-of-way on private property.

4.4 Where pipes are to be laid on a curve the method of installation of curved pipe and the maximum degree of curvature shall be in accordance with the pipe manufacturer's recommendations. Only one curve shall be permitted between adjacent manholes.

Pipe Selection and Bury

5.1 The strength of pipe and quality of bedding shall be in accordance with the recommendations of the pipe manufacturer for the particular service and depth of bury, taking into account the anticipated construction loading as well as the finished loading. Bedding shall be in accordance with Standard Plan SD-1, and shall be class B or better.

Manholes and Cleanouts

6.1 The maximum distance between sanitary manholes shall be 125 m. Manholes shall be located at:

- All changes of grade or alignment except a curve in accordance with section 4.2 of these specifications.
- All changes of pipe size.
- All pipe junctions other than service connections.
- At the upstream end of each sewer.

A cleanout may be installed at the upstream end of a sewer which is intended to be extended later.

6.2 When a smaller sewer joins a larger, normally the crown (obvert) of the smaller pipe should be placed at or above the level of the crown of the larger pipe. Where this is not practicable, the elevation of the larger pipe may be adjusted and the manhole constructed so as to maintain the energy gradient. The 0.8 depth point of the larger pipe shall not be higher than the 0.8 depth point of the smaller.

6.3 When the sewer pipes of the same size pass through a manhole, there shall be a minimum elevation difference between the discharging pipe and receiving pipe as follows:

- straight through, or bend less than 45°	- design grade plus 20 mm
- bend 45° to 90°	- design grade plus 30 mm

Bends within manholes should not exceed 90° and shall in no case exceed 110°.

REVISION #1 - APRIL 30/83

6.4 Manholes shall be constructed in accordance with Standard Drawings SD-4 and SD-5. Type "A" manhole bases shall have a minimum diameter of 1050 mm. Where pipe size or configuration so require, a larger diameter base shall be used. The horizontal barrel of Type "B" manholes should be the same size as the line of pipe of which it forms a part, but in no case less than 1200 mm diameter. Conical increasers and decreasers may be used to maintain the invert gradient, as shown on Standard Plan SD-5.

6.5 All manholes should be designed to provide safe and ample working space. In deeper manholes, the minimum diameter should extend from the top of benching to the top of the worker's head, considered to be 1.9 m. Above this height, the design may incorporate flat or conical reducers. Nothing in this section shall relieve the designer from providing steps in accordance with Standard Drawing SD-4.

6.6 Where the difference in elevation between a discharging pipe and the receiving pipe exceeds 0.60 m, a drop manhole shall be installed in accordance with Standard Drawing SD-6. Inside drops should not exceed 0.25 m. Drops less than 0.60 m and more than 0.25 m should be eliminated by altering the pipe grade.

6.7 A stub end shall extend not less than 1.5 m from the outside face of the manhole.

Sanitary Service Connections (For storm service connections see E-8.1)

7.1 Service connections shall be installed to all parcels of land which will ultimately require service. The sizes of such connections shall be in accordance with the Province of British Columbia Plumbing Code, except that none shall be smaller than 100 mm diameter.

7.2 Except in cul-de-sacs, all service connections should be connected to the main as shown in Standard Plan SD-8. All service connections to new mains shall be accomplished by wye branches. Tees shall not be used. Direct tap shall be permitted only in the case of old mains.

7.3 The sanitary sewer shall be designed so that the service connection for each parcel may be installed within the projection of the frontage of such parcel. The alignment of the sewer connection shall be straight and should be approximately at right angles to the centreline of the road allowance. Should the length of the service connection on the road allowance exceed 30 m, adequate cleanout facilities should be installed.

7.3.1 Service connections shall be provided with a pre-plugged inspection chamber at the property line as shown in Standard Plan SD-8A and shall be a Le-Ron Plastics part number 70A4PP complete with riser and locking lid and collar part numbers 71AL1D08GL and 7308HSL or equivalent. Lids shall be painted red.

7.4 The minimum gradient of a service connection should be 2%, but in no case shall be less than:

Pipe Diameter	Desirable Gradient	Minimum Gradient
100 mm	2.0%	1.25%
150 mm	2.0	.60

In any event the design velocity shall not be less than that specified in section 3.2 hereof.

7.5 Service connections from parcels beyond the last manhole in a cul-de-sac may be connected directly to that manhole, provided:

7.5.1 The direction of effluent flow from the service connection shall not be adverse to that in the main.

7.5.2 The crown of the service connection shall not be lower than the crown of the main.

7.5.3 Each service connection entry shall be channelled and benched in accordance with Standard Plan SD-4.

7.6 Where the depth of cover over the main exceeds 3.6 m, service drops should be provided. Such service drops shall be in accordance with Standard Plan SD-8.

7.7 The minimum cover over a service connection below final grade shall be one metre.

Vertical & Horizontal Separation

8.1 Where a watermain and a sanitary sewer cross, the sewer should, if practicable, be below the water. The minimum clear vertical separation shall be not less than 0.5 m. The crossing shall be arranged so that the sewer main joints will be equidistant and as remote as possible from the watermain joints.

8.2 The horizontal separation of a sewer main from a watermain shall not be less than 3 m measured edge to edge. Where practicable the sewer main should be lower.

8.3 When it is impracticable to obtain the minimum horizontal and vertical separations stipulated, the non-conforming portions of sewer pipe shall be designed and constructed equal to water pipe, and shall be pressure tested to assure watertightness.

This is a consolidated version prepared for convenience purposes only.

MATERIALS

(NOTE - For the sake of convenience and brevity, materials for storm drains and sanitary sewers are consolidated in this section. These materials may be used for either system unless otherwise specified.)

General

9.1 All materials shall be new and of first class quality, free from defects in manufacturer, storage and handling. Materials of the plastic family shall be of recent manufacture and shall not be stored, or show evidence of having been stored, for long periods of time, in direct sunlight.

Pipe and Fittings

10.1 Gravity sewers and drains may be constructed of the following pipe materials in accordance with the standards:

Pipe Material	Size	Class	Standard
Sanitary or Storm			
- Polyvinylchloride (PVC) mains	100 to 150 mm 200 to 300 mm	SDR 28 or better SDR 35 or better	ASTM-D 3034 ASTM-D 3034
- PVC service conn. & catch basin leads	100 to 150 mm 200 to 300 mm	SDR 28 or better SDR 35 or better	ASTM-D 3034 ASTM-D 3034
Storm drains only			
- Ribbed Polyvinylchloride	300 to 900 mm		ASTM-F794
- Unreinforced concrete	up to 375 mm	Class III min.	ASTM-C 14
- Reinforced	all sizes	Class III min	ASTM-C 76

10.1.1 The joints or couplers shall conform to the corresponding standards and manufacturer's recommendations for the main pipe. All sanitary sewer joints, and those of storm drains so specified, shall employ rubber or neoprene "o" rings or gaskets to ensure watertightness.

10.1.2 Pipe fittings shall be compatible with and conform to the specifications for the main pipe.

10.1.3 Service connections for ribbed PVC pipe shall be either "Inserta Tee" by Fowler Mfg. Co. Inc. or epoxy weld wyes or equivalent.

Manholes

11.1 Manholes shall be constructed of concrete in accordance with Standard Plans SD-4 and SD-5. Type A manholes shall be in accordance with ASTM C 478-82.

The horizontal barrel of Type B manholes shall be equal to or better than the line of pipe of which it is a part. The vertical barrel shall be in accordance with ASTM C 478-82.

Any concrete elements not otherwise specified shall be designed to withstand H-20 loading.

11.2 The lower manhole sections of Type A manholes shall be cast with half-round cores removed along the lower edge to provide pipe openings specifically designed for each manhole location. Where required, openings may be adjusted by drill and cold chisel or power chisel.

11.3 Manhole frames and covers shall be in accordance with Standard Plan SD-4. The cover and frame shall be interchangeable with the Albemi Foundry frame and cover, and shall be machined to provide a non-rocking bearing. Where watertight covers are called for, the covers shall have half-depth pick holes (for lifting) and no ventilation holes.

11.4 Jointing of manhole rings, reducers and risers should be by Portland cement mortar. When infiltration-proof joints are specified, they shall be formed with rubber or neoprene "o" rings, or by an approved fibrous bituminal substance between sections.

Concrete, Backfill and Bedding

12.1 All concrete for sewers and storm drains shall conform to CSA CAN 3-A23.1 with a minimum 28 day compressive strength of:

-	Thrust blocks and class A bedding	15 MPa
-	All other purposes	25 MPa

12.1.1 Cement shall be normal Portland Cement conforming to CSA CAN 3-A5-M77 unless otherwise specified.

12.1.2 Air entrainment shall be accomplished by the addition at the batch plant or mixer of an air entraining agent in accordance with CSA CAN 3-266.1. The air content shall be 4 to 6% by volume unless otherwise specified.

Calcium chloride, when permitted by the Consultant, shall be installed in accordance with ASTM D 90. The amount added must not exceed 2% by weight of the cement.

No other additives shall be used.

12.2 Bedding material shall be sand or a mixture of sand and gravel passing the 19 mm sieve. Bedding material shall be free from organic materials, from other deleterious substances and from frozen lumps.

12.3 Backfill may be native material, where approved, or imported granular material or a mixture of the two. It shall be free from boulders or stones measuring more than 150 mm along the longest axis, from all organic materials and from frozen lumps.

Catch Basins

13.1 Catch basins shall be constructed in accordance with one of the following standard plans:

Flat grate catch basin, Plan SD-9
Combined grate catch basin, Plan SD-10

The barrel of each catch basin shall be constructed in accordance with ASTM C 478-82. Any concrete elements not specified in that standard shall be designed to withstand H-20 loading.

13.2 Catch basin frames, covers and side inlets shall be in accordance with the standard plans. All parts shall be interchangeable with the Alberni Foundry, Dobney or Titan Castings specified on standard plan. SD-9, SD-10A, and SD-10B.

Other Materials

14.1 Rip rap shall consist of sound, erosion-resistant rock or broken concrete, each piece weighing not less than 25 kg and having at least one flat or irregular face.

14.2 Plugs shall be compatible with the pipe on which they are to be used, must prevent entry of extraneous water and must be removable without destroying the plug.

14.3 Markers shall be one piece of lumber, 40 X 90 mm or larger, of lengths specified elsewhere in this section. The required painting and markings shall be applied with all-weather permanent materials.

TRENCHING AND BACKFILLING

(Note - for the sake of convenience and brevity, the requirements for trenching and backfilling water mains, storm drains and sanitary sewers are consolidated in this section. Pipe bedding is not included here, but is specified in the installation section for each type of service.)

General

15.1 This specification is a statement of minimum requirements. The Consultant shall provide such detailed specifications as may be required to ensure the works are accomplished in a satisfactory manner within these limits.

15.2 The Owner shall notify all owners of public utilities well in advance of any excavation at or near their facilities, and shall arrange for any necessary protection, diversion or interruption of service. Property owners shall be given adequate notice of work to be done on easements on their property.

Surface Drainage

16.1 If the work requires the disturbance of existing drainage facilities, the Owner shall be responsible for the provision of any temporary drainage facilities necessary to dispose of the runoff water.

Trench Excavation

17.1 The trench shall be excavated to the required subgrade, in accordance with Standard Plan SD-1. The trenching equipment shall be suited to the work to be done so that the excavations and pipe-laying, once started, may continue without undue delay and without unnecessary widening of the trench.

17.2 Where a trench crosses a paved surface, the pavement shall first be cut to a neat edge.

17.3 If trenches are overexcavated below the pipe, or wider than the standard plan permits, or if the bottom is found to be unsuitable, the Consultant shall specify what special bedding or stronger classes of pipe should be installed to correct the situation.

17.4 Where rock or large boulders are encountered, they shall be removed so as to provide a minimum clearance in all directions measured from the widest part of the pipe as follows:

Main Diameter	Clearance
600 mm or less	150 mm
larger than 600 mm	250 mm

Fulcrum points should be avoided.

17.5 Trenches shall be excavated only as far in advance of the pipelaying operation as safety, traffic and weather conditions require or permit. The top of trench should be as narrow as the circumstances of the work permit. Excavated trench material should be piled so as to cause minimum inconvenience to adjacent occupied property, traffic and pedestrians. Cross traffic at street intersections should not be unduly restricted by piles of material, pipe, fittings or equipment.

Materials should not be placed so as to obstruct unduly the ready access to and use of existing fire hydrants and valves.

17.6 Trenches shall be excavated and maintained and water shall be removed so that the trench bottom remains firm and capable of supporting the pipe. If a suitable trench bottom is later found to be unsuitable, for whatever reason, remedial measures shall be taken in accordance with paragraph 17.3 hereof.

17.7 No water or muck shall be permitted to enter any watermain or sanitary sewer main. Only clean water shall be allowed to enter any storm drain. Discharge from pumps, well points or other de-watering devices shall be disposed of without damage or nuisance to adjacent owners or to the public or in contravention of regulations of other authorities having jurisdiction.

Other Excavation

18.1 Excavation for appurtenances such as manholes, catch basins and hydrants shall be to such lines as will permit the ready assembly of such appurtenances. The requirements for trench excavation apply equally to these excavations, to the extent that they are applicable.

18.2 Trench timber or shoring, when used, should not extend below the spring-line of the pipe. If such shoring is to be left in place, it shall be cut off not less than 0.3 m below the surface.

18.3 Other underground services which may encroach into or be affected by the excavation shall be protected and restored in the manner shown on the plans or ordered by the Consultant so as to be left in a condition equal to or better than before the construction.

Bedding and Backfill

19.1 Bedding requirements are specified for each type of service in the "Installation" portions of these specifications.

19.2 Backfill may be suitable native material, or approved imported material, or a mixture of them. Requirements for backfill are set out in paragraph 12.3 hereof and Standard Plan SD-1. The type and quality of backfill shall be specified by the Consultant depending upon the properties of the backfill materials and the nature of the surface.

Backfill may be pushed into the trench from the end so as to roll evenly down the slope of existing material. Backfill shall not be pushed directly over the edge of the excavation and allowed to drop directly into a trench containing a pipe.

19.3 Backfill under roadways and utility crossings shall be compacted granular material as shown on Standard Plan SD-2. Other backfill may be uncompacted granular material or native material compacted to a density of not less than that of the adjacent undisturbed ground.

19.4 Backfilling shall not be done around concrete work until at least 24 hours after the completion of the placement of such concrete unless otherwise ordered by the Consultant.

Clean-up and Restoration

20.1 The construction site shall be cleaned up as the work proceeds with the removal of excess excavated material, pipe, fittings and all materials, equipment and construction refuse from the various sections of the project as they are completed.

All curbing, sidewalks, drainage ditches and culverts, shrubbery, fences and other surface properties that have been removed or disrupted by the construction operations shall be restored or replaced to a condition equivalent to that which existed before the work began.

20.2 All paved areas affected by the excavation shall be repaired promptly. Trenches along or across those roadways or portions thereof designated from time to time by the Administrator as heavy traffic streets, shall be repaired with an asphaltic or Portland cement concrete patch the same day as they are excavated.

Pavement shall be repaired in accordance with Standard Plan SD-2 using similar materials equal to or better than the adjacent undisturbed areas. If a cut edge of pavement has become irregular during the course of the construction, the pavement shall be re-cut to form a new straight line with vertical face prior to patching.

When weather or season of the year make it impracticable or unwise to make a permanent Portland cement or hot asphalt repair at the time of backfilling, an approved cutback or emulsified asphaltic cold patching material may be used as a temporary patch. The permanent patch shall be applied as soon as weather or season permit.

20.3 Trenches in easements shall be backfilled promptly and restored to their original level and condition and clean-up completed without delay. Any topsoil, shrubs, lawn, fences, pathway and driveway surfaces required to be replaced shall be restored as closely as practicable to their original conditions on a timetable agreeable to the property owner.

20.4 Trench settlement which occurs at any time during the construction or the maintenance period shall be made good as soon as practicable but in any event before the expiry of the maintenance period.

INSTALLATION AND TESTING

(NOTE - For the sake of convenience and brevity, installation and testing for storm drains and sanitary sewers are consolidated in this section. The procedures apply to both systems unless stated otherwise, or the context so requires.)

General

21.1 This specification is a statement of minimum requirements. The Consultant shall provide such further detailed specifications as may be required. Where reference is made to the recommendations of the manufacturer, should a particular recommendation be less stringent than this specification, this specification shall govern.

Handling of Pipe

22.1 Each shipment of pipe shall be inspected upon arrival, and any faulty or damaged materials shall be removed from the work site. The pipe and other materials shall be unloaded, transported and stored in accordance with the recommendations of the manufacturer.

Installation of Pipe

23.1 Sewer pipe shall be laid to the line and grade shown on the drawing or ordered by the Consultant. Pipelaying shall commence at the lower elevation with the bell or receiving ends facing upstream.

23.2 The spigot end of the pipe shall be inserted in the bell or receiving end and pushed home in such manner and using such equipment as is recommended by the pipe manufacturer. Rubber-type gaskets shall be installed on all sanitary sewer joints, and on those storm sewer joints shown on the plans or ordered by the Consultant.

23.3 Bedding shall be class B unless otherwise shown on the drawings. Bedding material shall be installed under and around the pipe in accordance with Standard Plan SD-1, taking particular care that there are no voids, and that the bedding under the pipe and around the haunches conforms to the manufacturer's recommendations. Except for bell holes, the pipe shall rest firmly and be supported uniformly along its whole length.

23.4 Connections shall be installed at locations shown on the plan, and shall be capped with water-tight plugs.

23.5 With the exception of class A concrete bedding, or concrete jacketing, no pipe in a trench shall be laid or supported temporarily or permanently upon wooden, masonry or other unyielding material.

Connections to Existing Mains

24.1 The Town may elect to make connections to existing mains with Town forces at the Owner's cost or may permit the Owner to make such connections under Town supervision.

24.2 During construction, the Owner shall install and maintain such sewer plugs in sanitary manholes as the Town may require so as to prevent foreign material and extraneous water in the new mains from entering the existing sanitary system. The plugs shall remain in place until the new mains or sections thereof have passed the infiltration tests.

Manholes and Catch Basins

25.1 Manholes shall be installed in accordance with Standard Plans SD-4 through SD-6. Sanitary manholes shall be of water-tight construction. The covers shall be sloped where necessary to conform to pavement grades and shall not protrude above the plane of adjacent pavement.

25.2 PVC pipe entering a manhole shall be fitted with a manhole sealing ring of rubber or neoprene, or other approved device, within the grouted area. Non-shrink grout shall be used around PVC pipes.

25.3 Sewer main pipes 600 mm and smaller shall not run through manholes. All channelled areas shall be shaped and finished to provide smooth passage for the sewage, to minimize head loss and to permit convenient access for a sewer television camera. The benched areas and step configuration shall be aligned so as to facilitate the movements of workmen.

25.4 This specification does not prohibit the complete above-ground fabrication of a manhole base (with floor and stub pipes) provided that the finished manhole, in place, conforms in all other respects to the requirements of the plans and specifications. Every pipe leading into or out of such prefabricated manhole shall have a flexible joint or coupling not less than 300 mm outside the face of such manhole.

25.5 Cleanouts shall be installed in accordance with Standard Plan SD-7 and shall be water-tight.

25.6 Catch basins shall be in accordance with Standard Plans SD-9 and SD-10. The catch basin should generally be aligned with the curb and gutter, as shown on the standard plan. However in areas of steep slope or heavy flow, the entrance grates should be positioned at such location, elevation and slope so as, together with shaping of the concrete gutter, to collect the maximum amount of runoff without projecting above gutter level or beyond the face of curb.

Storm and Sanitary Service Connections

26.1 Service connections shall be installed in accordance with Standard Plan S D-8. Rubber gaskets shall be installed on all joints in sanitary service connections, and on those storm service connections shown on the plan or ordered by the Consultant. Bedding shall be as for sewer mains. Service connections shall be capped with water-tight plugs.

26.2 Riser type connections shall be installed in accordance with Standard Plan SD-8 at locations shown on the plans or ordered by the Consultant.

26.3 When a building service to a property connects with a main in an easement on that property, the building service shall extend from the main to the edge of the easement.

26.4 Connections to existing mains shall use existing wye branches where available. Where tapping of a service connection is approved by the Administrator, it shall be made in accordance with the Standard Plan SD-8 except that a tapping saddle replaces the wye. The main shall be opened in such a manner and using such specialized tools and materials as the pipe manufacturer recommends, and sealed so as to be water-tight.

26.5 Markers should extend at least 0.5 m above ground. The top 300 mm shall be painted red for sanitary services and green for storm.

Erosion Control

27.1 Erosion control devices shall be set in place before or during the course of the work, as required, to perform their function.

27.2 Wire basket devices used for erosion control shall be placed, filled and secured in accordance with the manufacturer's recommendations. Baskets and rip rap shall be finished so as to present a pleasing appearance with, as far as practicable, a hazard-free surface.

Energy dissipators, where required, shall be a special design.

Testing

28.1 All gravity sewers and appurtenances shall be inspected visually during the course of the work for compliance with this By-law. Upon completion of sewer construction, and prior to construction of adjacent roadway, curbing or sidewalks, the mains shall be inspected by means of a sewer video camera in the presence of the Administrator, and a written inspection log and report, with photographs, shall be submitted to the Town, at the subdivider's cost.

All defects discovered shall be remedied promptly by the subdivider, and the main reinspected if the defect warrants.

28.2 All sanitary manholes shall be tested for water-tightness by installing water-tight plugs in all connecting pipes and filling the barrel with water. The manhole is acceptable if there is no measurable drop in one hour.

28.3 Every effort shall be made to obtain water-tight joints in all gravity sanitary sewers and those storm drains so ordered by the Consultant. All such gravity sewers and storm drains shall be tested for water-tightness by one or more of the following tests:

- air test
- infiltration test

When a section of a sewer or drain is found to have leakage or loss of pressure exceeding the allowable limit, replacement or repairs shall be made so as to reduce the leakage below such limit. Repaired sections shall be re-tested, and the procedure continued until all sections comply.

28.3.1 If, prior to the issuance of the certificate of completion excessive infiltration is observed, the Administrator may order that such infiltration be measured. Should the flow exceed the allowance limit for any section, that section shall not be acceptable, notwithstanding the results of air tests or earlier infiltration tests.

28.3.2 Should excessive infiltration be observed after the issuance of the certificate of completion, but before the expiry of the maintenance period, the Administrator may order such investigation as he deems suitable, in keeping with the then state of construction, to determine the cause of the excessive infiltration and the remedies indicated. Those portions of the remedial measures involving the subdivider's main and appurtenances shall be performed promptly by him. The cost of this investigation and any re-tests shall be borne by the parties as their interests appear. In case of dispute, the decision of the Administrator shall govern.

28.3.3 Not withstanding that the infiltration in a particular test section does not exceed the maximum permissible amount, if it is evident at any time before the expiration of the maintenance period that all or most of the infiltration is occurring at one or a few localized areas, the Owner shall effect repairs to eliminate or reduce such obvious leaks.

28.3.4 The infiltration test shall last not less than one hour. The maximum allowable infiltration shall be calculated as follows:

$$\text{Allowable Leakage} = \frac{HDL}{5200} \quad \text{Litres}$$

Where H = Duration of test in hours
D = Inside pipe diameter in mm
L = Length of test section in m

(Explanatory Note - This formula is based on the manufacturer's recommendations, as contained in the Uni-Bell "Handbook of PVC Pipe Design and Construction", page 278. For testing of sewer pipe, the recommended allowable leakage for infiltration is 50 US gal/inch/diam/mile/day, (4.6 L/mm/km/day). That this is a PVC pipe standard does not preclude use of other pipe materials provided the infiltration does not exceed the allowable.

28.3.5 Low pressure air testing shall conform to the test procedure shown in ASTM C 828. The air test should be conducted at the pressures shown, adjusted, if necessary, to compensate for the height of ground water (if any) above the pipe, but the test pressure shall not exceed 30 kPa. The test reading shall be the length of time for the pressure to fall 3.5 kPa. Timing shall commence when the descending pressures passes 20.75 kPa, or such higher figure calculated to compensate for ground water level. For the pipe to pass the test, the length of time required for a 3.5 kPa fall in pressure must not be less than these permissible times:

Pipe Size	Minimum Time (min:sec)
100	2:32
150	3:50
200	5:06
250	6:22
300	7:39
350	8:58
375	9:35
400	10:12
450	11:34
500	12:45
525	13:30
600	15:24

Where more than one pipe size is under test, the test diameter shall be the weighted average of the diameters of the pipes according to the length of each diameter.

PROVISIONS FOR ON-SITE SEWAGE DISPOSAL SYSTEMS (#1514 July 5/06)

29.1 Section 29 of this bylaw applies only to the following lands as shown shaded on Map D-1:

Lot B, District Lot 186, Comox District, Plan 47094
Lot A, District Lot 186, Comox District, Plan 47094
Lot 12, District Lot 186, Comox District Plan 449
Lot A, District Lot 186, Comox District, Plan 18914
Lot B of District Lot 186, Comox District, Plan 18914
Lot C, District Lot 186, Comox District, Plan 18914
That Part of Lot 7, District Lot 186, Comox District, Plan 449, Lying to the South of a Boundary Parallel to and Perpendicularly Distant 168 Feet From the South Boundary of Said Lot 7, Except That Part Included in Plan 18914
Lot 1, District Lot 186, Comox District, Plan 43061
Lot A, District Lot 186, Comox District, Plan 14058
Lot B, District Lot 186, Comox District, Plan 14056
Lot C, District Lot 186, Comox District, Plan 14056
Lot D, District Lot 186, Comox District, Plan 14056
Lot E, District Lot 186, Comox District, Plan 14056
Lot F, District Lot 186, Comox District, Plan 14056
That Part of Parcel A (DD 3381N), Lots 4 and 5, District Lot 186, Comox District, Plan 449 Lying Within Said Lot 5

Lot 5, District Lot 186, Comox District, Plan 449, Except Parcel A (DD 3381N)
Lot 6, District Lot 186, Comox District, Plan 449
Lot 11, District Lot 186, Comox District, Plan 449

29.2 As an alternative to the sewage collection and disposal system required by Section 14.0, the Owner of a Parcel used or proposed to be used for only one single-family dwelling not containing a secondary suite and located more than 15 metres from the nearest sewer main may provide an on-site sewage disposal system complying with applicable regulations under the *Health Act*, if the Owner complies with the building permit application and occupancy permit requirements of Bylaw No. 1472 pertaining to such systems.

29.3 For the purposes of this Section 29, the distance of a Parcel from the nearest sewer main shall be determined by projecting the side Parcel line nearest the sewer main and the centre line of the sewer main such that the projected lines intersect, and measuring the distance from point of intersection to the closest part of the sewer main or manhole in which the main terminates.

29.4 In the case of an application for a building permit to alter a single family dwelling served by an on-site sewage disposal system, Section 14.1 shall not apply if the building as altered does not increase the volume of sewage produced as determined by the Building Inspector or as certified by an authorized person as defined in the Sewerage System Regulation and for the purposes of this section 29.4 buildings shall be deemed to produce sewage at the minimum flow rate indicated in the Sewerage System Standard Practice Manual of the B.C. On Site Sewage Association, as amended from time to time.

30.1 Section 30 of this bylaw applies only to the following lands as shown shaded on Map D-2: **(#1665 August 18/10)**

Amended Parcel A (DD F20035) Of Lot 2, Section 83A, Comox District, Plan 8799
That Part Of Lot 2, Section 83A, Comox District, Plan 8799, Shown In Red On Plan 1531R, Except Part In Plans 16323 And 17275
Lot 6 Section 83A Comox District Plan 8799 Except Part Outlined In Red On Plan 854RW, Except Part In Green On Plan 2093 O.S. And Except Part In Plan 2054R.
Lot 7, Section 83A, Comox District, Plan 8799
Lot A, Section 83A, Comox District, Plan 20444
Lot B, Section 83A, Comox District, Plan 20444
Lot C, Section 83A, Comox District, Plan 20444
Lot 1, Section 83A, Comox District, Plan 29527
Lot 2, Section 83-A, Comox District, Plan 29527
Lot D, Section 83A, Comox District, Plan 37066
Lot 1, Section 83-A, Comox District, Plan 39022
Lot 2, Section 83-A, Comox District, Plan 39022
Lot 1, Section 83-A, Comox District, Plan 43733
Lot 2, Section 83-A, Comox District, Plan 43733
Lot 2, Section 83A, Comox District, Plan 44452
Lot A Section 83-A Comox District Plan VIP62445
Lot B Section 83-A Comox District Plan VIP62445
Lot A, District Lot 89-G, Comox District, Plan 6921
Lot 1, District Lot 89g, Comox District, Plan 14780, Except Part In Plan VIP58571
Lot A, District Lot 89G, Comox District, Plan 17711
Lot A, District Lot 89-G, Comox District, Plan 18811
Lot B, District Lot 89-G, Comox District, Plan 18811
Lot 1, District Lot 89G, Comox District, Plan 20382
Lot 1, District Lot 89G, Comox District, Plan 23014

Lot 3, District Lot 89-G, Comox District, Plan 33822
Lot 4, District Lot 89-G, Comox District, Plan 33822, Except Part In Plan 49556
Lot A, District Lot 89G, Comox District, Plan 50229
Lot B, District Lot 89G, Comox District, Plan 50229
Lot 1, District Lot 89G, Comox District, Plan 51336, Except Part In Plan 51337
Lot A, District Lot 89G, Comox District, Plan 51337
Lot A, District Lot 89-G, Comox District, Plan VIP56420
Lot 1, District Lot 89G, Comox District, Plan VIP57820
Lot A, District Lot 89G, Comox District, PLAN VIP58571
Lot D District Lot 89G Comox District Plan VIP62020
Lot E District Lot 89G Comox District Plan VIP62020
Lot 1, District Lot 93, Comox District, Plan 2175, Except Amended Parcel A (DD 20783N), And Except Those Parts In Plan 1507R, 834 RW And 32578, And Except That Part Lying South West Of Plan 834 RW
Amended Parcel A (DD 20783N) Of Lot 1, District Lot 93,Comox District, Plan 2175
Lot 24, District Lot 93, Comox District, Plan 25393
Lot 5, District Lot 93, Comox District, Plan 31073
Lot 1, District Lot 93, Comox District, Plan 32578
Parcel B (DD 20772N) Of District Lot 191, Comox District
Lot 1, District Lot 191, Comox District, Plan 3947
Lot 3, District Lot 191, Comox District, Plan 3947
Lot 4, District Lot 191, Comox District, Plan 3947
That Part Of Lot 5, District Lot 191, Comox District, Plan 3947 Lying To The South West Of A Boundary Parallel To The North East Boundary Of Said Lot 5 And 30 Feet Perpendicularly Distant South Westerly Therefrom.
Lot 6, District Lot 191, Comox District, Plan 3947
Lot 7, District Lot 191, Comox District, Plan 3947
Lot 8, District Lot 191, Comox District, Plan 3947
Lot 9, District Lot 191, Comox District, Plan 3947
Lot 13, District Lot 191, Comox District, Plan 3947
Lot 15, District Lot 191, Comox District, Plan 3947
Lot 16, District Lot 191, Comox District, Plan 3947
Lot A, District Lot 191, Comox District, Plan 8452, Except Part In Plan VIP78151
Lot B, District Lot 191, Comox District, Plan 8452
Lot A, District Lot 191, Comox District, Plan 39095
Lot A, District Lot 191, Comox District, Plan 39614
Lot A, District Lot 191, Comox District, Plan 47979 Except Part In Plan 49529
Lot 1, District Lot 191, Comox District, Plan 49529
Lot 1 District Lot 191 Comox District PLAN VIP83187
Lot 1, District Lot 89G, Comox District, Plan 2545, Except Those Parts In Plans 17038, 50451 And 50830
Lot 10, District Lot 191, Comox District, Plan 3947
Lot 14, District Lot 191, Comox District, Plan 3947
Lot 6 Section 83A Comox District Plan 8799 Except Part Outlined In Red On Plan 854RW, Except Part In Green On Plan 2093 O.S. And Except Part In Plan 2054R
That Property Designated Park On The South West Corner Of The Intersection Of Sand Pines Drive And Lazo Road
That Property Designated Park On The North West Corner Of The Intersection Of Sand Pines Drive And Lazo Road

30.2 As an alternative to the sewage collection and disposal system required by Section 14.0, for development of a single family dwelling, home occupation, carriage house, or secondary suite, the Owner of a Parcel located more than 15 metres from the nearest sewer main may provide an on-site sewage disposal system complying with applicable regulations under the *Health Act*, if the Owner complies

with the building permit application and occupancy permit requirements of Bylaw No. 1472 pertaining to such systems.

30.3 For the purposes of this Section 30, the distance of a Parcel from the nearest sewer main shall be determined by projecting the side Parcel line nearest the sewer main and the centre line of the sewer main such that the projected lines intersect, and measuring the distance from point of intersection to the closest part of the sewer main or manhole in which the main terminates.

30.4 In the case of an application for a building permit to alter a single family dwelling served by an on-site sewage disposal system, Section 14.1 shall not apply if the building as altered does not increase the volume of sewage produced as determined by the Building Inspector or as certified by an authorized person as defined in the Sewerage System Regulation and for the purposes of this section 30.4 buildings shall be deemed to produce sewage at the minimum flow rate indicated in the Sewerage System Standard Practice Manual of the B.C. On Site Sewage Association, as amended from time to time.

MAPS

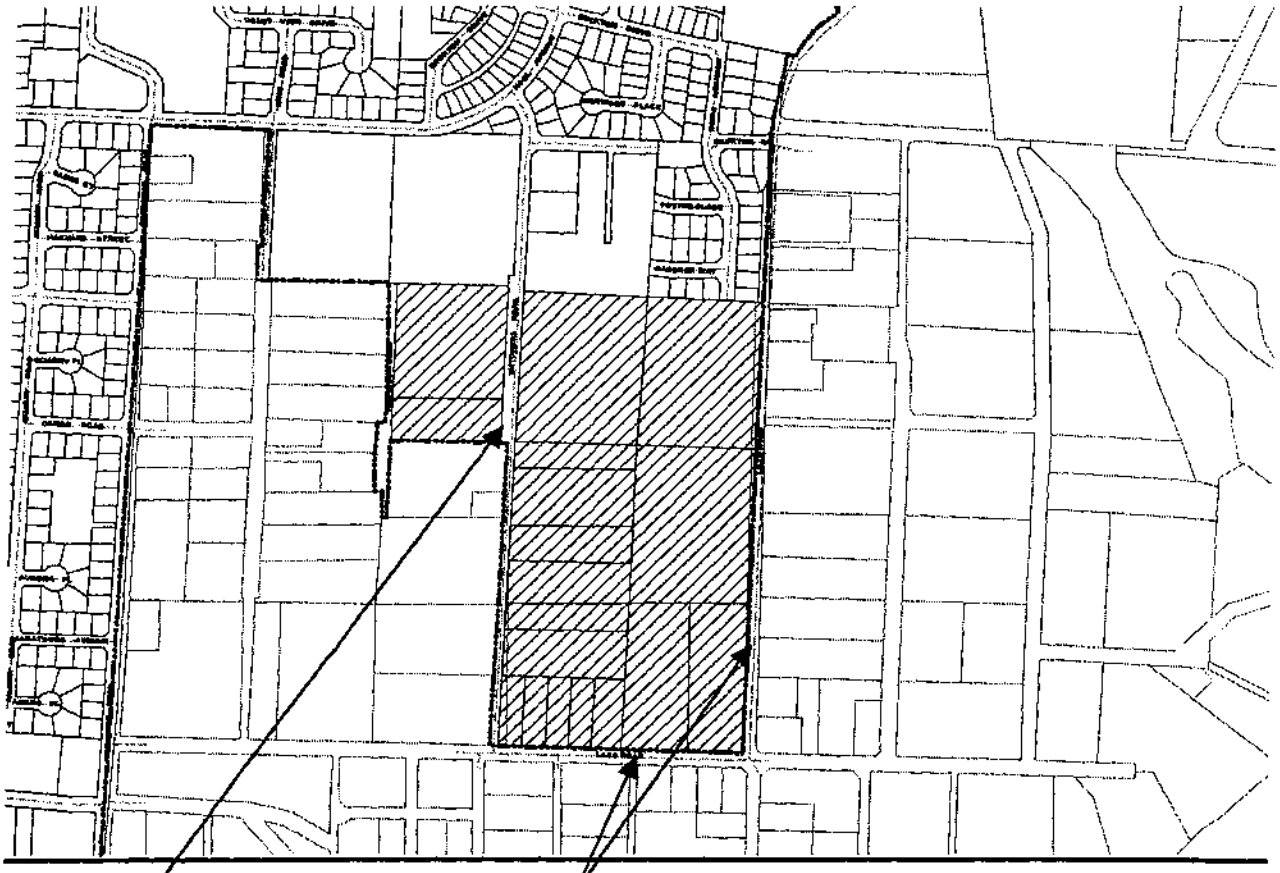
MAP D-1
MAP D-2

STANDARD DRAWINGS

SD-1	Pipe Bedding
SD-1A	Utility Trench
SD-2	Pavement Restoration
SD-2A	Utility Trench Restoration in Asphalt Roads
SD-3	Culvert Headwall
SD-4	Manhole Type A
SD-5	Manhole Type B
SD-6	Drop Manhole
SD-7	Cleanout
SD-8	Sewer Service Connection
SD-8A	Sanitary and Drain Inspection Chamber
SD-9	Catch Basin with Flat Grate
SD-10A/B	Catch Basin with Combined Inlet (2pgs.)

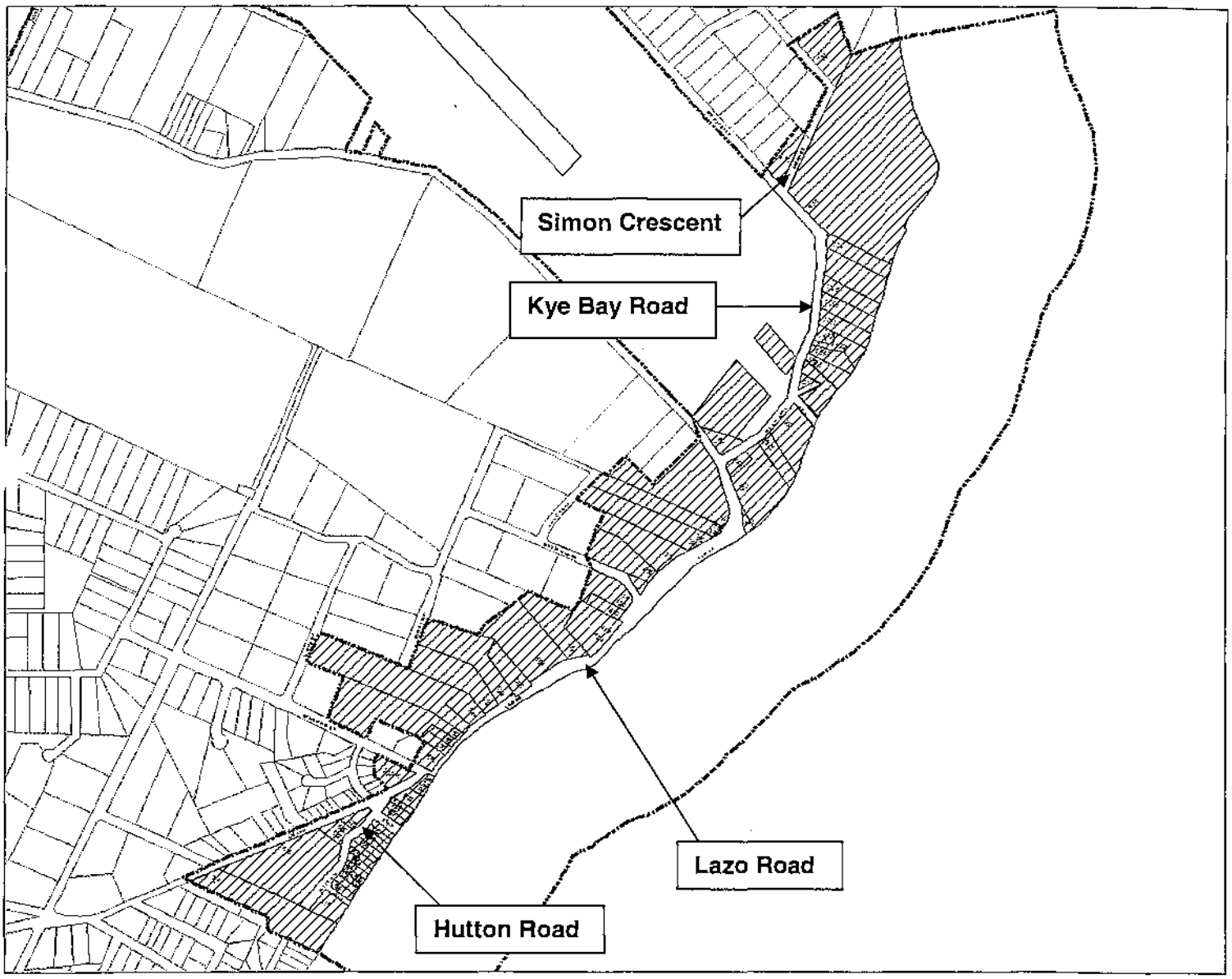
Amended by Bylaw 1514 Jul 5/06

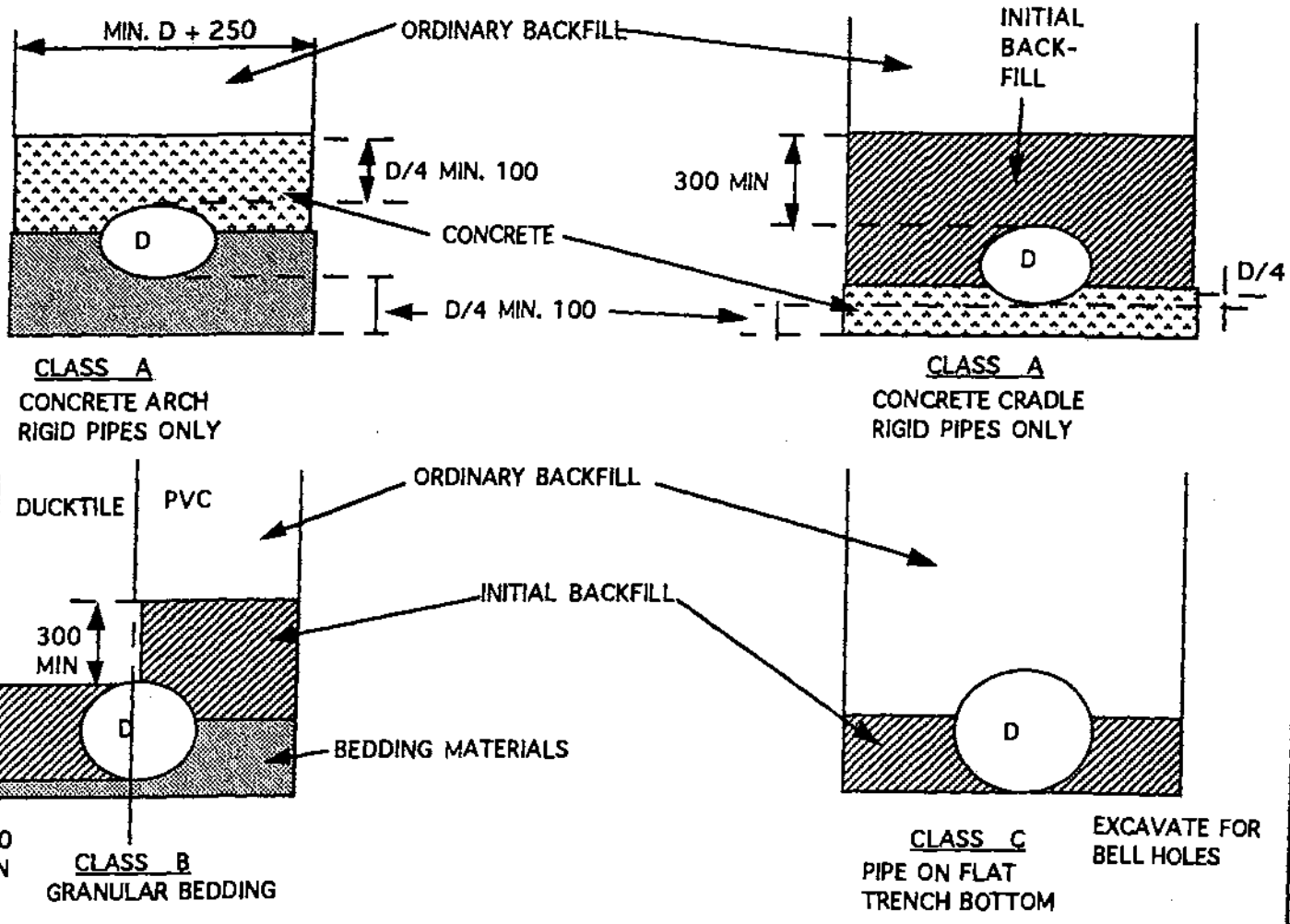
Map D-1 Land Capable of Development Using an On-Site Sanitary Sewer System



Amended by
Bylaw 1665 Aug 18/10

Map D-2 Land Capable of Development Using an On-Site Sanitary Sewer System





ORDINARY BACKFILL IS MACHINE-PLACED BACKFILL MATERIAL, FREE FROM STONES OVER 150mm. STONES GREATER THAN 75mm MUST NOT BE CLOSER THAN 300mm FROM PIPE.

INITIAL BACKFILL IS HAND-PLACED BACKFILL MATERIAL, FREE FROM STONES OVER 50mm.

BEDDING IS A HAND-PLACED AND COMPACTED SAND OR MIXTURE OR SAND AND GRAVEL PASSING 19mm SCREEN.

ALL MATERIAL PLACED UNDER THE HAUNCHES OF THE PIPE SHALL BE DEPOSITED EQUALLY ON BOTH SIDES OF THE PIPE IN LAYERS NOT EXCEEDING 150mm AND WELL TAMPED TO SPRINGLINE OF PIPE.

MAXIMUM TRENCH WIDTH AT TOP OF PIPE MUST NOT EXCEED 600mm, OR OUTSIDE DIA. PLUS 300mm, WHICHEVER IS GREATER.

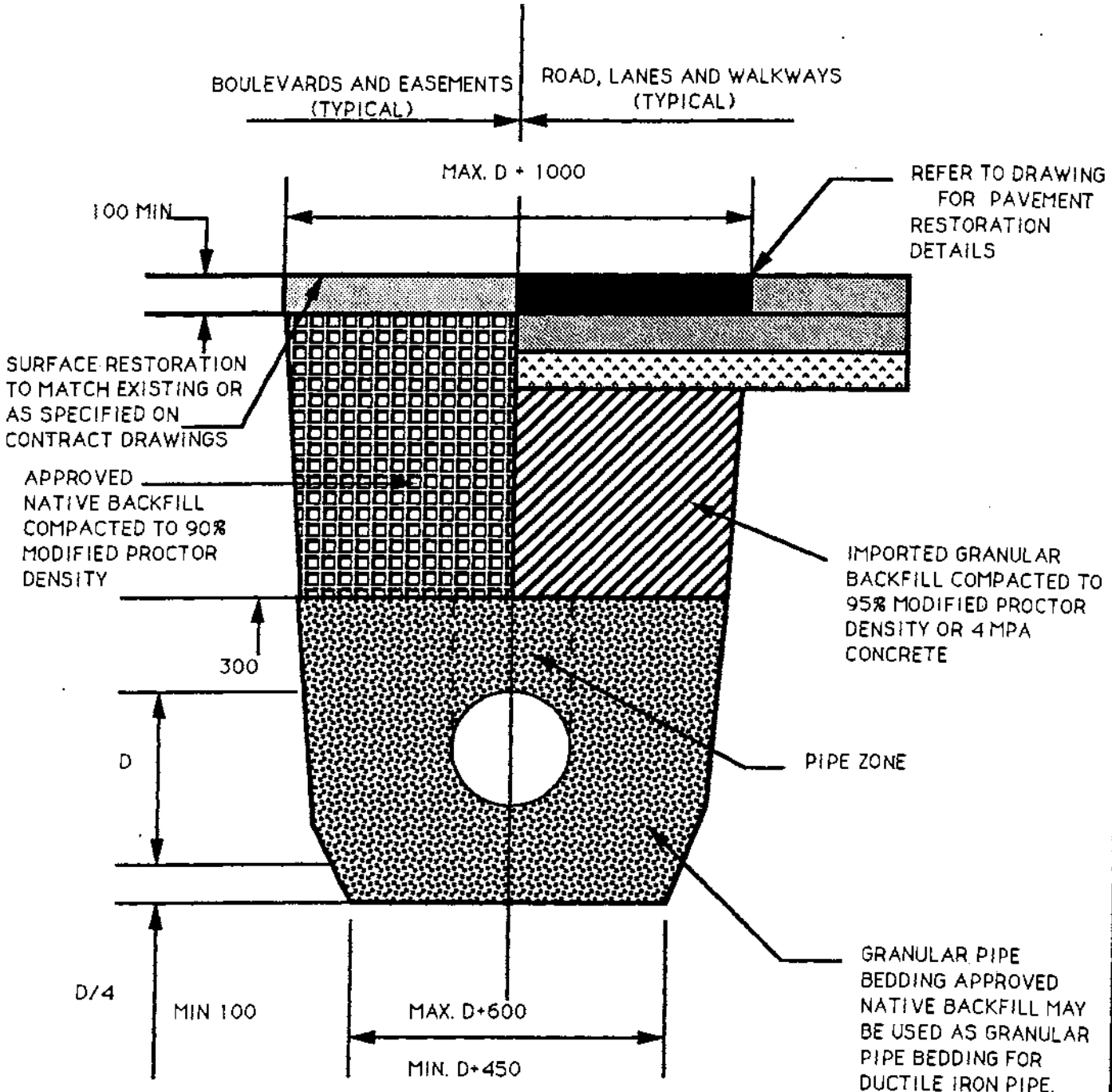
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: PIPE BEDDING	STANDARD DWG. NO. SD - 1
DRAWN BY: GB	DATE: 91/07/19	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.

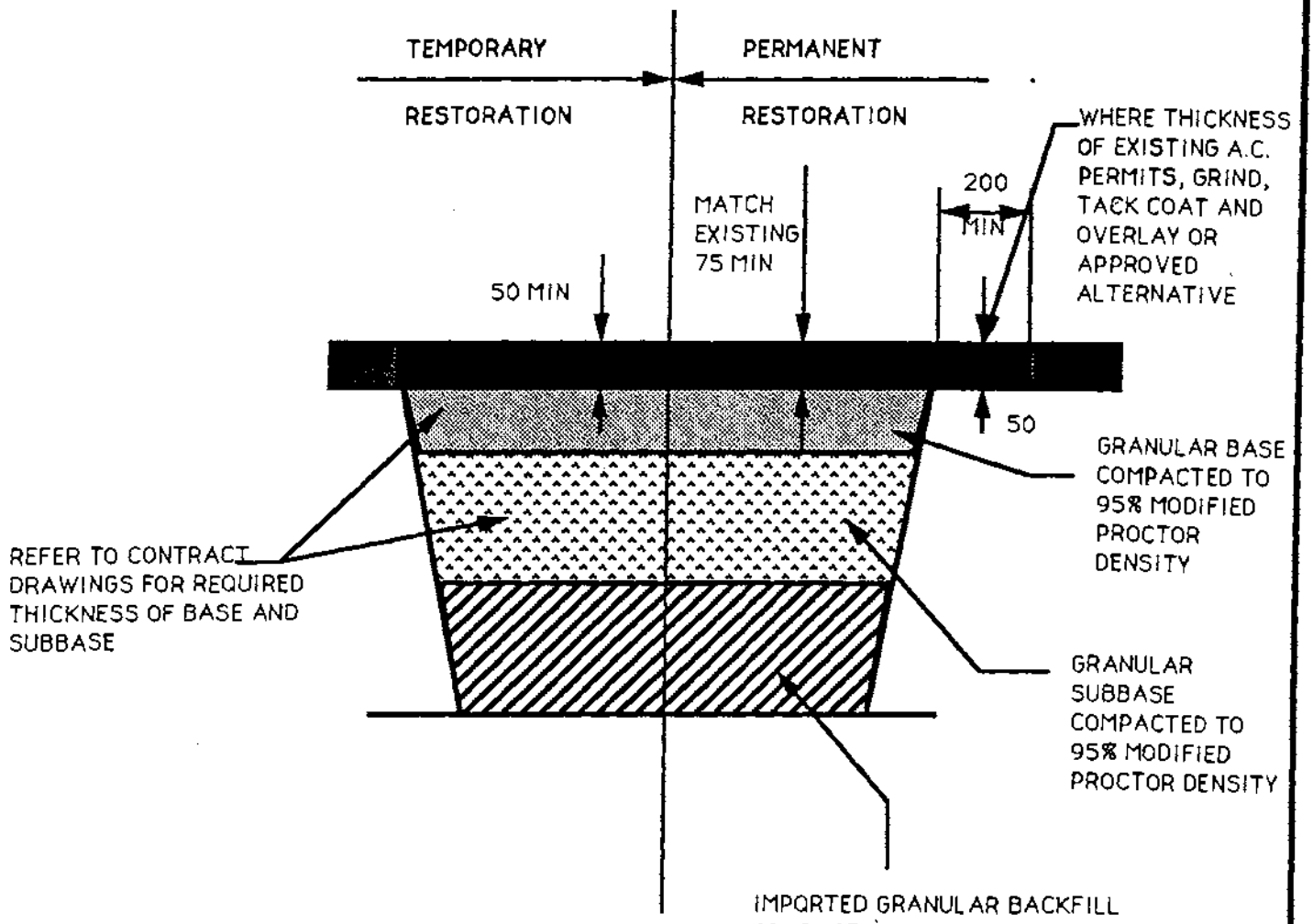
STANDARD DETAIL DRAWINGS



NOTE: 1. TRENCHING TO COMPLY WITH ALL REQUIREMENTS OF THE WORKERS' COMPENSATION BOARD.
2. REFER TO CONTRACT DRAWINGS AND SECTION 02223 FOR DETAILED SPECIFICATIONS.

THE TOWN OF COMOX	TITLE: UTILITY TRENCH	STANDARD DWG. NO. SD-1A
DRAWN BY: TM	DATE: JUNE / 93	APPROVED BY: FP
		REV. NO

STANDARD DETAIL DRAWINGS

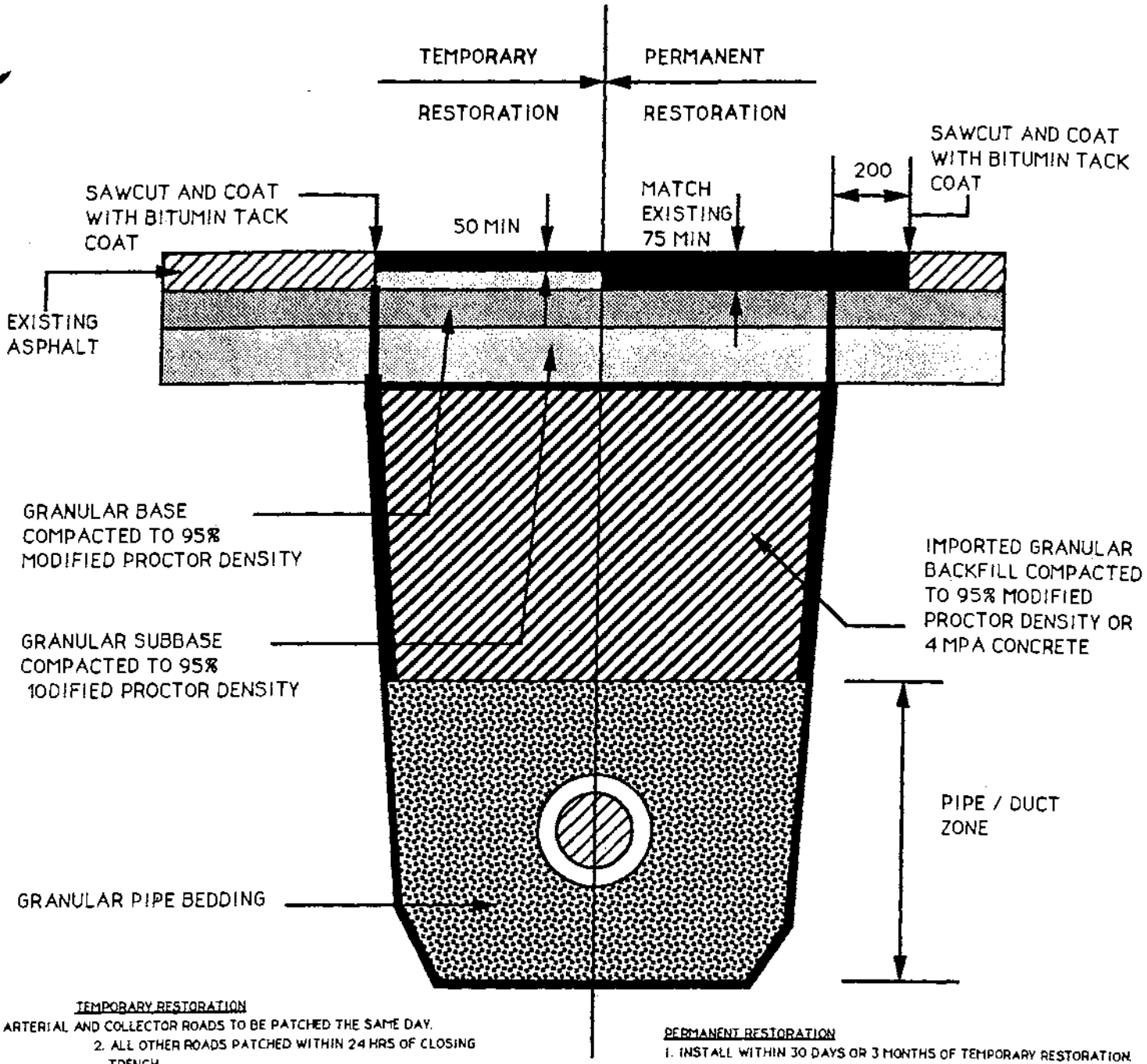


NOTE: 1. REFER TO CONTRACT DRAWINGS AND SECTIONS 02223 AND 02512 FOR DETAILED SPECIFICATIONS

THE TOWN OF COMOX	TITLE: PAVEMENT RESTORATION	STANDARD DWG. NO. SD-2	
DRAWN BY: TM	DATE: JUNE/93	APPROVED BY: FP	REV. NO.

UTILITY TRENCHES IN ASPHALT ROADS
TEMPORARY AND PERMANENT RESTORATIO

This is a consolidated versi prepared for convenience purposes only.



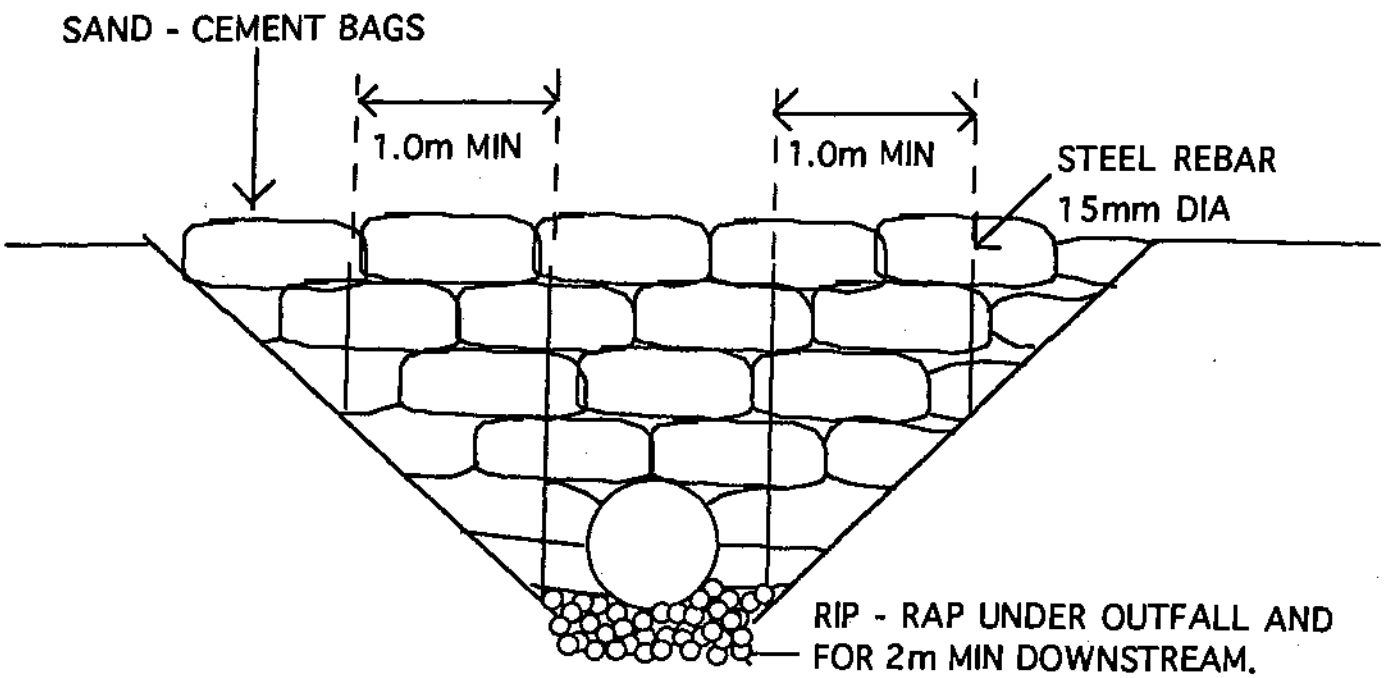
TEMPORARY RESTORATION

1. ARTERIAL AND COLLECTOR ROADS TO BE PATCHED THE SAME DAY.
2. ALL OTHER ROADS PATCHED WITHIN 24 HRS OF CLOSING TRENCH.
3. PATCHING MATERIAL TO BE HOT MIX ASPHALT ON ALL ROADS UNLESS OTHERWISE SPECIFIED, COLD MIX MAY BE USED ONLY WHERE DIRECTED BY THE MUNICIPAL ENGINEER.
4. TEMPORARY PATCH TO BE MAINTAINED TO ENSURE SAFE AND SMOOTH CONDITION.
5. SAWCUT TO BE BRUSH CLEANED AND COATED WITH BITUMIN TACK COAT IMMEDIATELY PRIOR TO ASPHALT LAYING.

PERMANENT RESTORATION

1. INSTALL WITHIN 30 DAYS OR 3 MONTHS OF TEMPORARY RESTORATION.
2. REMOVE BROKEN OR CRACKED PAVEMENT AS WELL AS ANY AREAS SHOWING SETTLEMENT AND DISPOSE OF OFF SITE.
3. REMOVE UNDERLYING GRANULAR ROAD BASE TO ALLOW PLACEMENT OF PERMANENT PAVEMENT.
4. COMPACT BASE TO 95% MODIFIED PROCTOR DENSITY.
5. RESTORE PAVEMENT TO SMOOTH, MATCHING SURFACE AND GRADE ADJACENT ASPHALT.
6. SAWCUT TO BE BRUSHED CLEAN AND COATED WITH BITUMIN TACK COAT IMMEDIATELY PRIOR TO ASPHALT LAYING.

THE TOWN OF COMOX			TITLE: UTILITY TRENCH RESTORATION IN ASPHALT ROADS	STANDARD DWG NO. SD-2A
DRAWN BY: TM	DATE: JUNE/93	APPROVED BY: FP		REV. NO.



SANDBAGS TO BE FILLED WITH FRESH WET 6:1 MIXTURE OF SAND AND CEMENT000.

MINIMUM OF 10 ROWS OF BAGS PER VERTICAL METER.

STEEL REINFORCING BAR TO BE DRIVEN VERTICALLY THROUGH FRESHLY LAID SAND - CEMENT BAGS.

SAND - CEMENT BAGS TO BE PROTECTED FROM RAINFALL AND FLOWING OR STANDING WATER FOR 24 HOURS.

ALL DIMENSIONS IN METERS UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: CULVERT HEADWALL	STANDARD DWG. NO. SD - 3
DRAWN BY: GB	DATE: 91/07/17	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.

FRAME AND COVER TO BE INTERCHANGEABLE FIT WITH ALBERNI FOUNDRY:

#10-26 MANHOLE FRAME
#10-26 SOLID COVER
#10-26A SLOTTED COVER (STORM DRAIN ONLY)

TWO 300mm RISER SECTIONS REQUIRED BELOW REDUCER

SEALING RING SANITARTY MANHOLE

FOR PREFABRICATED MANHOLE BASES AND RIGID PIPES ONLY

300 MIN.

LIFTING HOLES IN M.H. LID (SAN.) SHALL BE PROVIDED WITH 16mm x 62mm LONG CARRIAGE BOLTS C/W NUTS.

BRICK FILLER RING, OR CONCRETE RISER RINGS, MORTAR IN AND OUT, BUILT UP TO SUIT GRADE. MAX. 275mm HIGH.

COVER SLAB TO BE REINFORCED TO MEET H20 LOADING REQUIREMENTS.

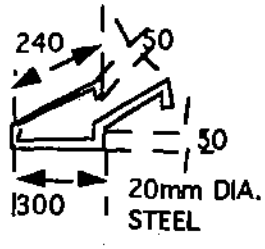
JOINTS IN SANITARY MANHOLES TO BE INFILTRATION-PROOF.

PRECAST REINFORCED CONCRETE BARREL ASTM C-478-82.

20mm DIA. GALVANIZED STEEL RUNGS AT 300mm C TO C, CAST IN WALL OF BARREL SECTION.

CONCRETE BENCHING WITH SMOOTH CEMENT MORTAR FINISH. SLOPE SURFACE TO PIPE AT 10%. STEEL TROWEL FINISH.

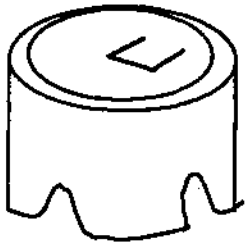
MIN . 200mm DEPTH OF COMPACTED GRAVEL UNDER MANHOLE BASE.



NOT TO SCALE

MANHOLE SELECTION

DIAMETER OF LARGEST PIPE	TYPE OF MANHOLE
UP TO 450mm	TYPE A
500mm TO 750mm	TYPE A ENLARGED OR TYPE B
OVER 800mm	TYPE B

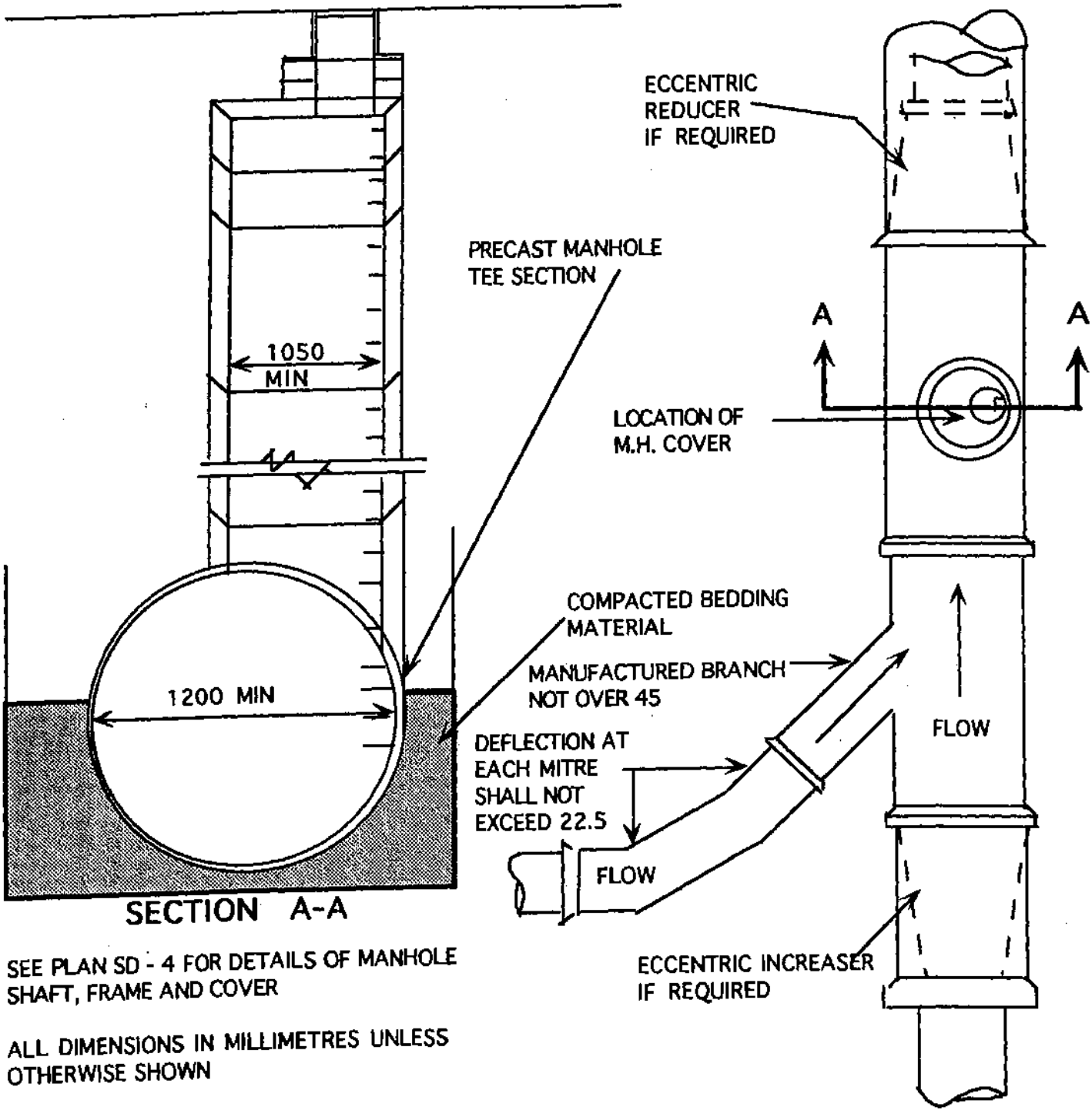


BOTTOM SECTION CAST WITH HALF-ROUND CORES REMOVED

BENCHING AND CHANNELIZATION SHALL BE SHAPED TO PERMIT ACCESS OF SEWER T.V. CAMERA.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

TOWN OF COMOX			TITLE: MANHOLE TYPE A	STANDARD DWG. NO. SD - 4
DRAWN BY: GB	DATE: 91/07/22	APPROVED BY: FP		



SECTION A-A

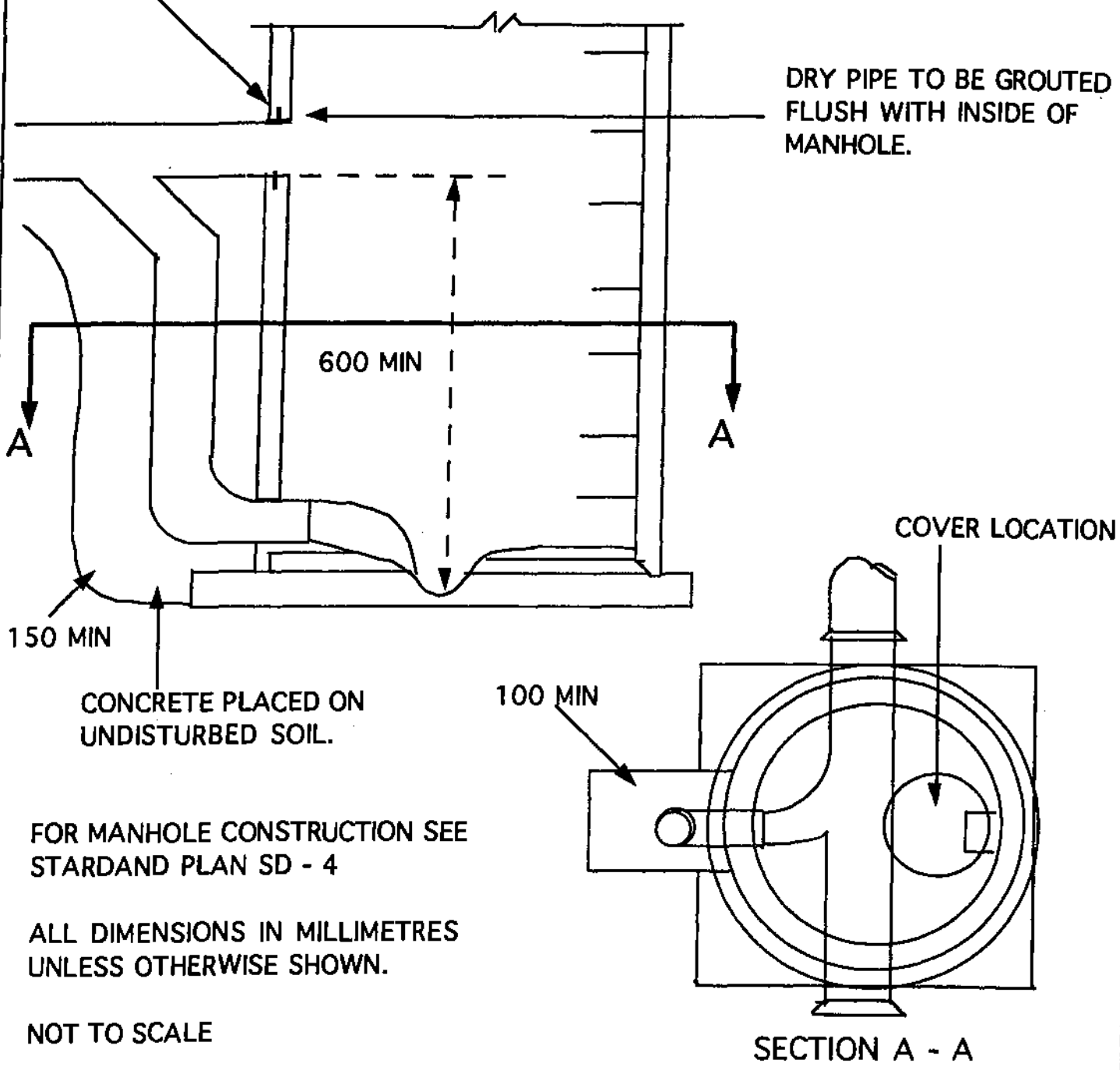
SEE PLAN SD - 4 FOR DETAILS OF MANHOLE SHAFT, FRAME AND COVER

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

NOT TO SCALE

TOWN OF COMOX			TITLE: MANHOLE TYPE B	STANDARD DWG. NO. SD - 5
DRAWN BY: GB	DATE: 91/07/17	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.



FOR MANHOLE CONSTRUCTION SEE STARDAND PLAN SD - 4

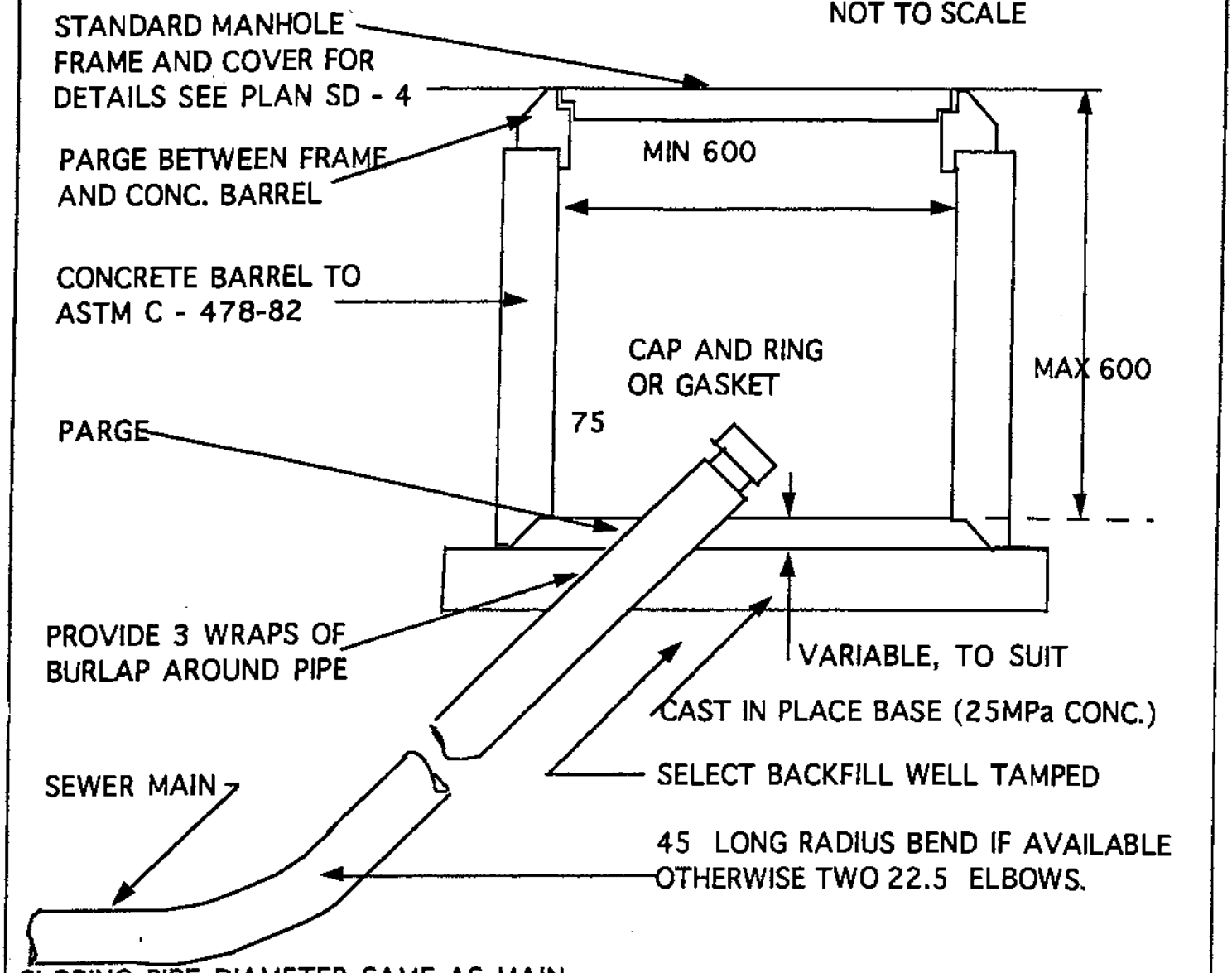
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE

TOWN OF COMOX			TITLE: DROP MANHOLE	STANDARD DWG. NO. SD - 6
DRAWN BY: GB	DATE: 91/07/17	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.

NOT TO SCALE

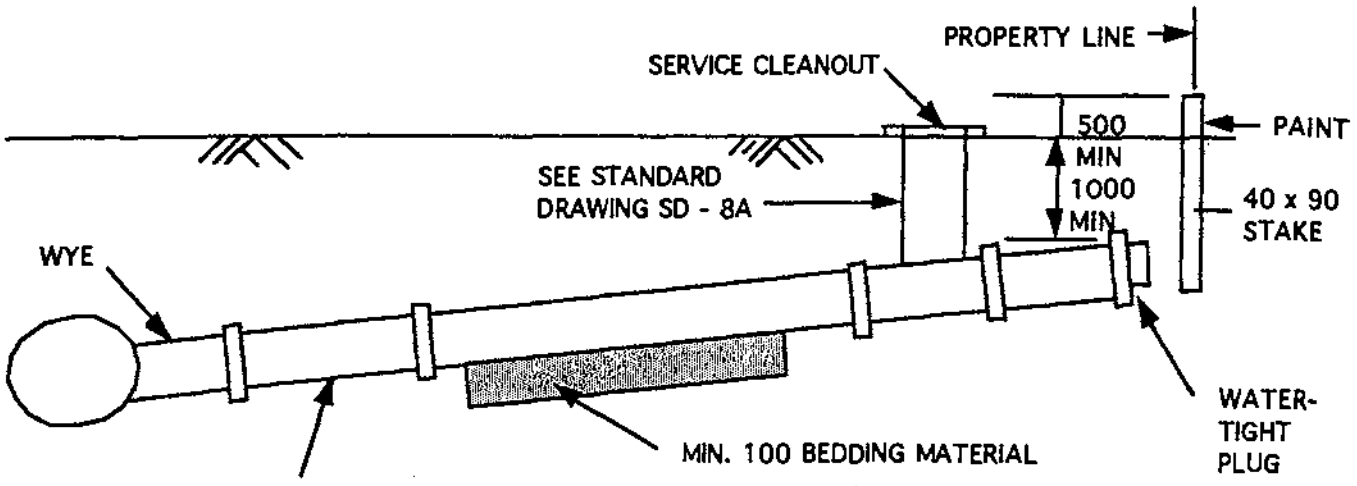


LENGTH OF CONCRETE BARREL AND LENGTH AND ANGLE OF SEWER PIPE AND LOCATION WITHIN BARREL TO BE ADJUSTED IF REQUIRED TO FACILITATE ACCESS OF MAINTENANCE EQUIPMENT AND SEWER TV CAMERA, AND TO EXCLUDE EXTRANEOUS WATER.

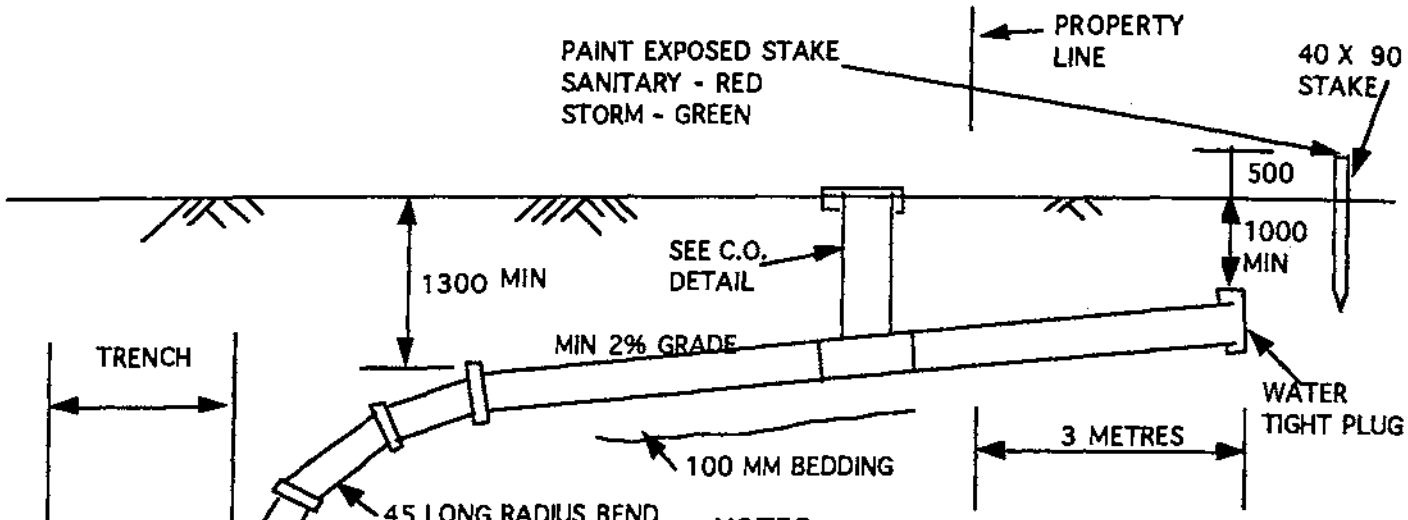
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

TOWN OF COMOX			TITLE	STANDARD DWG. NO.
			CLEANOUT	SD - 7
DRAWN BY: GB	DATE: 91/07/17	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.



SERVICE CONNECTION



SERVICE DROP

NOT TO SCALE

NOTES

SERVICES SHALL EXTEND 3.0 METRES INTO PROPERTY ON THAT SIDE OF THE STREET HAVING BURIED HYDRO AND TELEPHONE . (SEE DRG # SF -6)

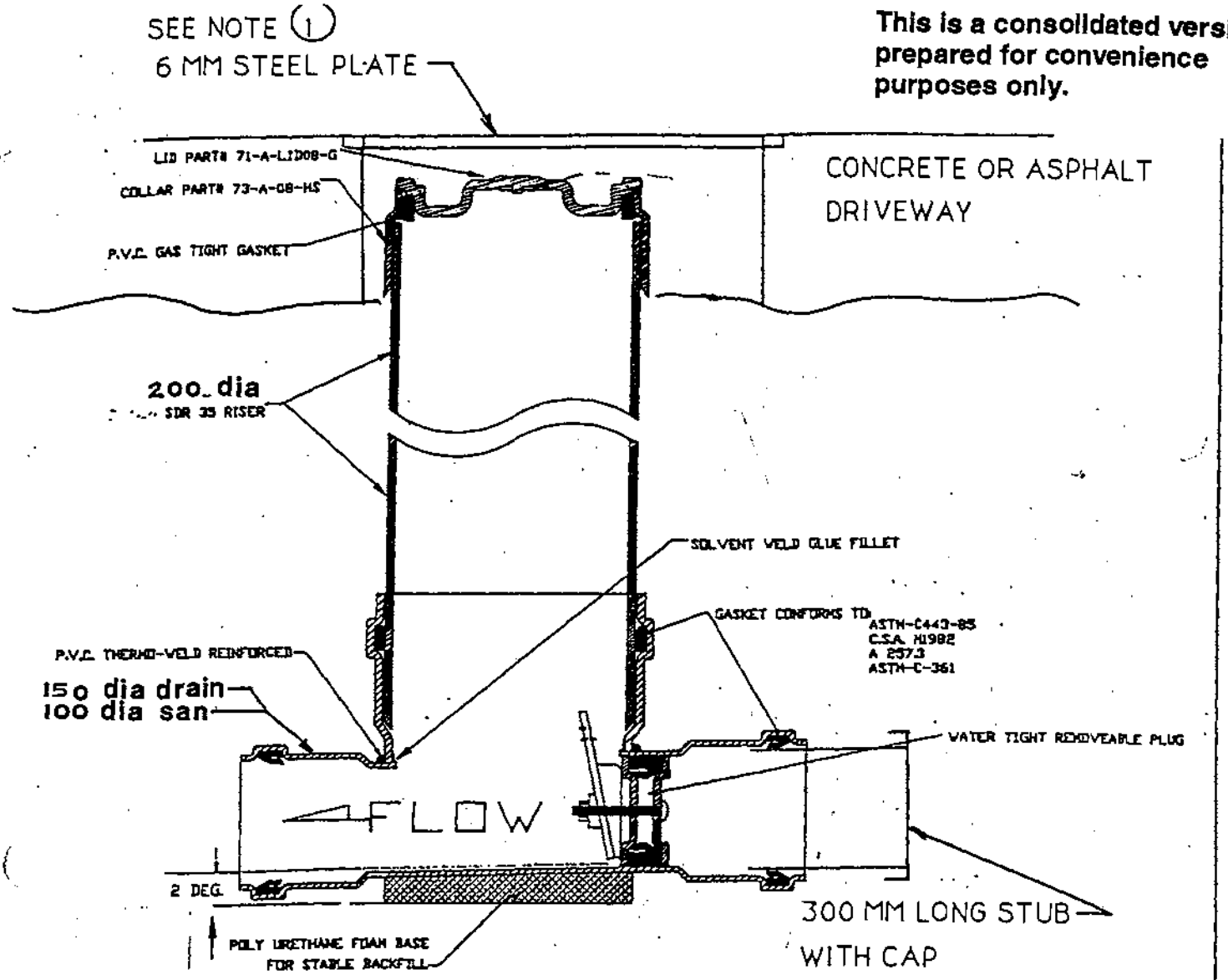
SERVICE CONNECTIONS SHOULD BE LONG LENGTHS OF PVC WITH AS FEW JOINTS AS POSSIBLE. SANITARY SERVICES SHALL BE WATERTIGHT.

MINIMUM SIZE OF SERVICE CONNECTION: SANITARY 100MM, STORM 150MM

ALL DIMENSIONS IN MILLMETRES OR AS SHOWN

TOWN OF COMOX			TITLE: SEWER SERVICE CONNECTION	STANDARD DWG. NO. SD - 8
DRAWN BY: TR	DATE: 91/08/14	APPROVED BY: FP		

This is a consolidated version prepared for convenience purposes only.



NOTES

(1) ALL SANITARY SEWER CLEANOUTS AND WATER SERVICE CONNECTION SHUT - OFF BOXES INSTALLED IN ASPHALT OR CONCRETE DRIVEWAYS AND SIDEWALKS SHALL BE PROVIDED WITH A RECESSED BOX AS SHOWN

ABOVE COMPLETE WITH A 6 MM PROTECTIVE STEEL COVER PLATE.

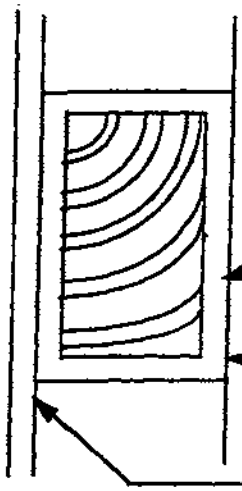
NOT TO SCALE

TOWN OF COMOX			TITLE	STANDARD DWG. NO.
			SANITARY & DRAIN INSPECTION CHAMBER	SD-8A
DRAWN BY: GB	DATE: 07/91	APPROVED BY: FP	**LE-RON PLASTICS INC**	REV (1) MAY 93

This is a consolidated version prepared for convenience purposes only.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

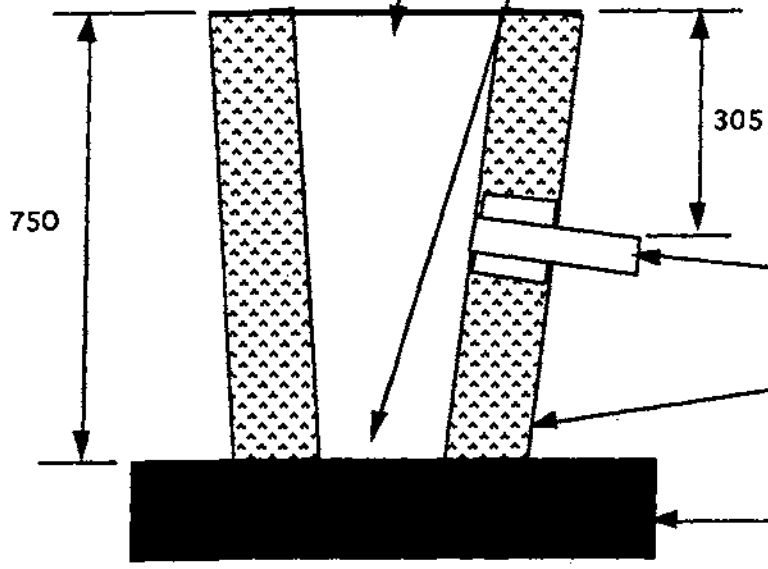
NOT TO SCALE



CAST IRON FRAME AND GRATING WITH CURVED PATTERN PROVIDED BY ALBERNI FOUNDRIES OR EQUIVALENT

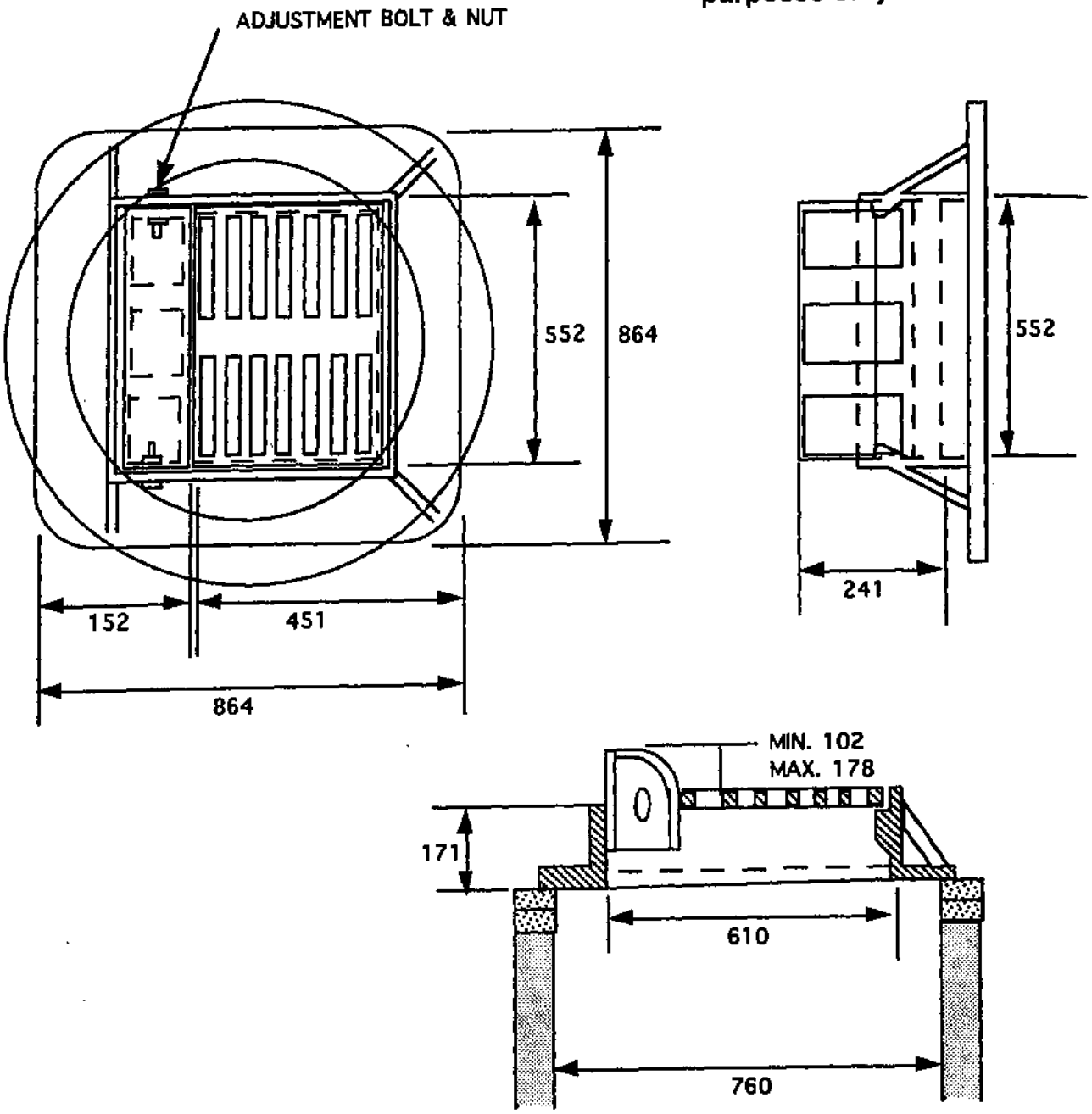
FRAME 510 x 710

CURB AND GUTTER SECTION



TOWN OF COMOX			TITLE: CATCH BASIN WITH FLAT GRATE	STANDARD DWG. NO. SD - 9
DRAWN BY: TR	DATE: 91/08/14	APPROVED BY: FP		

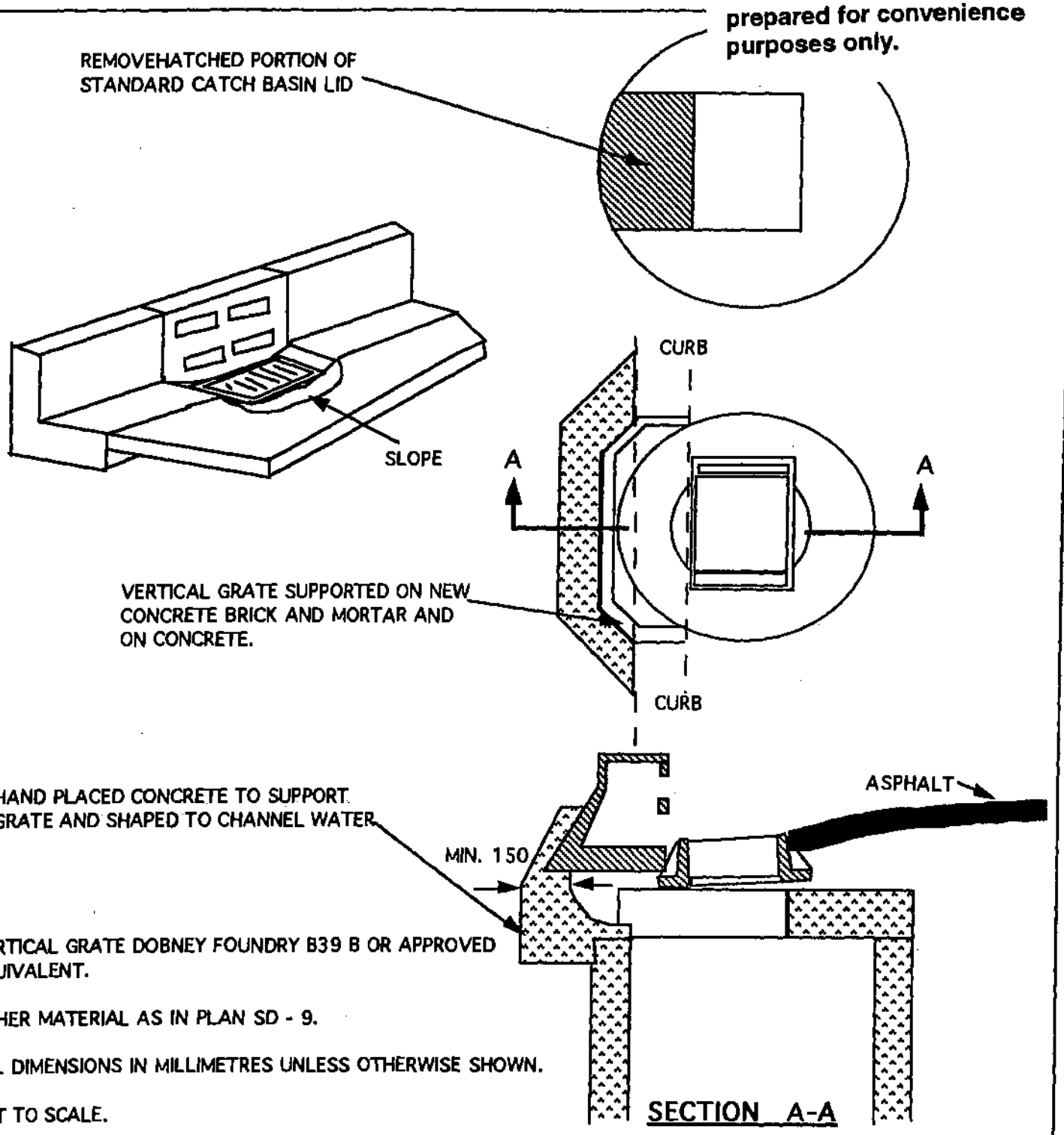
This is a consolidated version prepared for convenience purposes only.



ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: CATCH BASIN WITH COMBINED INLET	STANDARD DWG. NO. SD -10A
DRAWN BY: GB	DATE: 91/07/31	APPROVED BY: FP		



VERTICAL GRATE DOBNEY FOUNDRY B39 B OR APPROVED EQUIVALENT.

OTHER MATERIAL AS IN PLAN SD - 9.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: CATCH BASIN WITH COMBINED INLET	STANDARD DWG. NO. SD -10B
DRAWN BY: GB	DATE: 91/07/31	APPROVED BY: FP		

Date: January 1998

TOWN OF COMOX
SUBDIVISION AND DEVELOPMENTS SPECIFICATIONS

APPENDIX E
SPECIFICATIONS FOR STORM DRAINAGE

For list of Standard Plans, see Appendix B, Page 10.

APPENDIX 'E'
SPECIFICATIONS FOR STORM DRAINAGE

This Appendix consists of 4 Parts:

I DESIGN
II MATERIALS
III TRENCHING AND BACKFILLING
IV INSTALLATION AND TESTING

DESIGN

Requirements of a Drainage System

1.1 The design catchment area shall include the entire area tributary to the storm drain. The catchment area should be shown on the Catchment Area and Storm Drainage Plan. The detailed boundaries shall be established by the Consultant insofar[4] as they effect the proposed subdivision and/or development.

1.2 The presences of an existing Town drainage facility or natural channel does not imply that such is a suitable or adequate point of discharge. Where existing downstream facilities are inadequate to handle the increased flow from the proposed subdivision, a special design is required.

1.3 The storm drainage system shall be designed with sufficient capacity to collect and convey anticipated storm runoff from the total area to be served when fully developed.

1.4 The drainage system shall have two components, the "minor" and the "major".

1.4.1 The minor system, excluding Kye Bay Road and Simon Crescent, shall consist of underground conduits and appurtenances capable of conveying runoff from the ten year return storm. (#1612 Jan 20/10)

1.4.1.1 For the purpose of subdivision or building permit applications on Lot 1, Section 65 Comox District Plan VIP79279; Lot A Section 65 Comox District Plan VIP66458 Except That Part in Strata Plan VIS4540 (Phase 1); Lot 1 Section 65 Comox District Plan VIP65684; Lot 3 Section 65 Comox District Plan VIP76796; Lot 3 District Lot 170 Comox District Plan VIP60685; and Lot A District Lot 144 Comox District Plan 2328 Except That Part in Plan 20350 the minor system shall consist of underground conduits and appurtenances capable of conveying runoff from the 4 year return storm event. **(#1528 Sept 20/06)**

1.4.1.2 The standard prescribed in Section 1.4.1.1 also applied to any other parcels that are drained by the drainage works prescribed under the Anderton Drainage Area Development Works Agreement, for the purpose of building permit applications which would result in one single-family dwelling or one two-family dwelling on a parcel and additions and accessory buildings thereto, provided the Town of Comox Official Community Plan does not permit or envision more intensive residential development than one single-family dwelling or one two-family

dwelling on a parcel (such as patio homes, townhouses, or apartment dwellings) or commercial or industrial development **(#1528 Sept 02/06)**

1.4.1.3 Upon completion of the drainage works prescribed under the Anderton Drainage Area Development Works Agreement, the minor system for all parcels drained by those drainage works with the exception of parcel shown shaded on Map E-1 shall consist of underground conduits and appurtenances capable of conveying runoff from the 10 year return storm event. **(#1528 Sept 20/06)**

1.4.2 The minor system for Kye Bay Road and Simon Crescent shall consist of surface flow paths within open ditches capable of conveying runoff from the ten year return storm. **(#1612 Jan 20/10)**

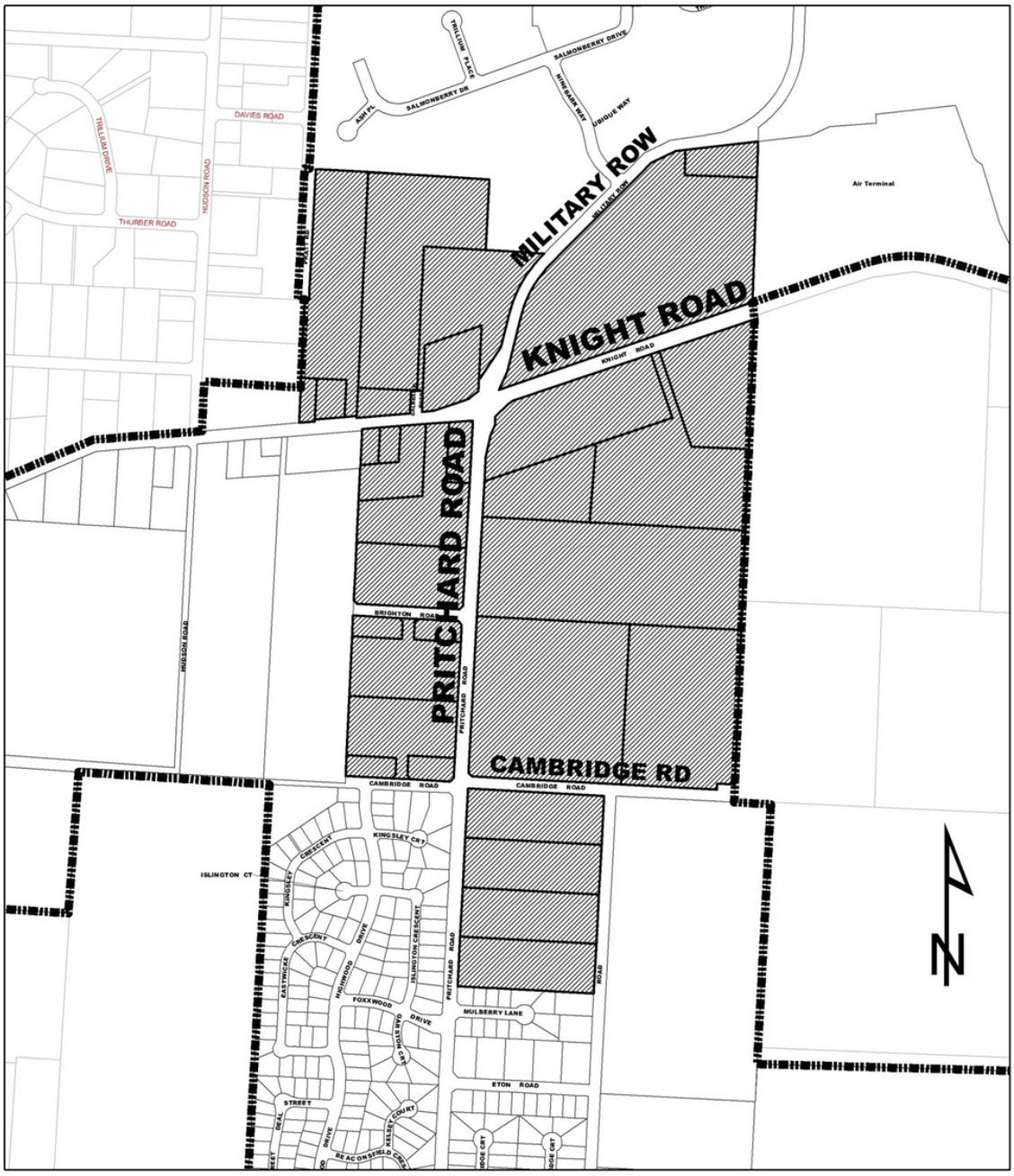
1.4.3 The major system shall consist of surface flow paths within roadways and walkways, and other open channels, capable of conveying that portion of the runoff from the 100 year return storm over and above the capacity of the minor system. Components of the minor system maybe enlarged to accommodate the major flow.

1.4.3.1 Section 1.4.3 does not apply to parcels that are drained by the drainage works prescribed under the Anderton Drainage Area Development Works Agreement until such time as those drainage works are completed. **(#1528 Sept 20/06)**

1.4.4 For single family and two-family residential lot subdivisions, the applicant shall submit an assessment by a Geotechnical Engineer Registered in the Province of British Columbia determining the feasibility of each lot to support rock pits in accordance with Standard Drawing SE – 2 Rock Pit Detail. **(#1567 AUG 15/07)**

1.4.5 Rock pits in accordance with Standard Drawing SE – 2 Rock Pit Detail shall be incorporated into all single-family and two-family development where determined feasible in accordance with Section 1.4.4 above **(#1567 Aug 15/07)**

1.5 North East Comox-Special Requirements **(#1977 Oct 20/21)**



The following specifications shall apply to subdivision and/or development to those lands shown shaded in the above drawing, source North East Comox Neighborhood Stormwater Management Plan - Phase 3 of 3, March 1, 2018, McElhanney Consulting Services Ltd.

1.5.1. General

1.5.1.1 Infiltration trenches shall not be consecutive. That is, once runoff travels through a control manhole downstream of an infiltration trench, said runoff shall not be directed to additional infiltration trenches, but conveyed via the storm system to an outlet or neighbourhood dry detention pond.

1.5.1.2 Prior to design, infiltration rates for each site shall be confirmed. Infiltration rates to be verified using the Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer ASTM D3385 – 09. If field tested infiltration rates vary by more than 25% of the applicable modeled rates shown in Table 4 – Model Input Parameters, the required base area and storage volume of the infiltration trench shall be re-calculated. Sub-catchment areas are identified on Figure 1.

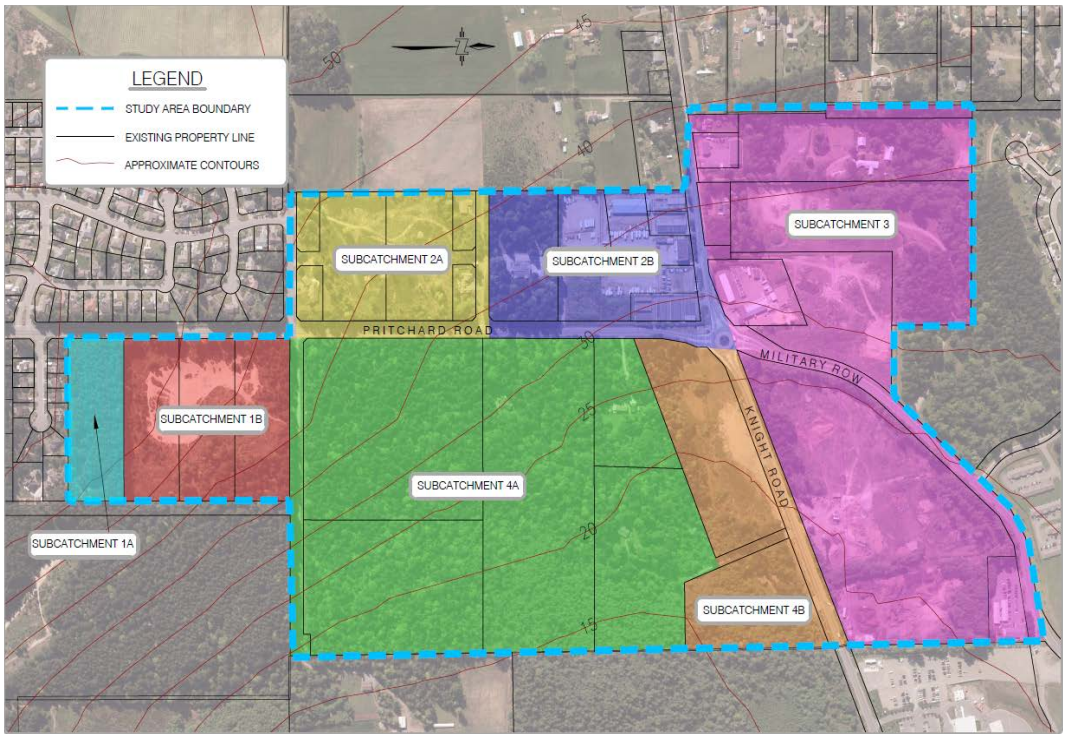


Figure 1 Sub-catchment Areas

1.5.1. General

1.5.1.1 Infiltration trenches shall not be consecutive. That is, once runoff travels through a control manhole downstream of an infiltration trench, said runoff shall not be directed to additional infiltration trenches, but conveyed via the storm system to an outlet or neighbourhood dry detention pond.

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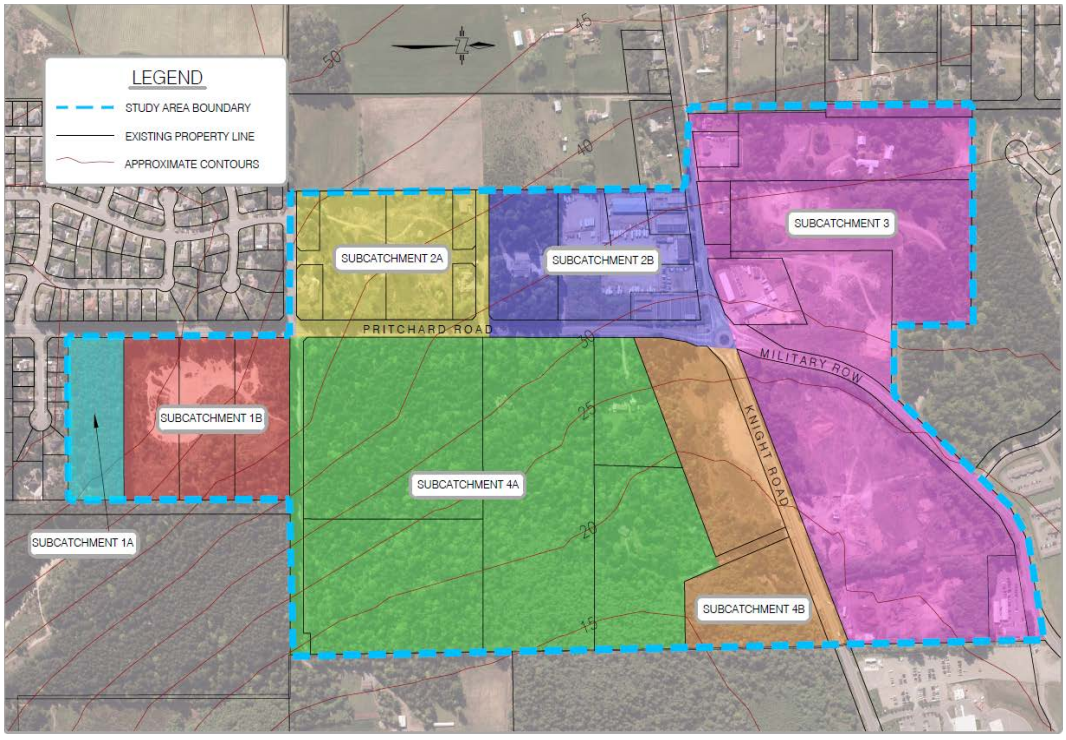


Figure 2 Sub-catchment Areas

Table 4: Model Input Parameters

Sub-Catchment	Area (ha)	% Imp.	Time to peak (hr)		Initial Abstractions (mm)		S max	S min	Infiltration Rate (mm/hr)
			Perv.	Imp.	Perv.	Imp.			
1A	2	60 (90)	1.5	0.75	9	2.5	250	20	40
1B	5.9	90	1.5	0.75	9	2.5	250	20	40
2A	6	60 (90)	1.5	0.75	9	2.5	250	20	10
2B	6.4	90	1.5	0.75	9	2.5	250	20	50
3	25.8	90	1.5	0.75	9	2.5	250	20	80
4A	27.5	60 (90)	1.5	0.75	9	2.5	250	20	30
4B	6.4	90	1.5	0.75	9	2.5	250	20	10

Notes for Table 4:
1) ha: Hectares
2) Imp.: Impervious
3) Perv.: Pervious
4) S max: Maximum value of soil moisture storage (mm)
5) S min: Minimum value of soil moisture storage (mm)
6) Single Family Land Uses are 60% Impervious and all other Land Uses are 90% Impervious.

1.5.1.3 Infiltration trenches must meet both the base area and storage volume for the applicable sub-catchment as specified in Table 5 as shown on SE-6 and SE-8. The outlet rating curves for the infiltration trench storage are based on orifice controls sized to convey 4 lps/ha at 1 metre of head.

1.5.1.4 Infiltration trenches shall be sized based on the tributary area of developed land and the land use, and in accordance with the surface areas and volumes specified in Table 5 – Infiltration Trench Sizing as shown on SE-6 and SE-8. To calculate the required Infiltration trench base area and storage volume, multiply the tributary area (in hectares) by the per hectare base area and storage volumes, for the applicable subcatchment, tabulated in Table 5 as shown on SE-6 and SE-8.

1.5.1.5 Base areas for infiltration trenches shall be calculated as the total base area of the drain rock reservoir.

1.5.1.6 Storage volumes for infiltration trenches shall be calculated as the total volume of the drain rock reservoir multiplied by a porosity of 30%.

1.5.1.7 Maximum discharge rate, infiltration rate, storage volume and drawdown time (the time it takes for an infiltration trench or dry detention pond to completely drain once inflow has stopped) shall be calculated and submitted to the Town for acceptance.

1.5.1.8 Infiltration trenches shall be dispersed throughout the development, unless otherwise approved by the Municipal Engineer.

1.5.1.9 All stormwater facilities except for amended soil shall be located within municipal rights-of-way (i.e. highway or statutory rights-of-way in favour of the Town).

1.5.1.10 All paved areas, such as streets, driveways and walkways, shall either be sloped to drain onto adjacent unpaved landscape areas, boulevard infiltration trenches, or collected in catch basins and routed through subsurface infiltration trenches.

1.5.1.11 Infiltration trenches and landscaped areas designed as infiltration trenches shall be designed in accordance with the guidelines below, to encourage runoff from these areas to infiltrate into the soil.

1.5.1.12 Roof runoff shall not be directly connected to the storm service connection. All roof runoff shall be directed onto adjacent unpaved landscape areas. Lots shall be graded to direct overland flow onto adjacent unpaved landscape areas, or permeable infiltration trenches.

1.5.1.13 Maximum ponding depth of boulevard infiltration trenches shall be 150 mm. All boulevard infiltration trenches shall drain away from buildings and shall have an overflow to the 100-year return period flow path.

1.5.1.14 The surface of unpaved landscape areas shall be designed for positive drainage away from buildings. Slopes of 1% to 4% are desirable to encourage infiltration of small rainfalls while facilitating drainage of large storms and to prevent flooding of buildings.

1.5.1.15 Geotechnical investigation will be required prior to implementing infiltration trenches in the areas within 30 m of a slope that is steeper than 3 (horizontal) to 1 (vertical) and higher than 6 m, or other unstable slopes as determined by the Town.

1.5.1.16 Infiltration trenches are required in all developments.

All utility crossings of infiltration trenches shall have trench dams installed to stop infiltration water from flowing down the utility trench. Trench dams to be constructed of either non-shrink grout, a minimum of 150 mm thick and keyed into trench walls a minimum of 150 mm, or compacted impermeable earthen material approved by a geotechnical engineer a minimum of 450 mm thick and keyed into trench walls a minimum of 300 mm.

1.5.2 Materials

1.5.2.1 Infiltration Drain Rock: clean round stone or crushed rock conforming to the following gradations:

Drain Rock	
Sieve Designation	Percent Passing
25.0 mm	100
19.0 mm	0 – 100
9.50 mm	0 – 5
4.75 mm	0

1.5.2.2 Sand: Pit Run Sand, well graded, free from organic materials and conforming to following gradations:

Pit Run Sand

Sieve Designation	Percent Passing
12.5 mm	100
4.75 mm	35 – 100
2.36 mm	20 – 100
1.18 mm	13 – 70
0.60 mm	8 – 50
0.30 mm	5 – 35
0.15 mm	2 – 25
0.075 mm	0 – 6

1.5.2.3 Amended soil shall meet the requirements of Guidelines and Resources for Implementing Soil Quality and Depth of section T5.13 in WDOE Stormwater Manual for Western Washington (see also North East Comox Neighbourhood Stormwater Management Plan Phase 2 of 3), with organic matter requirements modified as follows:

(1) For lawn areas 4 – 8%

(2) For plant bedding areas 4 – 18%

1.5.3 Installation and Testing

Infiltration trenches to be tested prior to acceptance by the Town. The recommended procedure for testing infiltration rate, and storage volume of infiltration trenches is as follows:

- Check the weather. Testing must be completed on a dry day with no rain in the forecast.
- Prior to testing, a complete inspection of the infiltration trench is required. Check the control manhole, cleanouts, observation well, upstream catch basins and manhole inlet piping. Remove any signs of sediment or debris buildup with the use of a vactor truck or other means capable of removing sediment without flushing sediment and debris into the infiltration trench or storm sewer. Allow system to completely drain prior to testing.
- Check the observation well to ensure the infiltration trench is completely empty.
- Ensure that there is ample supply of clean water free of contaminants. Fill the infiltration trench at a minimum rate of three times the maximum design infiltration rate. A minimum available volume of water of one half the infiltration trench design storage volume is required.
- Block the downstream outlet.
- Install a water level meter at ¼ of the depth of the infiltration trench either in the observation well or the control manhole overflow piping.
- Fill infiltration trench with clean water via manhole, catch basin or cleanout until ¼ full.
- Record total input volume, and time to fill ¼ full.
- Let infiltration trench completely drain through infiltration and record the total time.
- First calculate the infiltration rate using the following formula:

$(total\ input\ volume\ /\ total\ time\ ) = infiltration\ rate$

If calculated infiltration rate is not within 15% of design infiltration rate, the Town will require the infiltration trench be reconstructed.

- Second, calculate the storage volume using the following formula:

$4 \times [total\ input\ volume - (infiltration\ rate \times time\ to\ fill)] = storage\ volume$

If calculated storage volume is not within 15% of design storage volume (this could mean that sediment has filled in a portion of the available volume), the Town may require the storage volume to be rehabilitated.

- Ensure that all manhole covers, catch basin grates, clean out and observation well lids are securely in place once test is complete.

For ponded areas of boulevard infiltration trenches, the ponded area drain time shall also be checked using the following method:

- On a dry day with no rain in the forecast, fill surface collection area with clean water to a ponded depth of 100 mm and record time to completely drain.
- Drain time must be less than 4 hours. If drain time is greater than 4 hours, the Town will require the amended soil / washed sand layer to be removed and replaced.

1.5.4 Monitoring Equipment and Data Collection

Specifications are based on manufacturers approved products. Where modifications or updated products have been issued the latest approved product shall be used.

1.5.4.1 **Velocity Flow Meters**

Developers will be required to install data collectors (velocity flow meters) at the downstream end of each phase of development (to monitor infiltration trench performance) and downstream of dry detention ponds (to monitor pond performance). Data collection shall include depth (m), velocity (m/s) and temperature (Degree Celsius) at 5 minute intervals.

Velocity flow meters shall be installed in pipe and be easily accessible by manhole.

Velocity flow meters will be installed with sufficient water depth to provide continuous operation. A short weir may be required to be installed in the pipe downstream of the sensor to maintain water depth over the sensor.

Velocity flow meters shall be compatible with Remote Transmittal Unit (RTU) unit and software for data collection and processing.

1.5.4.2 **Ultrasonic Sensors**

Dry Detention Pond water levels will be measured using Tough Sonic CHEM10 ultrasonic sensors. Ultrasonic sensors are to be mounted in the pond outlet control structure on the upstream side to measure the pond water level in meters and at 5 minute intervals.

The sensor leads connect to the RS-2323 interface (a port and connection type between data terminal equipment and data circuit terminating equipment) to communication with the RTU. Distance measurements from the sensor to the water level are automatically calibrated for elevation inside the RTU.

In order to operate properly, a deadband of 0.50 m is required for the sensor (refer to Figure 1-2). This is the distance between the bottom of the sensor and the highest recordable elevation (or depth) required, which is usually the HWL. The HWL elevation is to be set below the required deadband to provide additional clearance.

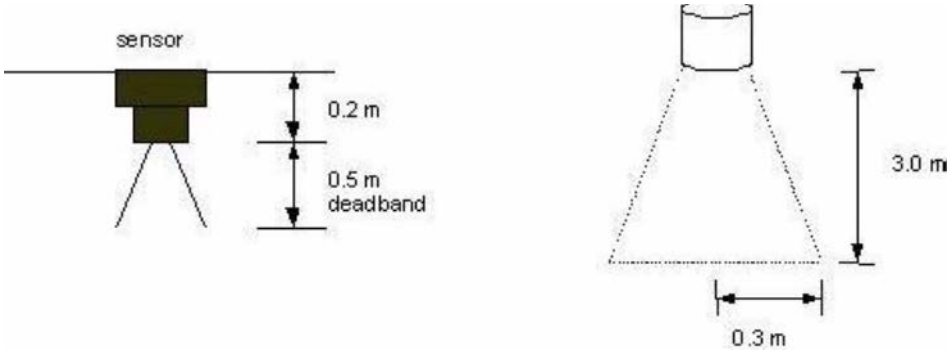


Figure 3 Dead Band and Sensor Band for Ultrasonic Sensors

Due to the conical shape of the sensor band, it is important that there be sufficient radial clearance (refer to Figure 2) between the signal from the sensor and any structure wall or protrusions. A radial distance of 0.30 m per 3.0 m of vertical distance is required. Ensure that MH rungs, trash racks, etc., do not interfere with the signal. As a backup to the ultrasonic sensor, a mechanical float (Flygt bulb) is installed at or just below the HWL elevation.

The system will be set to send an alarm when:

- the water level reaches the design High Water Level.
- There is a loss of power, and

When any of these conditions are encountered the monitoring system will send an alarm to the person designated by the Town of Comox.

If monitoring of an adjacent similar subdivision is required, area velocity flow meters shall be installed in a storm sewer. The Town will provide the specific manhole location and corresponding catchment area. Data collection shall include depth, velocity and temperature at 5 minute intervals.

RTU unit shall be Sutron Xlink 500, HSPA loger/transmitter (or approved equal).

This device contains datalogging, sensor interface, solar charge controller and communications both on and off site. The devise is used to collect, store, and transmit sensor data.

Monitoring equipment shall be;

- Capable of monitoring reverse flow (flow meters only).
- 20W solar panel kits c/w 48 Hr battery or alternative option to connect directly to power source..
- Connected to the internet and/or capable of remote data collection by cell phone connection.
- Capable of storing a minimum of 6 months of data at 5 minute intervals.
- Capable of field data collection.
- NEMA 4 weatherproof enclosure (or approved equal) secured on a 4 m tall Type 4A galvanized steel pole type B concrete base (or approved equal).
- Equipped with alarm capabilities in the form of either a dial out or text message to notify of pond water levels approaching overflow or power failure.

1.5.4.3 Setup and Calibration

Due to the complexity of the equipment, setup must be completed by a qualified contractor. A calibration certificate from the service provider (or the equipment vendor) is also required to ensure that the elevations (HWL, and pond bottom) have been set correctly. Calibration certificates and phone numbers must be submitted to the Town of Comox. Monitoring equipment must be operational prior to Construction Completion Certificate; delays in servicing phone and electrical lines must be approved by the Town of Comox

- All work to be done in accordance with Canadian Electrical Code.
- High level regulator switch and ultrasonic level transmitters shall be connected to the RTU Package.

- The RTU shall be programmed to log the following conditions
    - Ultrasonic-high water level (HWL) alarm at elevation _____.
    - Power failure condition. (The RTU and the ultrasonic unit must be on the same breaker.)
- The contractor shall arrange for installation of one telephone/celluar line to the control panel enclosure. The line must be suitable for voice touch-tone communications. The RJ-II Box must be labelled with proper phone number with a permanent label.
- The contractor shall install the ultrasonic level sensor and regulator switch in appropriate locations. The regulator switch must be secured in an area subject to minimal water turbulence outside the trash rack and the ultrasonic level sensor must be located such that there is 0.3 m of radial clearance per 3.0 m depth in the control chamber. (No interference with trash rack, walls, etc.)
- The unit shall be mounted to the ceiling and above the level of the weir wall. A minimum clearance of 0.5 m is required between the bottom of the unit and the top of the weir wall (PWL) to accommodate the sensor's dead zone (blanket distance).
- The contractor shall ensure all necessary equipment can be installed in the equipment enclosures.
- The contractor shall ensure proper operation of the RTU monitoring and communication functions. The ultrasonic level sensor must be calibrated. All alarm conditions must be tested.
- Installation and operating manuals must be supplied.
- The contractor must ensure that the alarm system is tied to the storm pond monitoring system. Calibration and testing of equipment to be completed by service provider.

1.5.5 Detailed Specifications

1.5.5.1 Disconnected Roof Leaders (Standard Drawing SE-3)

On parcels in residential zones, roof leaders shall not be connected to the municipal storm service. Roof leaders shall be disconnected and directed via lot grading to an unpaved landscaped area per Standard Drawing SE-3. Splash pads, drain rock or other similar means to displace energy and eliminate erosion at roof leader outlets must be used. Building lots shall be graded so that each property either drains directly to a municipal / statutory right-of-way or, at most, across one (1) other lot before reaching a municipal / statutory right-of-way. Subdivision lot grading and ultimate lot grading (post-building construction) shall be per the details on Standard Drawing SE – 11 or SE – 12 as applicable. Grading away from buildings shall be as per the latest edition of the British Columbia Building Code with a minimum grade away from buildings of 4% for 1.8 metres or 2% for 4.0 metres.

1.5.5.2 Sediment Catch Basin (Standard Drawing SE-4)

Catch basins shall have an underdrain connected to an infiltration trench per Standard Drawing SE-4.

1.5.5.3 Control Manhole (Standard Drawing SE-5)

Control manholes shall conform to Standard Drawing SE-5. Flow control to consist of a PVC tee, pipe stub cut at 30 degrees to the horizontal and a 15 mm thick PVC plate solvent welded to pipe stub. Orifices to be sized to discharge 4 litres per second per hectare of tributary area per the sizing table on Standard Drawing SE-5. Overflow shall be a PVC pipe stub securely attached to the manhole wall with an inlet elevation set at the top elevation of the upstream infiltration facility.

1.5.5.4 Boulevard Infiltration Trench (Drawing SE-6) – General

1.5.5.4.1 Smaller, distributed infiltration trenches are preferred to single large-scale facilities.

1.5.5.4.2 Locate boulevard infiltration trenches so there is at least 3 m of undisturbed soil between the trench and any building. Where the trenches are within 30 m of wells or unstable slopes, a geotechnical review will be required.

1.5.5.4.3 Flow to boulevard infiltration trenches shall be distributed sheet flow, travelling through a filter strip: non-erodible material for erosion and scour protection, either vegetated (grassed) or non-vegetated (drain rock) filter area or swale (500 mm minimum, greater than 3000 mm desirable filter length) see Standard Drawing SE- 10.

1.5.5.4.4 Boulevard infiltration trench to have a level perforated drain pipe with either a manhole or clean out per Standard Drawing SE-9 installed at the upstream end.

1.5.5.4.5 Outflow from boulevard infiltration trench will be regulated by a control manhole per Standard Drawing SE-5 prior to discharge into a storm main.

1.5.5.4.6 Boulevard infiltration trench bottom to be level.

1.5.5.4.7 Boulevard infiltration trench bottom width – 600 mm minimum.

1.5.5.4.8 Install boulevard infiltration trench in native ground, and avoid over-compaction of the trench sides and bottom, which reduces infiltration.

1.5.5.4.9 Provide erosion control along all sides of drainage inlets.

1.5.5.4.10 Pavement edge at the swale to be per Standard Drawing SE-10. Provide a 100 mm drop at the edge of paving to the filter strip, to allow for positive drainage and buildup of road sanding/organic materials at this edge. Ensure positive drainage from curb into the ponded invert.

1.5.5.4.11 Ponded area side slopes of a maximum of 2H:1V, 4H:1V are required to aid operations and maintenance. Provide amended soil on side slopes similar to bottom. Approved plantings are provided below. Alternative native species may be used upon acceptance of the Town. See Standard Drawing SE-7 for an overview of the three planting zones; Center, Sloped Sides and Bermed Edges.

Center:

This area floods often and requires species that tolerate frequent flooding. Approved species that will be used in this zone are as follows:

- Tall sedge (Carex appressa)
- Spike rush (Eleocharis)
- Common cottongrass (Eriophorum angustifolium)
- Land quillwort (Isoetes histrix)
- Dwarf cattail (Typha minima)

- Giant leather fern (Acrostichum danaeifolium)
- Lady fern (Athyrium fillix –femina)
- Cinnamon fern (Osmunda cinnamomea)
- Royal fern (Osmunda regalis)
- Sword fern (Polystichum munitum)

Sloped Sides:

This area floods briefly and requires plant species that tolerate damp soil but require only modest amounts of water during the dry season. Deciduous native shrubs, ferns, and grasses could be considered for use in this zone. Approved species of grasses and native shrubs that will be used in this zone are as follows:

Grasses for 4:1 slopes:

- Big bluestem (Andropogon gerardii)
- Meadow pinegrss, reedgrass (Calamagrostis Canadensis)
- Meadow barley (Hordeum secalinum)
- Moor grass (Molinia caerulea)
- Switchgrass (Panicum virgatum)

Shrubs for 2:1 or 4:1 slopes:

- Dogwood (cornus)
- Oceanspray (Holodiscus discolor)
- Sumac (Rhus)
- Thimbleberry (Rubus parviflorus

Bermed Edges:

These areas are outside the flood zone. Approved species of herbaceous perennials that will be used in this zone are as follows:

- Yarrow (Achillea millefolium)
- Swamp milkweed (Asclepias incarnata)
- Purple coneflower (Echinacea purpurea)
- Tuffted bluebell (Wahlenbergia communis)

1.5.5.4.12 Provide observation well for each boulevard infiltration trench: vertical standpipe, with perforated sides (perforated in drain rock reservoir only), and locking lid, to allow monitoring of water depth and sediment loading.

1.5.5.4.13 Maximum ponded level: 150 mm.

1.5.5.4.14 A non-erodible outlet or spillway must be established to discharge overflow.

1.5.5.4.15 Avoid utility or other crossings of the boulevard infiltration trench. Where utility trenches must be constructed crossing below the boulevard infiltration trench, install trench dams to avoid infiltration water following the utility trench.

1.5.5.4.16 Construction

1.5.5.4.17 Isolate the ponded area from sedimentation during construction, either by use of effective erosion and sediment control measures upstream, or by delaying the excavation of 300 mm of material over the final subgrade of the ponded area, until all sediment-producing construction in the drainage area has been completed.

1.5.5.4.18 Prevent natural fill soils from intermixing with the infiltration drain rock. All contaminated stone aggregate must be removed and replaced.

1.5.5.4.19 Infiltration drain rock shall be installed in 300 mm lifts and “compacted” to eliminate voids between the geotextile and surrounding soils.

1.5.5.5 Street Infiltration Trench (Standard Drawing SE-8)

1.5.5.5.1 Locate street infiltration trenches so there is at least 3 m of undisturbed soil between the trench and any building. Where the trenches are within 30 m of wells or unstable slopes a geotechnical review will be required.

1.5.5.5.2 Provide a sump manhole or catch basin upstream of all street infiltration trenches for pre-treatment grit separation to avoid sedimentation in the infiltration trench. Do not allow drainage from land uses with a high risk for water pollution (e.g. refueling stations) to enter an infiltration trench.

1.5.5.5.3 Installation of perforated drain pipe within the drain rock reservoir to be level.

1.5.5.5.4 Outflow from street infiltration trenches will be regulated by a control manhole per Standard Drawing SE-5 prior to discharge to a storm main.

1.5.5.5.5 Street infiltration trench bottom to be level.

1.5.5.5.6 Street infiltration trench bottom width – 600 mm minimum.

1.5.5.5.7 Install the street infiltration trench in native ground, and avoid over-compaction of the trench sides and bottom, which reduces infiltration.

1.5.5.5.8 Provide observation well for each street infiltration trench: vertical standpipe, with perforated sides (perforated in drain rock reservoir only), and locking lid, to allow the monitoring of water depth and sediment loading.

1.5.5.5.9 Avoid utility or other crossings of the street infiltration trench. Where utility trenches must be constructed crossing below the street infiltration trench, install trench dams to avoid infiltration water following the utility trench.

1.5.5.5.10 Construction

1.5.5.5.11 Physically isolate the street infiltration trench from flow during construction by capping all inlet and outlet pipes and directing runoff directly to the municipal storm main.

1.5.5.5.12 Prevent natural fill soils from intermixing with the infiltration drain rock. All contaminated stone aggregate must be removed and replaced.

1.5.5.5.13 Infiltration drain rock shall be installed in 300 mm lifts and compacted to eliminate voids between the geotextile and surrounding soils.

1.5.5.6 Dry Detention Pond (Standard Drawings SE-14 and SE-15) -

1.5.5.6.1 General

1.5.5.6.2 General landscaping, vegetation requirements, pathway access, will be designed with collaboration with the Town of Comox Parks Department.

1.5.5.6.3 Size dry detention ponds by continuous flow modeling to provide rainfall capture of historic rainfall adjusted for 2050 climate change. As listed in the Source as Table 6 –Dry Detention Pond Sizing, provides a rough estimate of required dry detention pond sizing based on the tributary area of developed land and current Official Community Plan designation. Sub-catchment areas are shown on Figure 1.

Table 6: Dry Detention Pond Sizing

Sub-Catchment			Dry Detention Pond	
(#)	Total Area (ha)	% Impervious[1] (%)	Approximate Storage Volume (m^3)	Storage Volume per Hectare (m^3/ha)
1A	2.0	60 (90)	900 (900)	450 (450)
1B	5.9	90	2655	450
2A	8.0	60 (90)	2700 / (2700)	450 / (450)
2B	4.4	90	2880	450
3	25.8	90	11610	450
4A	27.5	60 (90)	12375 (13000)	450 (475)
4B	6.4	90	2880	450

Note:
1) Single Family Land Uses are 60% impervious and all other Land Uses are 90% impervious.

1.5.5.6.4 All dry detention ponds must drain by gravity to the Town's Storm System within Town Right-Of-Way (i.e. highway or Town held statutory right of way).

1.5.5.6.5 Dry detention pond locations to be determined at time of detailed design, in conjunction with Town acceptance, to maximize the upstream tributary area and minimize the number of ponds while allowing for downstream conveyance to the Town's Storm System.

1.5.5.6.6 Design

1.5.5.6.7 Dry Detention Ponds and underground storage reservoirs (secondary) are the preferred method of stormwater detention for the NE Comox neighborhood, as water fowl pose a risk to the nearby airport. Dry Detention Ponds shall be built in conformance with Transport Canada's document TP 1247 - Aviation - Land Use in the Vicinity of Aerodromes.

1.5.5.6.8 Base elevations of dry detention ponds shall be above the seasonal groundwater elevation to avoid saturation in the winter months.

1.5.5.6.9 The design maximum water level shall be at or below the existing ground elevation. Maximum pond water level above the existing ground elevation may be considered provided the following issues are addressed to the satisfaction of the Town: potential inspection,

maintenance and replacement costs as well as the downstream implications if there is a failure.

1.5.5.6.10 A minimum freeboard of 0.6m shall be provided above the designed maximum water level.

1.5.5.6.11 The dry detention pond berms shall be constructed with a maximum interior side slope of 5H:1V and a maximum exterior side slope of 5H:1V.

1.5.5.6.12 Despite section 1.5.5.6.11 the Municipal Engineer may reduce the minimum slope requirement to 4:1 should the proposed 5:1 slope present unique challenges of a significant nature in regards to the amount of land needed and the impact to the developability of the surrounding parcels only taking into account the following factors:

1. Submission of a report prepared and certified under seal by a P.Eng analyzing:

   a. Impact on Land (difference in area)
   b. Impact to the Developability of Surrounding Parcels
   c. Maintenance Impact
   d. Certification that Town Equipment can Access and Maintain.
   e. Cost Comparison
   g. Assessment Confirming Stability of the 4:1 for the Anticipated Life of the Pond.

1.5.5.6.13 The top of dry detention pond berms shall be a minimum width of 3.0m.

1.5.5.6.14 Pilot channels may be piped.

1.5.5.6.15 A pre-treatment sump or sediment forebay is to be provided at the inlet to pilot channels.

1.5.5.6.16 Pond inlets and outlets shall have safety grillage and be constructed of either precast concrete or fiberglass materials as approved by the Town.

1.5.5.6.17 The dry detention pond and outlet structure shall be designed to function with the overall objective of the NE Comox Stormwater Management Plan.

1.5.5.6.18 The flow control structure is to be constructed with a removable orifice plate sized to restrict flows to the pre-development target rates and shall be located within a lockable manhole positioned within the embankment for purpose of maintenance, access, safety and aesthetics. Discharges will be controlled by two orifices where the bottom of the lower orifice is placed at the pond bottom elevation and the bottom of the upper orifice is placed 0.6 m above the pond bottom. The orifices will be sized for the combined total discharges as shown below:

Subcatchment Discharge (L/s/ha)				
Depth (m)	1	2	3	4
0	0	0	0	0
0.6	7.5	7.3	8.3	8.0
1.0	16.7	16.4	16.8	16.9

1.5.5.6.19 An emergency spillway shall be designed to accommodate the post-development runoff in excess of a 1:100-year storm event. The discharge path from the dry detention pond to the receiving environment shall be adequately protected from erosion.

1.5.5.6.20 The design of the emergency spillway shall be determined based on the exit velocity of stormwater runoff from the dry detention pond.

1.5.5.6.21 A minimum of 4 signs shall be installed around the perimeter of dry detention ponds. Signs to be per Standard Drawing SE-13.

1.5.5.6.22 An access tract or road sufficient to accommodate maintenance vehicles shall be provided from the public right-of-way to the inlet and outlet structures and to the pond bottom.

1.5.5.6.23 Pedestrian trails to Town Standards may be included where applicable and desired, subject to Town acceptance.

1.5.5.6.24 Dry detention pond and surrounding green space landscaping must be designed and installed under the direction of a landscape architect with preference given to native species. The developer must submit for approval by Parks Superintendent an irrigation plan, complete with meter, meter setter and controller, landscaping plan which identifies topsoil depth, plant varieties, plant sizes, planting details and planting locations and meet requirements of BCLNA Standards as published by the BC landscape and Nursery Association.

Quantity of Storm Runoff

2.1 Runoff should be calculated by the Rational Method using the formula:

$$Q = \frac{AIC}{360}$$

Q = Runoff in m^3/sec
A = Area in hectares
I = Rainfall Intensity in mm/hr.
C = Runoff coefficient

2.2 The intensity shall be determined from the Rainfall Intensity Duration Frequency curve which is standard plan SE-1.

2.3 Inlet time should not be less than ten minutes. Times in excess of fifteen minutes may be used when that portion of the catchment area is in the Agricultural Land Reserve, (ALR), or is otherwise prohibited from development.

2.4 Runoff coefficients shall be based on the actual topography and soil conditions, and should generally be as follows:

Grassland, Forest, Part, ALR	0.10 – 0.30
Schools, Developed Parks	0.30
Single Family Residential	0.40 – 0.60
Multiple Residential	0.50 – 0.80
Industrial	0.70
Commercial	0.70 – 0.90

Capacity of Storm Drains

3.1 The minimum diameter for all pipes including catch basin leads shall be 150 mm. The minimum diameter for catch basin leads is specified elsewhere in this section.

3.2 Storm flows shall be calculated by the Manning formula, using the

$$v = \frac{r^{2/3} s^{1/2}}{n}$$

where

V = velocity of flow, metres per second
R = hydraulic radius, metres
S = slope, metres/metre
N = roughness coefficient

PVC pipe	0.010
Corrugated metal pipe	0.024
Other pipe	0.013
Excavated ditch	0.030
Natural grass channel	0.050

The minimum velocity shall be 0.75 m/s when the pipe is running full but not surcharged.

3.3 A design may involve intentional surcharging of short portions of a storm drain provided that this will not involve backup of storm water in service connection, and the hydraulic grade line is not less than 0.5 m below ground level at manholes or catch basins. Joints of intentionally surcharged drains shall be made with rubber “o” rings or equivalent.

Location, Alignment and Grade

4.1 The storm drains should be deep enough to service all those abutting properties which are require by By-law to connect to such drains. In no case shall the depth of cover be less than one metre, measured from finished grade.

4.2 Storm drains should normally be located within public road allowances. They should be laid in a straight line from manhole to manhole at a uniform grade on a constant offset, in accordance with standard plan SC-5. Where the road allowance curves, the sewer may be laid on a horizontal circular curve at a constant offset unless otherwise prohibited by these specifications. Where abrupt topography so requires, a vertical curve may be used.

4.3 Where topography does not permit installation within a road allowance, the storm drain may be installed in a public walkway or, if that is impracticable, within a utility right-of-way on private property.

4.4 Where curvature is permitted, storm drains maybe laid on a uniform curve. The method of installation of curved pipe and the maximum degree of curvature shall be in accordance with the pipe manufacturer’s recommendations.

4.5 Any components of the major system which traverse private property shall be protected by appropriate restrictive covenants or surface easements. Such easements should normally specify minimum floor elevation so that all habitable areas of buildings will be above the major flow hydraulic grade line.

Pipe Selection and Bury

5.1 The strength of pipe and quality of bedding shall be in accordance with the recommendations of the pipe manufacturer for the particular service and depth of bury, taking into account the anticipated construction loading as well as the finished loading. Bedding shall be in accordance with standard plan SD-1, and shall be class B or better.

Manholes

6.1 The maximum distance between storm manholes should be as follows:

Pipe up to 400 mm diameter	125 m
All other pipes	155 m

6.2 Manholes shall be located at:

- all changes of grade or alignment except a curve in accordance with section 4.2 of these specifications
- all changes of pipe size
- all pipe junctions other than service and catch basin connections.
- at the upstream end of each storm drain.

A cleanout may be installed at the upstream end of a storm drain which is intended to be extended later.

6.3 Pipe diameter of a downstream main should not normally be less than that of an upstream main.

6.4 When a smaller drain joins a larger, normally the crown of the smaller pipe should be placed at or above the level of the crown of the larger. Where this is not practicable, the elevation of the larger pipe may be adjusted and the manhole constructed so as to maintain the energy gradient. The 0.8 depth point of the larger pipe shall not be higher than the 0.8 depth point of the smaller. Factory manufactured wye branches should be crown to crown, but if not available, centre-line to centre-line may be used.

6.5 Manholes should provide safe and ample working space, and shall be constructed in accordance with one of the following standard plans:

- drains smaller than 500 mm – Type A manhole in accordance with standard plan SD-4.
- drains 500 – 750 mm may have Type A enlarged or Type B manholes.
- drains larger than 800 mm – Type B manhole in accordance with standard plan SD-5.

A Type A enlarged manhole is a Type A manhole with the 1050 mm diameter increased to accommodate the pipe openings and channelizing.

Side drains larger than 400 mm may be connected to the through main by wye branches immediately upstream from the manhole.

Side drains larger than 800 mm must be connected to the through main by means of wye branches immediately upstream from the manhole.

The barrel of Type B manhole should be the same size as the through drain, but shall not be less than 1200 mm. Increasers and reducers, where used, should be of the eccentric conical type. Flat increasers and reducers should not be used along the line of pipe.

6.6 A drop manhole should be provided in accordance with standard plan SD-6 for a 350 mm or smaller drain entering a manhole at an elevation of 0.60 m or more above the manhole invert. A vertical drop of 0.25 m or less should be accomplished by benching. Vertical drops of 0.25 m to 0.60 m should be avoided by adjusting sewer gradients.

6.7 Stub pipes, where provided, shall extend not less than 1.5 m from the outside face of the manhole.

Catch Basins

7.1 Catch basins should be installed at locations best suited to collect runoff water. The distance between catch basins should not normally exceed:

- on road grades up to 2% 100 m
- on road graders steeper than 2% 60 m

Catch basins should normally intercept all the flow resulting from the design storm. Where necessary more steeply cross-slopes gutters, special inlets and double catch basins may be required so that only a minimum amount of water by-passes during the design storm.

7.2 Catch basins should be of the pre-cast type, installed in accordance with standard plans SD-9 & 10. Combination gratings should be used on catch basins located on steep grades, at low spots and at such other places as damage by flooding might occur if the flat grating were to become blocked.

7.3 Catch basin leads shall not be smaller than 150 mm, and shall have at least 0.6 m cover. Catch basin leads should run in a straight line to a storm manhole or to another catch basin. Where the connection must be to the main, a wye or tee branch shall be used.

Service Connections

8.1 Service connections to storm drains shall be constructed in accordance with the requirements for service connections to sanitary sewers, Appendix D, section 7.1 through 7.7 except as follows:

- Minimum pipe size 150 mm, minimum velocity 0.75 m/s

Revision #1 – April 30/93

- Tees or wyes shall be used to connect to mains 300 mm and smaller
- Tapping saddles are permitted on existing mains and on mains 350 mm and larger

8.2 Service connections shall be provided with pre-lugged inspection chamber at the property line as shown in Standard Plan SD-8A and shall be a Le-Ron Plastics part number 70A6PP complete with riser and locking lid and collar part numbers 71AL1D08GL and 7308HSL or equivalent. Lids shall be painted green.

Vertical and Horizontal Separation

9.1 The requirements for vertical and horizontal separation of water and sewer mains in Appendix D, sections 8.1 through 8.3, shall apply equally to storm drains as to sanitary sewers.

9.2 In addition, a storm drain may be laid in the same trench as a sanitary sewer provided there is a clear distance of 0.6 metres between the mains and the relative elevation of one does not interfere with service connections to the other.

MATERIALS

10.1 For the sake of convenience and brevity, materials for use in storm drains are consolidated in section D "Sewerage Collection", beginning with paragraph 9.1. Those requirements apply equally to this section unless stated otherwise, or the context requires.

TRENCHING AND BACKFILLING

11.1 Similarly, the requirements for trenching and backfilling are in section D, beginning with paragraph 21.2, and apply equally to this section unless stated otherwise, or the context requires.

INSTALLLATION AND TESTING

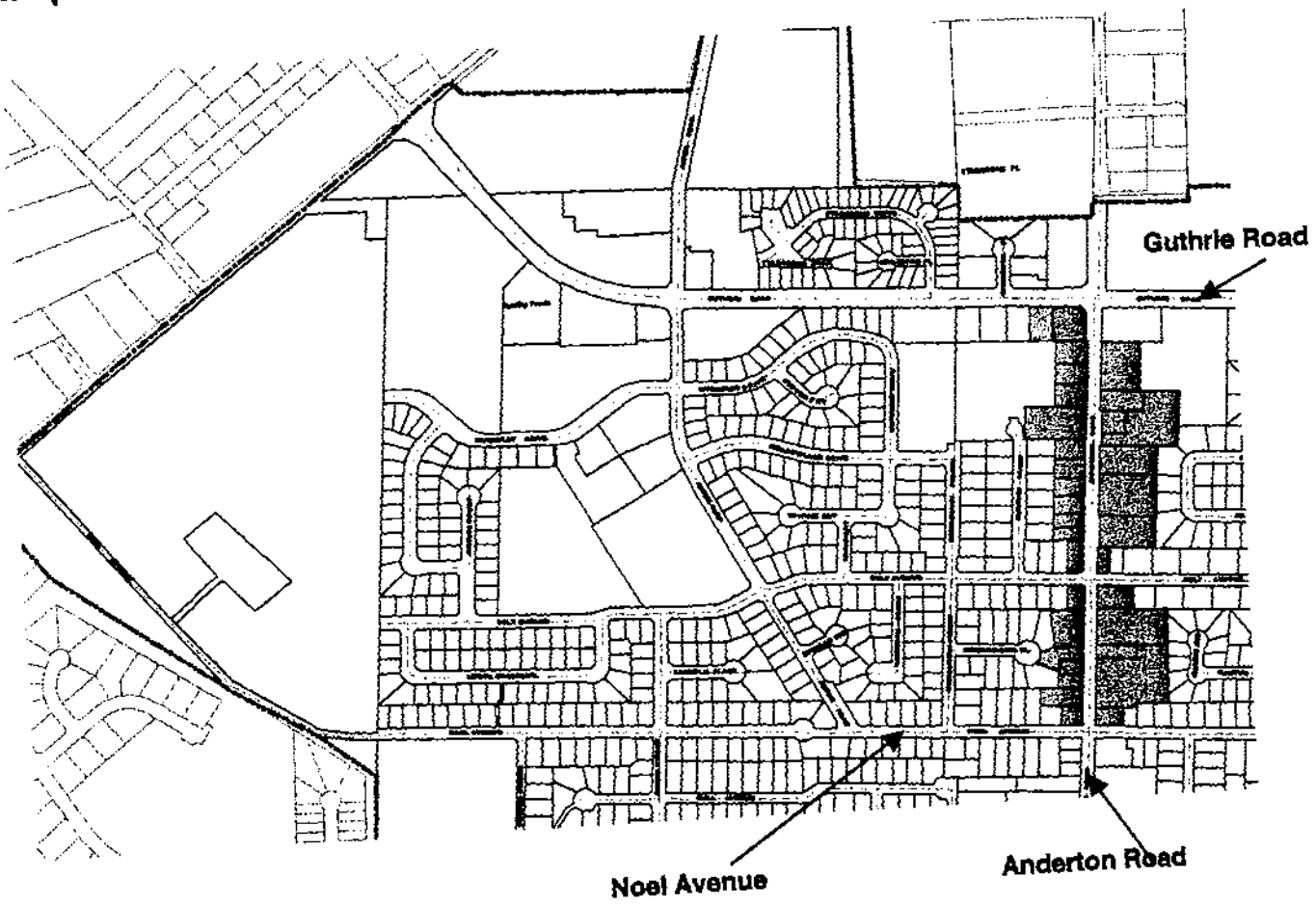
12 Refer to Appendix D, Sections 28.1 to 28.3.5

INSERT:
MAP E-1

Standard Drawing SE-1	Rainfall Intensity Duration Frequency Curve
Standard Drawing SE-2	Rock Pit Detail **(#1567 Aug 15/07)**
Standard Drawing SE-3	Service Connection with Disconnected Roof Leaders **(#1977 Oct 20/21)**
Standard Drawing SE-4	Sediment Catch basin **(#1977 Oct 20/21)**
Standard Drawing SE-5	Infiltration Trench Control Manhole **(#1977 Oct 20/21)**
Standard Drawing SE-6	Boulevard Infiltration Trench **(#1977 Oct 20/21)**
Standard Drawing SE-7	Boulevard Infiltration Trench Accepting Planting Species **(#1977 Oct 20/21)**
Standard Drawing SE-8	Street Infiltration Trench **(#1977 Oct 20/21)**
Standard Drawing SE-9	Clean Out **(#1977 Oct 20/21)**
Standard Drawing SE-10	Curbing Options at Boulevard Infiltration Trenches **(#1977 Oct 20/21)**
Standard Drawing SE-11	Typical Lot Grading (Rear to Front) **(#1977 Oct 20/21)**
Standard Drawing SE-12	Typical Lot Grading (Front to Rear) **(#1977 Oct 20/21)**
Standard Drawing SE-13	Dry Detention Pond Sign Detail **(#1977 Oct 20/21)**
Standard Drawing SE-14	Dry Detention Pond Plan & Sections **(#1977 Oct 20/21)**
Standard Drawing SE-15	Dry Detention Pond Outlet Control Structure Sections and Details **(#1977 Oct 20/21)**

Appendix 'E' Amended by Bylaw No. 1528 Sep 20/06

Map E-1 Anderton Storm Drainage Sub-Area



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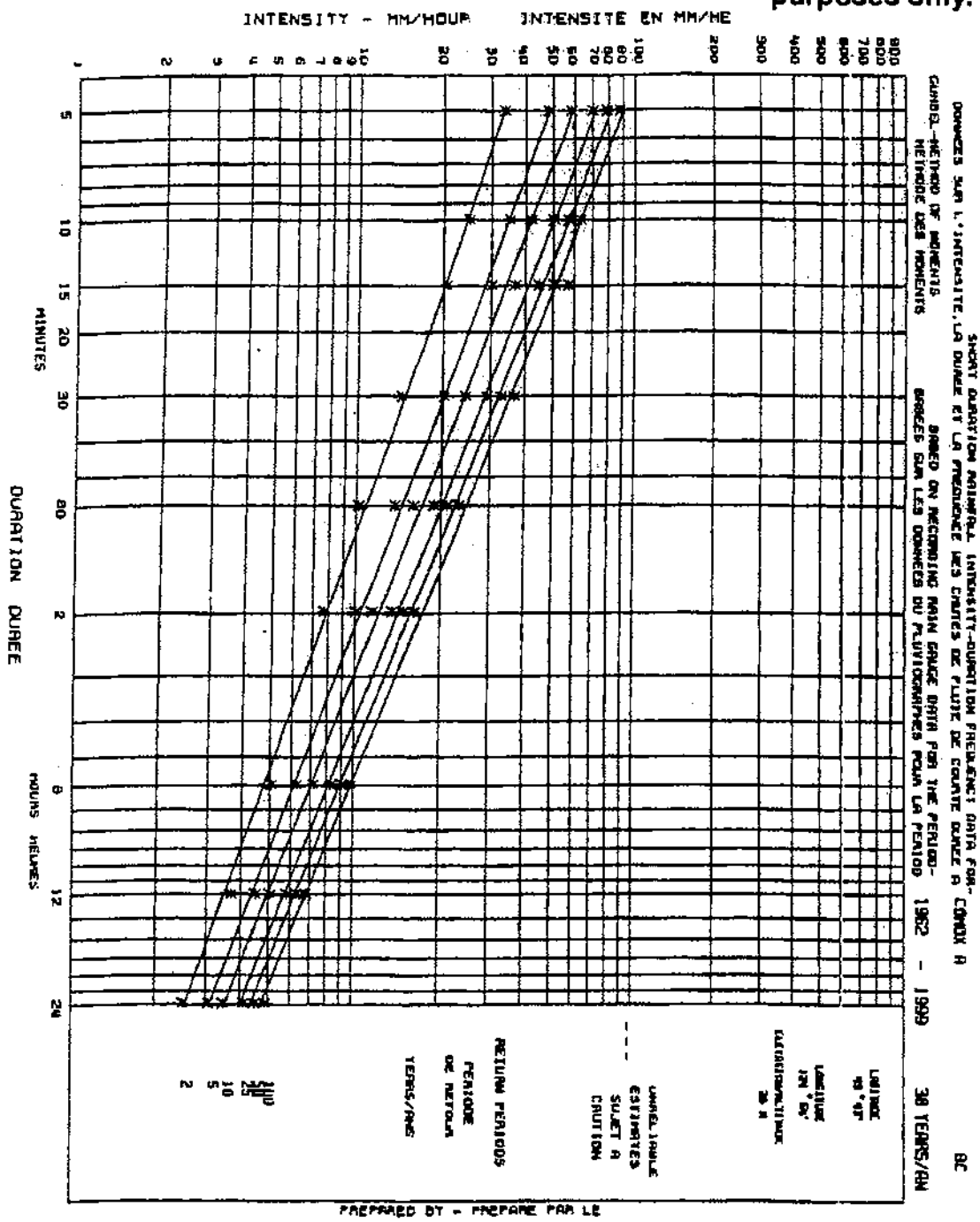
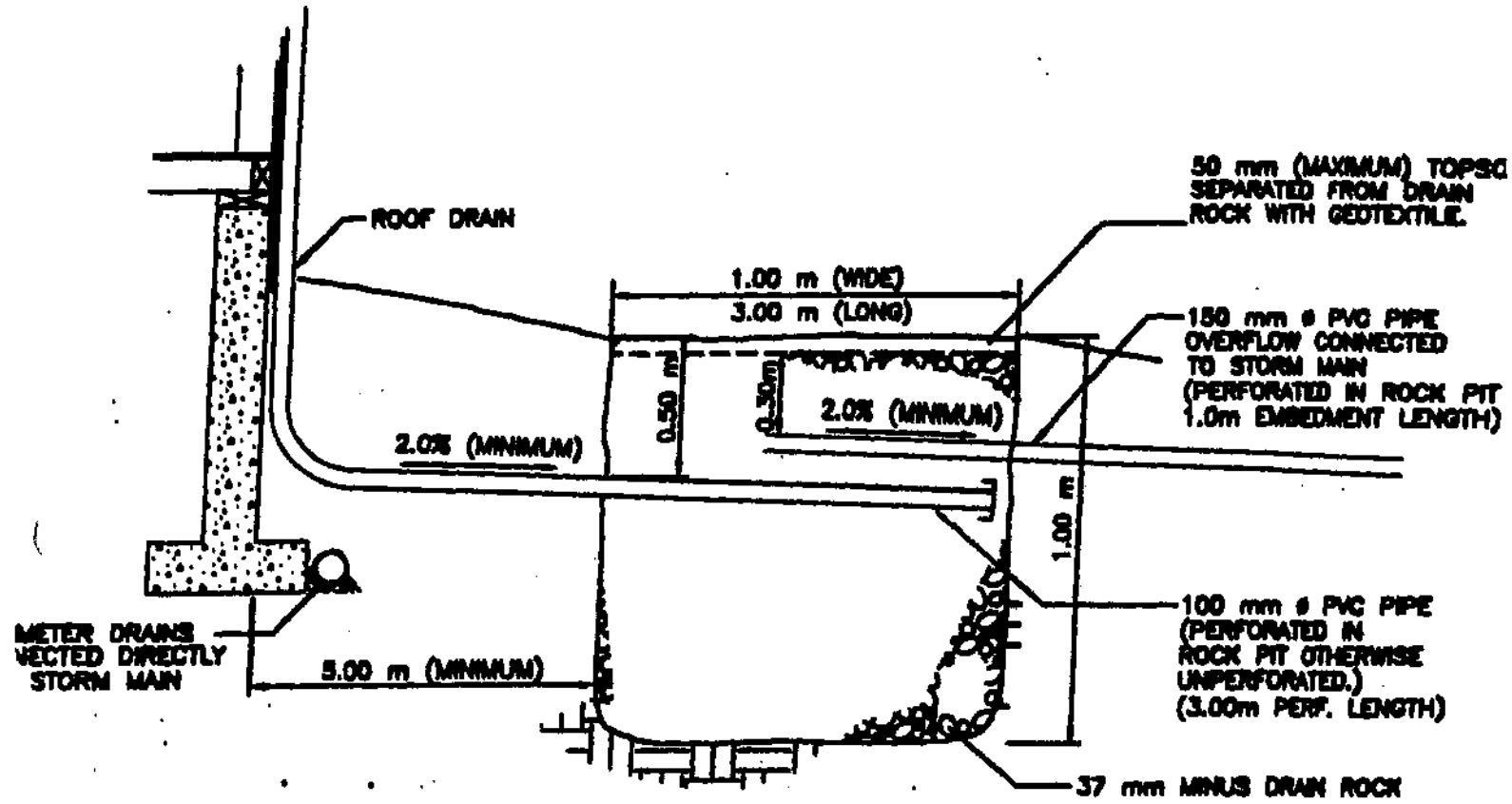
prepared for convenience
purposes only.



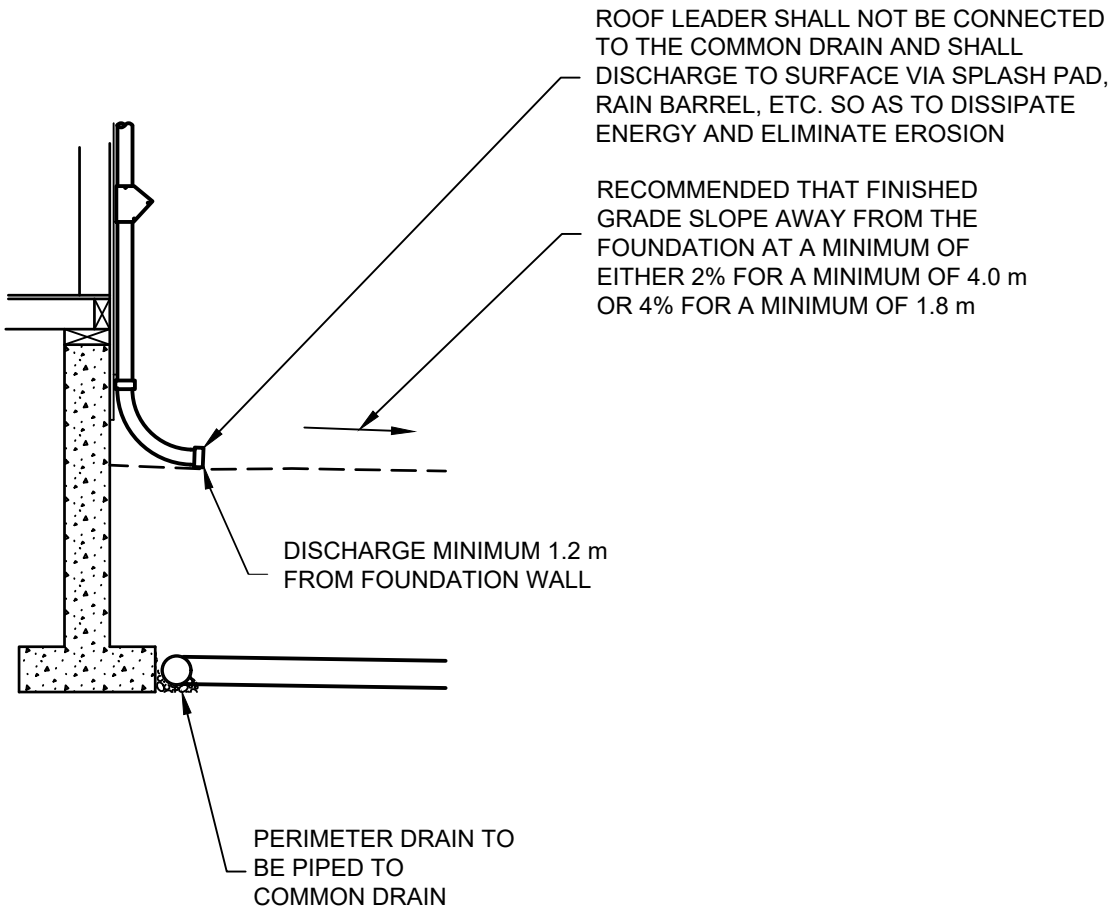
TOWN OF COMOX			TITLE RAINFALL INTENSITY DURATION FREQUENCY CURVE	STARDARD DWG. NO. SE - 1
DRAWN BY: GMW	DATE: January 05	APPROVED BY:		

This is a consolidated version prepared for convenience purposes only.



TOWN OF COMOX	TITLE ROCK PIT DETAIL	STANDARD DWG. NO SE - 2

(#1567 Aug 15/07)



NORTHEAST COMOX

SERVICE CONNECTION WITH DISCONNECTED ROOF LEADERS

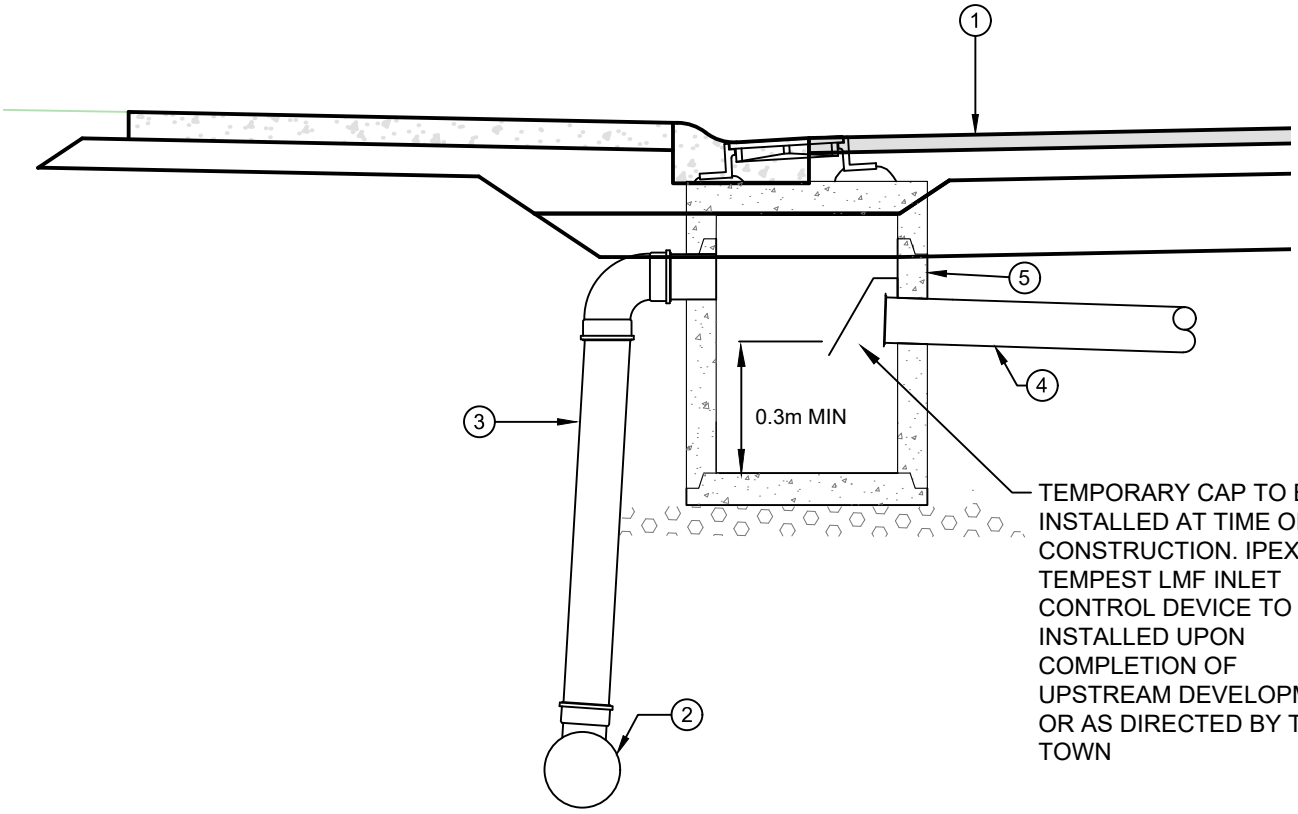
Drawing No.

SE-3

DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

1. ROAD SURFACE, BASE, AND SUBBASE
2. MUNICIPAL STORM MAIN
3. 150mm Ø (MIN.) OVERFLOW TO STORM MAIN
4. 150mm Ø (MIN.) UNDERFLOW TO INFILTRATION TRENCH
5. CATCHBASIN - TO CONFORM TO THE CURRENT EDITION OF THE TOWN OF COMOX SUBDIVISION AND DEVELOPMENT SPECIFICATIONS BYLAW



TOWN OF COMOX

NORTHEAST COMOX

SEDIMENT CATCHBASIN

Drawing No.

SE-4

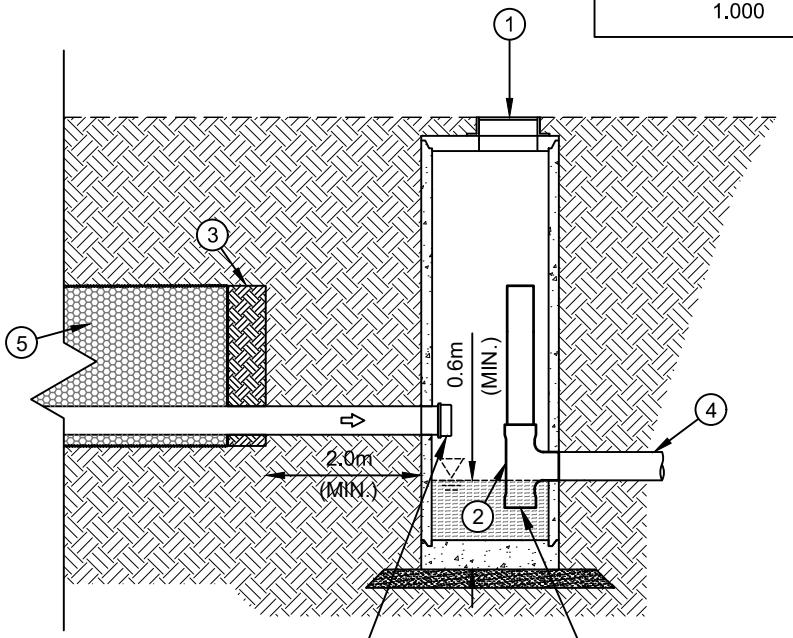
DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

1. CONTROL MANHOLE - MANHOLE TO CONFORM TO THE CURRENT EDITION OF THE TOWN OF COMOX SUBDIVISION AND DEVELOPMENT BYLAW
2. FLOW RESTRICTOR ASSEMBLY WITH ORIFICE PLATE AND OVERFLOW SET AT TOP ELEVATION OF DRAIN ROCK RESERVOIR
3. TRENCH DAMS AT END OF DRAIN ROCK RESERVOIR
4. OUTFLOW PIPE TO STORM DRAIN OR SWALE SYSTEM
5. DRAIN ROCK RESERVOIR (DEPTH 1.0m)
6. MINIMUM PIPE DIAMETER IS 150mm

ORIFICE SIZING TABLE

TRIBUTARY AREA (ha)	ORIFICE SIZE (mm)
0.050	10
0.075	12
0.100	13
0.125	14
0.150	16
0.175	18
0.200	19
0.225	20
0.250	21
0.275	22
0.300	23
0.325	24
0.350	25
0.375	26
0.400	27
0.450	28
0.500	30
0.550	31
0.600	33
0.650	34
0.700	35
0.750	37
0.800	38
0.850	39
0.900	40
0.950	41
1.000	42



TOWN OF COMOX

NORTHEAST COMOX

INFILTRATION TRENCH
CONTROL MANHOLE

Drawing No.
SE-5

DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

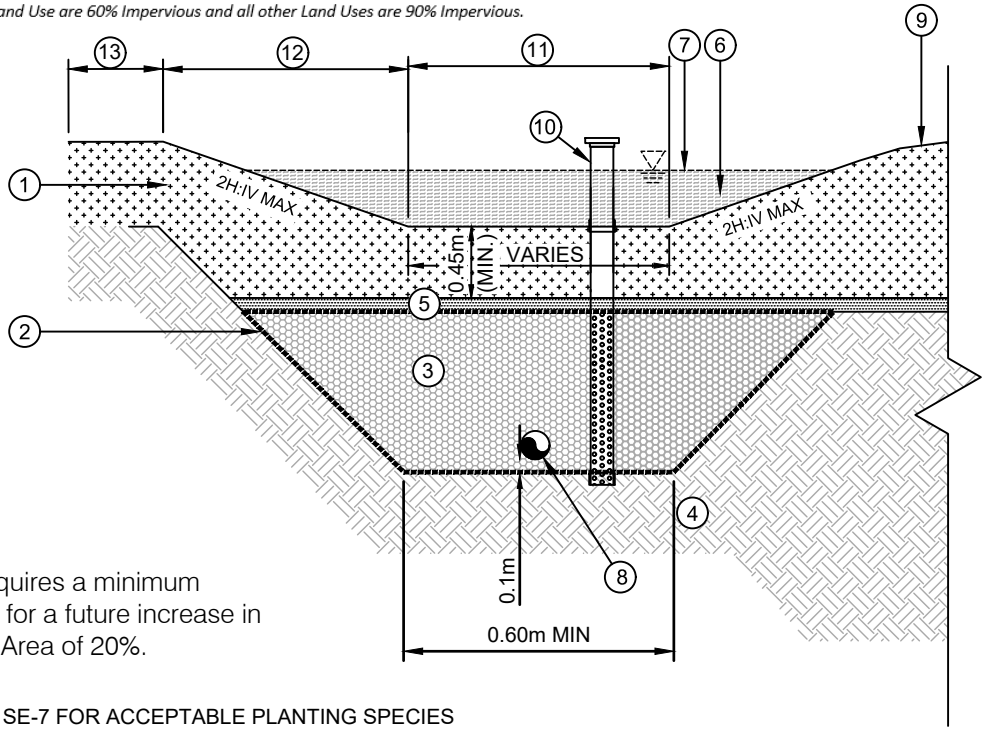
1. AMENDED SOIL (RAIN GARDENS) OR WASHED SAND (ROCK GARDENS) MIN 0.45m DEPTH
2. GEOTEXTILE ALONG ALL SIDES OF RESERVOIR
3. DRAIN ROCK RESERVOIR
4. FLAT, SCARIFIED SUBSOIL
5. 100mm WASHED SAND (RAIN GARDENS ONLY)
6. PONDING AREA - MAX 150mm DEPTH
7. MAX WATER LEVEL
8. PERFORATED DRAIN PIPE (150mm Ø MIN.) WITH FILTER CLOTH SOCK (OPTIONAL)
9. FILTER STRIP (SEE SE-10)
10. OBSERVATION WELL - 50mm Ø (MIN.) PIPE (PERFORATED INSIDE DRAIN ROCK RESERVOIR ONLY)
11. CENTER
12. SLOPED SIDES (4H:IV SIDE SLOPE REQUIRED FOR GRASS PLANTINGS)
13. BERMED EDGES

Table 5: Infiltration Trench Sizing

Sub-Catchment			Infiltration Trench Parameters		
(#)	Total Area (ha)	% Imp[2] (%)	Total Base Area (m^2)	Base Area per area (m^2/ha)	Storage Volume[1] per Hectare (m^3/ha)
1A	2.0	60 / (90)	250 / (400)	125 / (200)	38 (60)
1B	5.9	90	1180	200	60
2A	6.0	60 / (90)	2700 / (4800)	450 / (800)	135 / (240)
2B	6.4	90	1024	160	48
3	25.8	90	2580	100	30
4A	27.5	60 / (90)	4538 / (7000)	165 / (255)	50 / (80)
4B	6.4	90	5120	800	240

Notes:
1) Infiltration trench storage volume is calculated as a 1 metre deep drain rock reservoir with a long-term void ratio of 30%. I.e., for every 1 square meter of base area, the total storage volume is 0.3 cubic metres.
2) Single Family Land Use are 60% Impervious and all other Land Uses are 90% Impervious.

Infiltration trenches shall be sized by the design engineer based on the tributary area of developed land and the land use, and in accordance with the surface areas and volumes specified in Table 5 – Infiltration Trench Sizing. To calculate the required Infiltration trench base area and storage volume, multiply the tributary area (in hectares) by the per hectare base area and storage volumes, for the applicable subcatchment, tabulated in Table 5.



Design requires a minimum allowance for a future increase in Infiltration Area of 20%.

NOTE: SEE SE-7 FOR ACCEPTABLE PLANTING SPECIES

TOWN OF COMOX

NORTHEAST COMOX

BOULEVARD INFILTRATION TRENCH

Drawing No.
SE-6

DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

Ponded area side slopes of a maximum of 2H:1V, 4H:1V are recommended to aid operations and maintenance. Provide amended soil on side slopes similar to bottom. Approved plantings are provided below. Alternative native species may be used upon acceptance of the Town. See Standard Drawing SE-6 for an overview of the three planting zones; Center, Sloped Sides and Bermed Edges.

Center:

This area floods often and requires species that tolerate frequent flooding. Approved species that may be used in this zone are as follows:

- Tall sedge (Carex appressa)
- Spike rush (Eleocharis)
- Common cottongrass (Eriophorum angustifolium)
- Land quillwort (Isoetes histrix)
- Dwarf cattail (Typha minima)
- Giant leather fern (Acrostichum dadanaeifolium)
- Lady fern (Athyrium fillix –femina)
- Cinnamon fern (Osmunda cinnamomea)
- Royal fern (Osmunda regalis)
- Sword fern (Polystichum munitum

Sloped Sides:

This area floods briefly and requires plant species that tolerate damp soil but require only modest amounts of water during the dry season. Deciduous native shrubs, ferns, and grasses could be considered for use in this zone. Approved species of grasses and native shrubs that may be used in this zone are as follows:

Grasses:

- Big bluestem (Andropogon gerardii)
- Meadow pinegrss, reedgrass (Calamagrostis Canadensis)
- Meadow barley (Hordeum secalinum)
- Moor grass (Molinia caerulea)
- Switchgrass (Panicum virgatum)

Shrubs:

- Dogwood (cornus)
- Oceanspray (Holodiscus discolor)
- Sumac (Rhus)
- Thimbleberry (Rubus parviflorus

Bermed Edges:

These areas are outside the flood zone. Approved species of herbaceous perennials that may be used in this zone are as follows:

- Yarrow (Achillea millefolium)
- Swamp milkweed (Asclepias incarnata)
- Purple coneflower (Echinacea purpurea)
- Tuffted bluebell (Wahlenbergia communis)

TOWN OF COMOX

NORTHEAST COMOX

BOULEVARD INFILTRATION TRENCH

ACCEPTABLE PLANTING SPECIES

Drawing No.

SE-7

DATE : Feb 2021

D

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

Table 5: Infiltration Trench Sizing

Sub-Catchment			Infiltration Trench Parameters		
(#)	Total Area (ha)	% Imp[2] (%)	Total Base Area (m^2)	Base Area per area (m^2/ha)	Storage Volume[1] per Hectare (m^3/ha)
1A	2.0	60 / (90)	250 / (400)	125 / (200)	38 (60)
1B	5.9	90	1180	200	60
2A	6.0	60 / (90)	2700 / (4800)	450 / (800)	135 / (240)
2B	6.4	90	1024	160	48
3	25.8	90	2580	100	30
4A	27.5	60 / (90)	4538 / (7000)	165 / (255)	50 / (80)
4B	6.4	90	5120	800	240

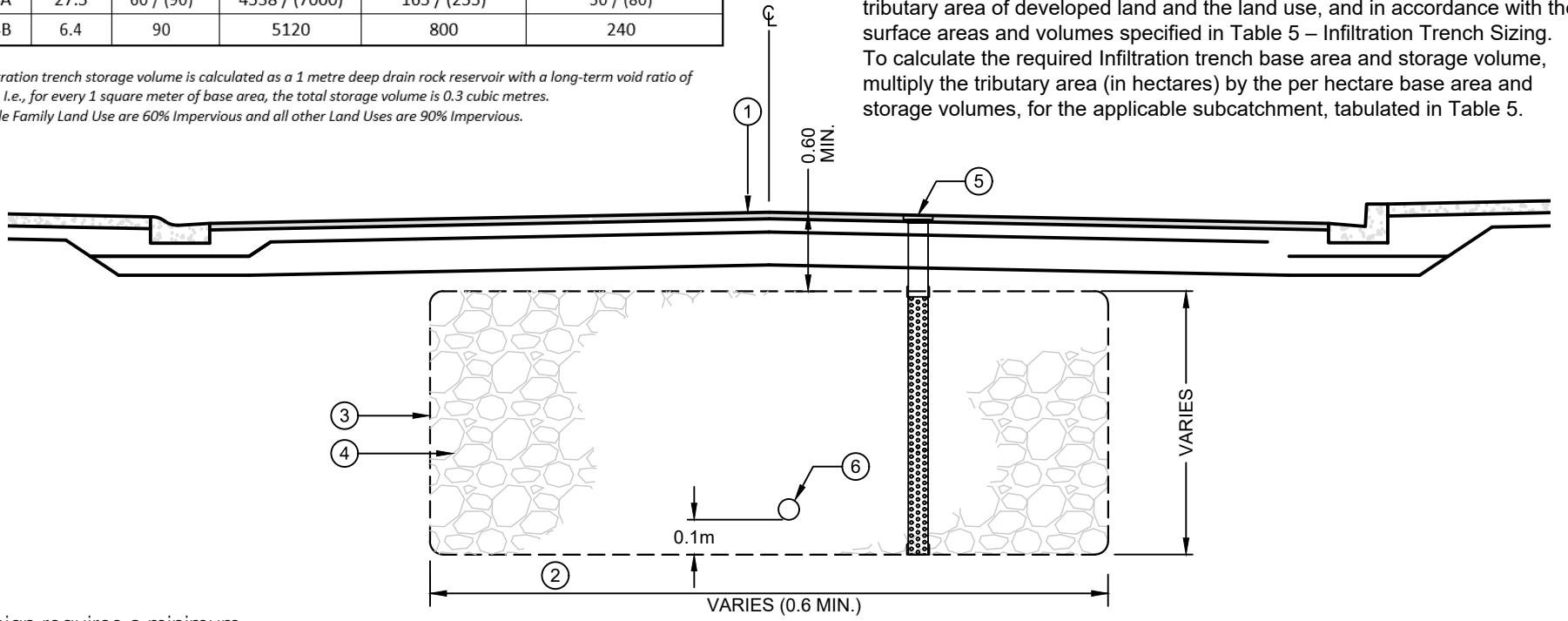
Notes:

1) Infiltration trench storage volume is calculated as a 1 metre deep drain rock reservoir with a long-term void ratio of 30%. I.e., for every 1 square meter of base area, the total storage volume is 0.3 cubic metres.

2) Single Family Land Use are 60% Impervious and all other Land Uses are 90% Impervious.

1. ROAD SURFACE, BASE, AND SUBBASE
2. FLAT, SCARIFIED SUB SOIL
3. GEOTEXTILE ALONG ALL SIDES OF RESERVOIR
4. DRAIN ROCK RESERVOIR
5. OBSERVATION WELL - 150Ø (MIN.) PIPE (PERFORATED INSIDE DRAIN ROCK RESERVOIR ONLY) C/W "ROBAR TYPE" CAST IRON VALVE BOX MARKED "STORM"
6. 150mm Ø MIN. PERFORATED DRAIN PIPE (PERFORATED INSIDE ROCK TRENCH ONLY). CONNECT TO CONTROL MANHOLE SE- 5

Infiltration trenches shall be sized by the design engineer based on the tributary area of developed land and the land use, and in accordance with the surface areas and volumes specified in Table 5 – Infiltration Trench Sizing. To calculate the required Infiltration trench base area and storage volume, multiply the tributary area (in hectares) by the per hectare base area and storage volumes, for the applicable subcatchment, tabulated in Table 5.



Design requires a minimum allowance for a future increase in Infiltration Area of 20%.

TOWN OF COMOX

NORTHEAST COMOX

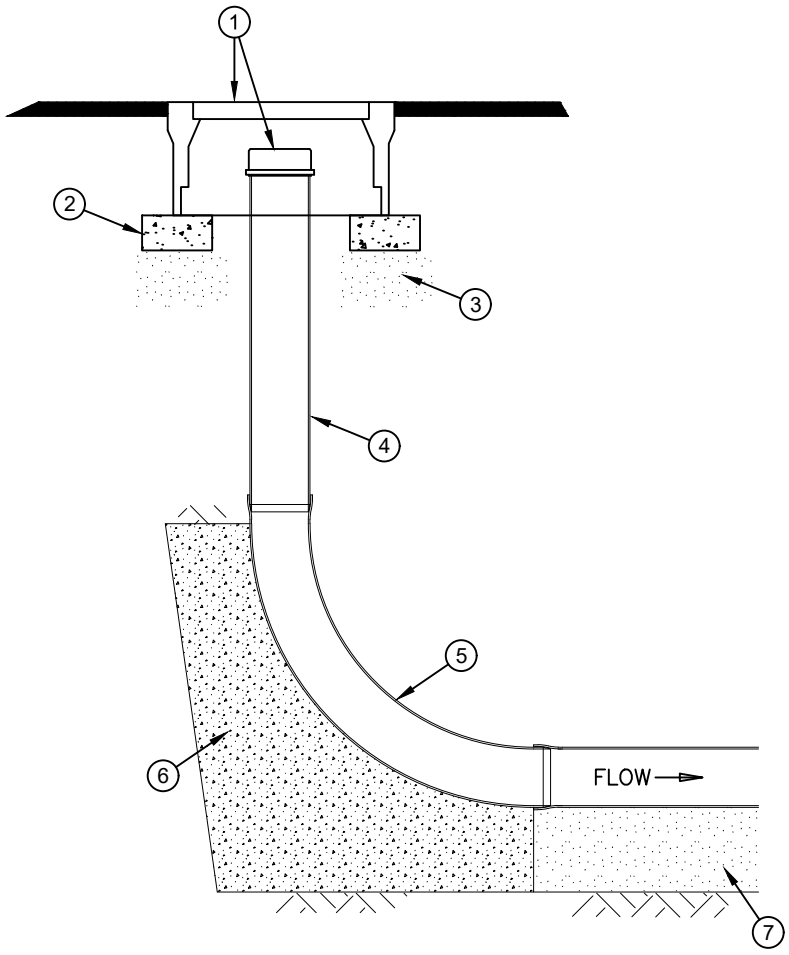
STREET INFILTRATION TRENCH

Drawing No. SE-8

DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

1. 150mm Ø (MIN.) PVC CAP. FOR BOULEVARD INSTALLATIONS USE CONCRETE BOX MARKED "STORM" (LANGLEY #37 OR EQUIVALENT), FOR ROADWAY INSTALLATIONS USE "ROBAR TYPE" CAST IRON VALVE BOX MARKED "STORM"
2. CONCRETE BOX TO BE INSTALLED ON CONCRETE BLOCK SUPPORTS (ALL SIDES)
3. GRANULAR BASE MATERIAL
4. 150mm Ø (MIN.) DRAIN PIPE
5. 90° LONG RADIUS BEND (OR 2 x 45° LONG RADIUS BENDS)
6. CONCRETE ENCASEMENT MIN. 150mm THICK ALL AROUND
7. GRANULAR PIPE BEDDING AND BACKFILL



TOWN OF COMOX

NORTHEAST COMOX

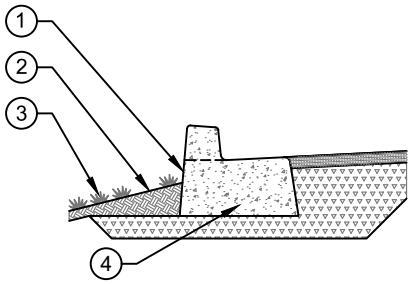
CLEAN OUT

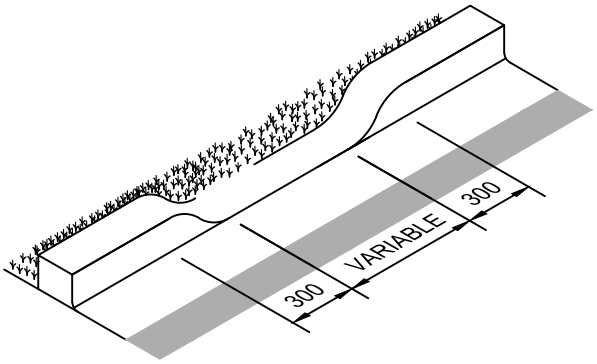
Drawing No.

SE-9

DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.





DROP CURB

1. 0.10m VERTICAL DROP FROM GUTTERLINE TO FILTER STRIP (TYPICAL)
2. 4 : 1 MAX. 25 : 1 MIN. SLOPE FOR FIRST 0.5m (TYPICAL)
3. FILTER STRIP: EROSION RESISTANT TREATMENT (EG. GRASS OR EROSION CONTROL FABRIC AND DRAIN ROCK) TYPICAL
4. CURB PROFILE PER TOWN OF COMOX SUBDIVISION AND DEVELOPMENT SPECIFICATIONS BYLAW

TOWN OF COMOX

NORTHEAST COMOX

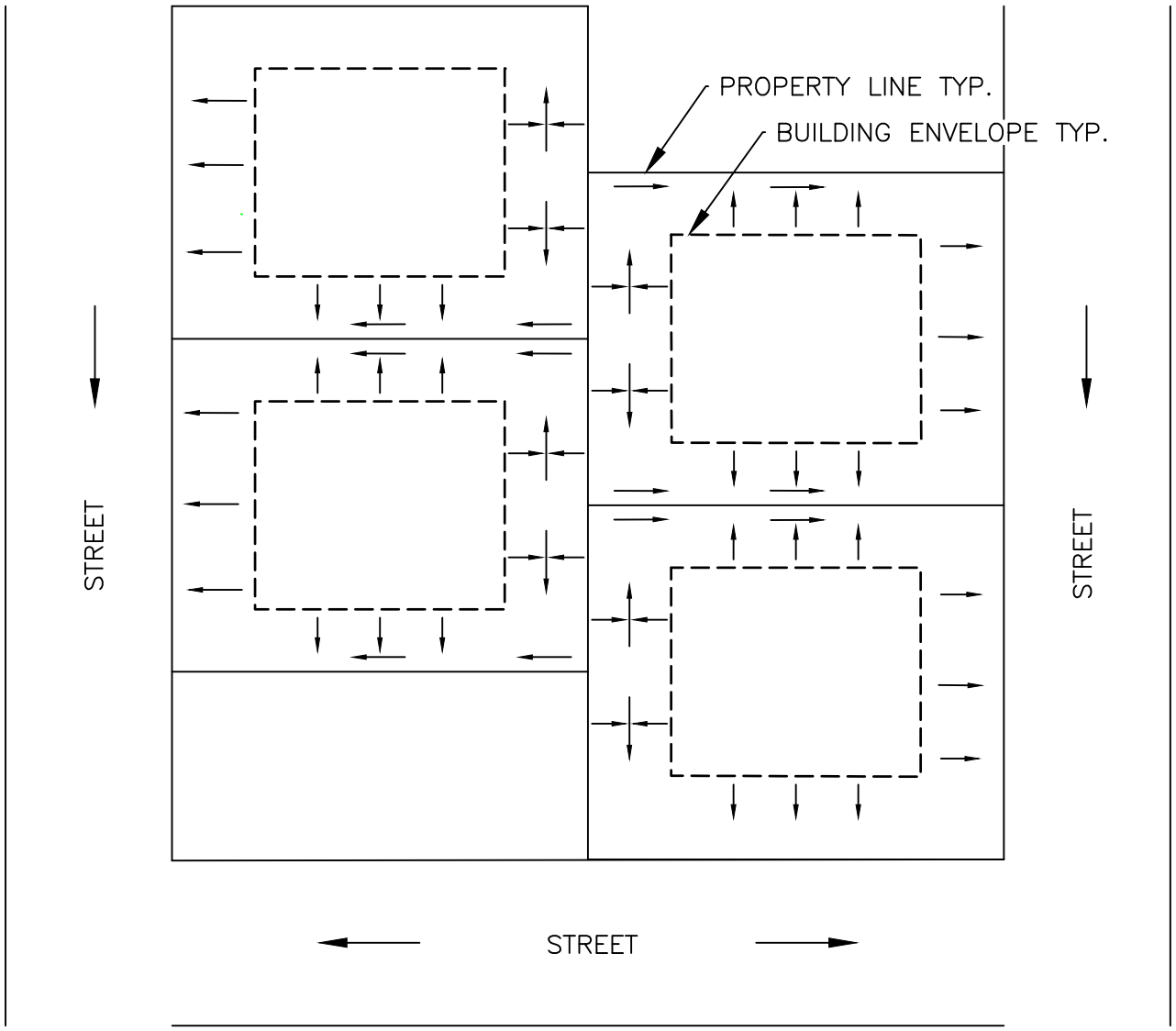
CURBING OPTIONS AT BOULAVARD INFILTRATION TRENCHES

Drawing No.

SE-10

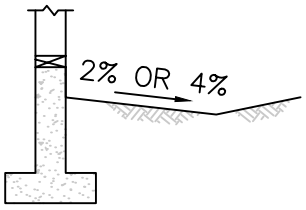
DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.



REAR TO FRONT LOT DRAINAGE

RECOMMENDED FINISHED GRADE TO SLOPE AWAY FROM HOUSE AT A MINIMUM OF EITHER 2% FOR MIN. OF 4.0m OR 4% FOR MIN. OF 1.8m



LOT GRADING AWAY FROM HOUSE DETAIL

NOTES:

1) ALL SURFACE DRAINAGE AROUND BUILDING TO BE PER BC BUILDING CODE LATEST EDITION

2) ALL BUILDING PENETRATIONS I.E. DOORS, WINDOWS, VENTS ETC. SHALL BE A MINIMUM OF 150mm ABOVE FINISHED GRADE UNLESS DRAINED PER BC BUILDING CODE LATEST EDITION.

LEGEND:

LOT GRADING AT TIME OF FINAL SUBDIVISION APPROVAL →

TOWN OF COMOX

NORTHEAST COMOX

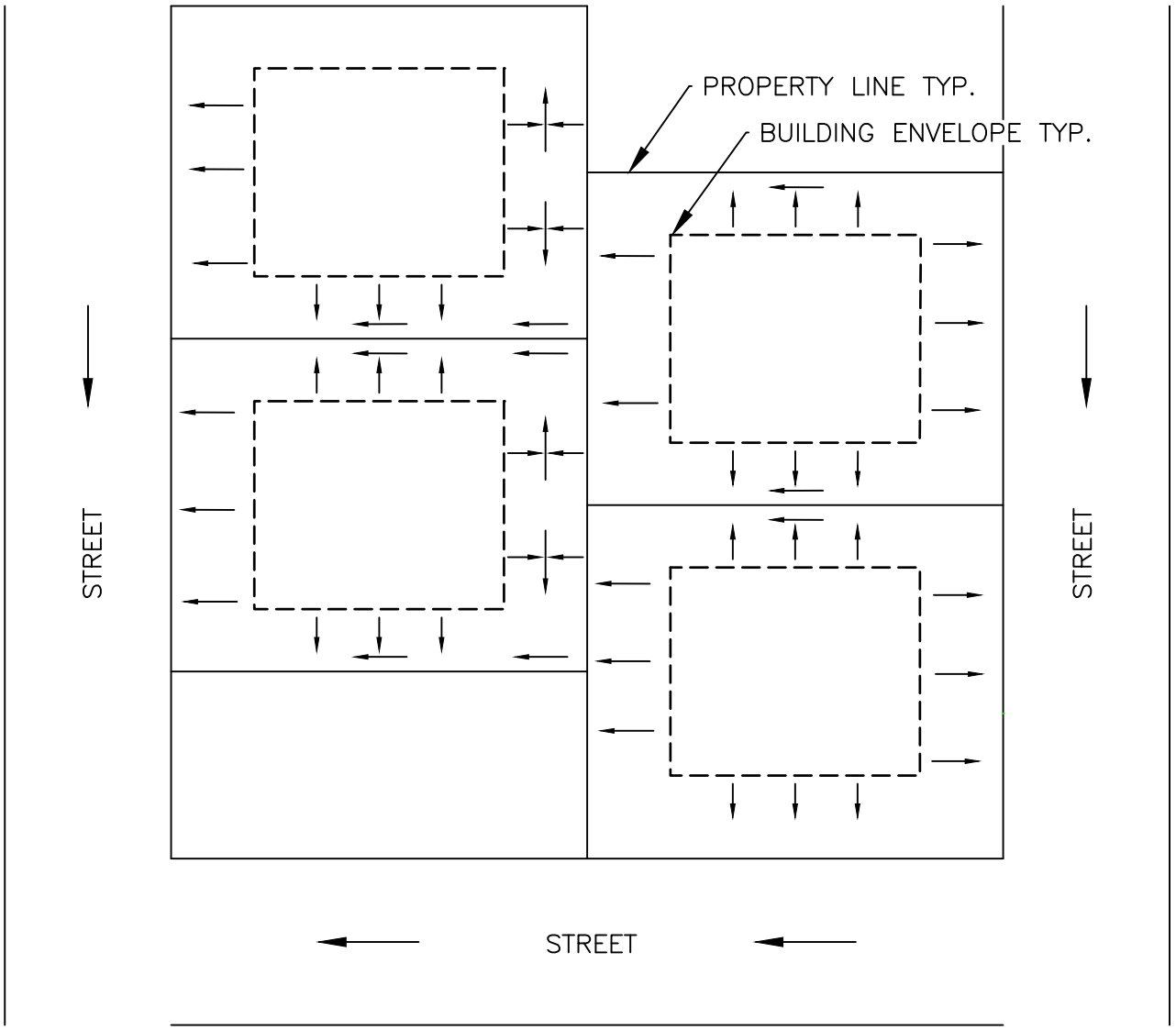
TYPICAL LOT GRADING

Drawing No.

SE-11

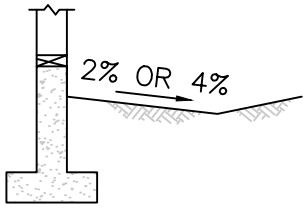
DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.



FRONT TO REAR LOT DRAINAGE

RECOMMENDED FINISHED GRADE TO SLOPE AWAY FROM HOUSE AT A MINIMUM EITHER 2% FOR MIN. OF 4.0m OR 4% FOR MIN. OF 1.8m



LOT GRADING AWAY FROM HOUSE DETAIL

NOTES:

1) ALL SURFACE DRAINAGE AROUND BUILDING TO BE PER BC BUILDING CODE LATEST EDITION

2) ALL BUILDING PENETRATIONS I.E. DOORS, WINDOWS, VENTS ETC. SHALL BE A MINIMUM OF 150mm ABOVE FINISHED GRADE UNLESS DRAINED PER BC BUILDING CODE LATEST EDITION.

LEGEND:

LOT GRADING AT TIME OF FINAL SUBDIVISION APPROVAL →

TOWN OF COMOX

NORTHEAST COMOX

TYPICAL LOT GRADING

Drawing No.

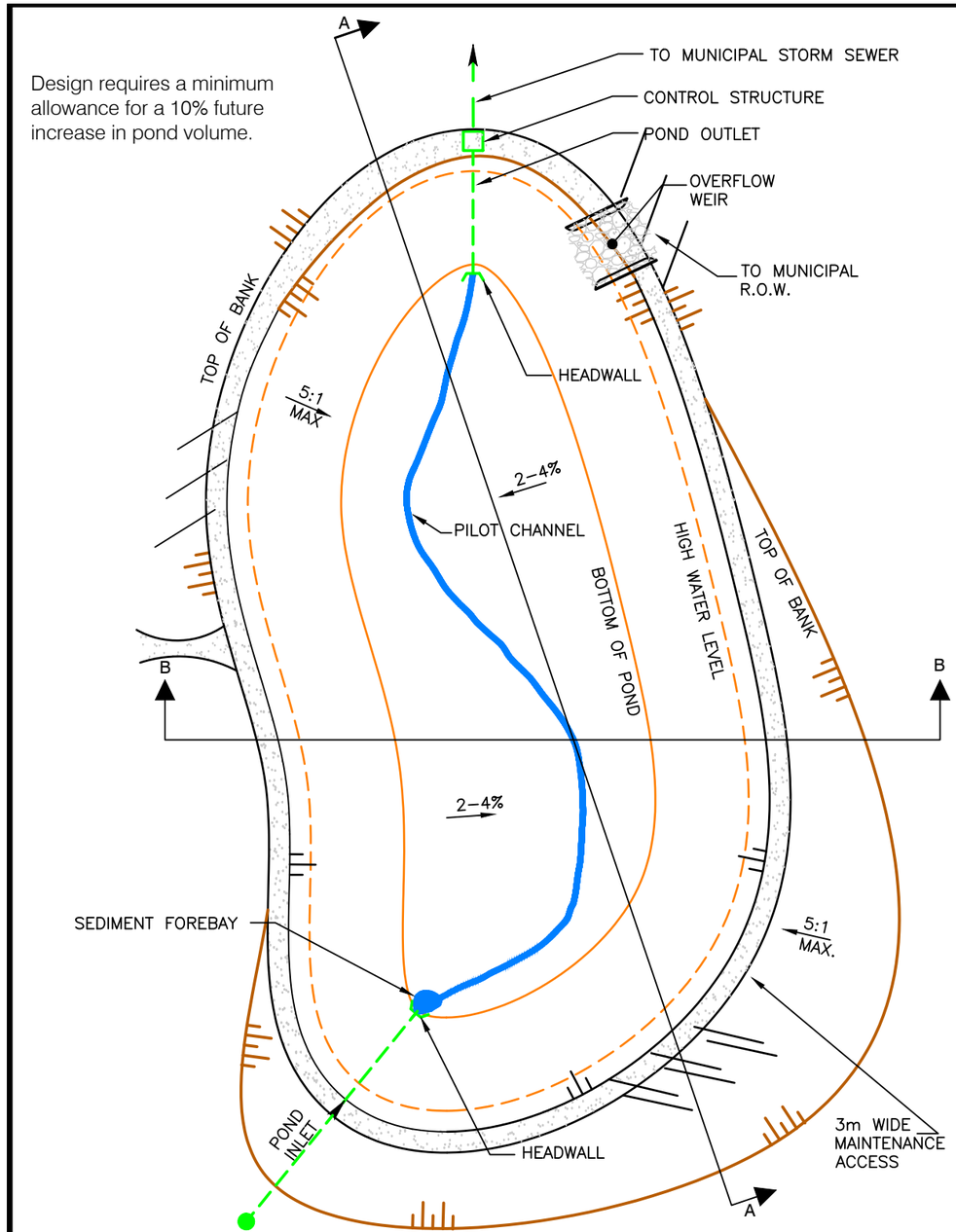
SE-12

DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

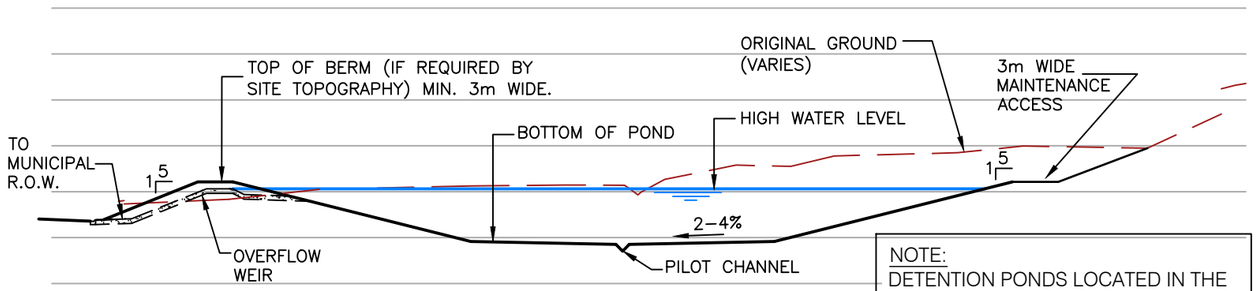
	NORTHEAST COMOX	Drawing No. SE-13
	DRY DETENTION POND SIGN DETAIL	DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.



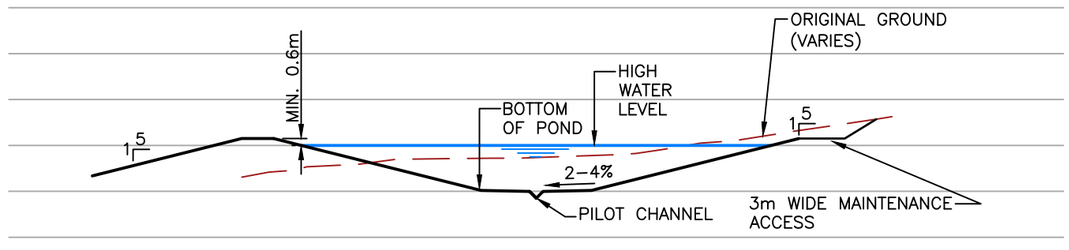
Design requires a minimum allowance for a 10% future increase in pond volume.

DETENTION POND - PLAN
N.T.S.

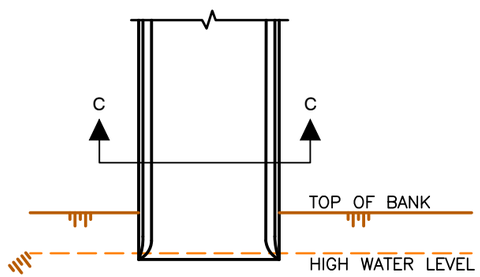


SECTION A - A
SCALE N.T.S.

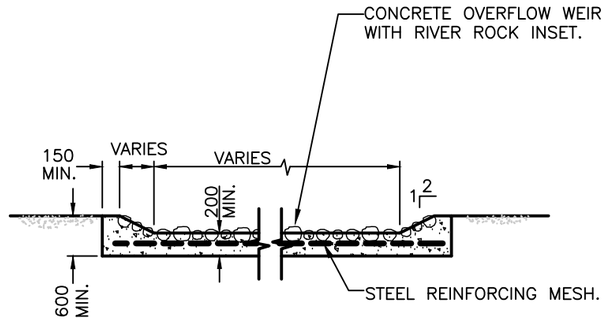
NOTE:
DETENTION PONDS LOCATED IN THE LOWER EASTERN PORTION OF SUB-CATCHMENT 4, WHERE ARTESIAN CONDITIONS EXIST, MAY REQUIRE AN IMPERMEABLE POND LINER.



SECTION B - B
SCALE N.T.S



POND OVERFLOW DETAIL
SCALE N.T.S.



SECTION C - C
SCALE N.T.S.

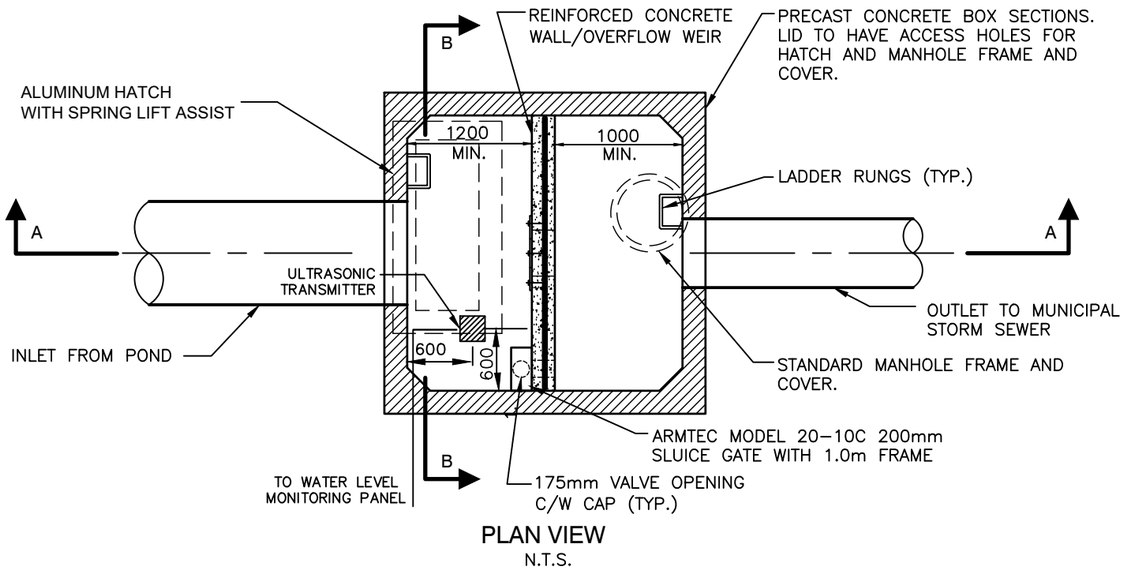
NORTHEAST COMOX

DRY DETENTION POND PLAN & SECTIONS

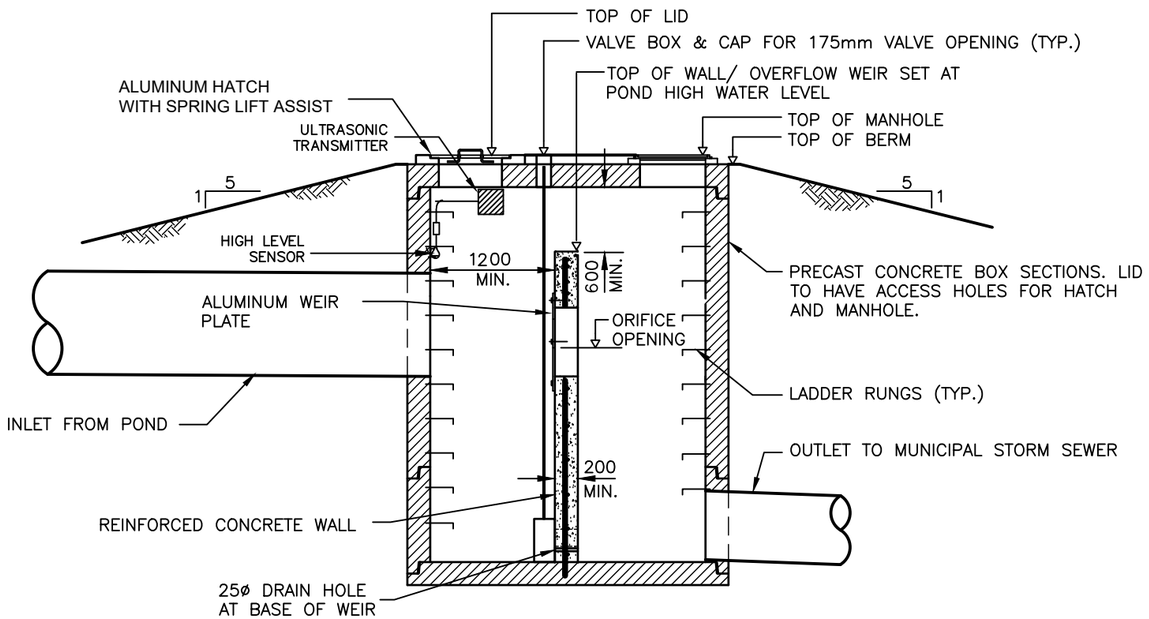
Drawing No.
SE-14

DATE : Feb 2021

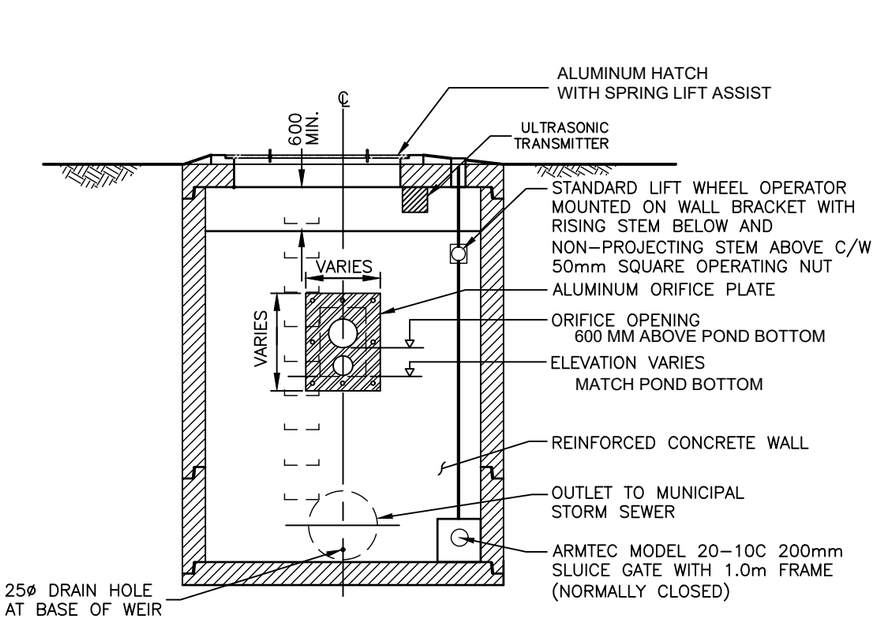
Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.



PLAN VIEW
N.T.S.



SECTION A - A
N.T.S.



SECTION B - B
N.T.S.

NORTHEAST COMOX

DRY DETENTION POND OUTLET CONTROL STRUCTURE SECTIONS AND DETAILS

Drawing No.
SE-15
DATE : Feb 2021

Source: North East Comox Neighbourhood Stormwater Management Plan - PHASE 3 OF 3, March 1, 2018, McElhanney Consulting Services Ltd.

TOWN OF COMOX
SUBDIVISION AND DEVELOPMENTS SPECIFICATIONS

APPENDIX F
SPECIFICATIONS FOR WATERWORKS

For list of Standard Plans, see Appendix B, Page 10.

TOWN OF COMOX

APPENDIX 'F' (#1378 Nov 7/01)

SPECIFICATIONS FOR WATERWORKS

This Appendix consists of 5 Parts

-Design
-Materials
-Trenching and Backfilling
-Installation and Testing
-Provision for On-Site Water Supply Systems **(#1514 Jul 5/06)**

DESIGN

Demand

1.1 The minimum design flows shall be based upon population and fireflow demand as follows:

1.1.1 Domestic Demand (Litres per capita per day):

-annual average daily per capita demand.....635 L/c/d
-peak day.....2100 L/c/d
-peak hour.....3000 L/c/d

1.1.2 Fireflow demand shall be in accordance with the most recent version of "Water Supply for Public Fire Protection", by Fire Underwriters Survey, for the existing or anticipated land use, but shall in no case be less than 75 L/s. The fire flow should not exceed 300 L/s except in the case of an unusual risk.

1.2 The peak demand shall be the greater of:

-peak hour demand, or
-peak day demand plus fireflow demand with the fire at that location which will put the greatest strain on the system or part of the system under consideration.

Supply

2.1 The system should be designed to satisfy the peak demand. The pressure in the street main should normally not be less than 350 kPa nor more than 700 kPa. In exceptional circumstances or for brief periods design pressures of 280 to 770 kPa are permitted. During a fire the design pressure shall not be less than 150 kPa at any point in the mains. In areas where buildings may be expected to have automatic sprinkler systems, a special design is required to ensure a continuous supply to the sprinklers while providing adequate flow to stand pipes and hydrants.

2.2 The presence of an existing Town water main adjacent to a development does not imply that such has suitable pressure or adequate available flow. The Consultant shall determine the quantity of water available in existing and proposed mains, having regard for the nature and extent of existing and ultimate development within the subdivision and /or development and other areas which the

mains will serve. The design should incorporate additional or alternate sources of supply if necessary to satisfy the requirements.

Configuration and Capacity of Mains

3.1 The design of mains in a subdivision and/or development should be consistent with the requirements for arterial feeder mains of larger diameter looping throughout the entire system, using a grid of 200 mm and larger mains not more than 1000 m apart. All other mains, except in cul-de-sacs, shall be looped, or provision be made for looping.

3.2 The minimum sizes for water mains shall be in accordance with the most recent updates of the "Town of Comox Water System Study" or the "Comox Valley Water System Water Study". In the absence of direct recommendations by either of these studies, or that derived by the above fire flow requirements, the following minimums shall apply:

-Commercial and Industrial areas.....200 mm
-Cul-de-sac without hydrant.....100 mm
-Elsewhere.....150 mm

3.3 Unsupported runs of 150 mm main in excess of 200 m should be avoided, by construction of additional cross mains, or by increasing the diameter of the long run main.

3.4 Flow calculations should be performed using the Hazen-Williams formula. The flow velocity should be calculated:

$$V = \frac{CD^{0.63} S^{0.54}}{219}$$

Where V= velocity of flow, m/s
C=roughness coefficient
D=inside pipe diameter, mm
S=slope of hydraulic gradient, m/m

The roughness coefficient should generally be as follows:

-unlined ductile iron and steel pipe	C=110
-lined ductile iron pipe	C=140
-PCV pipe	C-140

If required, the roughness coefficient of the existing mains may be established by field testing.

The design velocity in supply mains should not normally exceed 3 m/s. There is no maximum velocity for distribution mains.

Location, Alignment and Grades

4.1 Water mains shall be located so as to serve all parcels directly. Mains should normally be located within public road allowances, and located as shown on Standard Plan SC-5. Mains should be laid in a straight line on a uniform grade at a constant offset except as follows:

4.1.1 Where a road allowance curves, the main may be laid on a horizontal curve at a constant offset unless otherwise prohibited by these specifications.

4.1.2 Where the proposed travelled surface of a roadway is on a consistently ascending or descending grade, the main may be installed at a constant depth below that grade with appropriate vertical curves if necessary. Where the road grade fluctuates moderately between ascending and descending, the main shall be laid on a uniform grade, avoiding unnecessary high and low points. In no case shall the depth of cover be less than 1 m measured from finished grade.

4.2 Where topography does not permit installation within a road allowance, the main may be installed in a public walkway or, if that is impracticable, within a utility right-of-way on private property.

4.3 Where a main is to be installed on a curve by deflection of joints, or arcing of pipe, the deflection shall not exceed:

-for ductile iron pipe, as specified in AWWA C600/82.
-for PCV pipe as specified in Uni-Bell Handbook of PCV pipe.

Horizontal and vertical curves should not coincide. Unnecessary curves should be avoided. Note that AWWA C-600 para 3.4.3 specifies: "For design purposes, deflection should be limited to 80% of the values show" in Tables 4 and 5 of that standard.

Pipe Selection and Bury

5.1 The strength of pipe and quality of bedding shall be in accordance with the recommendations of the pipe manufacturer for the particular service and depth of burry, taking into account the anticipated construction loading as well as the trench loading.

5.2 Watermains should not be installed in fill. Where it is impracticable to do otherwise, a special design is required.

5.3 The valves and fittings shall be designed for the same working pressure as the mains they serve, but in no case less than 1035 kPa.

Hydrants

6.1 Hydrants shall be located throughout the distribution system having regard for the properties to be served, the direction of approach of the fire-fighting apparatus, the access of the pumper truck to the hydrant, and the locations of adjacent hydrants relative to line valves. Good practice call for hydrants at intersections.

6.2 The spacing of hydrants shall not exceed the maximum recommended spacing listed in the most recent version of "Water Supply for Public Fire Protection". Hydrants are not permitted at the high point in a watermain. An air release valve is required at the high point in a water main.

6.3 Hydrants shall be installed in accordance with Standard Plan SF-1. Hydrants shall be connected only to 150 mm or larger diameter mains. Hydrant leads shall not be less than 150 mm diameter. Each hydrant shall have an isolation valve.

Valves

7.1 Valves should be located so as to direct the flow of water to the required areas and to keep to a minimum the portion of the distribution system affected by a single water main break or un-serviceability.

7.2 All valves shall be gate valves of the same size as the main. There should be at least two valves at a Tee and three valves at a cross. Valves should be attached directly to such fittings on the downstream sides.

7.3 The spacing of valves shall not exceed the maximum recommended spacing contained in the most recent version of "Water Supply for Public Fire Protection", but in no case shall more than two hydrants be deprived of water due to a single water main break or un-serviceability.

7.4 Additional valves may be required for satisfactory system operation or testing purposes.

-on a new water line near the point of connection to the existing system.
-adjacent to a pressure reduction station or a connection to a supply main.
-at the boundary between pressure zones.
-in high density residential areas where more than 50 dwelling units would otherwise be without water supply in the event of single water break or un-seviceability.

Fittings and Appurtenances

8.1 A 50 mm standpipe or blowoff shall be installed at the end of any main which does not have a hydrant within 10 m of the termination point. Location and installation shal be in accordance with Standard Plan SF-4.

8.2 Where a pressure reduction device is required, it shall consist of at least two pressure reduction valves, the larger of which shall be 150 mm diameter or larger. In each case a special design is required.

8.3 For the purpose of hydrostatic pressure testing and chlorination of new mains, test points should be installed at those locations where no hydrant or other appurtenance is available for the purpose. Advance installation of a planned building service connection may be used in lieu of a test point.

8.4 Thrust blocks shall be provided on all tees, crosses, reducers, bends and caps in accordance with Standard Plan SF-5. Thrust blocks shall be designed to withstand the maximum thrust generated at such locations. At hydrants tie rods may be used in lieu of thrust blocks in accordance with Standard Plan SF-1.

Building Service Connections

9.1 Building services shall be installed to all parcels of land which ultimately will require service. The sizes of such connections should take into account the ultimate use of the parcel but shall in no case be smaller than 19 mm diameter.

9.2 The water main shall be designed so that the building service connection for each parcel may be installed within the projection of the frontage of such a parcel. The alignment of the building service connection shall be straight and should generally be right-angles to the centre-line of the road allowance.

9.3 The building service shall be installed in accordance with Standard Plan SF-3. The minimum cover over a building service connection shall be one metre.

9.4 Meters shall be required on all single-family, single-family with secondary suite, Multi-Family, Commercial, Institutional and Industrial developments. **(#1462 Nov 2/05) (#1612 Jan 20/10)**

9.5 Meters for single-family dwellings and single-family with secondary suite dwellings where zoning permits a secondary suite shall be deposited at the Town of Comox Public Works Yard for installation at Town cost prior to occupancy. **(#1462 Nov 2/05) (#1612 Jan 20/10)**

Cross Connection

10.1 There shall be no physical connection between a public and a private potable water supply system, nor between either 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.

10.2 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.

Materials

General

11.1 All materials shall be new and of first class quality, free from defects in manufacture, storage and handling. Any equipment or materials required to complete the works, but which are not included or referred to in the following standards, shall be supplied in accordance with their respective AWWA standards for the types and classes of service for which they are intended.

11.1.1 Where the standards so require, an affidavit of compliance or certificate of inspection shall be submitted to the Administrator prior to incorporation of such materials in the works. The Engineer may waive this requirement in whole or in part.

11.1.2 Materials of the plastic family shall be of recent manufacture and shall not be stored, or show evidence of having been store, for long periods of time in direct sunlight.

11.1.3 Rubber and neoprene materials, such as pipe gaskets, shall be protected from the elements until installed.

Pipe and Fittings

12.1 Watermains may be constructed of the following pipe materials:

Material	Standard	Class	Type
Polyvinylchloride (PVC)	AWWA C900	min. 150	DR18 or better
Ductile Iron	AWWA C151	min. 50	cement lined
Steel	AWWA C200	min. 1035 kPa	
Soft Copper (building service only)	ASTM B 88		Type K

12.2 All flanged joints shall be in accordance with ANSI B16.1 and B16.5 flat faced. All other joins or couplings shall be of the rubber ring type in accordance with the standards for their respective pipes and classes of service, and the recommendations of the pipe manufacturer.

12.3 All fittings shall be cast iron or ductile iron in accordance with AWWA C110 or AWWA 153. Minimum pressure rating for fittings shall be 1035 kPa.

12.4 All bolts, nuts and similar hardware shall be made of a highly corrosive-resistant alloy, or cadmium plated in accordance with ASTM A 165 Type TS.

12.5 When ductile iron or steel pipe is specified, the Consultant shall first submit to the Administrator a measurement and analysis of the resistivity of the soil along the line of proposed construction together with the Consultant's recommendations for special bedding coating or other means of corrosion protection which may be required. This pipe shall not be ordered or shipped until the Administrator has approved the protective measures.

Hydrants

13.1 All hydrants shall conform to AWWA C502. Hydrants should be of the compression type, Terminal City C71P, Mueller Modern Centurion of AVK manufacture with frangible base or approved equal.

13.2 Hydrants shall be designed so that the top section may, without excavation, be rotated so as to face in other directions in increments of not less than 60°.

13.3 Hydrant operating nuts and nozzle cap nuts shall be AWWA standard pentagonal. The direction of opening shall be counter-clockwise.

13.4 All hydrants shall have pumper nozzles in accordance with Standard Plan SF-1. The portion of the hydrants and barrel above ground shall be painted. The top of the bonnet and the nozzle caps shall be painted.

Valves

14.1 Gate valves shall be resilient wedge and conform to AWWA C509 designed to withstand a not-shock shut off pressure of 1035 kPa. Valves shall be bronze mounted with resilient wedge. Gate valves 400 mm and larger shall have gears in enclosed gear cases suitable for direct bury.

14.2 Butterfly valves shall conform to AWWA C500, designed to withstand a non-shock shut off pressure of 1035 kPa. The body material shall be ductile or cast iron. The valve disc shall be ductile or cast iron. The valve shall be operated by totally enclosed worm gear, water-proofed and equipped with adjustable stops, suitable for direct bury.

14.3 The wrench nut shall be the AWWA standard square 50 mm nut, opening counter-clockwise, operating a non-rising stem. Valve ends shall conform to the run of pipe, and will usually have at least one flanged end. Stem seals shall be "o" ring.

14.4 Where specified for valve chambers, a combination hard wheel and wrench nut shall be supplied. The standard square 50 mm nut shall be permanently attached to an operating wheel of the diameter specified in AWWA C500, so that the valve may be operated by either device. The wheel shall be similar McAvity Catalogue 72, page 36.

14.5 Extension pieces shall be used where the valve operator nut bury is greater than 1.2 m.

14.6 Valve boxes shall be installed on all buried valves, in accordance with Standard Plan SF-2. Valve boxes shall be of the telescoping cast iron type. The valve boxes in paved streets, curbs, sidewalks or parking areas shall be Robar flat top Nelson type by Terminal City Iron Works Ltd. or approved equivalent. Regardless of the source of manufacture or supply of valve boxes, the

removable covers of flat top boxes shall be a good close fit in it frame without binding or rattling under traffic. The covers of Nelson type boxes shall fit similarly in Terminal City frames. To prevent transfer of vehicle loads to the valve, the lower pipe shall be cut so as to provide a minimum of 100 mm downward adjustment of the valve box when in place, as shown on Standard Plan SF-2.

14.7 Pressure reduction, altitude and pressure relief valves and chambers shall be especially designed for each location.

Building Service Connections

15.1 Service connections shall be 19 mm diameter unless designated by the Engineer. All components (i.e. curb and corporation stop) shall be the same size as the service to which they are connected.

15.2 Service connection pipes 50 mm and smaller shall be Type K annealed copper conforming to ASTM B88. Connections 25 mm and smaller shall be continuous runs; connection 50 mm and smaller shall utilize brass compression fittings. Service connections 100 mm or larger shall utilize PVC pressure pipe, which conforms to AWWA designation C-900 and CSA designation B1376.3. Use of Schedule 40 PVC pipe shall require the approval of the Engineer.

15.3 Corporation stops shall be in accordance with that specified on Standard Drawing SF-3.

15.4 Curb stops where required shall be Ford B44-333 or approved equal having a solid tee type head with compression fittings and locking clamps (pack joints).

15.5 Where required, water meters shall conform to the following:

a) Unit of measurement shall be cubic meter. Water meters shall be equipped with a "Sensus model 520R Pit Set Radio Read Unit" remote reading systems. **(#1612 Jan 20/10)**

b) Meters used with services ranging in size from 19 mm to 50 mm diameters shall be Sensus TR-PL positive displacement meters. Sizes 19 mm through 40 mm shall be supplied with a plastic bonnet and plastic bottom.

c) For applications requiring meters ranging in size from 75 mm to 200 mm diameters either Senses SRH Compound meters or Sensus Series "W" Turbo-Meters shall be used. Meter selection shall suit high and low flow requirements.

d) Bypasses shall be provided on all meters 50 mm diameter and larger.

e) For applications where domestic and fire demands are supplied from the same internal system, a Sensus Fire Line Fire Service Assembly shall be used. This assembly includes a UL Listed; FM approved strainer and detector check valve, a Turbo-Meter for high flows, and a "W" Series Turbo-Meter for low flows.

f) For applications where fire demands are to be supplied from a designated fire system separate from the domestic system, a Sensus TrimLine Detector Check Valve/Meter Trim Package shall be used. This package includes a UL Listed, FM approved detector check valve with a small positive displacement meter to detect usage. Approved backflow prevention shall be provided by the Developer and installed on private property to isolate

the fire system from the Municipal system. A separate meter and service as noted above shall supply domestic demands.

g) All meters shall be installed at the property line unless authorized by the Engineer. Service boxes or chambers shall be in accordance with Standard Drawing SF-3. Service boxes for water services larger than 40 mm diameter shall be as approved by the Engineer. All meter lids shall be drilled to allow for the installation of "Touch Pad".

15.6 Brass fittings not otherwise specified shall conform to ASTM B62.

15.7 Wooden markers shall be installed at all curb boxes, meter boxes and the termination of all building services. The marker shall consist of one piece of 40 x 90 mm lumber painted with all-weather blue paint.

Bedding Material

16.1 Bedding material should be sand but may be a clean well graded minus 19 mm gravel. Bedding shall be free from organic materials and other deleterious substances and from frozen lumps.

Trenching and Backfilling

General

17.1 For the sake of convenience and brevity the requirements for trenching and backfilling are consolidated in Section D "Sewage Collection" beginning with paragraph 15.1 Those requirements apply equally to this section unless stated otherwise or the context requires.

Installation and Testing

General

18.1 This specification is a statement of minimum requirements. The Consultant shall provide such further detailed specifications as may be required. Where reference is made to the recommendations of the manufacturer, should a particular recommendation be less stringent than this specification, this specification shall govern. In the event of conflict between an AWWA standard and this specification, the AWWA standard shall govern.

Handling of Pipe

19.1 Each shipment of pipe and appurtenances shall be inspected upon arrival and any faulty or damaged materials shall be removed from the work site. The pipe and other materials shall be unloaded, transported and stored in accordance with the recommendations of the manufacturer and the respective AWWA standards.

Installation of Pipe

20.1 Water pipe shall be laid to the line and grade shown on the drawing or ordered by the Consultant, with fittings, valves and hydrants at the required locations.

20.2 Pipe shall be laid, jointed and bedded and appurtenances shall be installed in accordance with the following standards, manuals and manufacturer's recommendations.

Polyvinylchloride (PVC)	Uni-Bell Handbook of PVC Pipe Design & Construction & AWWA M23
Ductile Iron	AWWA C150 and AWWA C600
Steel	AWWA M11, "Steel Pipe Design and Installation"

Where these standards and manuals include by reference other AWWA standards pertaining to installation and testing of water mains, such other standards shall apply equally as if they had been included in the above listing. When more than one standard is called up, the AWWA standard shall govern.

20.3 Bedding shall be installed under and around the pipe in accordance with Standard Plan SD-1, taking particular care that there are no voids and that the bedding under the pipe and around the haunches conforms to the manufacturer's recommendations. Except for bell holes the pipe shall rest firmly and be supported uniformly along its whole length.

20.4 Bells should point in the direction in which work is progressing.

20.5 With the exception of Class A concrete bedding, no pipe in a trench shall be laid or supported temporarily or permanently upon wooden, masonry or other unyielding material.

20.6 No foreign material shall be placed in or allowed to enter or remain in any existing or new main.

Connections to Existing Mains

21.1 The Town may elect to make connections to the existing mains using Town forces at the Owner's cost, or may permit the Owner to make such connections under Town supervision.

21.1.1 All existing valves and the valve (existing or new) which first admits Town water to the new main shall be operated only by Town employees. Such valves are referred to herein as Town valves.

21.1.2 The Owner shall give timely notice to the Town of his requirement for operation of Town valves, but in no case less than four hours.

21.1.3 The operation of valves by Town employees during their normal working hours shall be done at no cost to the Owner. Other valve operation by Town employees shall be at the Owner's cost based upon the applicable overtime rates and minimum callout times for the Town employees involved, plus the usual overhead charges.

Installation of Valve Hydrants and Fittings

22.1 Valves, drawings and fittings shall be installed where shown on the drawings or ordered by the Consultant.

22.1.1 Valves and valve boxes shall be installed in accordance with Standard Plan SF-2.

22.1.2 Hydrants shall be installed in accordance with Standard Plan SF-1 After each hydrant is installed it shall be covered with a firmly secured burlap sack until it is placed in service.

Pressure Regulating Devices

23.1 Pressure regulating devices shall be installed as shown on the drawings or ordered by the Consultant. While new pressure regulating devices are being brought into operation and during any period of fine adjustment, sufficient valves in the new mains shall be closed to prevent inadvertent over-pressuring of new or existing mains or appurtenances.

Thrust Restraints

24.1 Thrust restraints shall be installed at each valve, hydrant, bend, tee, cross, plug, reducer and fitting where changes in pipe diameter occur. Thrust blocks shall not be fewer or smaller than shown on Standard Plan SF-5. Tie rods may be used in lieu of thrust blocks where shown on the drawings or ordered by the Consultant.

Building Service Connections

25.1 Building service connections shall be installed in accordance with Standard Plan SF-3. Installation and bedding shall be as for water mains.

Other Appurtenances

26.1.1 Blow-offs shall be installed in accordance with Standard Plan SF-4.

26.1.2 A flexible joint shall be provided in a water main adjacent to locations where the pipe is held in a fixed position by a rigid support or structure. The purpose is to prevent pipe failure due to uneven support under or load on the pipe.

Initial Flushing

27.1 Thorough initial flushing together with operation of all valves and hydrants under pressure shall be carried out prior to pressure and leakage testing. The owner shall ensure that no water from new mains is permitted, as a result of his work, to enter existing mains at any time prior to the approved completion of final flushing.

Pressure and Leakage Testing

28.1 The following tests shall be required for new water mains.

- Proving of valves
- Leakage test

The leakage test shall be performed in accordance with the respective standards and manufacturer's recommendations detailed in paragraph 28.1.3 of this section. Care shall be taken not to exceed the allowable pressure on any main or appurtenance, especially if some parts of the system are much lower than others. In particular, resilient-seat gate valves and all butterfly valves shall not be subjected to pressures in excess of their rated pressures. Subject to those precautions, the hydrostatic pressure for testing shall be as required by the respective standard or manufacturer's recommendation for the pipe under test.

28.1.1 The proving of valves shall commence with the new mains isolated from the existing system, full of water, with an independent source of water and pump available to raise and maintain pressure in the new mains. All valves not required to be closed shall be open. Hydrant isolating valves shall be open. Pressure shall be raised to the design operating pressure. Each line valve shall be closed one valve at a time, the downstream main depressurized and the valve proved. (Hydrant isolating valves will be proved later.) The owner may manipulate any valve under test to obtain a tight seal. Any valve which fails to hold pressure shall be repaired or replaced and be retested until a successful test is achieved.

28.1.2 The maximum length of pipe for each leakage test shall not exceed 300 m. The leakage test shall be carried out in accordance with the standard for the pipe being tested, but in no case shall the duration of any leakage test be less than one hour.

The allowable leakage amounts are:

PCV $$L = \frac{ND\sqrt{P}}{130{,}000}$$

Ductile Iron $$L = \frac{ND\sqrt{P}}{130{,}000}$$

L = Allowable leakage in L / hr
N = Number of joints
D = Pipe inside diameter in mm
P = Average test pressure in kPa

28.1.3 The number of joints shall be one joint per length of pipe plus one joint per valve, two per tee and three per cross, based on the design drawings. Any additional joints introduced by the owner for purpose of convenience of construction or repair shall not be included in the count.

Disinfection and Final Testing

29.1 All new waterworks materials shall be cleaned, installed and the mains and appurtenances constructed and disinfected in accordance with AWWA C601. The requirements for flushing, chlorinating and final flushing of new mains apply, insofar as practicable, to repairs or subsequent work performed in pipes which were previously chlorinated. Those mains previously flushed, disinfected and approved shall remain isolated from other new mains not yet so approved.

29.2 The owner shall notify the Health Inspector of the Provincial Health Department of any intended chlorination test, and shall not proceed with the test in the absence of the authorized representative of that Department. Copies of the test results shall be submitted to the Administrator.

Hydrant Operation

30.1 The Developer's Consultant is to provide documentation and inspection reports confirming that all installed hydrants are operational, prior to subdivision approval. This documentation is to be

signed by a qualified hydrant maintenance technician. All costs incurred to provide this information, are at the developer's expense.

Provision For On-Site Water Supply Systems **(#1514 Jul 5/06)**

31.1 Section 31 of this bylaw applies only to the following lands as shown shaded on Map F-1:

Lot B, District Lot 186, Comox District, Plan 47094
Lot A, District Lot 186, Comox District, Plan 47094
Lot 12, District Lot 186, Comox District Plan 449
Lot A, District Lot 186, Comox District, Plan 18914
Lot B of District Lot 186, Comox District, Plan 18914
Lot C, District Lot 186, Comox District, Plan 18914
That Part of Lot 7, District Lot 186, Comox District, Plan 449, Lying to the South of a Boundary Parallel to and Perpendicularly Distant 168 Feet From the South Boundary of Said Lot 7, Except That Part Included in Plan 18914
Lot 1, District Lot 186, Comox District, Plan 43061
Lot A, District Lot 186, Comox District, Plan 14056
Lot B, District Lot 186, Comox District, Plan 14056
Lot C, District Lot 186, Comox District, Plan 14056
Lot D, District Lot 186, Comox District, Plan 14056
Lot E, District Lot 186, Comox District, Plan 14056
Lot F, District Lot 186, Comox District, Plan 14056
That Part of Parcel A (DD 3381N), Lots 4 and 5, District Lot 186, Comox District, Plan 449 Lying Within Said Lot 5
Lot 5, District Lot 186, Comox District, Plan 449, Except Parcel A (DD 3381N)
Lot 6, District Lot 186, Comox District, Plan 449
Lot 11, District Lot 186, Comox District, Plan 449

31.2 As an alternative to the water distribution system required by Section 13.0, the Owner of a Parcel located more than 15 metres from the nearest water main may provide an on-site water supply system complying with applicable regulations under the *Drinking Water Protection Act* if the Owner has complied with section 3(i) of *Comox Water Rates and Regulation Bylaw 1979*. **(#1665 Aug 18/10)**

31.3 For the purposes of this Section 31, the distance of a Parcel from the nearest water main shall be determined by projecting the side Parcel line nearest the water main and the centre line of the water main such that the projected lines intersect, and measuring the distance from point of intersection to the closest part of the water main.

31.4 In the case of an application for a building permit to alter a single family dwelling served by an on-site water system Section 13.1 shall not apply if the building as altered does not increase the volume of sewage produced as determined by the Building Inspector or certified by an authorized person as defined in the Sewerage System Regulation and for the purposes of this section 31.4 buildings shall be deemed to produce sewage at the minimum flow rate indicated in the Sewerage System Standard Practice Manual of the B.C. On Site Sewage Association, as amended from time to time.

INSERT

Maps:

Map F-1

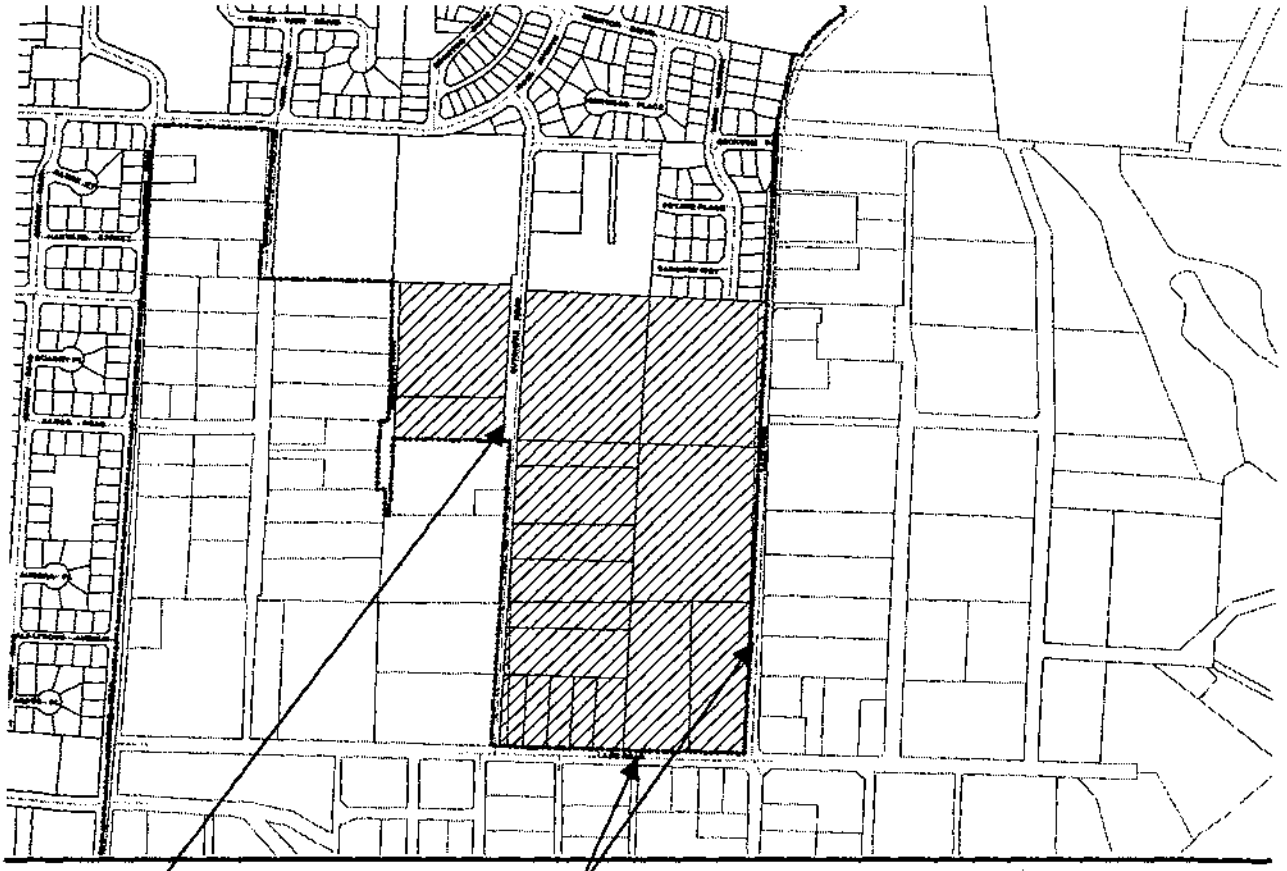
Standard Drawings

SF-1	Hydrant
SF-2	Valve Box
SF-3	Water Service Connection
SF-4	Blow-off
SF-5A/B	Thrust Blocking (2 pgs.)
SF-6	Typical Locations of Building Service
SF-7	Service Location and Tree Envelopes

This is a consolidated version prepared for convenience purposes only.

Amended by Bylaw No. 1514 July 5/06

Map F-1 Land Capable of Development Using an On-Site Water System



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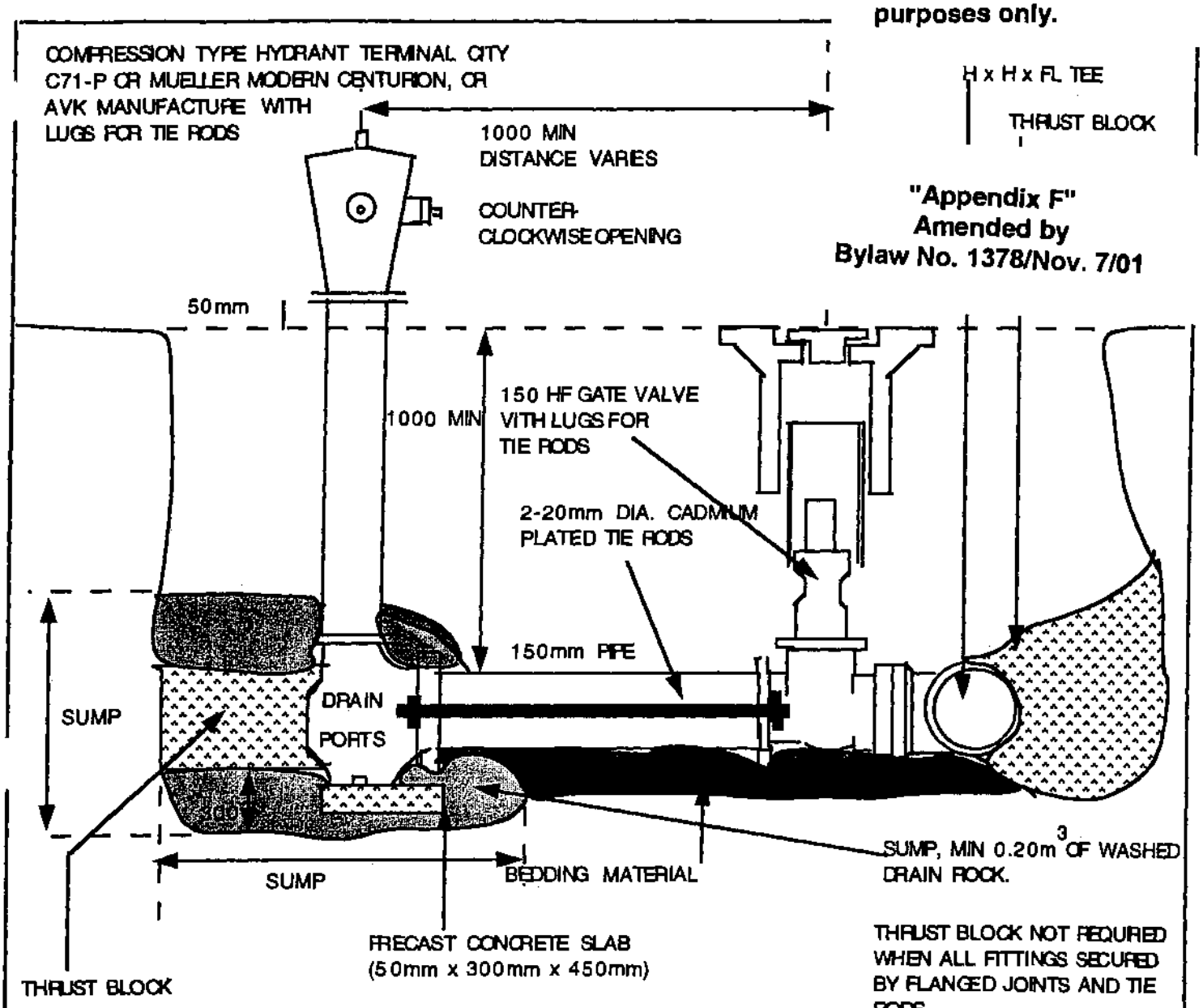


H x H x FL TEE

THRUST BLOCK

"Appendix F"
Amended by
Bylaw No. 1378/Nov. 7/01

THRUST BLOCK NOT REQUIRED WHEN ALL FITTINGS SECURED BY FLANGED JOINTS AND TIE RODS

ALL MATERIAL SHALL CONFORM TO AWWA C-500 (VALVES AND C-502 (HYDRANTS)

HYDRANT HOSE CONNECTIONS :
- -65mm STANDARD BC HYDRANT THREAD
- -PUMPER PORT 5.75 INCH OD, 4 THREADS/ INCH

HOSE AND PUMPER NOZZLE MUST FACE ROADWAY

CONCRETE FOR THRUST BLOCK MUST BE WELL CLEAR OF DRAIN PORTS.

HYDRANT COLOURS : FACTORY YELLOW

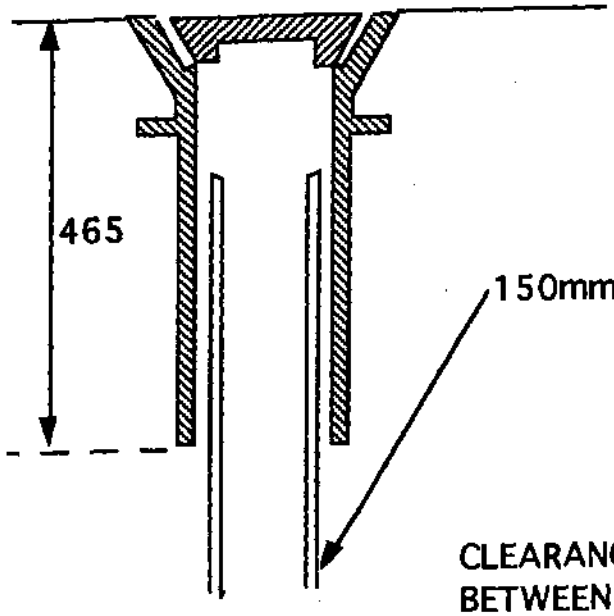
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

NOT TO SCALE

TOWN OF COMOX			TITLE	STANDARD DWG. NO.
DRAWN · GB	DATE: REV FEB 2/98	APPROVED BY: FP	HYDRANT	SF - 1

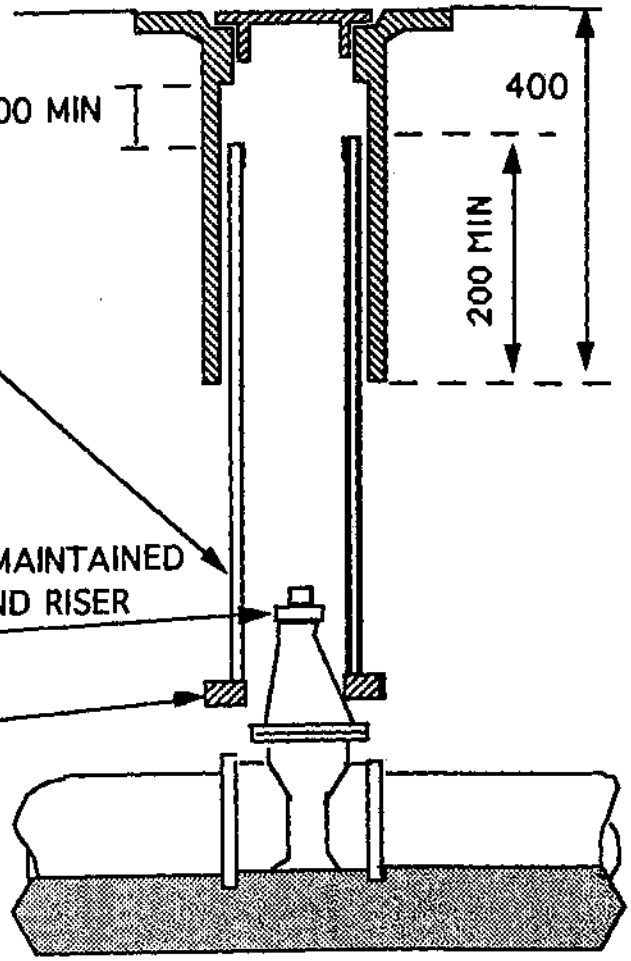
OFF PAVED AREAS

NELSON TYPE



PAVED AREAS

ROBAR FLAT TYPE



VALVE BOXES IN PAVED AREAS SHALL BE ROBAR TYPE.

OTHER VALVE BOXES MAY BE OF NELSON TYPE.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

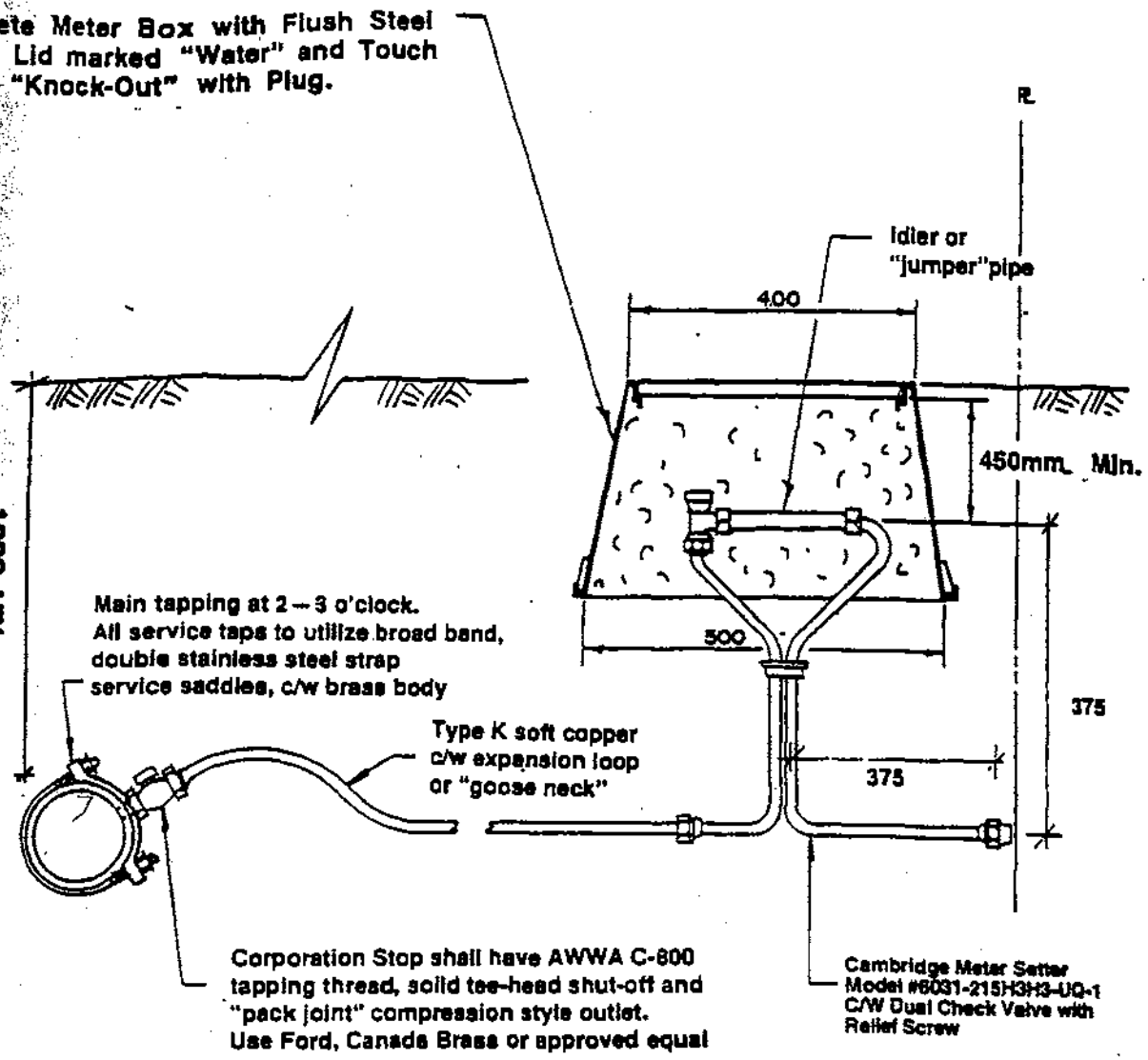
NOT TO SCALE

**"Appendix F"
Amended by
Bylaw No. 1378/Nov. 7/01**

TOWN OF COMOX			TITLE: VALVE BOX	STANDARD DWG. NO. SF - 2
DRAWN BY: GB	DATE: 91/07/18	APPROVED BY: FP		

"Appendix F"
Amended by
Bylaw No. 1378/Nov. 7/(
Bylaw No. 1462/Nov. 2/(

SCHEDULE "1"



Notes:

All Residential Services are to be equipped with an Idler Arm. Where required by specific residential zoning, meters shall be delivered to the Town of Comox Public Works Yard.

Additional meter "risers" shall be employed to achieve a depth of cover between 450mm and 600mm as measured between the finished grade and the idler arm.

TOWN OF COMOX			TITLE: WATER SERVICE CONNECTION	STANDARD DWG. NO. SF - 3
DRAWN BY: Glenn Westendorp	DATE: January 26, 2005	APPROVED BY:		

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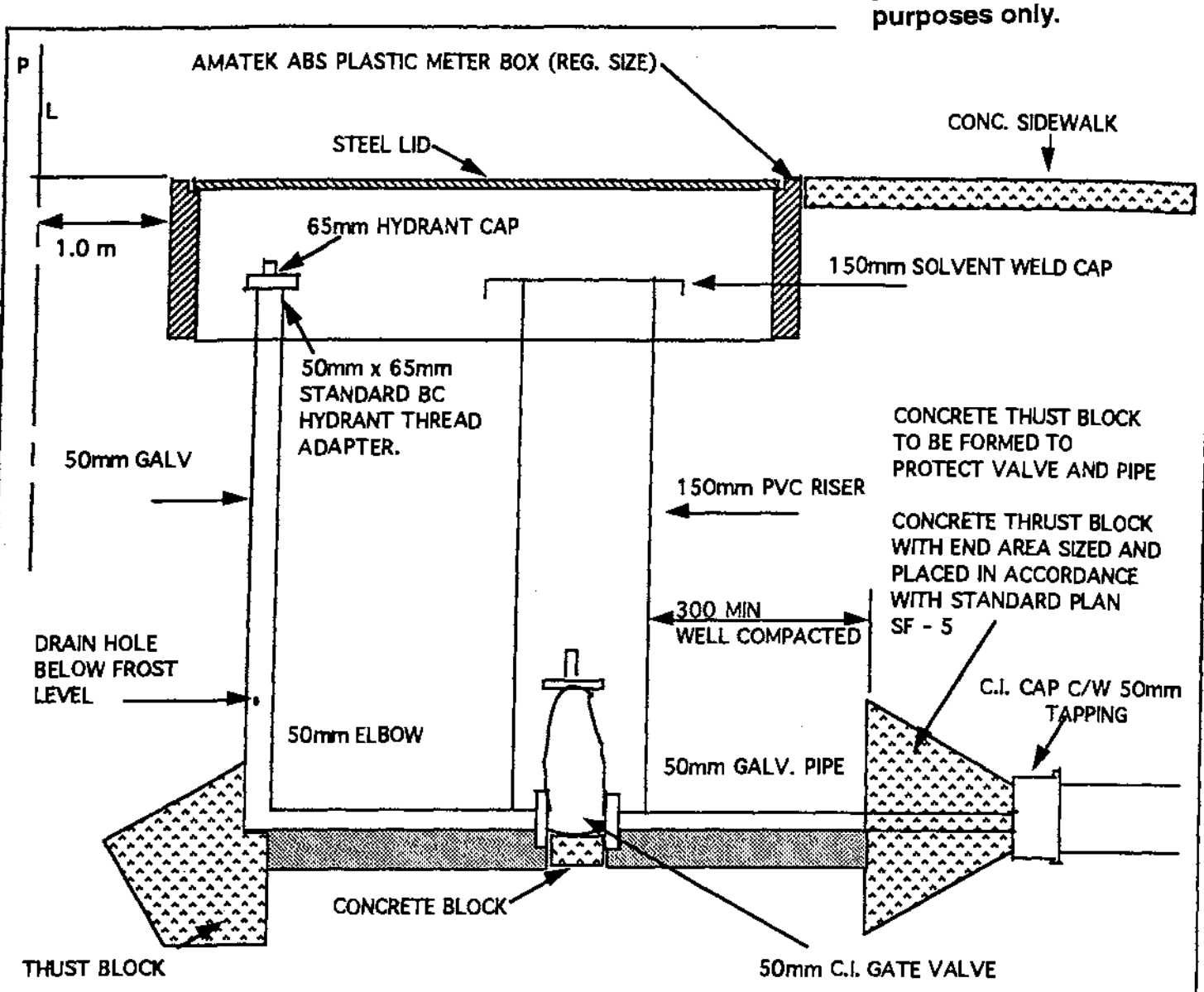
prepared for convenience
purposes only.



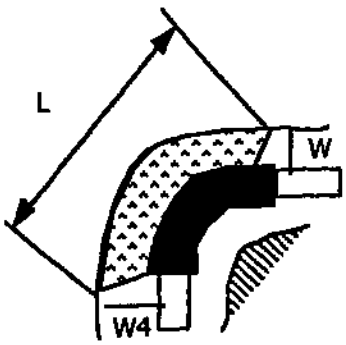
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN

NOT TO SCALE

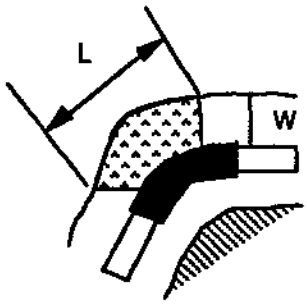
"Appendix F"
Amended by
Bylaw No. 1378/Nov. 7/01

TOWN OF COMOX			TITLE	STANDARD DWG. NO.
			BLOW OFF	SF - 4
DRAWN BY: GB	DATE: 91/07/18	APPROVED BY: FP		

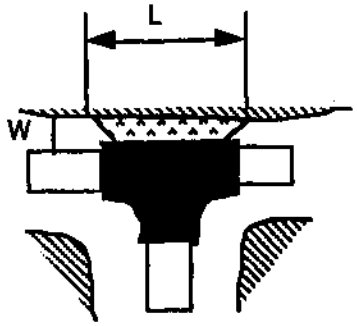
This is a consolidated versi
prepared for convenience
purposes only.



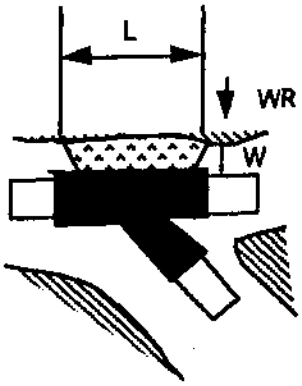
HORIZONTAL 90° BEND



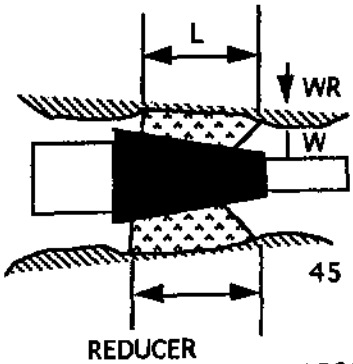
HORIZONTAL 45 BEND



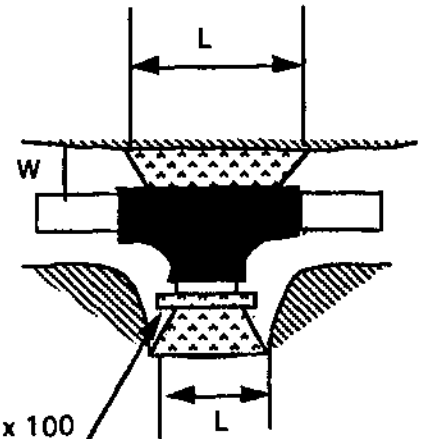
TEE



WYE

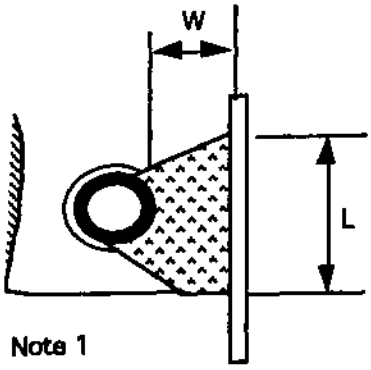


REDUCER

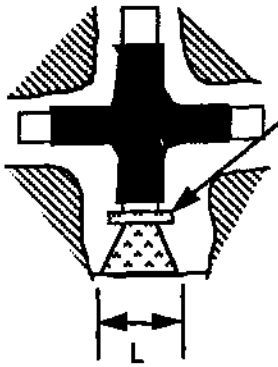


300 x 300 x 100
CONCRETE BLOCK

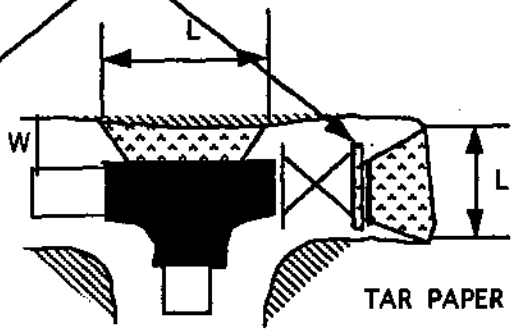
TEE WITH CAP



Note 1



CROSS WITH PLUG



TAR PAPER

TEE WITH VALVE

Note 1:
WHERE GROUND CANNOT BE EXCAVATEDTO FREE STANDING UNDISTURED SOIL. SMALL PLANK SHEET PILING SHALL BE DRIVEN TO PROVIDE UNDISTURED THRUST AREA. PILING TO BE DRIVEN PRIOR TO EXCAVATING FOR THRUST BLOCK. PILING SHOULD BE USED ONLY BELOW THE PERMAMENT WATER TABLE.

FOR DETAILS SEE SF - 5B

NOT TO SCALE

TOWN OF COMOX			TITLE THRUST BLOCKING	STANDARD DWG. NO. SF - 5A
DRAWN BY: GB	DATE: 91/07/30	APPROVED BY: FP		

"Appendix F"
Amended by
Bylaw No. 1378/Nov. 7/01

MINIMUM THRUST AREA FOR FITTINGS AT 1030 kPa PRESSURE AND FOR SOIL WITH MIN. BEARING OF 96 kPa
(NOT TO BE USED FOR SOFT CLAY, MUCK, PEAT, ETC.)

TYPE OF FITTING	FITTING SIZE	OUTSIDE OF FITTING TO BEARING	RECESS IN TRENCH WALL	LENGTH	HEIGHT
	D	W	WR	L	H
90° BEND	150	300		920	460
	200	350		1070	610
	250	380		1450	760
	300	400		1650	920
45° BEND	150	300		460	460
	200	350		610	610
	250	380		760	760
	300	400		920	920
22 1/2° BEND	150	300		460	460
	200	350		610	610
	250	380		840	760
	300	400		920	920
TEE	150	300		610	460
	200	350		760	610
	250	380		990	786
	300	400		1220	920
CROSS	150	300		610	460
	200	350		760	610
	250	380		920	760
	300	400		1220	920
45° WYE	150	300	300	460	460
	200	350	400	610	610
	250	380	500	760	760
	300	400	600	920	920
REDUCER	150	300	150	460	460
	200	350	200	610	610
	250	380	250	760	760
	300	400	300	920	920
CAPS WITH PLUG (IF NOT BELTED)	150	300		460	460
	200	350		610	610
	250	380		760	760
	300	400		920	920

This is a consolidated version prepared for convenience

TOWN OF COMOX

TITLE

THRUST BLOCKING

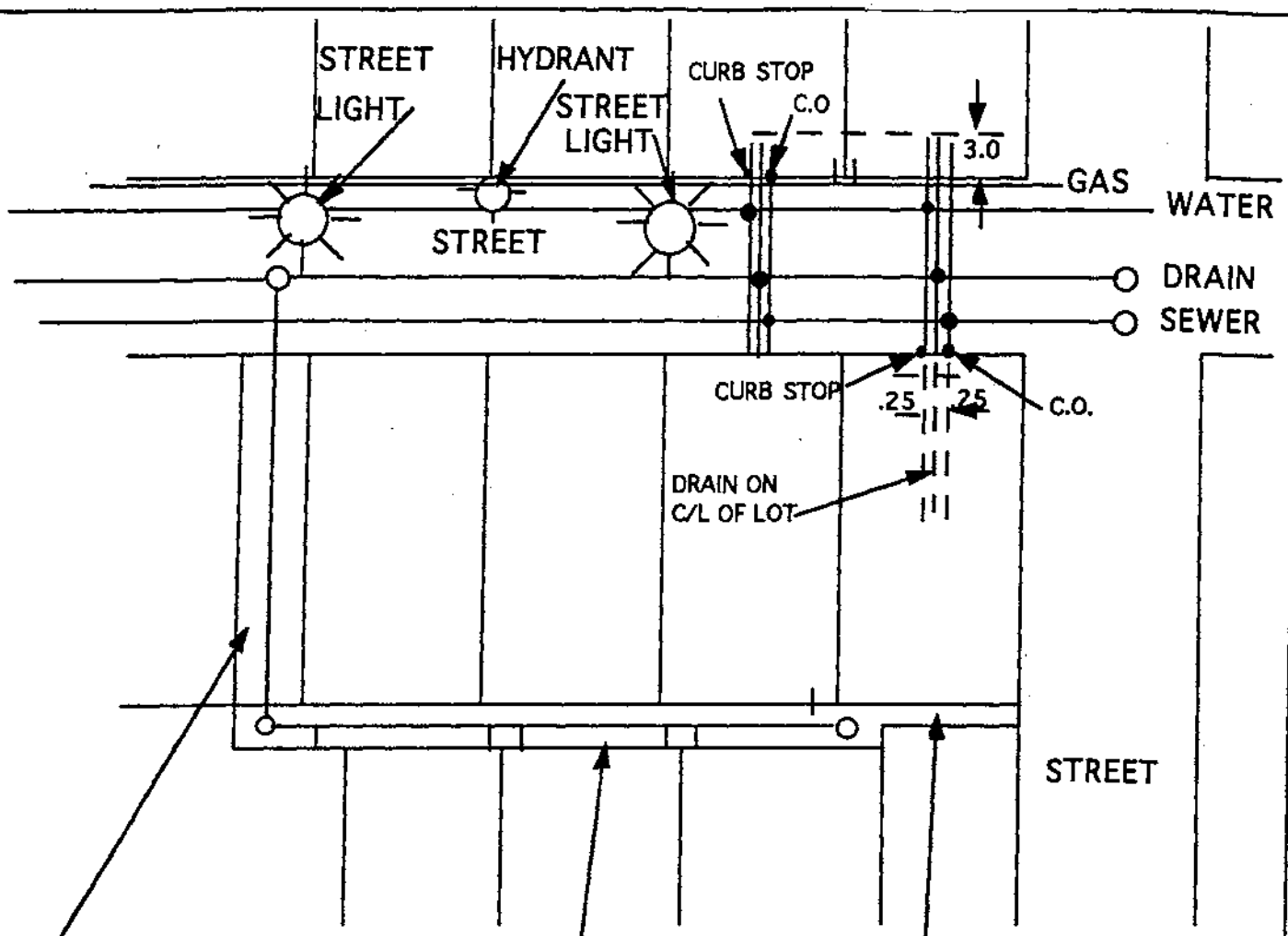
STANDARD DWG. NO.

SF - 5B

DRAWN	DATE:	APPROVED
BY: GB	91/07/30	BY: FP

"Appendix F"
Amended by
Bylaw No. 1378/Nov. 7/01

This is a consolidated versio
prepared for convenience
purposes only.



NOT TO SCALE

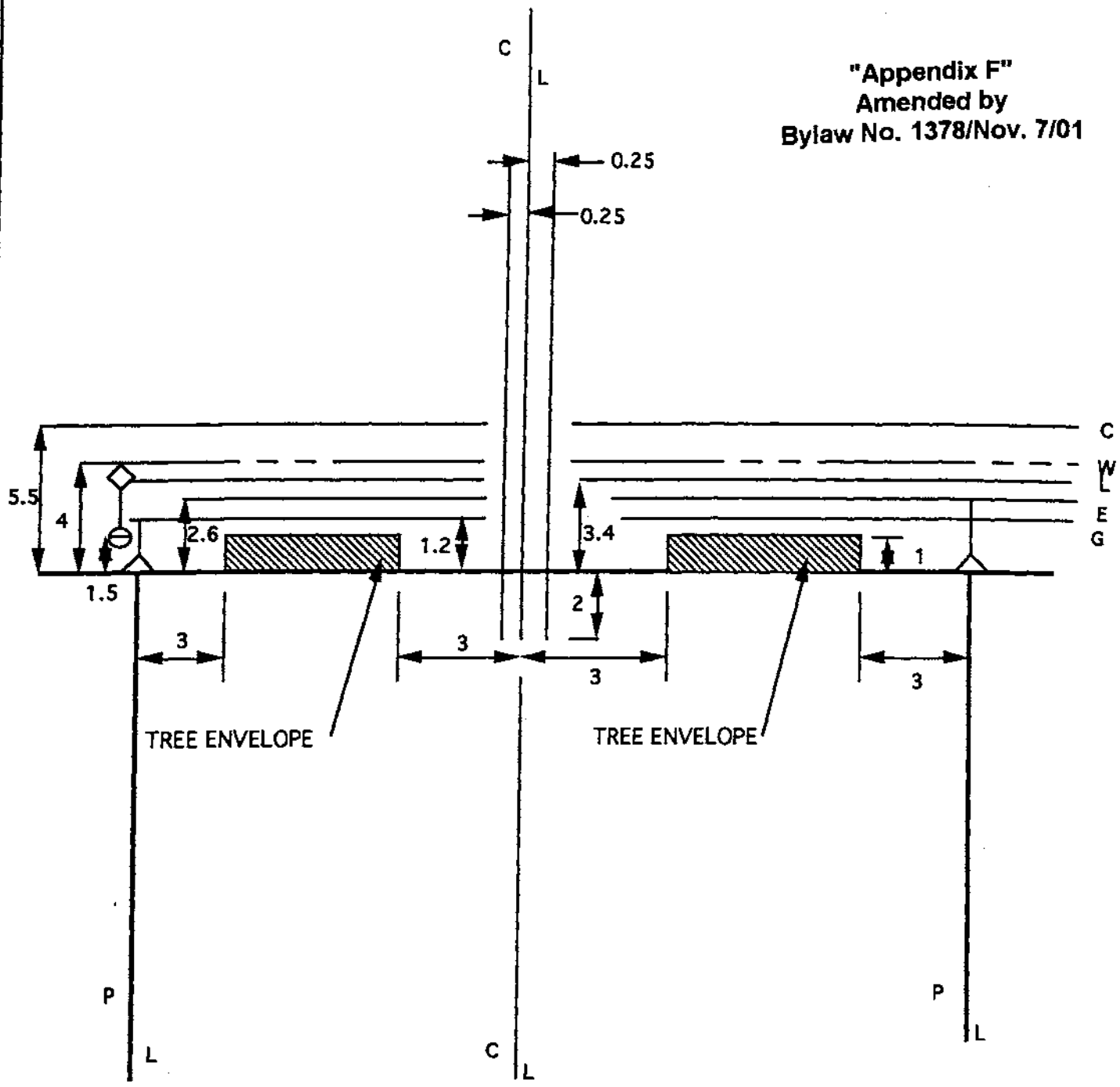
ALL DIMENSIONS IN METERS UNLESS OTHERWISE SHOWN.

TOWN OF COMOX			TITLE: PREFERRED LOCATIONS OF BUILDING SERVICES	STANDARD DWG. NO. SF - 6
DRAWN BY: GB	DATE: 91/07/16	APPROVED BY: FP		

"Appendix F"
Amended by
Bylaw No. [illegible]

This is a consolidated version prepared for convenience purposes only.

"Appendix F"
Amended by
Bylaw No. 1378/Nov. 7/01



ALL DEMENSIONS IN METRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE	STARDARD DWG. NO.
			SERVICE LOCATIONS & TREE ENVELOPES	SF - 7
DRAWN BY: GB	DATE: 92/09/14	APPROVED BY: RB		

TOWN OF COMOX
SUBDIVISION AND DEVELOPMENT SPECIFICATIONS

APPENDIX G
SPECIFICATIONS FOR UNDERGROUND WIRING AND STREET LIGHTING

For list of Standard Plans, see Appendix B, Page 10.

APPENDIX 'G'

SPECIFICATIONS FOR UNDERGROUND WIRING AND STREET LIGHTING

Underground Wiring Specifications

1.1 The requirements of this Appendix G apply to underground wiring and ornamental street lighting. The requirements apply equally to overhead wiring and/or wood pole mounted street lights insofar as they are applicable.

1.2.1 With respect to subdivision, all wiring shall be underground, except where: **(#1653 Feb 16/11)**

1.2.1.1 the development is adjacent to that portion of Butchers Road commencing at a point 60 metres south from the north west corner of Lot 12, District Lot 186, Plan 449 (392 and 404 Butchers Road) and terminating at the intersection of Butchers Road and Lazo Road where all wiring shall be overhead.

1.2.1.2 the development is within a residential zone where one parcel will be split into two provided the parcel can connect directly to existing overhead wiring. **(#1959 Aug 5/20)**

1.2.2 With respect to development:

1.2.2.1 within DPA No. 7 Downtown and DPA No. 14 Street Oriented Townhouse Multi-Family, as defined in Town of Comox Official Community Plan Bylaw 1471, all wiring shall be underground.

1.2.2.2 for lands abutting Comox Avenue or Beaufort Avenue between Ellis Street and Stewart Street and within DPA No. 14 Street Oriented Townhouse Multi-Family, as defined in Town of Comox Official Community Plan Bylaw 1471, all wiring shall be underground.

1.2.2.3 excluding lands within DPA No. 7 Downtown and DPA No. 14 Street Oriented Townhouse Multi-Family, as defined in Town of Comox Official Community Plan Bylaw 1471, all wiring shall be underground unless the development can connect directly to existing overhead wiring. **(#1551 Feb 7/07) (#1653 Feb 16/11)**

1.3 Underground wiring shall conform when required to the Canadian Electrical Code as revised and adopted by the Province of British Columbia, and to the requirements of the electrical, telephone and cable television utilities. The ducts and conductors should be laid in a straight line at a constant offset and uniform grade. Where the road allowance curves, the ducts and cables may be laid on a horizontal curve at a constant offset. The location and offset of conductors along highways, lanes and walkways shall be in accordance with Standard Plan SC-5. Roadway crossings shall be laid in a straight line and where possible, should be at right angles to the centre-line of the roadway. Design drawings shall be submitted to the Town for approval before construction.

Street light service connections and distribution cables shall conform to these requirements wherever possible.

1.4 Surface and subsurface electrical, telephone and cable television appurtenances within highways shall be designed and located so as not to interfere with other street fixtures such as hydrants, catch basins and driveways. Such appurtenances should be located on the same offset as the cables they access, and must not be directly above water mains or water service connections.

Above ground appurtenances should not be installed within the right-of-way of any lane, pedestrian connection, or greenways network-dedicated walkway, or the access portion of any panhandle lot. Appurtenances ;may be installed in easements on private property. **(#1551 Feb 7/07)**

1.5 The as-constructed drawings shall show the locations of
- all buried cables and underground ducts
- all above ground appurtenances
- all underground splicing and pull chambers

Use of Sodium Street Lights

2.1 All new street lights shall be of the high pressure sodium type, with the wattage shown in Table G-1.

Design of Street Lighting

3.1 The level of street illumination shall be determined by the Consultant so as to ensure the night time safety of motorists and pedestrians and to facilitate an orderly and safe flow of traffic but, in no case, shall the illumination be less than 0.6 foot candles. The ratio between the average lighting level and the minimum level shall not exceed 6 times.

3.2 Street lights shall be installed at every highway intersection and bend.

3.3 A midblock street light shall not be located at the same lot line as a hydrant on the same side of the highway. The restrictions on location of street lights apply equally to utility poles.

3.4 Street lights should be on one side of the highway and, wherever possible, on the same side as the underground electrical supply. The street light bases shall be located on the offset shown in Standard Plan SC-4 for wood pole mounted street lights and SC-5 for ornamental street lights in the underground wiring areas.

3.5 Additional street lights shall be installed on pedestrian connections where there is not inter-visibility of the street lights at each end. Lanes need not be illuminated. **(#1551 Feb 7/07)**

3.6 In underground wiring areas with ornamental street lights, davit poles shall be used on subdivision and/or development highways at or near their intersections with arterial and collector highways. Elsewhere within the subdivision and/or development post-top lights may be used.

3.7 In underground wiring areas, electric power shall be delivered from the service connections to the street light system at integral distribution bases.

An integral distribution base is a special steel base which not only supports a street light standard, but which also has its lower portion enlarged so as to accommodate electrical controls, and from which power is distributed to other street lights in the vicinity.

3.8 In underground wiring areas, the electrical service connections for street lights shall be laid, as far as is practicable, along the same offset as the main underground wiring from the electrical source to a point opposite or adjacent to the distribution base, and thence in a straight line to the distribution base. Crossings under the roadway should be at right angles to the centerline of roadway. Depth of bury shall not be less than 0.6 m below finished grade.

3.9 In underground wiring areas, the distribution cables and ducts from the distribution base to the individual light standards may be laid at the same offset as the main underground wiring, or may be laid on the same offset as the light standards they serve. Roadway crossings and depth of burry shall be as set out in the preceding paragraph 3.8.

Materials

4.1 To ensure the interchangeability of ornamental street lighting hardware within the Municipality, all materials used in new ornamental street lighting designs shall conform to the values and dimensions in Table G-1. (Imperial measurements are also shown because much lighting materials is still ordered and supplied in Imperial units, and exact fit is essential).

Table G-1 Hardware for Ornamental Street Lighting (#1567 Aug 15/07)

Type of Standard	**Davit Polygonal Steel**		**Decorative Post Top Round Steel**	**Distribution Base**
Base to fit Bolt Circle (mm)	280 mm (11”)		244 mm (9 5/8”)	380 mm (15”)
Bolt Size	25 mm (1”)		197 – 229 mm (7 ¾” - 9”)	25 mm (1”)
Mounting Heights	7.6 – 11.0 m		4.88 m	0.9 m
Davit Span	2.5 m		-	-
Tenon Diameter	60 mm (2 3/8”)		76.2 mm (3”)	-
Tenon Min. Length	200 mm (7”)		76.2 mm (3”)	-
	Bulb Alone (W)	Bulb plus Ballast (W)	Bulb Alone (W)	Bulb plus Ballast (W)
Bulb Powers	100	130	100	130
High Pressure	150	190	-	-

All luminaires must use 55 volt lamp operating voltage. Control shall be by photo-electric cell with a test switch located at the distribution base.

4.2 Luminaires shall be of similar design and appearance to other luminaires in general use throughout the Town. They shall be equipped with high impact resistant plastic or other approved vandal-proof lenses. Cutoffs should be installed where necessary to prevent glare. Luminaires shall be equipped with integral ballasts, having ready access for inspection and maintenance. Each ornamental lighting fixture shall be individually protected by an in-line fuse accessible from the hand hole.

4.3 Davit-style light standards shall be polygonal steel poles and shall be of welded one-piece uniformly tapered construction; Decorative Post Top Street Lights shall be round steel poles. All

ornamental light standards shall be in accordance with ASTM A 242, and shall be designed to withstand wind loads equivalent 160 km/h when carrying the recommended fixture. **(#1567 Aug 15/07)**

4.4 Ornamental lighting standards shall have a secure hand hole access near the base, and a readily accessible grounding stud. The hand hole shall not be smaller than 100 x 75 mm, and shall be equipped with a bolted cover. The hand hole shall not face the road. The base shall include nut cover assemblies and leveling shims.

4.5 An integral distribution base shall be fully interchangeable with the standard distribution base No. TB1636 by Polesystems Ltd., and shall be of the same material as the street light assembly of which it forms a part.

4.6 Ornamental lighting standards and distribution bases shall be hot dip galvanized. Galvanizing of standards shall be in accordance with ASTM A 388, and bolts and hardware in accordance with ASTM A 153.

4.7 The electrical equipment in the ornamental pole bases shall conform to Standard Plans SG-3, 4 and 5.

4.8 Decorative Post Top Street Lights shall be black in colour, and shall be constructed in accordance with Table G-1 Hardware for Ornamental Street Lighting and Standard Drawing SG-6 Decorative Post Top Street Lights. Once Decorative Post Top Street Lights have been utilized on a highway, new development along that highway or along any directly or indirectly intersecting highways must provide continuous Decorative Post Top Street Lights until new development along a highway: **(#1567 Aug 15/07)**

4.8.1 interfaces with an area that has a different existing light standard; or

4.8.2 interfaces with an arterial, major or minor collector road.

4.9 Single-family or two-family infill housing which does not adjoin a highway utilizing Decorative Post Top Street Lights may not use Decorative Post Top Street Lights. All other residential uses, and commercial and industrial uses may use a Decorative Post Top Street Light where development comprises part or all of a road section between two intersecting roads (e.g. a city block) which has not been developed. **(#1567 Aug 15/07)**

Installation and Testing

5.1 Concrete bases for ornamental light standards shall be constructed in accordance with Standard Plan SG-1. Concrete bases for internal distribution bases shall be in accordance with Standard Plan SG-2/

5.1.1 The upper 300 mm of concrete shall be formed to the dimensions shown. The lower concrete may be poured against undisturbed soil, if suitable, provided that the dimensions are not less than those on the standard plan. Pre-cst bases may be used.

5.1.2 The bolts shall be placed using a template. The top of the concrete base shall be trowelled smooth and self-draining.

5.1.3 Concrete in light standard bases shall have a minimum compressive strength of 28 MPa at 28 days. Light standards shall not be erected until 7 days after pouring bases.

5.2 Light standards shall be erected plumb. Davits should be at right angles to the centre-line of the roadway except where otherwise specified.

5.3 The wiring in the base of an ornamental street light shall be in accordance with Standard Plan SG-3.

The electrical equipment and wiring in a distribution base shall be installed in accordance with Standard Plan SG-4 and SG-5.

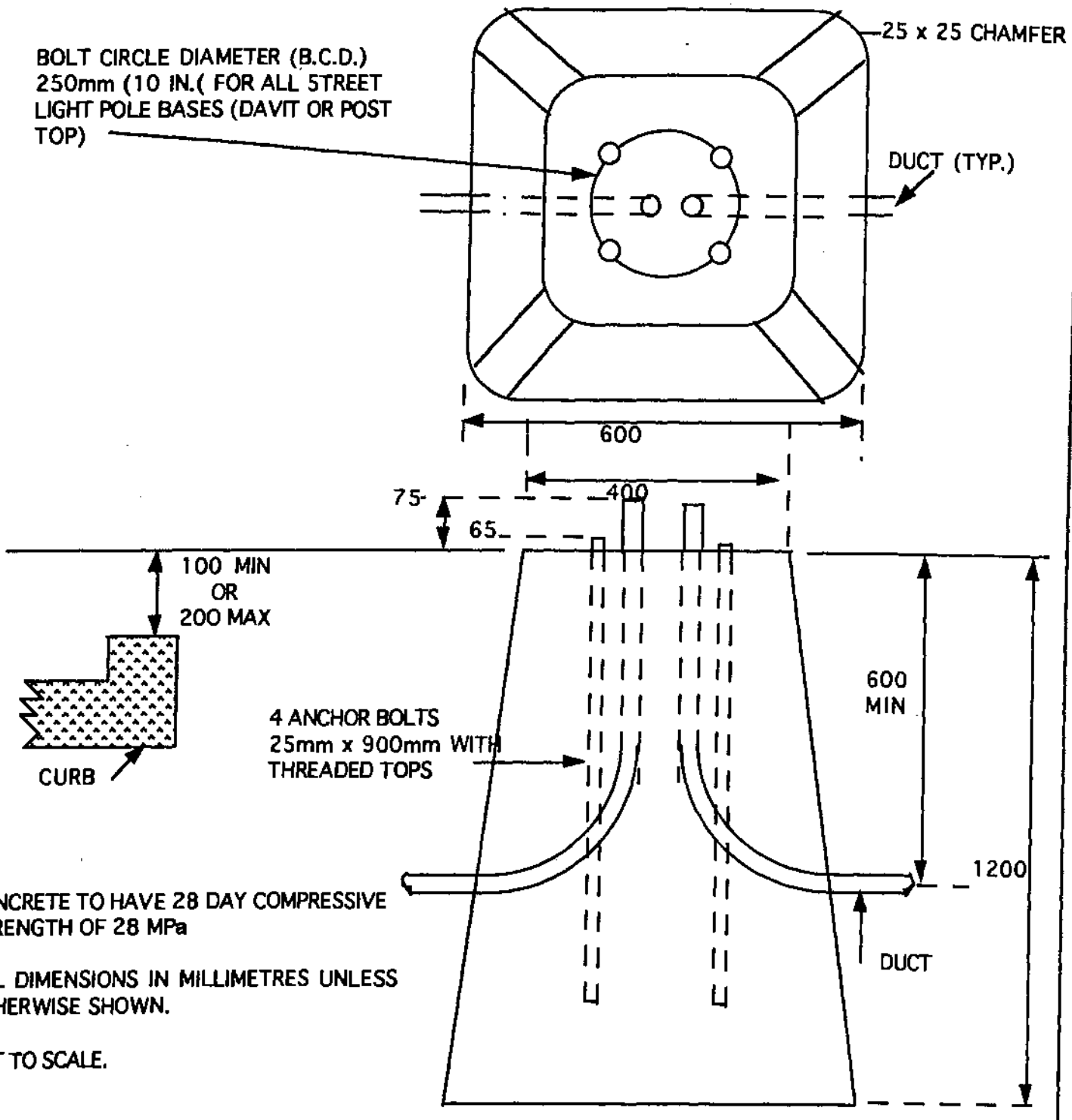
5.4 Upon completion of the work, the lighting system shall be tested under night conditions. The owner shall provide the Municipal Engineer with a certificate of approval of the electrical work from the Electrical Inspector of the Provincial Ministry of Labour.

5.5 Locations of all street lights and any associated underground wiring shall be included in the as-constructed drawings. Where required, the Consultant shall supply a plan showing actual roadway centre-line illumination levels at intervals not exceed 15 m.

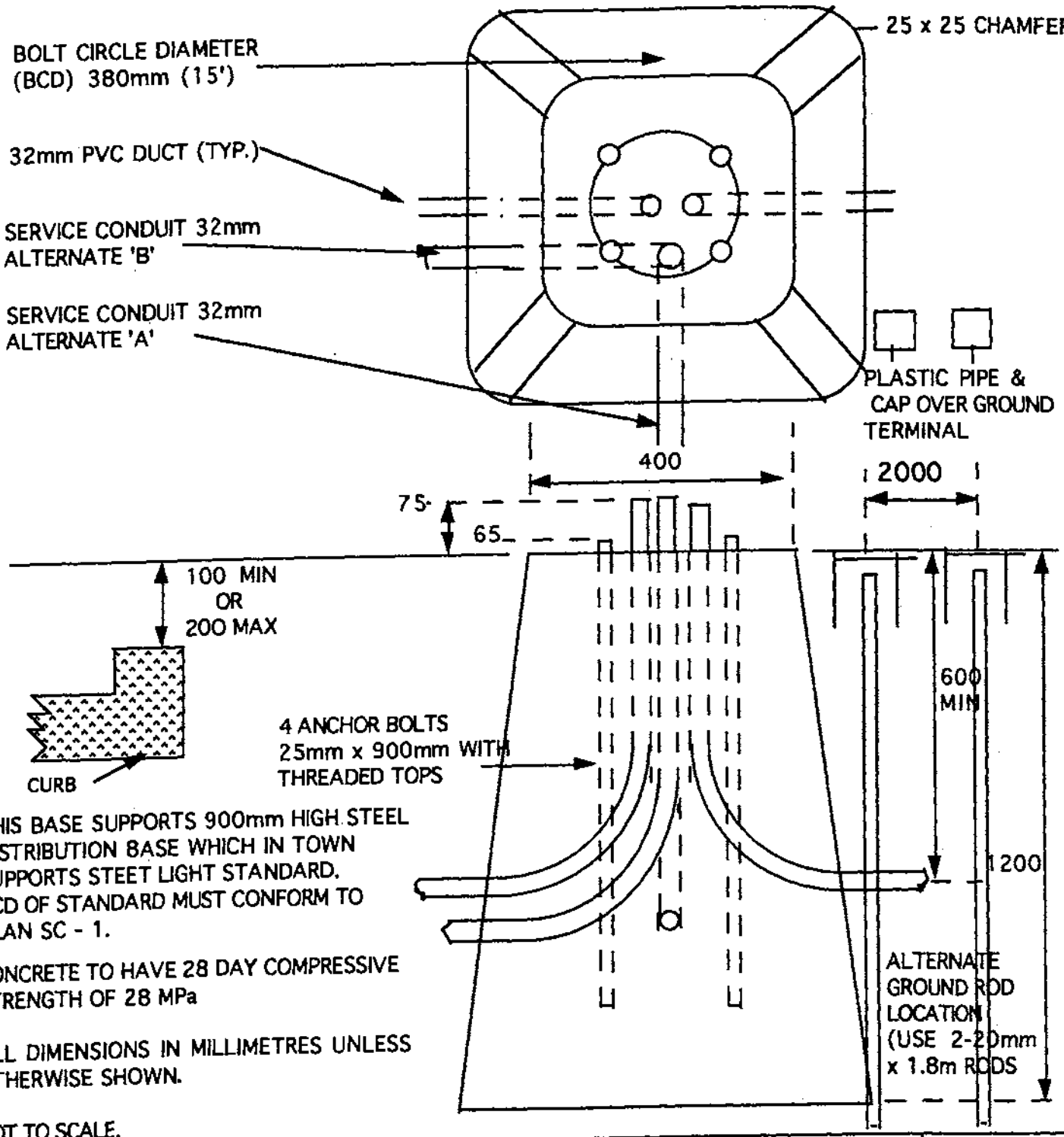
INSERT

Standard Drawings

SG-1	Concrete Base for Street Light Standard
SG-2	Concrete Base for Distribution Base Standard
SG-3	Wiring Schematic for Street Light
SG-4	Distribution Base and Equipment
SG-5	Wiring Schematic for Distribution Base
SG-6	Decorative Post Top Street Light Standard **(#1567 Aug 15/07)**



TOWN OF COMOX			TITLE: CONCRETE BASE FOR STREET LIGHT STANDARD	STANDARD DWG. NO. SG - 1
DRAWN BY: GB	DATE: 91/07/19	APPROVED BY: FP		



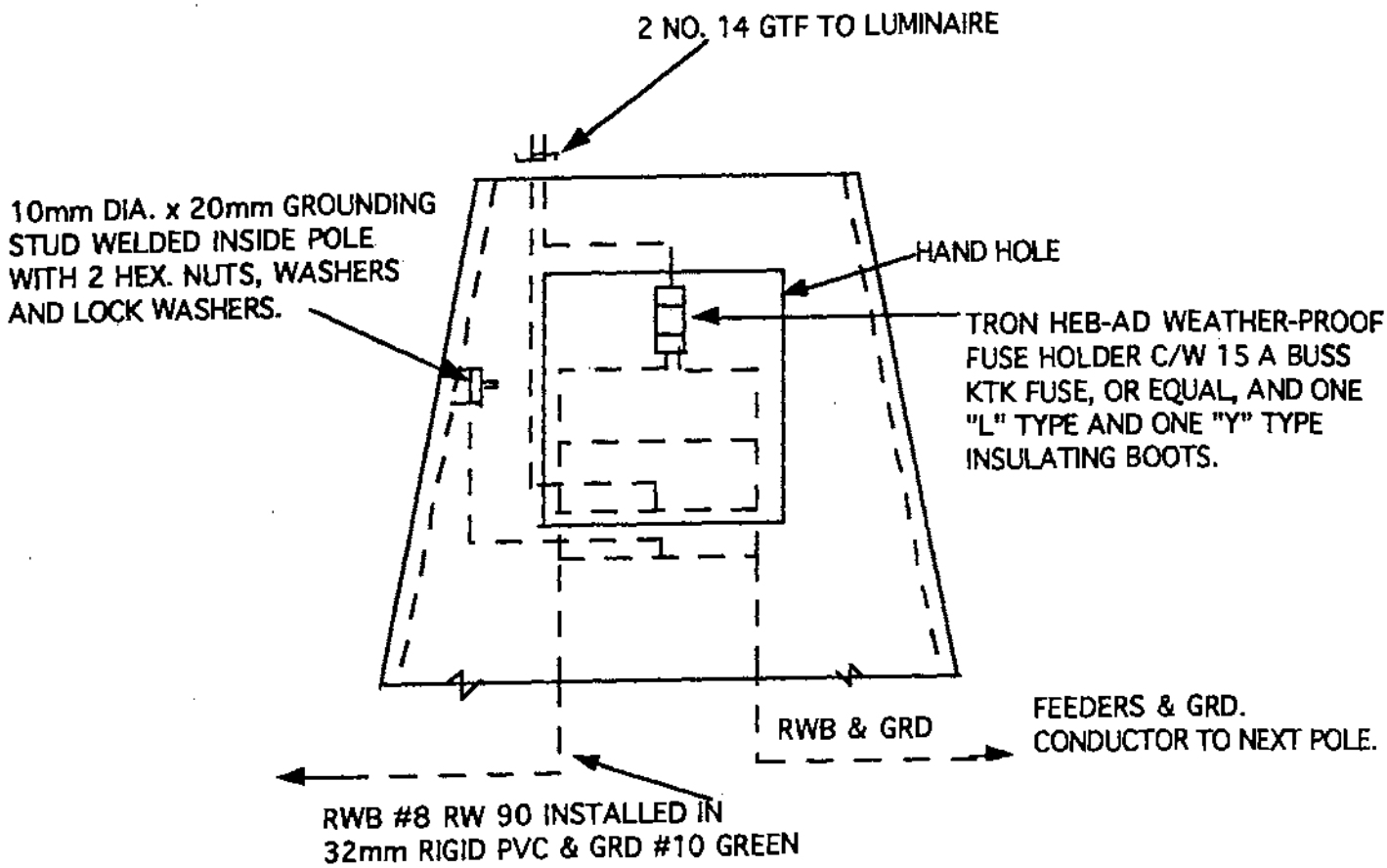
THIS BASE SUPPORTS 900mm HIGH STEEL DISTRIBUTION BASE WHICH IN TOWN SUPPORTS STEET LIGHT STANDARD. BCD OF STANDARD MUST CONFORM TO PLAN SC - 1.

CONCRETE TO HAVE 28 DAY COMPRESSIVE STRENGTH OF 28 MPa

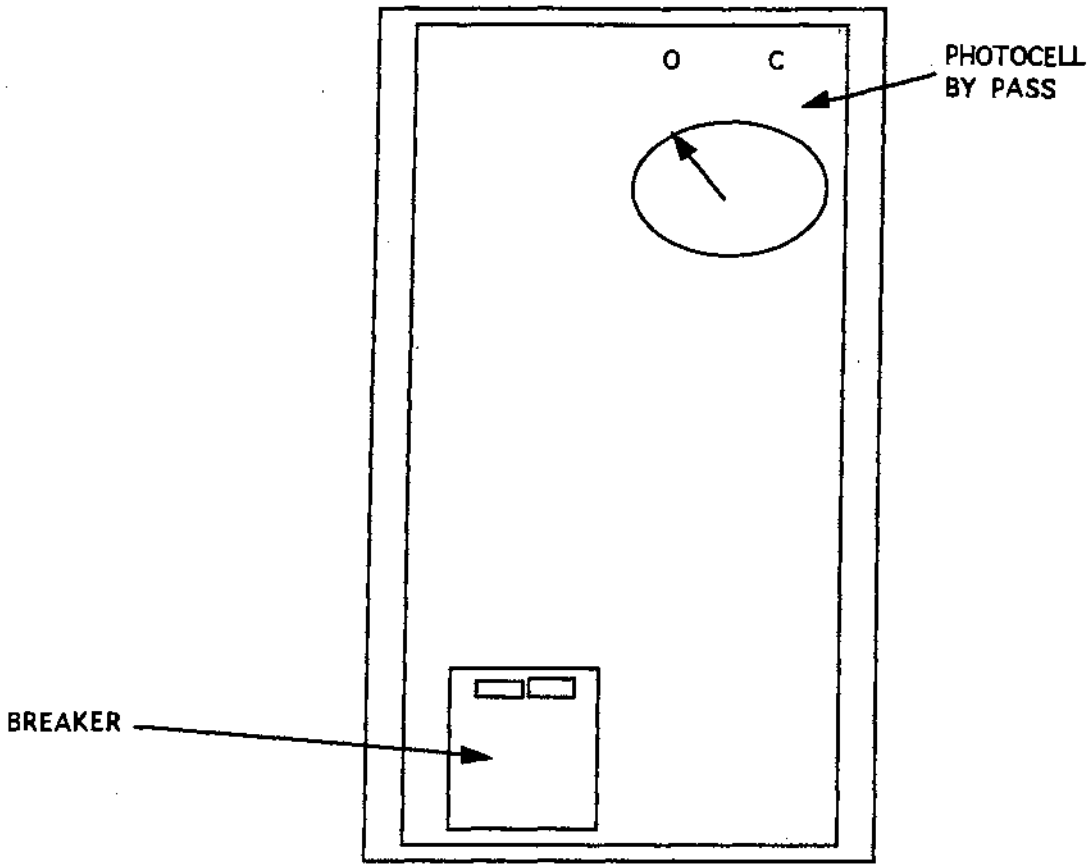
ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: CONCRETE BASE FOR DISTRIBUTION BASE STANDARD	STANDARD DWG. NO. SG - 2
DRAWN BY: GB	DATE: 91/07/19	APPROVED BY: FP		



TOWN OF COMOX			TITLE: WIRING SCHEMATIC FOR STREET LIGHT	STANDARD DWG. NO. SG - 3
DRAWN BY: GB	DATE: 91/07/19	APPROVED BY: FP		



PREMANUFACTURED MAIN CONTROL PANEL CONTAINING A SERVICE ENTRANCE WITH MINIMUM 30 AMP BREAKER, 30 AMP CONTACTOR, HAND / AUTO SWITCH, ALL IN A CEMA 3 ENCLOSURE . (WEST COAST ELECTRIC LTD # MSTL 3301 OR EQUAL)

NOT TO SCALE

TOWN OF COMOX			TITLE DISTRIBUTION BASE AND EQUIPMENT	STANDARD DWG. NO. SG - 4
DRAWN BY: GB	DATE: 91/07/23	APPROVED BY: FP		

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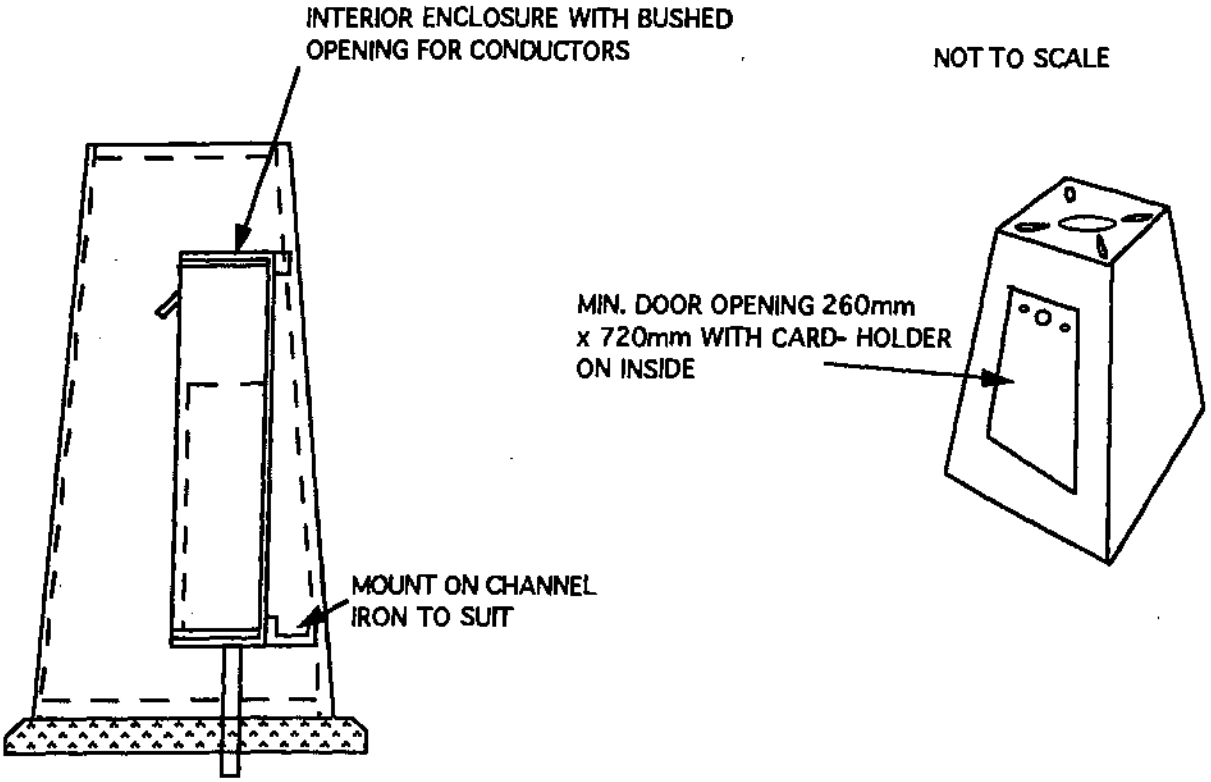
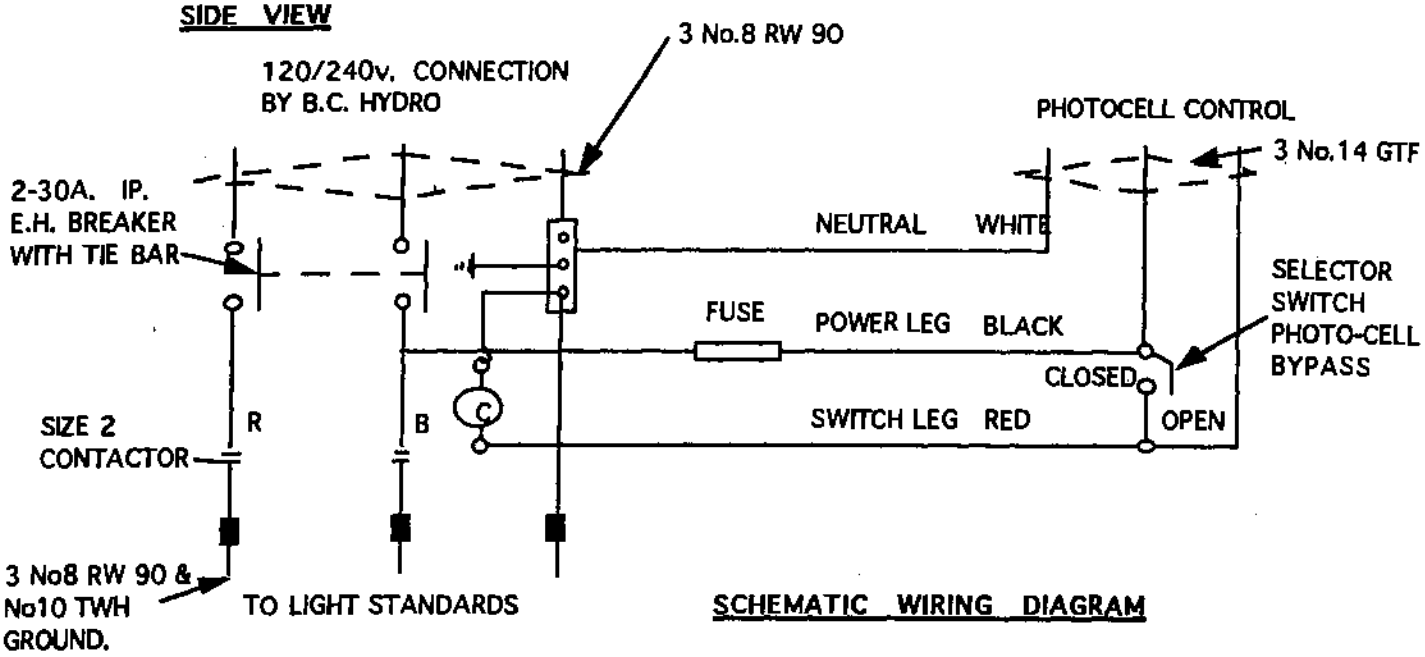
purposes only.



SIDE VIEW



SCHEMATIC WIRING DIAGRAM

TOWN OF COMOX			TITLE WIRING SCHEMATIC FOR DISTRIBUTION BASE	STANDARD DWG. NO. SG - 5
DRAWN BY: GB	DATE: 91/07/29	APPROVED BY: FP		

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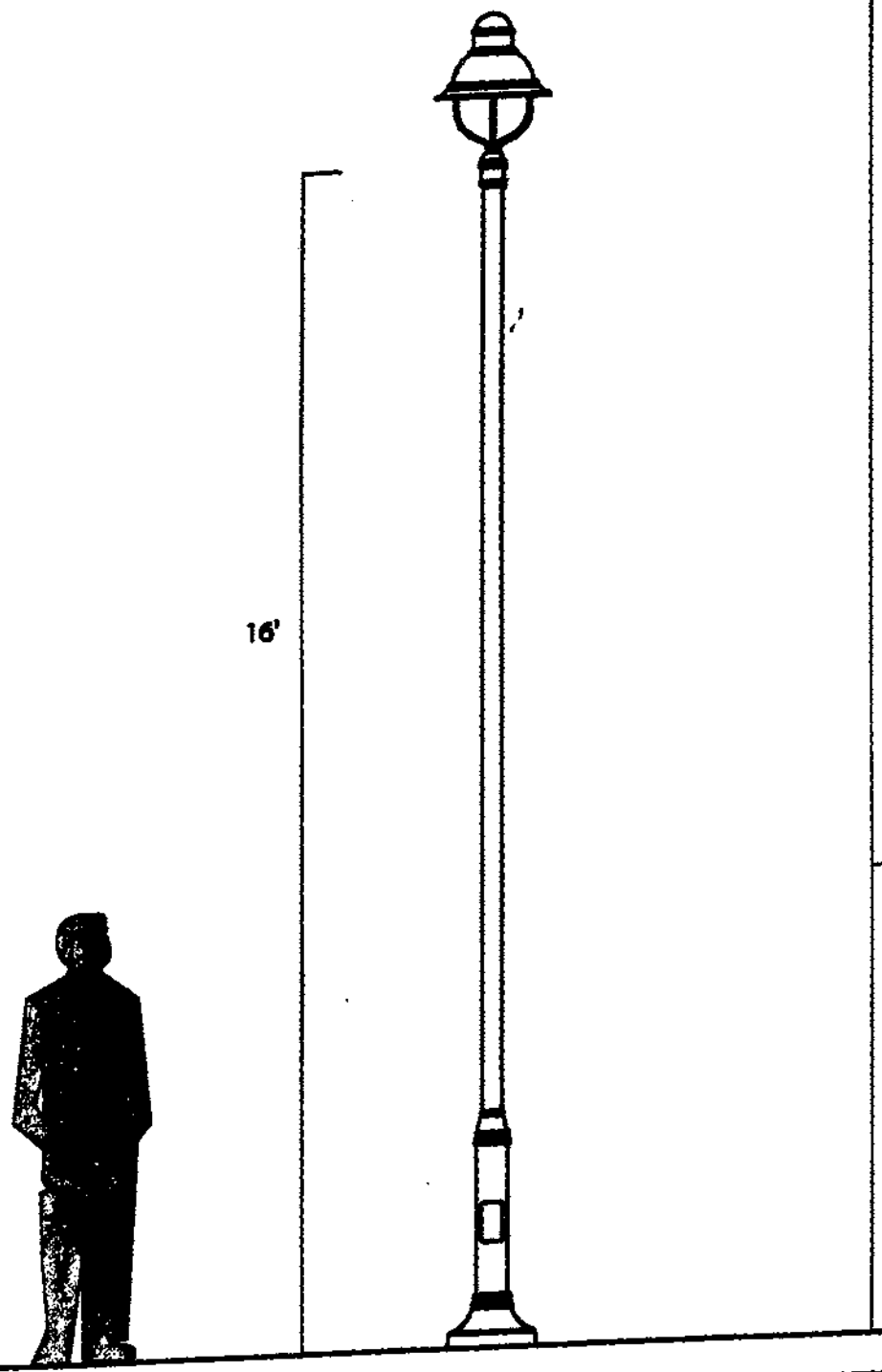
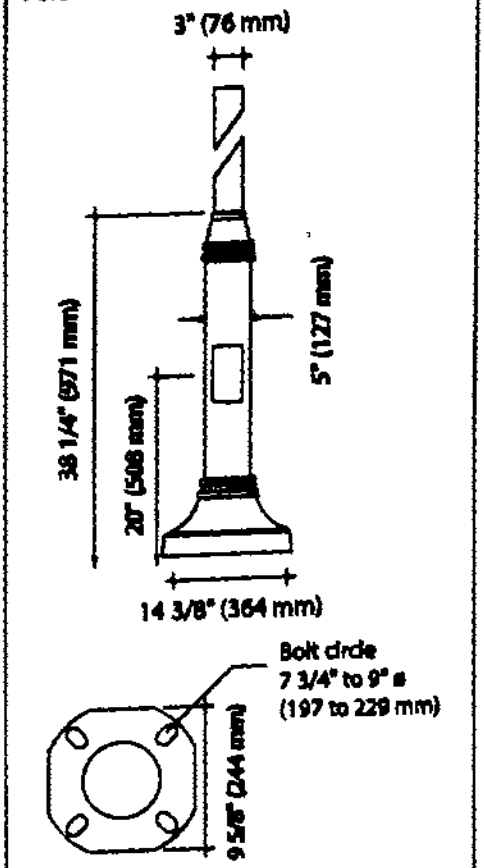
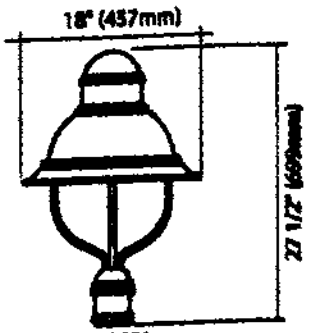


Pole and Base Detail



Luminaire Detail



TOWN OF COMOX	TITLE DECORATIVE POST TOP STREET LIGHT STANDARD	STANDARD DWG. NO SG - 6

(#1587 Aug 15/07)

Date: January 1998

This is a consolidated version of Bylaw 1261 prepared for convenience purposes only

TOWN OF COMOX
SUBDIVISION AND/OR DEVELOPMENT SPECIFICATIONS

APPENDIX H
SPECIFICATIONS FOR STREET TREE PLANTING

AND
STORM WATER POND
LANDSCAPING
(#1567 Aug 15/07)

This is a consolidated versio prepared for convenience purposes only.

TOWN OF COMOX

BYLAW NO. 1069

APPENDIX 'H'

SPECIFICATIONS FOR STREET TREE PLANTING

1.1 Street trees must be planted for all new roads or road extensions. No planting will be required for infill subdivision and/or development unless the infill comprises part or all of a road section between two intersecting roads (e.g., a city lock) which has not been developed.

1.2 Street trees, excluding those for Greenway Network – Adjacent to Local Street as shown in Map C-1, shall be planted in accordance with the Drawings labeled SH-1, SF-7, and SC-5; and shall be spaced between 15 - 22 metres for the trees in Table H-I; 7.5 metres to 11 metres for the trees in Table H-III; street trees for Greenway Network – Adjacent to Local Street as shown in Map C-1, shall be selected from Table H-IV, shall be spaced 15 metres, and shall be planted in accordance with the Drawings labeled SH-1 and SF-7 and Figure C-1. **(#1551 FEB 7**

1.3 All trees shall be planted within 60 days of the "Notice to Proceed" which will be issued by the Town when approximately 80% of the lots have been developed. No actual planting shall take place until the notice to proceed is given.

Completion of the works shall be guaranteed to the Town by way of an irrevocable Letter of Credit or other acceptable security in the amount of 120% of the estimated cost of the works. The deposit shall be based on a preliminary planting plan and estimate prepared by the consultant.

1.4 Prior to planting any trees, the consultant shall submit for approval a construction plan which identifies the tree varieties, sizes and planting locations.

2.1 Street Trees shall be selected by the Developer in accordance with Section 3.2, 3.3 and 3.4 and Tables H-I, H-II, H-III except where shown on Map C-1 as Greenways Network – Adjacent to Local Street, in which case Street Trees shall be selected in accordance with Table H-IV. **(#1551 FEB 7/07**

3.1 Each tree shall be planted in accordance with the specifications on the drawing numbered SH-1 (tree planting detail)

3.2 Each road section separated by intersecting streets shall be planted with the same variety of trees.

3.3 Intersecting streets may not use the street tree variety planted on the roads with which they intersect.

3.4 Each tree variety may not comprise more than 20% of all trees planted under the programme.

This clause will be effective 2 years after the street tree planting programme has been in effect. The prunus species shall not comprise more than 60% of all trees planted.

3.5 If Municipal services are located within 3 feet of the surface at the planting location, a 0.8 m by 1.5m impervious sheet (e.g., fiberglass or plywood) must be placed in the planting pit between the tree and the services.

Insert:

This is a consolidated version prepared for convenience purposes only.

(#1567 Aug 15/07)

SPECIFICATIONS FOR STORMWATER POND LANDSCAPING

4.1 Retention and detention ponds shall be landscaped and underground irrigation provided in accordance with Standard Drawings SH-2 and SH-3 and BC Landscape and Nursery Association standards. Alternative plant species as contained in Table H-5 may be substituted for those contained in Standard drawings SH-2 and SH-3.

4.2 Landscaping shall include a mixture of trees and shrubs so as to create focal points and visual diversity to a standard equal or exceeding that shown in Standard Drawing SH-3.

4.3 30% of shrubs and trees shall be shrubs that encourage birds in accordance with Table H-5.

4.4 Each tree variety may not comprise more than 20% of all trees planted under the program.

4.5 In retention and detention pond areas planting shall occur in the spring to give root systems time to develop.

4.6 Prior to planting any plants, the developer shall submit for approval an irrigation plan and landscaping plan which identifies top soil depth, the plant varieties, plant sizes, planting details and planting locations in substantial accordance with Standard Drawing SH-3 and Table H-5 and meet requirements of BCLNA Standards, as published by the BC Landscape and Nursery Association. Landscaping plans shall itemize plants by species. Irrigation plans shall include meter, meter setter and controller.

4.7 The developer must submit a security in the amount of10% of the actual cost of planting and irrigation; this bond shall be held by the Town for a 2 year maintenance period as a security that 80% of plant material will remain free of defects and survive for two full growing seasons. Mortalities greater than 20% within each species shall be replaced by the developer.

5.1 Where a storm water retention or detention pond abuts an existing or proposed dedicated walkway or pedestrian connection, a connecting trail of minimum 2.0 metres in width shall be provided along the pond. Trails shall be serviced with a storm water management system to the satisfaction of the approving officer.

5.2 Where a storm water retention or detention pond abuts two or more existing or proposed streets, lanes or combinations thereof, a trail of minimum 2.0 metres in width shall be provided along the pond. Trails shall be serviced with a storm water management system to the satisfaction of the approving officer.

5.3 All trails shall be surfaced with concrete or asphalt.

5.4 The width and location of trails shall be varied to accommodate required engineering, and existing trees and natural features of public value and create public focal points and visual diversity.

5.5 Service routes of 3 meters in width shall be provided to facilitate maintenance crews accessing all pertinents, such as silt tray and outlets.

6.1 A silt tray must be included as part of ponds.

7.1 No fish shall be introduced into the ponds.

8.1 Ponds shall have baffles in substantial accordance with Standard Drawing SH-4.

This is a consolidated version prepared for convenience purposes only.

Table H-1 (2 pgs.)	Recommended Street Trees
Table H-2	Non-recommended Street Trees
Table H-3	Very Small Trees
Table H-4	Recommended Street Trees **(#1551 Feb7/07)**
Table H-5	Recommended Plantings for Storm Water Ponds **(#1567 15 Aug/07)**

Standard Drawing SH-1	Tree Planting Detail
Standard Drawing SH – 2	Detention and Retention Pond Irrigation (Typical) **(#1567 Aug 15/07)**
Standard Drawing SH – 3	Detention and Retention Pond Landscaping (Typical) **(#1567 Aug 15/07)**
Standard Drawing SH – 4	Stormwater Pond Baffle Detail **(#1567 Aug 15/07)**

TABLE H-I
RECOMMENDED STREET TREES

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Acer davidii (Davids Maple)		10		Y Pu	
Acer griseum (Paperbark Maple)		14		R	
Acer platanoides (Norway Maple)	'Columnare' 'Crimson King' 'Globosum' 'Summershade', etc.	8-20	Y	Y	
Acer pseudoplatanus (Sycamore Maple)		12		-	
Acer rubrum (Red Maple)		6-16		R	
Aesculus hippocastanum (Horsechestnut)	esp. 'Baumannii'	20-25	W	-	Selected variety is fruitless
Aesculus x carnea (Red Horsechestnut)	'Briotii'	8-12		-	
Amelanchier laevis (Allegany Serviceberry)		6-10	W	Y R	Non-aggressive rooting
Amelanchier canadensis (Shadblow Serviceberry)		5-8	W	Y R	Greyish young foliage
Carpinus betulus (European Hornbeam)		10-12		Y	
Carpinus caroliniana (American Hornbeam)		10-12		R	
Cercidiphyllum japonica (Katsura Tree)		10-20		S	Protect from hot sun and dry wind
Cercis canadensis (Eastern Redbud)		6-12	Pu - P	Y	Some horizontal branching in age
Cornus florida (Flowering Dogwood)		5-10	W	S	
Davidia involucrata (Dove Tree)		10-20	W		Large brown fruit ??on over winter
Fagus sylvatica (European Beech)	esp. 'Atropunicea' 'Purpurea' 'Cuprea'	8-25		B	Leaves purple or copper
Fraxinus americana (White Ash)	esp. 'Autumn Purple'	12-15		Pu	
Fraxinus excelsior (Europenn Ash)	'Kimberly'	12-15		-	Male
Fraxinus holotricha	'Moraine'	12		Y	Produces few seeds
Fraxinus latifolia (Oregon Ash)		10			
Fraxinus ornus (Flowering Ash)		15-20	W	Y	
Fraxinus pennsylvanica lanceolata	'Marshal' 'Summit' etc.	12-18		Y	Few or no seeds
Fraxinus (Westhof Glory)		15		Y	Sturdy
Ginkgo biloba (Maidenhair tree)	(male only)	20		Y	Male trees only
Ginkgo biloba (Maidenhair tree)	'Sentry' (male only)	18		Y	Male trees only
Gleditsia tricanthos inermis (Honey Locust)	'Skyline' 'Shademaster' etc.	10-18		-	
Halesia Monticola (Mountain Silver Bell)		12-18	Y		
Liquidamber styraciflua (American Sweet Gum)		10-20		S	Bark deeply furrowed
Liriodendron tulipifera (Tulip Tree)	'Arnold' 'Fastigiata'	10-22		Y	Unique tulip-shaped
Magnolia kobus (Kobus Magnolia)		9-12	W		

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Malus (Flowering Crabapple)	Winter gold & Other med. size	6-9	W		Buds pink
Malus floribunda (Japanese Flowering Crabapple)	'Plena' 'Hopa' 'Makamik'	6-9	W		Buds deep pink
Prunus blireiana (Blireiana plum)		7	P	Pu	Foliage reddish-purple
Prunus serrulata (Japanese Flowering Cherry)	esp. 'Kwanzan' 'Shirofugen' 'Ukon'	6-8	PY	R	Foliage bronze
Prunus subhirtella (Flowering Cherry)	'Autumnalis'	6-8	P		Autumn flowering
Prunus subhirtella (Flowering Cherry)	'Whitcomb'	3-8	P		
Prunus yedoensis (Yoshino Flowering Cherry)	'Akebono'	5-8	P		
Pyrus calleryana 'Bradford' (Bradford Pear)		5-8	W	R	
Quercus Coccinea (Scarlet Oak)		6-15		S	
Quercus garryana (Oregon White Oak)		12-27			Roots non-aggressive deep
Quercus phellos (Willow Oak)		15-25		Y	Fine texture foliage
Quercus robur (Englis Oak)	'Fastigiata'	25		-	
Quercus rubra (Red Oak		18-25		R	
Quercus shumardii (Shumard Oak)		25		S	
Styrax japonica (Snowdrop tree)		9-11	W	RY	Roots non-aggressive
Tilia cordata (Littleleaf Linden)	esp. 'Greenspire' 'Rancho'	6-15	Y		Variety upright
Tilia euchlora (Crimean Linden)		8-15	Y		Summer flower
Zelkova serrata (Japanese Zelkova)		15-18		Y	A substitute for American Elm

Legend:

Flower or Autumn foliage colour codes: Bronze, Pink, Purple, Red, Scarlet, White, Yellow.

Note:

* All of the trees in Table H-I must be a minimum 2" (5 cm) caliper.

** Other varieties may be considered if there are deemed to be suitable. A landscape architect's written opinion may be required to determine suitability.

TABLE H-II
NON-RECOMMENDED STREET TREES

The following trees are not for street use due to weak wood, destructive roots, thorns, insects, disease problems and/or drooping branches.

Acer Negundo (Box Elder)
Acer Saccharinum (Silver Maple)
Allanthus Altissima (Tree of Heaven)
Albizia Julibrissin (Silk Tree)
Alnus Rubra (Red Alder)
Betula Alba (Birch
Catalpa
Crataegus Oxyacantha (Hawthorn)
Gleditsia Triacanthus (Honey Locust Horned)
Juglans sp. (Walnuts)
Malus (fruiting apple)
Plantanus sp. (London Plane)
Populus sp. (Poplars)
Prinus (fruiting cherry)
Pyrus (fruiting pears)
Quercus Palustris (Pin Oak) except "Crownright"
Robinia Pseudoacaeia (Black Locust)
Salix sp. (Willows)
Sophora Japonica (Pagoda Tree)
Sorbus Aucuparia (Mountain Ash)
Tilia americana (American Linden, Basswood)
Ulmus americana; U. parvifolia; U. Pumila (Elm; American, Chinese, Siberian).

Most conifer trees are not recommended due to site clearance problems and root system requirements.

TABLE H-III
VERY SMALL TREES

The following list of trees may be considered for areas where planting conditions are extremely poor,i.e., bedrock within one foot of the surface. Because these trees are considerably smaller, they must be planted in twice the quantity required for the trees in Table III.

VARIETY	SIZE
Maple - Rocky Mt. Glow (Grandidentatum)	1.5 meters
Japanese Maple - Palmatum Oaakakanjki	10 gallon
Dogwood - Cloud 9	10 gallon
Magnolia - Merrill	10 gallon
Magnolia - Susan	10 gallon
Crab - Malus (Professor Springer)	4 cm caliper
Magaria Soul Anglana (Saucer Magnolia)	10 gallon

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Table H-IV
RECOMMENDED STREET TREES **(#1551 FEB 7/07)**

Acer rubrum (Red Maple)	6-16	Red	
Quercus rubra (Red Oak)	18-25	Red	
Fraxinus oxycarpa (Raywood Ash)	12-15	Purple; Red	No seeds

Note:

All of the trees in Table H-IV must be 6 cm caliper/lowest branch at minimum 1.8 m height

Other varieties may be considered if they are deemed to be suitable. A landscape architect's written opinion may be required to determine viability.

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(#1567 Aug 15/07)

TABLE H-5
RECOMMENDED PLANTINGS FOR STORM WATER PONDS

The following plant list is for detention ponds that are wet and or flooding during the winter months and could dry out during the summer months. Those plants shown as "Plants suitable for Base to High Water Level of pond" are also fine in constant water, if the pond stays full.

Plants suitable for Base to High Water Level of pond

These plants should only be used where the soil will have a year-round high moisture content:
Carex mertensii – Merten's Sedge: space 0.9 m apart
Carex obnupta - Slough sedge: space 0.9 m apart
Carex pluriflora –Several –Flowered Sedge: space 0.9 m apart
Juncus effusus – Common Rush: space 0.9 m apart
Lysichiton americanum – Skunk Cabbage: space 0.9 m apart
Oenanthe samentosa - Pacific Water-parsley: space 1.2 m apart
Potentilla palustris - Marsh Cinquefoil: space 0.6 m apart
Sagittaria latifolia - Wapato, Arrowhead: space 0.9 m apart
Scirpus acutus - Hard-stemmed Bulrush: space 1.5 m apart
Scirpus microcarpus - Small-flowered Bulrush: space 1.2 m apart
Typha latifolia - Common Cattail- space 0.9 m apart

A Hydroseed mix, as described at the end of this table, should be used in the base to high water level of the pond where it is anticipated that soil moisture level will be low for periods of time.

Plants suitable for High Water Level of pond to 6 metres beyond pond's edge

Trees:
Malus fusca - Pacific Crab Apple: space 3 – 4.5 m apart
Populus tremuloides - Trembling Aspen: space 4.5 – 6 m apart
Populus trichocarpa – Black Cottonwood: space 4.5 m apart
Thuja plicata - Western Red Cedar: space 6 – 7.5 m apart

Shrubs:
Lonicera involucrata - Black Twinberry: space 1.5 m apart
Myrica gale - Sweet Gale: space 1.2 m apart
Physocarpus capitatus – Ninebark: space 1.8 m apart
Rubus parviflorus – Thimbleberry: space 1.5 m apart
Salix hookeriana – Hooker's Blue Willow: space 1.8 m apart
Salix lucida ssp lasiandra – Pacific Willow: space 6 – 7.5 m apart
Salix sitchensis – Sitka Willow: space 2.4 - 3 m apart
Spirea douglasii – Hardhack: space 1.5 - 1.8 m apart
Y *Sambucus racemosa* – Red elderberry

Shrubs suitable for inside slope plantings:
(for use only on inside pond slope; not to be planted along crest of slope; not to be planted where a portion of the plant will be under water at any given time)

Y *Amelanchier alnifolia*- Saskatoon: space 6.0 m apart
Lonicera hispidula - Hairy Honeysuckle: space 1.5 m apart
Philadelphus lewisii - Mock Orange (Coastal): space 1.5 m apart

This is a consolidated version prepared for convenience purposes only.

ɣ *Ribes lobbii* - Fushsia-flowered Currant: space 1.5 m apart
Ribes sanguineum - Red Flowering Currant: space 1.5 m apart
Rosa gymnocarpa - Baldhip Rose: space 1.5 m apart
Rosa nutkana - Nootka Rose: space 1.5 m apart
Symphoricarpos albus – Snowberry: space 1.5 m apart
ɣ *Vaccinium ovatum* - Evergreen Huckleberry: space 1.5 m apart
ɣ *Oemleria cerasiformis* - Indian plum: space 1.5 m apart

Perennials:
Heracleum lanatum – Cow Parsnip: space 1.5 m apart
Iris setosa – Wild Flag Iris: space 0.9 m apart
Petasites palmatus – Palmate Coltsfoot: space 1.2 - 1.5 m apart
Sidalcea hendersonii – Henderson's Checker Mallow: space 0.6 m apart
Achlys triphylla - Vanilla Leaf: Fill plant
Aquilegia Formosa - Red Columbine: Fill plant
Dicentra Formosa - Bleeding Heart: Fill plant

Plants suitable for area between the invert outlet and 1 metre above (retention ponds only)

Shrubs – water edge:
Cornus stolonifera Red Osier Dogwood: space 1.2 m apart
ɣ *Rubus spectabilis* Salmonberry:space 1.2 m

Plants suitable for the area from 6 metres beyond pond's edge

Trees:
Acer macrophyllum – Big Leaf Maple: space 6 – 7.5 m apart
Betula papyrifera – Paper Birch: space 4.5 – 6 m apart
Chamaecyparis nootkatensis – Yellow Cedar: space 6 m apart
Picea sitchensis – Sitka Spruce: space 7.5 m apart
Pseudotsuga menziesii –Douglas Fir: space 9 m apart
Rhamnus purshiana – Cascara: space 4.5 – 6 m apart
Tsuga heterophylla – Western Hemlock: space 4.5 – 6 m apart

Shrubs:
Crataegus douglasii – Black Hawthorn: space 3 – 3.7 m apart
Holodiscus discolor – Oceanspray: space 2.5 – 3 m apart
ɣ *Mahonia aquifolium* – Oregon Grape: space 0.9-1.1 m apart
ɣ *Sambucus caerulea* – Blue Elderberry: space 3 – 3.6 m apart
ɣ *Vaccinium membranaceum* – Black Huckleberry: 1.5 – 1.8 m apart

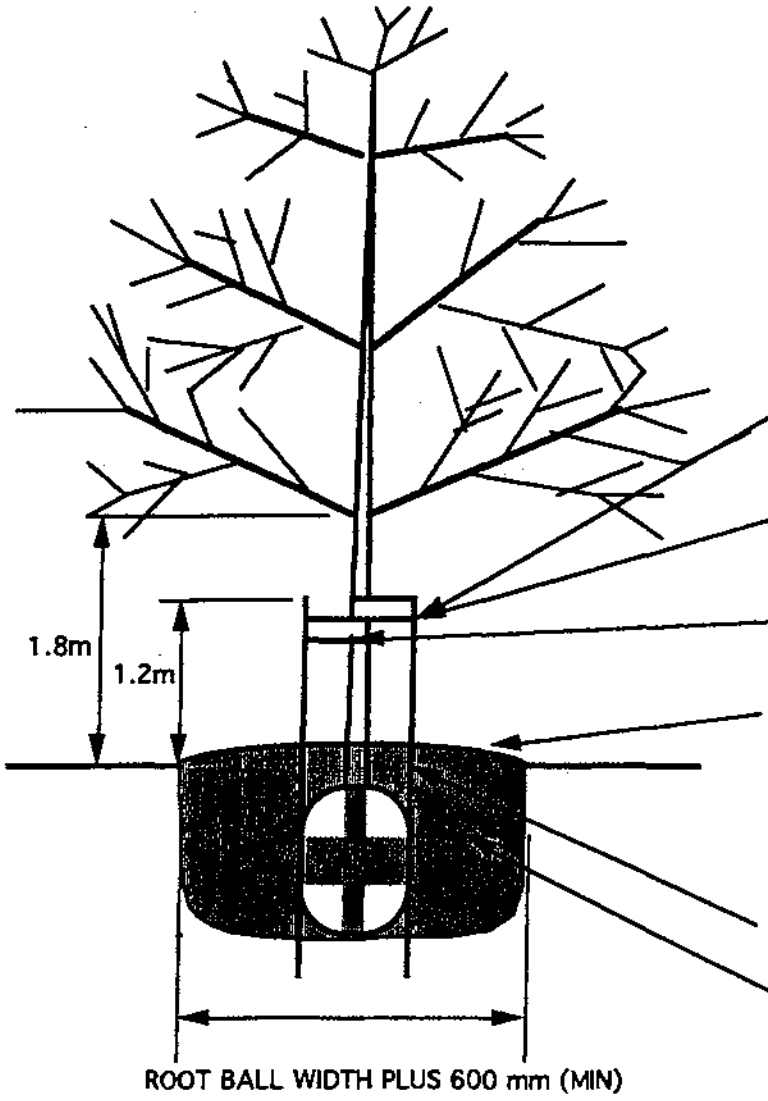
ɣ - Typically attracts birds (esp. passerines) due to berry production.

Hydroseed Mix to use around pond area

Coastal Reclamation Mix:

creeping red fescue	timothy
hard fescue	Canada blue grass
slender wheatgrass	red top
perennial ryegrass	white clover
dahurian wild ryegrass	single cut red clover
orchard grass	alsike clover

This is a consolidated version prepared for convenience purposes only.



TREE STAKES TO BE ALIGNED PARALLEL TO THE SIDEWALK OR ROAD

2 PRESSURE TREATED 50 - 75 mm DIA. WOOD STAKES 2m LENGHT.

50 mm WIDE, GREEN VINYL BANDING ATTACHED TO STAKES WITH SHINGLE NAILS.

50 mm HIGH MOUND.

STAKES NOT TO PENETRATE ROOT BALL.

300 mm MIN. OF TOPSOIL AROUND ROOT BALL COMPACTED TO 85% STANDARD PROCTOR DENSITY.

ALL DEMENSIONS IN METRES UNLESS OTHERWISE SHOWN.

NOT TO SCALE.

TOWN OF COMOX			TITLE: TREE PLANTING DETAIL	STARDARD DWG. NO. SH - 1
DRAWN BY: GB	DATE: 92/09/14	APPROVED BY: RB		

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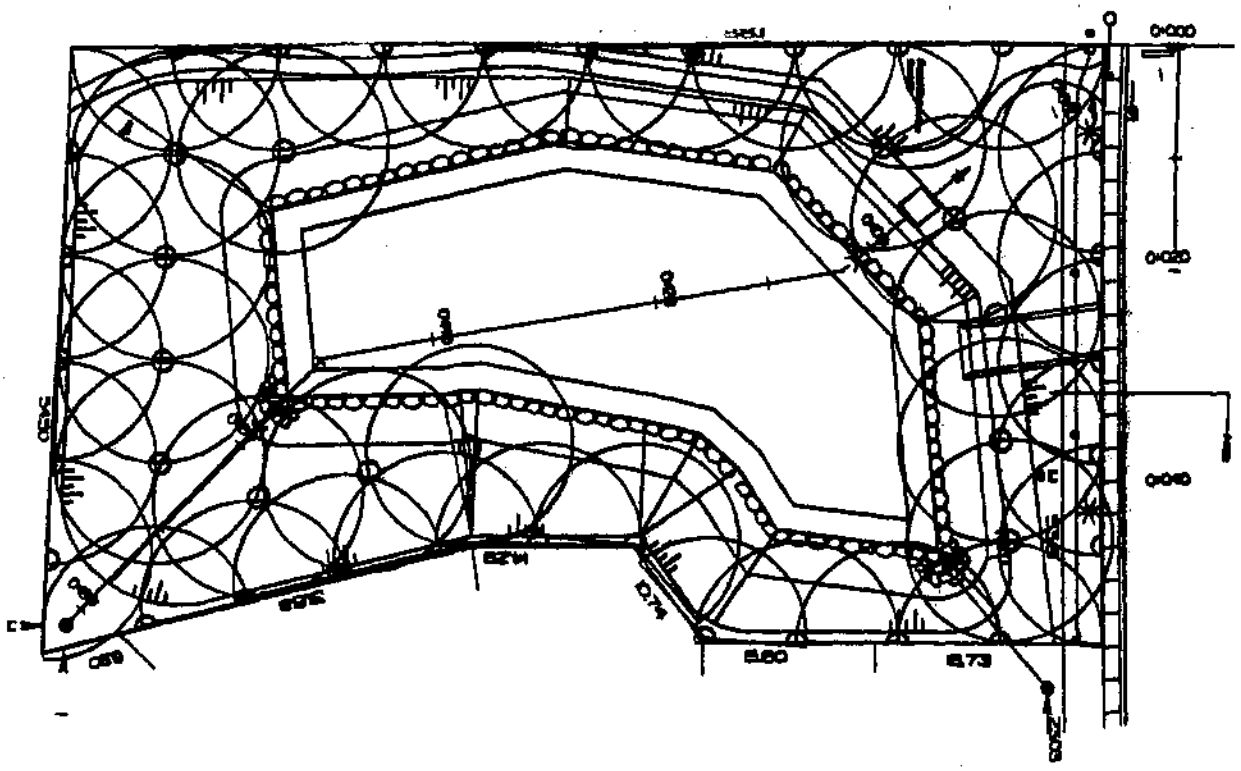
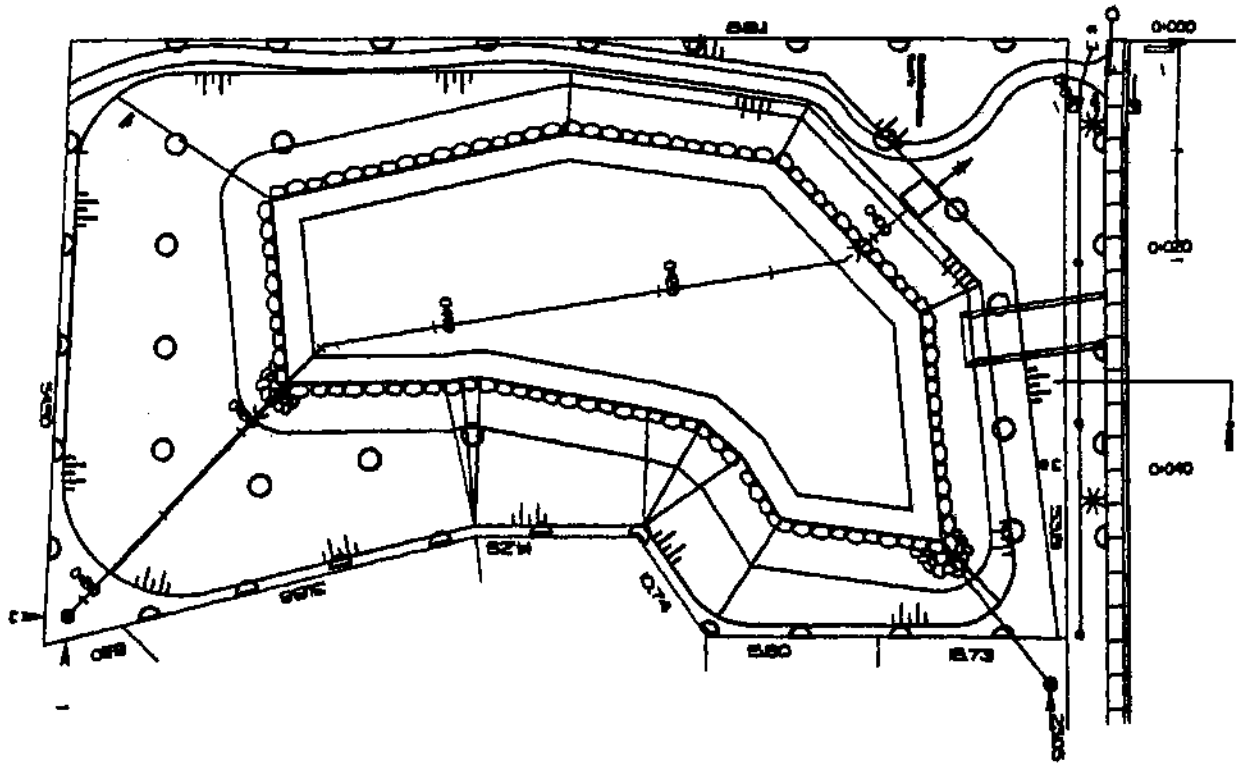
EAU CLARE DETENTION POND



LANDSCAPE IRRIGATION HEAD LAYOUT PLAN

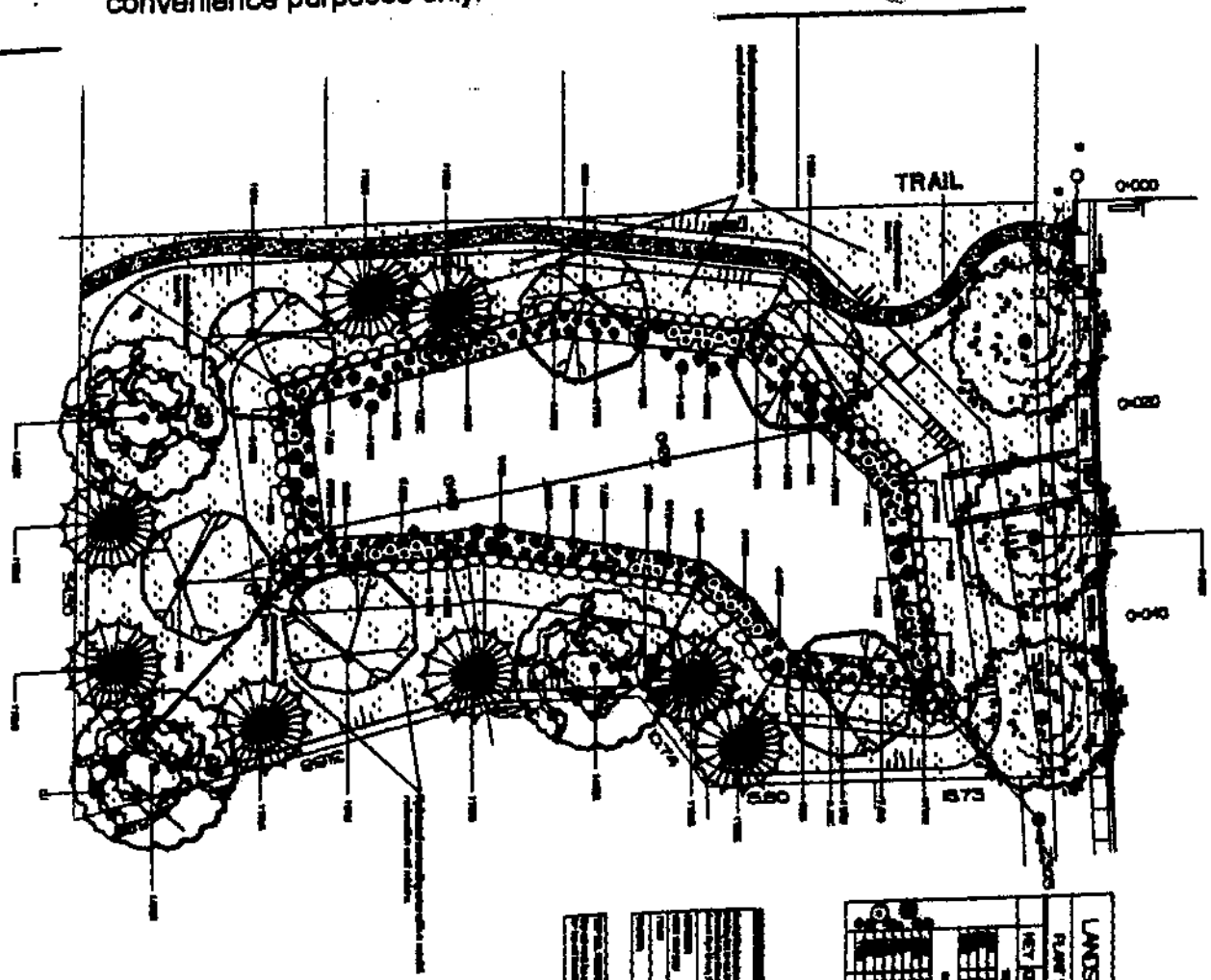


(#1587 Aug 15/07)

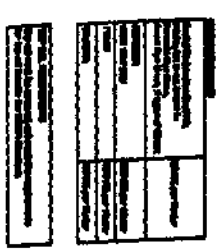
TOWN OF COMOX

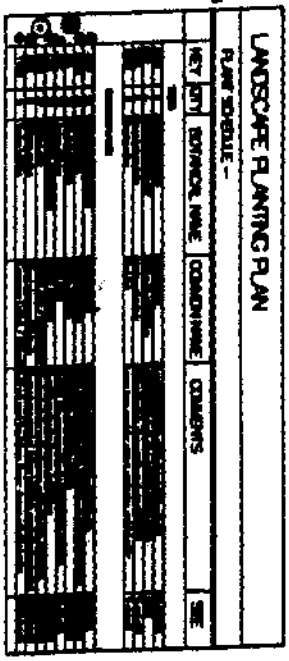
ETENTION AND ETENTION POND IRIGATION (TYPICAL)	**STANDARD DWG. NO.** **SH - 2**

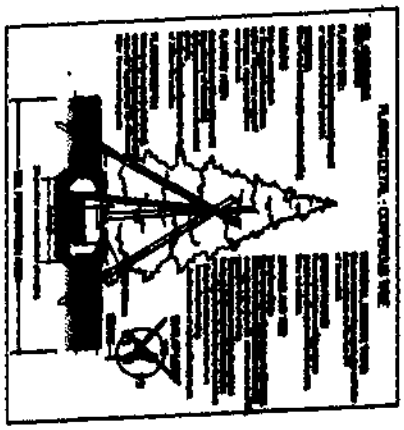
This is a consolidated version prepared for convenience purposes only.

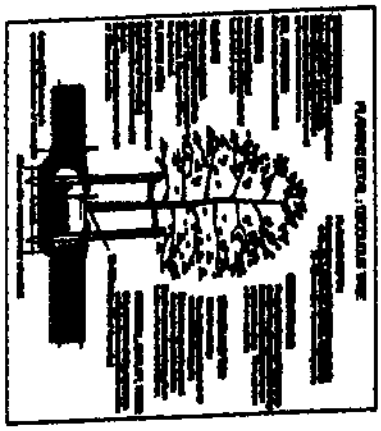


EAU CLARE DETENTION POND LANDSCAPE PLANTING PLAN





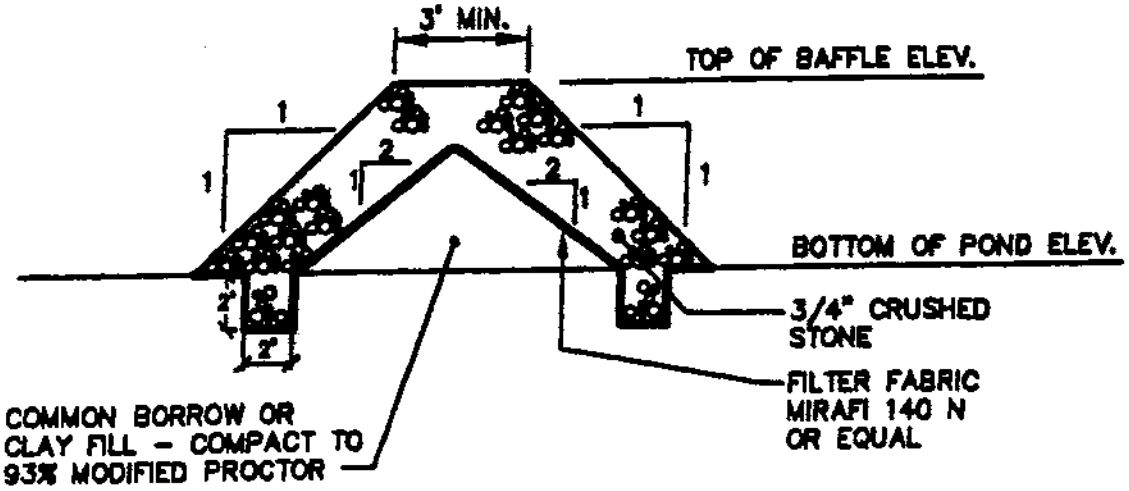




(#1567 Aug 15/07)

TOWN OF COMOX	STANDARD DWG. NO.
ETENTION AND ETENTION POND ANDSCAPING (TYPICAL)	SH - 3

This is a consolidated version prepared for convenience purposes only.



TYPICAL SECTION

STORMWATER POND BAFFLE DETAIL

N.T.S.

(#1567 Aug 15/07)

TOWN OF COMOX	TITLE STORM WATER POND BAFFLE DETAIL	STANDARD DWG. NO SH - 4