THE DISTRICT OF NORTH VANCOUVER

DEVELOPMENT SERVICING BYLAW

BYLAW 8145

Effective Date – June 19, 2017

CONSOLIDATED FOR CONVENIENCE ONLY

This is a consolidation of the bylaws below. The amending bylaws have been combined with the original bylaw for convenience only. This consolidation is not a legal document. Certified copies of the original bylaws should be consulted for all interpretations and applications of the bylaw on this subject.

Original Bylaw	**Date of Adoption**
Bylaw 8145	June 19, 2017
Amending Bylaw	**Date of Adoption**
Bylaw 8659	January 08, 2024

The bylaw numbers in the margin of this consolidation refer to the bylaws that amended the principal bylaw (Sewer Bylaw - Bylaw 6656). The number of any amending bylaw that has been repealed is not referred to in this consolidation.

THE DISTRICT OF NORTH VANCOUVER

DEVELOPMENT SERVICING BYLAW

BYLAW 8145

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The Corporation of the District of North Vancouver

BYLAW 8145

A bylaw to regulate the provision of Works and Services.

The Council for The Corporation of the District of North Vancouver enacts as follows:

1.0 TITLE

1.1 This Bylaw may be cited as “District of North Vancouver Development Servicing Bylaw 8145, 2017”.

2.0 INTERPRETATION

2.1 In this Bylaw, unless the context requires otherwise:

a) “Accessory Building” means an accessory building having a Gross Floor Area not exceeding 10 square metres;

b) “Approving Officer” means the person appointed by the Council of the District as the Approving Officer under the *Land Title Act* and includes his or her deputy;

c) “Authorized Person” means the General Manager - Engineering, Parks and Facilities or a person designated in writing by the General Manager – Engineering, Parks and Facilities to act in his or her place or the General Manager – Planning, Properties and Permits or a person designated in writing by the General Manager – Planning, Properties and Permits to act in his or her place;

d) “Building Permit” means a Building Permit issued by the District pursuant to the Building Regulation Bylaw 7353, 2003, as amended or replaced;

e) “Certificate of Substantial Completion” means the certificate issued by the Consulting Engineer and accepted by the Authorized Person indicating that the Works and Services have been substantially completed, subject to any deficiencies identified in the Certificate;

f) "Completion" means completion of Works and Services (other than deficiencies identified in the Certificate of Substantial Completion) as evidenced by issuance by the Consulting Engineer and acceptance by the Authorized Person of a Certificate of Substantial Completion for the Works and Services pursuant to this Bylaw or a Servicing Agreement;

g) “Consulting Engineer” means a professional engineer retained by the Developer who is a registered member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia;

h) “Develop” or “Development” means an activity that requires a Building Permit;

i) “Developer” means the Owner or the person who has the express written authority to act on behalf of and represent the Owner in carrying out Works and Services under this Bylaw;

j) “District” means The Corporation of the District of North Vancouver;

k) “Gross Floor Area” has the meaning given to it in the District’s Zoning Bylaw No. 3210, 1965;

l) “Highway” means a street, road, lane, bridge, viaduct and any other way open to public use, other than a private right of way on private property;

m) “Landscape Architect” means a Landscape Architect retained by the Developer, who is a registered member in good standing of the British Columbia Society of Landscape Architects (BCSLA);

n) “Owner” means, in respect of real property,

(i) the registered owner of an estate in fee simple,

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

(iii) the registered holder of the last registered agreement for sale, and

(iv) the holder or occupier of land held in the manner referred to in section 228 or 229 of the *Community Charter*;

o) “Parcel” means any lot, block, or other area in which land is held or into which land is subdivided;

p) “Servicing Agreement” means an agreement to provide Works and Services and provide security in accordance with section 6 of this Bylaw;

q) “Subdivide”, “Subdivision” and “Subdivided” means the division of land into two or more Parcels (including air space parcels) by any means, including by deposit of a subdivision, reference or other plan under the *Land Title Act*, lease, fractional interest, or deposit of a

bare land strata plan under the Strata Property Act (including deposit of any phase of a phased bare land strata plan);

r) "Total Performance" where used in Schedule A to this Bylaw has the meaning given to it in the MMCD;

s) "Warranty Period" means the warranty period specified in section 12.1 of this Bylaw; and

t) "Works and Services" includes Highways, sidewalks, boulevards, boulevard crossings, boulevard hard and soft landscaping, transit bays, lighting, signalization, wiring, water distribution systems, fire hydrants, sewage collection and disposal systems, storm water drainage collection and disposal systems, irrigation systems, and other municipal infrastructure or systems as may be provided within the District from time to time.

3.0 ADMINISTRATION

3.1 No person shall Subdivide or Develop land except in conformity with all of the applicable requirements set out in this Bylaw.

3.2 The Authorized Person or his or her designate is authorized to enter at all times on any property or premises to inspect same to ascertain whether the provisions of this Bylaw **are** being complied with, subject to section 16 of the Community Charter.

3.3 Nothing in this Bylaw relieves a Developer from the responsibility to comply with every enactment applicable to the Developer's Development or Subdivision. Neither the granting of a permit nor the issuance, approval, acceptance or review of any plans, specifications or documents or any inspection made by any District employee shall in any way relieve a Developer from compliance with all enactments.

4.0 SERVICING REQUIREMENTS

4.1 Except as set out in this Bylaw or any other District bylaw, a Developer who intends to Subdivide or Develop lands in the District of North Vancouver must provide Works and Services as required by the Authorized Person or the Approving Officer in accordance with this Bylaw.

4.2 Works and Services required as a condition of Development or Subdivision must be designed to the standards set out in this Bylaw and constructed in accordance with drawings accepted by the Authorized Person in advance and in writing.

4.3 All Works and Services that are required to be constructed and installed by an Developer shall be completed at the sole expense of the Developer.

4.4 Where neighbourhood or town center plans or public realm guidelines have been approved by Council, and where the Authorized Person determines that any standard established under this Bylaw conflicts with said neighbourhood or town

center plans or public realm guidelines, then those neighbourhood or town center plans or public realm guidelines shall take precedence over the otherwise applicable standards under this Bylaw.

5.0 EXCEPTIONS

5.1 The following are exempted from any Works and Services requirements:

a) the construction of:

(i) a residential Accessory Building; or

(ii) an addition to a principal building having a Gross Floor Area not exceeding 10 square metres; and

b) the construction and installation of an improvement to a structure where the construction and installation requires a Building Permit and where the improvement, when completed, would not result in a change of use of the structure, provided that the improvement is for the sole purpose of any of the following:

(v) providing upgraded accessibility for disabled persons;

(vi) carrying out work under a Heritage Alteration Permit pursuant to section 617 of the *Local Government Act*;

(vii) installation of fire sprinklers, fire alarm systems, emergency lights, exits or other similar safety upgrades;

(viii) upgrades for energy efficiency; or

(ix) seismic upgrades.

6.0 SERVICING AREEMENT FOR WORKS

6.1 All Works and Services required to be constructed and installed pursuant to this Bylaw must be constructed and installed, and all applicable fees and charges must be paid, before the Subdivision plan is approved by the Approving Officer or the Building Permit is issued by the District unless the Developer:

a) deposits with the District a performance deposit in a form and amount satisfactory to the Approving Officer or the Authorized Person having regard to the cost of installing and paying for the Works and Services; and

b) enters into an agreement with the District in form and content acceptable to the Approving Officer or the Authorized Person to construct and install the required Works and Services by a specified date or dates or forfeit to the District the amount secured under section 6.1(a).

6.2 No Works and Services may be installed on a Highway or other District-owned land by any person unless the Developer has entered into a Servicing Agreement with the District in respect of such Works and Services and provided a performance deposit in a form and amount satisfactory to the Approving Officer

or the Authorized Person having regard to the cost of installing and paying for the Works and Services.

7.0 APPLICATION OF MMCD

7.1 Except as otherwise provided in this Bylaw, Works and Services must be designed in accordance with the MMCD Standard Detailed Drawings and MMCD Specifications (both included in MMCD Platinum Edition Volume II, 2009, as modified by the fifteen Supplementary Updates dated between 2009-11-19 and 2016-11-18), and MMCD Design Guidelines (2014), all as further supplemented and modified in Schedule A to this Bylaw.

7.2 Works and Services must be provided, constructed, installed and maintained in accordance with:

a) any applicable Servicing Agreement;

b) this Bylaw; and

c) design drawings and specifications approved in advance by the Authorized Person.

7.3 In case of a conflict between the provisions of this Bylaw and the MMCD Standard Detailed Drawings and MMCD Specifications (both included in MMCD Platinum Edition Volume II, 2009, as modified by the fifteen Supplementary Updates dated between 2009-11-19 and 2016-11-18), and MMCD Design Guidelines (2014), all as further modified in Schedule A, the provisions in this Bylaw will take precedence.

7.4 For greater certainty, the following terms as they are used in Schedule A and in the MMCD have the following meanings:

a) "Owner" means Owner as defined in this Bylaw and includes the Developer, if different than the Owner;

b) "Contractor" means a contractor hired by the Developer; and

c) "Contract Administrator" and "Developer's, Engineer" means Consulting Engineer as defined in this Bylaw.

8.0 ALTERNATE SERVICE LEVELS

8.1 The Authorized Person may, in his/her sole discretion, require or consider and accept or reject alternative service levels, specifications or designs for the Works and Services that, in the opinion of the Authorized Person, provide environmental, technical or economic solutions that:

a) achieve a level of performance that meets or exceeds the level of performance that would be achieved by strict adherence to the service levels, specifications or designs contained in the standards established by this bylaw; or

b) otherwise meet the requirements of this Bylaw.

9.0 ON-SITE DRAINAGE MANAGEMENT AND SEDIMENT AND EROSION CONTROL

9.1 As a condition of connecting to the District's drainage system, the Developer must comply with the on-site grading, building elevation and storm drainage and management guidelines, principles and requirements set out in MMCD as supplemented and modified in Schedule A to this Bylaw.

9.2 Developers must ensure compliance with all on-site sediment and erosion control requirements applicable to their Development or Subdivision as set out in MMCD as supplemented and modified in Schedule A to this Bylaw.

9.3 This section does not remove the need to comply with off-site stormwater management requirements.

10.0 DELEGATED AUTHORITY

10.1 Council delegates to the Authorized Person and the Approving Officer the authority to:

a) determine the extent of Works and Services required to be provided by a Developer subject to the limitations contained in section 506 of the *Local Government Act*;

b) establish the terms and conditions of any Servicing Agreement under section 6.0, determine the appropriate form and amount of security to be deposited, and execute the agreement on behalf of the District; and

c) establish the form of forms or plans to be submitted as part of an application for Development or Subdivision.

10.2 Council delegates to the Authorized Person the authority to:

a) require the provision of excess or extended services under section 507 of the *Local Government Act* and determine under section 508 of the *Local Government Act* the proportion of the cost of providing Works and Services that constitute an excess or extended service, identify benefiting lands, determine the amount of latecomer charges payable upon the development of benefiting lands, and prepare and execute a latecomer agreement;

b) establish the terms of a park land agreement pursuant to section 510 of the *Local Government Act*; and

c) waive or reduce a charge under section 563 of the *Local Government Act*

10.3 Council delegates to the Approving Officer the authority to exempt a Parcel from the statutory minimum highway frontage of 10% of the perimeter of the Parcel.

11.0 DESIGN AND CONSTRUCTION OF WORKS AND SERVICES BY THE DISTRICT

11.1 The Authorized Person may determine that certain Works and Services required to be installed as a condition of issuance of a Building Permit or approval of a Subdivision pursuant to this Bylaw must be constructed and installed by the District at the expense of the Developer in which event the Developer must, as a condition of said issuance or approval, make a payment to the District in an amount equal to 125% of the estimated cost of said design, construction, permitting, testing and supervision and installation, as determined by the Authorized Person. Said payment will be applied by the District to cover its costs incurred in constructing and installing the Works and Services, plus a 20% administration charge, and the balance of said payment, if any, will be returned to the Developer following Completion of construction.

12.0 WARRANTY

12.1 The Developer, must remedy any defects or deficiencies in the Works and Services and, in addition, must keep and maintain the Works and Services in good repair for the duration of the period set out in the Servicing Agreement or, if there is no Servicing Agreement for the Works and Services, for one year from the date of the issuance of the Certificate of Substantial Completion.

12.2 If the Developer fails to comply with section 12.1, the District may carry out such repairs, maintenance or other work as the District deems necessary and deduct the costs of same plus a 20% administration charge from the security deposit being held pursuant to section 6.1.

13.0 FEES

13.1 The Developer must pay all applicable fees for the Development as prescribed in Schedule B to the Fees and Charges Bylaw No. 6481, as amended or replaced.

13.2 The Developer is responsible for paying the costs of all tie-ins and other connections of the Works and Services to existing District services, including storm water, sanitary and water systems, water meters, access improvements (vehicular and non-vehicular), the cost of the installation of Highway name and traffic control signs and signals (as applicable) and the cost of any other municipal services in connection with the Works and Services carried out by the District.

14.0 SEVERABILITY

14.1 If any portion of this Bylaw is held to be invalid by a court of competent jurisdiction, such decision shall not affect the validity of the remaining provisions of this Bylaw.

15.0 REFERENCES

15.1 Any reference to District of North Vancouver Development Servicing Bylaw No. 7388, 2005 in any other District Bylaw is hereby deleted and replaced with a reference to this Bylaw 8145, 2017.

16.0 REPEAL

16.1 The District of North Vancouver Development Servicing Bylaw No. 7388, 2005 is repealed and all references in other District bylaws to District of North Vancouver Development Servicing Bylaw No. 7388 are hereby amended to refer to District of North Vancouver Development Servicing Bylaw 8145, 2017.

READ a first time June 12th, 2017

READ a second time June 12th, 2017

READ a third time June 12th, 2017

ADOPTED June 19th, 2017

Mayor

Municipal Clerk

Certified a true copy

Municipal Clerk

SCHEDULE A – PART 1: SUPPLEMENT TO THE MMCD DESIGN GUIDELINES (2014)

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Any sections listed in this schedule without any amendments are adopted as published in the Master Municipal Construction Document (MMCD) – Design Guidelines (2014).

1.0 GENERAL DESIGN CONSIDERATIONS – is amended

1.1 **Sustainability and Asset Management** – not amended, refer to MMCD Design Guidelines (2014).

1.2 **Independent Utilities** – not amended, refer to MMCD Design Guidelines (2014).

1.3 **Utility Rights-Of-Way** – not amended, refer to MMCD Design Guidelines (2014).

1.4 **Utility Separation** – not amended, refer to MMCD Design Guidelines (2014).

1.4.1 **Horizontal Separation** – not amended, refer to MMCD Design Guidelines (2014).

1.4.2 **Vertical Separation** – not amended, refer to MMCD Design Guidelines (2014).

1.4.3 **Sewers in Common Trench** – not amended, refer to MMCD Design Guidelines (2014).

1.5 **Trenchless Technologies** – not amended, refer to MMCD Design Guidelines (2014).

1.6 **Seismic Design Standards** – is amended by:

Adding the following clause beneath the final paragraph:

"Seismic design requirements are based on infrastructure type, as specified within the relevant sections of these guidelines."

The following sections are added to the MMCD Design Guidelines (2014):

"

1.7 **Design Populations**

Where the number of lots or units is unknown, use the Gross Density or Equivalent Population Factor in Table 1.7 to calculate population estimates.

Table 1.7 – Design Populations by Zoning or Land Use Designation

Type	Land Use	Zone	Gross Density, or Equivalent Population Factor (persons per hectare)
Commercial	Neighborhood Commercial	C1	90
	Local Commercial	C1A	60
	General commercial - major	C2	300

Table 1.7 – Design Populations by Zoning or Land Use Designation

Type	Land Use	Zone	Gross Density, or Equivalent Population Factor (persons per hectare)
	General commercial plus automotive	C3, C3A	90
	Tourist, Entertainment, Public House Commercial	C4, C5, C6	70
	Garden Centre Commercial	C7	50
	Highway Commercial/Industrial	C8	70
Industrial	Waterfront Industrial	I1	90
	General (heavy) Industrial	I2	90
	Light Industrial	I3	90
	Interim, Storage Industrial	I4, I5	50
Institutional / Public Uses	Public Assembly (school, church, community uses)	PA1, PA2	50
	Park, Recreational, Open Space	PR0	20
Residential	One-Acre Residential	RS1	10
	Large Parcel Residential	RS2	30
	Single Family Residential and all Neighborhood Zones	RS3, RS4, RS5	50
	Low Density Multi-family – townhouse, duplex, triplex	RM1, RM2, RM3	114
	Multi-family – low rise apartment	RM6, RM7, RL1, RL2, RL3	250
	Apartment – High Rise	RH1, RH2, RH3	350
	Special Care Housing		50
Comprehensive Development	Will be calculated based on most similar zone(s) in the Zoning Bylaw and the gross density may be the sum of one or more land uses.		

1.8 Population by Household Size

When population estimates are required for the calculation of District water and sewer systems the values in Table 1.8 will be used.

Table 1.8 Average Residential Household Populations (persons per unit)		
Single Family	**Townhouse**	**Apartment**
3.0	**2.7**	**1.7**

1.9 **Wiring**

All new wiring must be underground and associated appurtenances (e.g. utility vaults and kiosks) are to be located within private property, unless an exemption is approved by the Authorized Person. Undergrounding of existing electrical power distribution and communication wiring may also be required within the public right-of-way or road allowance and shall be determined by the Authorized Person."

END OF SECTION – GENERAL DESIGN CONSIDERATIONS

2.0 WATER DISTRIBUTION – MMCD is amended

2.1 **General** – is amended by:

Adding the following clauses to section 2.1 after the first paragraph:

"Unless otherwise accepted by the Authorized Person, computer-aided analysis of the District's water network will be carried out using the District's water network model. Analysis may require hydrant flow testing.

Municipal Watermains – are watermains (mains/pipes) which distribute water locally through service connections. Hydrant installation is permitted on distribution mains capable of delivering fire flows sufficient for land uses in the adjacent areas.

Metro Vancouver Mains – are large diameter watermains (mains/pipes) owned by the Metro Vancouver conveying water from the supply source and feeding to a large area primarily through a network of major mains. Municipal watermains, service connections or hydrant connections are not permitted to Metro Vancouver mains unless accepted by the District and Metro Vancouver.

Service Connections – are lateral water pipes and appurtenances that service that connect individual land parcels to municipal watermains. Service connections include a valve at the municipal watermain and a shut-off valve located approximately 450 mm from a property line. A typical service connection detail is provided in the Supplemental Standard Detail Drawings.

Building Water Services – are on-site, privately owned water pipes that connect buildings to service connections, terminating at a District shut-off valve."

2.2 **Metering** – is amended by:

Adding the following clauses to section 2.2 after the first paragraph:

"Water meters, where required under other District bylaws, must be installed in accordance with this Bylaw."

Adding the following clauses to section 2.2 after the fifth paragraph:

"The meters must meet the following criteria:

- The water meter and appurtenances must be approved by the Authorized Person prior to procurement by the Developer.
- Fire lines to be metered and have dedicated "tattle tale" displacement type meter and double detector check assembly.
- Water meters must be remotely readable through District's remote reading requirements. The meter location and housing must facilitate remote meter reading.
- Water meters must be installed in an unobstructed location as close as possible to the property line frontage (facing the main road) inside a

secure, easily and safely accessible housing that can be independently accessible by the District staff. The housing and location must be approved by the Authorized Person and meet British Columbia Occupational Health and Safety Regulation and WCB (Worksafe BC) requirements.

- The District must be provided with uninterrupted (24 hour) independent access to water meters.
- Developers must procure and install water meters and required assemblies. Water meters must be new and include the manufacturer's seal, testing certificate, warranty and user manual. The District will be responsible for the maintenance and replacement of the meter, and the costs associated with such activities, after the Warranty Period has ended.
- Residential buildings with commercial use will install a minimum of two water meters that separately meter residential and commercial water use.
- The use of air space parcels may require multiple water service connections and water meters installations within any one development project. "

2.3 **Per Capita Demand** – is amended by:

Replacing the third and fourth paragraphs and their associated bullets with the following:

"When new development is metered:

- Average annual daily demand (A): 300 litres per capita per day (L/c/d)
- Maximum Day Demand (D): 1000 litres per capita per day
- Peak hour demand (H): 2000 litres per capita per day

When new development is unmetered:

- Average annual daily demand (A): 450 litres per capita per day (L/c/d)
- Maximum Day Demand (D): 1000 litres per capita per day
- Peak hour demand (H): 2000 litres per capita per day"

2.4 **Non-Residential Demand** – is replaced with the following:

"Commercial, industrial and institutional water demands should be determined using the equivalent population factors provided in Table 1.7 and per capita demands provide in Section 2.3.

For a known water user where a higher water demand is expected, the water demand from a similar industrial application shall be used."

2.5 **Fire Flows** – is amended by:

Deleting Table 2.5 and replacing with Table 2.5a below and, following the last paragraph, adding the text below:

"

Table 2.5a – Fire Flow Design Requirements			
Type	**Land Use**	**Zone**	**Design Fire Flow "F" (litres/sec)**
Commercial	Neighborhood Commercial	C1	90
	Local Commercial	C1A	120
	General commercial - major	C2	200
	General commercial plus automotive	C3, C3A	120
	Tourist, Entertainment, Public House Commercial	C4, C5, C6	120
	Garden Centre Commercial	C7	120
	Highway Commercial/Industrial	C8	120
Industrial	Waterfront Industrial	I1	250
	General (heavy) Industrial	I2	250
	Light Industrial	I3	250
	Interim, Storage Industrial	I4, I5	250
Institutional/ Public Uses	Public Assembly (school, church, community uses)	PA1, PA2	120
	Park, Recreational, Open Space	PR0	90
Residential	One Acre Residential	RS1	60
	Large Parcel Residential	RS2	60
	Single Family Residential and all neighborhood zones	RS3, RS4, RS5	60
	Low Density Multi-family – townhouse, duplex, triplex	RM1, RM2, RM3	90
	Multi-family – low rise apartment	RM6, RM7, RL1, RL2, RL3	120
	Apartment – High Rise	RH1, RH2, RH3	200
	Special Care Housing		90
Comprehensive Development	Will be calculated based on most similar zone(s) in the zoning bylaw, and the gross density may be the sum of one or more land uses.		

If the District's water distribution system is unable to provide the Design Fire Flow required in Table 2.5a it is the Developer's responsibility to upgrade the water distribution system to the Table 2.5a requirements.

If the fire protection necessary for the development site is higher than that required in Table 2.5a, as determined through Fire Underwriters Survey calculations, it is the Developer's responsibility to upgrade the water distribution system sufficiently to provide the higher fire protection. Alternatively, the Developer can take other measures to reduce fire protection requirements of the proposed development to match the level of protection required by Table 2.5a."

2.6 **Design Flows** – not amended, refer to MMCD Design Guidelines (2014).

2.7 **Water Pressure** – is amended by:

Deleting paragraph 5 and adding the following pressure conversion table and note:

"

Table 2.7 Pressure Conversions		
kPa	**PSI**	**m (head)**
1035	**150.1**	**105.6**
850*	**123.3**	**86.7**
515	**74.7**	**52.5**
300	**43.5**	**30.6**
150	**21.8**	**15.3**

*increasing system pressures above this value is subject to acceptance by the Authorized Person."

2.8 **Hydraulic Design** – is amended by:

Adding the following paragraphs to section 2.8 before the first paragraph:

"Watermain sizes that may compromise water quality will not be accepted.

Ductile iron special class 50 wall thickness, cement-lined mains will be used in all areas of the District. Ductile iron pipes will conform to AWWA C151 with standard cement mortar lining to AWWA C104.

Restrained pipe joints must be used for all pipes 250 mm and larger and for all pipes installed in liquefaction zones."

Deleting Table 2.8, Roughness Coefficients for Various Pipe Materials, and replacing it with:

"In all instances, the District's water distribution system will use a Hazen-Williams' coefficient of:

- 125 for all watermains 250 mm diameter and larger
- 100 for all watermains 200 mm diameter and smaller"

2.9 **Minimum Pipe Diameter** – is amended by:

Deleting the last two paragraphs, including the one that starts with an asterisk "*", and replacing them with the following paragraph:

"On dead-end roads or cul-de-sacs, where no further extension of the distribution system is possible, mains less than 200 mm diameter may be used for the last 100 m before the end of the road."

2.10 **Dead Ends** – is amended by:

Deleting the bullets after the first paragraph and replacing them with the following:

"

- 50 mm diameter for water mains up to 200 mm diameter
- Above 200 mm water mains, blow-off and blow-down sizes will be sized to achieve a minimum flushing velocity of 1.0 meters/ second"

2.11 **Minimum Depth of Cover** – is amended by:

Replacing the last bullet of the first paragraph with the following:

"Minimum cover: 1.2m, except where it may be larger as required by local conditions."

2.12 **Grade** – not amended, refer to MMCD Design Guidelines (2014).

2.13 **Corrosion Protection** – is amended by:

Adding the following paragraph after the first paragraph:

"Corrosion protection methods must be submitted to the District for review and acceptance before implementation, consistent with AWWA C105."

2.14 **Valves** – not amended, refer to MMCD Design Guidelines (2014).

2.15 **Hydrants** – is amended by:

Extending the bullet list to include:

"

- within the public right-of-way, 1.0 m from property line with the pumper nozzle at right angles to the curb."

Adding the following clauses

"On streets where more than one parcel is on or adjacent to the top of a slope that is greater than 20 degrees, C71P hydrants will be required. Hydrants will be located on the side of the street opposite the aforementioned parcels.

Hydrant locations will be dependent upon the need for fire protection. Where building locations have been determined, a sufficient number of hydrants

will be provided within 45 m of the principal entrance of the building to deliver 75% of the required fire flow.

Fire hydrants on arterial roads and provincial highways will be installed as designed, but located “staggered” on either side of the road.

Existing 150 mm diameter watermains may be fitted with new fire hydrants if the hydrant is able to deliver the minimum Design Fire Flows required by Section 2.5.”

Adding the following clause to the end of section 2.15:

“Hydrant Decommissioning – The procedures for decommissioning hydrants will be as follows:

- notifying the Authorized Person 72 hours before any decommissioning work;
- removal of the hydrant;
- removal of the hydrant gate-valve from the existing water main;
- capping the hydrant tee on the water main with a blind flange.”

2.16 **Blowoffs and Blow Downs** – not amended, refer to MMCD Design Guidelines (2014).

2.17 **Test Points** – is amended by:

Adding the following paragraph after the first paragraph:

“For the purpose of pressure testing and chlorination of all new mains, a minimum of one test point will be installed between valves (per section of watermain), to be located adjacent to a valve. Test points will consist of a 19 mm corporation stop with a female outlet threaded for iron pipe. The corporation stop installed for the purpose of an air valve may be used as a test point or as a bleed point. Locations of the test points will be optimized to ensure thorough sterilization of a newly installed watermain.”

2.18 **Air Valves** – is amended by:

Adding the following clause to the end of section 2.18:

“Air valve body must have fusion epoxy coating.”

2.19 **Thrust Restraint** – is amended by:

Adding the following paragraph after the first paragraph:

”Details in the MMCD and in the Supplementary Standard Detail Drawings may be used as a guide only. The Consulting Engineer must design thrust blocks with due regard for pipeline pressure transients, soil conditions and expected test pressures. Thrust block design calculations and soil bearing pressures must be shown on construction drawings.”

2.20 **Chambers** – not amended, refer to MMCD Design Guidelines (2014).

2.21 **Service Connections** – is replaced with the following:

"Service connections must be sized appropriately for the designated land use and configured as shown on the Supplementary Standard Detail Drawings. Service connections must be terminated at the property line with a shut off valve.

The Consulting Engineer must ensure that the need of the property will be met, both in terms of pressure and flow under the District's current, as well as future, operating mode of the system.

Where a water service is being installed in a trench common with other services, water service depth at property line must be in accordance with the BC Plumbing Code and must not be deeper than 1.5 m unless accepted otherwise by the Authorized Person.

Only one service connection is permitted per legal lot, unless permitted by the Authorized Person."

2.22 **Alignments and Corridors** – is amended by:

Adding the following paragraph at the beginning of the section:

"Feeder and watermains are located within the road right-of-way as shown on the pertinent Supplementary Standard Detail Drawings. Where possible, watermains should be looped to avoid dead-end mains.

To eliminate stagnant water conditions on dead end mains, watermains should be terminated at the last hydrant and a small diameter service line should extend to houses being serviced beyond the hydrant.

For location in a right-of-way, where technically impractical, as determined by the Authorized Person, watermains in side yard and rear yard statutory or dedicated right-of-way may be accepted. The rights-of-ways must be a minimum of 3.0 m wide and have an access road capable of supporting the intended maintenance vehicles in all weather conditions. Suitable road access must be provided to any manholes, valve chambers or other water system appurtenances. Where no such appurtenances are provided, an access road is not required."

2.23 **Reservoirs** – not amended, refer to MMCD Design Guidelines (2014).

2.23.1 **Preliminary Design** – not amended, refer to MMCD Design Guidelines (2014).

2.23.2 **Capacity** – not amended, refer to MMCD Design Guidelines (2014).

2.23.3 **Structural Design Codes** – not amended, refer to MMCD Design Guidelines (2014).

2.23.4 **Design Features** – not amended, refer to MMCD Design Guidelines (2014).

2.23.5 **Valve Chamber** – not amended, refer to MMCD Design Guidelines (2014).

2.24 **Pump Stations** – not amended, refer to MMCD Design Guidelines (2014).

2.24.1 **Preliminary Design** – not amended, refer to MMCD Design Guidelines (2014).

2.24.2 **Capacity** – not amended, refer to MMCD Design Guidelines (2014).

2.24.3 **Design Features** – not amended, refer to MMCD Design Guidelines (2014).

2.25 **Pressure Reducing Valve (PRV) Stations** – not amended, refer to MMCD Design Guidelines (2014).

2.25.1 **Preliminary Design Parameters** – not amended, refer to MMCD Design Guidelines (2014).

2.25.2 **Design Features** – is amended by:

Deleting the first bullet.

The following new sections are added to MMCD Design Guidelines (2014):

“

2.26 **Watermain Seismic Design**

Areas where watermain seismic design standards apply are based on the District’s Development Permitting Areas and as designated by the Consulting Engineer as to whether the land upon which the watermain is located is susceptible to liquefaction or landslide, based on appropriate site investigation, and subject to the satisfaction of the Authorized Person.

The following design criteria must be used in areas subject to permanent ground deformation due to liquefaction or landslide. The Consulting Engineer must calculate and submit to the Authorized Person expected differential horizontal and vertical movement and provide a design that will accommodate the movement.

2.26.1 **Joint Restraint**

All pipeline, fittings and appurtenance joints will be restrained, so that they will not allow pullout when subjected to extension forces. The joint restraint system will be strong enough to resist loading developed by 50m of buried pipe being pulled through the ground.

2.26.2 **Flexible Expansion Joints**

Flexible expansion joints, in addition to joint restraint and flexible couplings, will be required at the following locations:

- At connections to structures inside or outside seismic vulnerability areas;
- Interface at areas that are subject to preload or permanent grade change and susceptible to residual ground movement.

2.26.3 **Wrapping**

Pipe joints will be wrapped with 8 mm thick polyethylene or geotextile to minimize soil-pipe interaction.

2.26.4 **Service Connections**

Provide an offset or loop in the Service Connection to accommodate movement up to 500 mm of the pipeline in the soil. Flexible connections will be required for all connections to structures and the Consulting Engineer will calculate the expected differential movement between pipe and structure for design purposes.

2.27 **Water Wells**

When a private well or surface water source is the only available water supply, the Authorized Person may accept this as the water supply, provided that the water from this type of unregulated and untreated source has been tested and proven safe for human consumption. As a condition of approval, water quality must be tested by a laboratory acceptable to the Provincial Health Officer for the bacteriological testing of potable water supplies and also by a laboratory accredited by the Ministry of Water, Land and Air Protection for testing of chemical and physical parameters. Testing must be undertaken in accordance with the latest edition, as amended from time to time, of the Guidelines for Canadian Drinking Water Quality, latest edition, as amended from time to time, published by Health Canada and must test for those chemicals and physical parameters required for community waterworks systems by the Medical Health Officer having jurisdiction. The Consulting Engineer is responsible for obtaining all necessary approvals from these agencies and certifying that the proposed water source meets all applicable provincial standards for water quality."

END OF SECTION – WATER DISTRIBUTION

3.0 SANITARY SEWERS – MMCD is amended

3.1 **General** – is amended by**:**

Adding the following clauses to section 3.1 after the last paragraph:

"All sewage disposal systems, including alternate systems, must meet all applicable requirements of the District of North Vancouver as well as regional, provincial and federal authorities, the Public Health Act, R.S.B.C. 2008, c. 28, BC Building Regulations, BC Hazardous Waste Regulation, and the Greater Vancouver Sewerage and Drainage District (GVS&DD) Sewer Use Bylaw No. 299, 2007, as amended or replaced from time to time.

Design submissions should utilize the following terminology:

Interceptor Sewers - are large diameter sewer pipes owned and maintained by Metro Vancouver which intercept and convey sewage flows from more than one trunk sewer to Metro Vancouver's sewage treatment plant.

Trunk Sewers - are sewer pipes, which have a peak wet weather flow (PWWF) of greater than 45 liters/second and a maximum pipe full depth under PWWF condition of 70%.

Local Sewers - are sewer pipes upstream of a trunk sewer pipe, which have a peak wet weather flow (PWWF) of less than 45 litres/second and a maximum full pipe depth under PWWF condition of 50%.

Terminal Sewers - are sewer pipes at the most upstream sections of the sewer system network branches.

Service Connections - are the lateral sewer pipes, including an inspection chamber, from the other sanitary sewer pipes in municipal rights-of-way, to within approximately 200 mm of the property line of a parcel of land.

Building Sewers - are small diameter sewer pipes on a parcel of land connecting a building to a service connection at the inspection chamber.

Catchment Area - is the total upstream area which drains to a sewer, whether by gravity or by pumping and gravity combined.

Force Mains - are sewers, operating under pressure, which join the pump(s) discharging from a sewage pump station to a point of gravity flow, or in some cases, another force main.

Any computer-aided analysis of the District's sanitary network will be carried out using the District's sanitary sewer network model. Sanitary sewer analysis will include assessment of the existing downstream catchment area to a point where the total contributing population, including the proposed development, is at least ten (10) times greater than the proposed contributing population.

In some cases, sewers may service areas lower in elevation than the sewer. Where sewage from outside the "gravity" catchment area is discharged into

a catchment from a force main, the catchment area tributary to the force main must be included as part of the catchment area."

3.2 **Per Capita Flow** – is replaced with the following:

"Refer to section 3.6, Design Flow, as noted below."

3.3 **Non-Residential Flows** – is replaced with the following:

"Refer to section 3.6, Design Flow, as noted below."

3.4 **Peaking Factor** – is replaced with the following:

"Refer to section 3.6, Design Flow, as noted below."

3.5 **Infiltration** – is replaced with the following:

"Refer to section 3.6, Design Flow, as noted below."

3.6 **Design Flow** – is replaced with the following:

"For design flow calculations, average and peak daily sewage flows will be calculated using the following criteria.

Table 3a – Sewage Flow Design Criteria		
Land Use	**Average Daily Sewage Flow**	**Peaking Factor**
Single Family Residential	320 litres / capita / day	$1 + 14/ (4 + p^{*0.5})$ (Note 1)
Townhouse / Apartment Residential	360 litres / capita / day	$1 + 14/ (4 + p^{*0.5})$ (Note 1)
Inflow and Infiltration	16,800 litres / hectare / day	1.0
Note 1: In the Harman peaking factor equation, p = population in thousands		

The total design sewage flow [Q design] must be based on the ultimate saturation population densities and land use designations, in accordance with the Official Community Plan, for the subject catchment area. Sanitary sewers must be sized to convey the calculated sewage flows, including infiltration and inflow. For equivalent population factors refer to the table in section 1.7, Design Populations by Zoning or Land Use Designation"

3.7 **Pipe Flow Formulas** – not amended, refer to MMCD Design Guidelines (2014).

3.7.1 **Gravity Sewers** – not amended, refer to MMCD Design Guidelines (2014).

3.7.2 **Sewage Force Mains** – not amended, refer to MMCD Design Guidelines (2014).

3.8 **Flow Velocities** – is replaced with the following:

"All sanitary sewers must be designed at grades which will ensure sewage flow at a self-cleansing velocity of 0.6 m/s at least once every 24 hours, based on flow from the existing and proposed full development upstream, except where the maximum grade possible is limited. In such cases, upon acceptance by the Authorized Person, the required flow velocity may be reduced to a minimum of 0.45 m/s provided the depth of flow at the peak wet weather flow condition exceeds 25% of the diameter of the pipe.

Where the sanitary sewer pipe grade is such that the velocity of flow is in excess of 5 m/s, the system design must include measures to prevent scour, erosion and pipe movement."

3.9 **Alignment** – not amended, refer to MMCD Design Guidelines (2014).

3.10 **Minimum Pipe Diameter** – is amended by:

Adding the following clauses to section 3.10 at the beginning, before 'Collector sewers':

"

- Commercial and institutional lands: 200 mm
- Industrial lands: 250 mm
- New extensions: No reduction in pipe size will be made for pipes downstream, irrespective of grade provided on the pipe."

3.11 **Minimum Grade** – is replaced with the following:

"This section refers to Pipe Grades. Pipes with slopes at 20% or greater must have an acceptable anchoring system.

Pipes with slopes at 20% or greater must be designed with special attention to scour velocities and potential damage to the pipe structure. Proposed pipe protection systems to prevent pipe invert damage will be accepted by the Authorized Person.

Sections of upstream sewers, or terminal sewers, may require steeper grades to ensure self-cleaning velocity under partial flow conditions."

3.12 **Curved Sewers** – is replaced with the following:

"Curvilinear sewers are only permitted under special circumstances and must be accepted by the Authorized Person prior to design and construction.

Pipes between two consecutive manholes may be installed on a defined curve, provided that the maximum joint deflection does not exceed one-half (½) the deflection recommended by the pipe manufacturer. Only one vertical or one horizontal defined curve is permitted between any two manholes. Curvilinear sewer designs must include proposed elevations at 5 m stations for vertical curves and sufficient data for setting out of horizontal curves and detailing of as-built record information.

PVC pipes must not be bent (between the pipe joint ends) to form curves. Manufactured long bends or PVC high deflection stops coupling (e.g., Certain Teed, or accepted equal) must be used to achieve curves, if accepted by the Authorized Person."

3.13 **Depth** – is replaced with the following:

"Sewers must be installed at nominal depths between 1.8 m and 3.5 m, from finished ground surface to pipe invert unless accepted by the Authorized Person on the basis of unusual servicing circumstances.

Sewer depth must be sufficient to provide appropriate gravity service connections to all properties tributary to the sewer (including both developed and vacant parcels that may be forseen to require connection). Pumped connections may be accepted by the Authorized Person as stipulated elsewhere in this Bylaw.

Where a new sewer will service existing buildings, the crown of the sewer must be at least 1.0 m below the basement elevations of the parcels to be serviced."

3.14 **Manholes** – is replaced with the following:

"

3.14.1 **Locations** – is deleted and replaced with the following:

Manholes are required at the following locations:

- At distances not greater than 120 m for sewers 375 mm diameter or less and 150 m for sewers 450 mm to 750 mm diameter.
- At the end of a sewer main; at all changes in grade, size, or alignment; at all pipe intersections.
- Every change of line or grade that exceeds ½ the maximum joint deflection recommended by the manufacturer, or where the radius of an accepted curvilinear sewer alignment is less than 30m.
- All sewer confluences and junctions, (accept those with GVRD interceptor sewers).
- A manhole will be required on all service connections where the size of the connection is greater than 250 mm diameter, unless the connection is more than two pipe sizes smaller than the main to which it is joining. A service connection exceeding 30 m in length will be treated as a regular main.
- A manhole may be required by the Authorized Person on all multi-family service connections where the size of the connection is greater than 150 mm diameter

Temporary cleanouts are permitted where an extension of the sewer, in the future, will provide a manhole at an appropriate spacing.

Offset manholes in the parallel sewer systems may be considered under some circumstances, subject to acceptance by the Authorized Person".

3.14.2 **Hydraulic Details** – is deleted and replaced with the following

"Drop Manhole Structures

Drop manholes, designed in accordance with the MMCD Standard Detail Drawings, must only be used when a new incoming sewer cannot be steepened or where site conditions do not permit excavation to the base of an existing manhole.

Inside drop pipe structures may be permitted only when all other options cannot be accommodated. A new inside drop manhole must be larger in diameter than the standard manhole and must accommodate the incoming sewer and drop pipe, as well as ensuring sufficient access and working space for personnel and safety equipment within the manhole. Acceptance of the size of the drop manhole must be obtained from the District, prior to design and construction."

The following sections are added to the MMCD Design Guidelines (2014):

"

3.14.3 **Through Manhole Structures**

The crown elevations of sewers entering a manhole must not be lower than the crown elevation of the outlet sewer. No drop in invert is required for a through manhole where the sewer mains are of the same size. A 30 mm drop in invert for alignment deflections up to 45 degrees and a 60 mm drop in invert for alignment deflections from 45 degrees to 90 degrees must be provided.

A straight through ramp drop up to one (1) pipe diameter may be permitted under special circumstances, if accepted by the Authorized Person.

Adding the following subsection to MMCD Design Guidelines (2014):

3.14.4 **Sanitary Manhole Construction**

All sanitary manhole bases must be pre-benched and require a third Party Accredited Certification / Compliance for the manufacture of precast products (CSA and ASTM certified) and also require:

- Tylox Superseal Gasket Joints (or pre-approved equivalent) for insertions and riser sections;
- Minimum 150 mm wall thickness on the base section;
- Minimum 150 mm thickness below the invert of the pipe;
- Minimum concrete strength 28 MPa;
- Reinforcing in the walls and bottom slab;
- At the Authorized Person's discretion, PVC lining.

All proposed tie-ins to existing manholes require District approval of the existing manhole condition. A preliminary approval can be given through a visual inspection of the manhole from the ground surface, however the required final approval will be made after excavation and when the District is able to thoroughly inspect manhole's exterior.

All approved tie-ins into existing manholes will require a core and the use of an inserta-tee and or pre-approved equivalent to make the connection. The coring is expected to extend into the existing channel, whereby creating the benching and a smooth transition into the channel of the main."

3.15 **Odour Control** – not amended, refer to MMCD Design Guidelines (2014).

3.16 **Service Connections** – is amended as follows

3.16.1 **Size** – is amended by:

Adding the following clause after the first paragraph:

"If there are air space parcels or more than one building on a legal parcel that is expected to subdivide, each air space parcel and/or building unit may require an independent service connection."

Adding the following bullet:

"

- Triplex and multi-family residential premises will have a single 150 mm diameter sanitary sewer service connection, or a larger service if required."

3.16.2 **Location and Depth** – not amended, refer to MMCD Design Guidelines (2014).

3.16.3 **Grade** – is amended by:

Deleting and replacing section 3.16.3 with the following:

"The slope or grade of service connections between the inspection chamber and the crown of a sewer main shall be a minimum of 2%.

To prevent maintenance issues, service connections shall have no sags or bellies."

3.16.4 **Details** – not amended, refer to MMCD Design Guidelines (2014).

3.17 **Locations and Corridors** – is amended by:

Deleting and replacing section 3.17 with the following:

"

3.17.1 **Locations and Corridors**

Sewers must be located as shown on the Supplemental Standard Detail Drawings, in municipal road right-of-way, or, as expressly permitted by the District, in a utility right-of-way.

Where a sewer crosses private land, right-of-way requirements are as indicated in Section 1.0, General Design Considerations.

Clearance from watermains is as indicated in MMCD Master Municipal Specifications (2009) Section 1.0, General Design Considerations.

Where all other options investigated by the Consulting Engineer prove to be technically impractical, the installation of sanitary sewer mains in side yard and rear yard statutory or dedicated right-of-way may be accepted. The right-of-way must be a minimum of 3.0 m wide capable of supporting the intended maintenance vehicles in all weather conditions with unobstructed access to any manholes, inspection chambers or other sewer appurtenances."

3.17.2 **Aerial Pipe Bridges and Inverted Siphons**

The Consulting Engineer must obtain written acceptance in principle from the Authorized Person for the proposed facility and, prior to proceeding with the design, obtain appropriate criteria and guidelines for the design."

3.18 **Pump Stations** – is amended by:

Deleting and replacing sections 3.18.1 and 3.18.2 with the following:

"

3.18.1 **Sewage Lift Stations and Forcemains**

Prior to commencing detailed design of a lift station facility, the Consulting Engineer must propose a suitable location along with catchment area design peak sewage flows for the Approved

Person's acceptance. A pre-design report must also be accepted, prior to commencing detailed design.

Access and safety features of the facilities must be in accordance with the Work Safe BC regulations.

The sewage lift station and/or force main facilities must be designed for the defined tributary catchment area, with peak design flows calculated for short term, intermediate term and long term (ultimate accepted saturation development) design horizons.

New lift stations must be incorporated with a "Supervisory Control and Data Acquisition" (SCADA) system. Details of the requirements for SCADA system hardware will be provided by the District.

3.18.2 **Pressure Sewer Systems**

Pressure sewer systems will only be considered as an alternative to gravity sewers where the parcels cannot be serviced by conventional gravity sewer systems and alternative conventional means of sewage disposal are not technically or financially feasible.

Any proposed use, design and installation method of a pressure sewer system must receive prior acceptance from the Authorized Person. Design of the on-site pumping system must conform to the B.C. Plumbing Code and the B.C. Building Code.

Pump selection will require prior Authorized Person acceptance and be limited to brands available within the Lower Mainland on one day's notice. Pumps will be single-stage impeller type manufactured with bronze or stainless steel impellers. Pumps must be effluent, grinder or solids handling depending on the type of installation.

Pumps must be installed in a manufactured fiberglass sump with a minimum inside diameter of 1.0m for a single pump installation and 1.5m for a duplex pumping system. Pumps must be mounted using a slide away coupling system and guide rails to facilitate servicing.

Venting must be configured to dissipate potential odours away from adjacent residences either by venting to above roof level or by use of subsurface vents. Subsurface vents must be designed to be free draining and non-clogging. Subsurface vents will consist of a perforated pipe bedded in gravel, underlying at least 450 mm of loam soil backfill. Drainage must be provided if the soil bed is located in an area subject to ponding or high ground water. Water must be drained to below the level of the perforated vent pipe.

Each service connection must incorporate:

- a corporation stop at the main;
- a curb stop (isolating valve) and check valve at the property line. The check valve will be located upstream of the curb stop and on private property.

Each on-site pumping system must incorporate the following:

- an audible high liquid level alarm which can be heard from inside the house;
- a flashing high liquid level alarm light;
- a check valve on the pump discharge line;
- a shutoff valve immediately downstream of the check valve;
- an emergency overflow chamber of at least 1.5 m^2 of storage.

Each on-site pumping system must be regularly serviced and maintained at least once a year by a plumber certified to provide such servicing.

The pressure sewer mains and service connections must be designed for:

- a minimum cleansing velocity of 0.9 m/s;
- a maximum velocity of 3.0 m/s.

The pressure sewer mains must be tested as follows:

- prior to construction of on-site pumping systems;
- with all service connections installed;
- with all corporation stops and curb stops open;
- to a minimum pressure of two (2) times the maximum system working pressure.

The pressure sewer test will be accepted only if there is no measurable leakage over a period of two (2) hours at the sustained test pressure.

The testing of the pressure sewer main will be carried out under the direction of the Consulting Engineer who must, upon completion of testing, certify to the District that such system has been properly installed and successfully tested.

No on-site pumping systems will be accepted for construction prior to:

- successful testing of the pressure sewer mains;
- acceptance of the pressure sewer system by the District;

- issuance of a Building Permit for the on-site works."

3.19 **Low Pressure Sewers** – is deleted.

The following new subsections are added to section 3.0 in numerical order:

"

3.20 **Inspection Chambers**

All new Developments and Subdivisions require installation of an inspection chamber (IC) at the property line.

The depth of cover over the service connection at the inspection chamber must be a minimum 1.2 m below the finished ground elevation at the inspection chamber.

For service connections to existing trunk or interceptor sewers, the invert of the service connection inspection chamber must be a minimum of 1.0 m above the crown of the trunk or interceptor sewer. If the hydraulic elevation of any potential surcharge in the trunk or interceptor sewer is known, the invert of the inspection chamber on the service connection must be above the surcharge elevation.

3.21 **Special Connections**

Direct connections to a Metro Vancouver interceptor sewer will require Metro Vancouver's approval. When such connection is permitted, it must comply with the criteria and details stipulated by Metro Vancouver. The Authorized Person's acceptance and /or conditions of acceptance of the service connection will be final and will override any lesser stipulations of the Metro Vancouver."

3.22 **Sanitary Sewer Seismic Design**

The sewer must be designed so that the joints will not separate and that the pipe may experience ductile deformation to accommodate permanent ground deformation during an earthquake. The design must limit the flotation of the pipe.

3.22.1 **Area**

Areas where sanitary sewer seismic design standards apply are based on the District's Development Permitting Areas and as designated by the Consulting Engineer as to whether the development site is susceptible to liquefaction or landslide, based on appropriate site investigation, and subject to the satisfaction of the Authorized Person.

The following design criteria must be used in areas subject to permanent ground deformation due to liquefaction or landslide. The Consulting Engineer must calculate and submit to the Authorized Person expected differential horizontal and vertical

movement and provide a design that will accommodate the movement.

3.22.2 **Gravity Sewers – Class 1**

Class 1 design criteria apply in areas subject to permanent ground deformation due to liquefaction or landslide, where there may potentially be severe sewer failure consequences.

Class 1 criteria should be applied within areas where gravity sewers are installed:

- above a potable water pipeline;
- parallel to a potable water pipeline with less than 3.0 m of separation;
- within 100 m of an environmentally sensitive water body;
- within the recharge area for a potable water well or spring supply;
- in other locations where the failure consequences would be significant as required by the District.

3.22.3 **Materials**

Use of ductile iron, steel, or high-density polyethylene pipe and fittings is required. Use of concrete pipe (either reinforced or unreinforced), PVC, and grey or cast iron pipe or fittings is not allowed.

.1 Joint Restraint

All pipeline, fittings and appurtenance joints must be restrained so that they will not allow pullout when subjected to extension forces. The joint restraint system must be strong enough to resist loading developed by 50m of buried pipe being pulled through the ground (wrapped in polyethylene).

.2 Pipe Wrapping

Pipe must be wrapped with 8 mm thickness polyethylene (a baggy), such as is commonly used for corrosion protection, to minimize soil-pipe interaction. It is not the intent that this pipe wrapping will provide corrosion protection.

.3 Pipe Flotation Control

If the pipeline is located within the liquefiable layer and is 500 mm or greater in diameter, provision must be made to limit flotation, either by designing the pipe system for neutral buoyancy in liquefiable soils or positively holding

down the pipe to keep it from floating under liquefaction conditions.

Under most circumstances, it is acceptable to assume that the pipe is half-full of sewage for the purposes of these calculations.

.4 Manhole Flotation Control

Provision must be made to limit flotation, either by designing the manhole for neutral buoyancy in liquefiable soils or positively holding down the manhole to keep it from floating for manholes with one or more pipes of 500 mm or greater diameter entering the manhole.

.5 Connections to Manholes and Structures

The Consulting Engineer must calculate the expected differential movement between the pipe and structure and provide a design that will accommodate the movement to the satisfaction of the Authorized Person for manholes with pipes of 500 mm or greater diameter entering the chamber. Typically this would be achieved by installing two mechanical couplings or flexible joints in the sewer pipe. One would be located close to the outside face of the manhole barrel and one would be located a short distance away, ideally at the edge of the manhole excavation.

3.22.4 **Gravity Sewers – Class 2**

It is the intent to apply the Class 2 design criteria in locations where failure consequences in areas subject to permanent ground deformation due to liquefaction or landslide are not severe and thus where Class 1 design is not required. The sewer must be designed such that the pipe sections will not crack or break. Joint separation and flotation may occur during an earthquake.

.1 Material

All pipeline materials must be designed by the Consulting Engineer and submitted to the Authorized Person for review. Use of unreinforced concrete pipe is not allowed.

.2 Connections to Manholes

The design must provide flexibility at pipe connections to manholes to accommodate differential movement for manholes with pipes of 500 mm or greater diameter entering the chamber. Typically this would be achieved by installing two mechanical couplings or flexible joints in the sewer pipe. One would be located close to the outside

face of the manhole barrel and another located a short distance away, ideally at the edge of the manhole excavation.

3.22.5 Force Main Design

The design of Force Mains must be the same as for Class I Gravity Sewer design, except that flotation control is not required."

END OF SECTION – SANITARY SEWERS

4.0 STORMWATER (DRAINAGE) MANAGEMENT – MMCD is amended

4.1 **General** – is amended by:

Adding the following text before the first paragraph:

"The term "Stormwater" noted in MMCD Design Guidelines 2014 is interpreted and referred to herein as "Drainage."

Adding the following subsections to section 4.1 in numerical order:

"

4.1.1 District Goals and Objectives for Drainage Management

Land drainage designs that protect or replicate natural water balance (that mimic the balance of pre-development hydrological processes – interception, evapotranspiration, infiltration and runoff) are considered to be best management practices by the District. Disruption of natural water balance through urban and suburban development will be avoided. Drainage design should achieve the following goals:

Goal #1 – Preserve, respect, incorporate and improve natural capital and habitat

- maintain a minimum 30 m setback from all streams and minimize alterations of fish and wildlife habitat;
- manage natural and built environments as integrated components of a healthy watershed;
- restore watercourses, where possible, to their most natural form;
- restore and maintain the natural shape and composition (geomorphology) of stream channels or ravines, biological indicator conditions and flow conditions (the hydro geometric regime).

Goal #2 – Maintain water balance through management of surface water and groundwater resources

- integrate land development within watersheds to prevent negative hydrological and water quality impacts;
- permit groundwater recharge and manage runoff release rates to minimize fluctuations in stream flows;
- consider the cumulative impacts of land development on the water balance.

Goal #3 – Reduce risk to persons and property

- provide both major and minor drainage protection for persons and property;
- control and limit the incidence of nuisance or damage related to surface ponding and flooding.

Goal #4 – Be responsible stewards of the environment and community values

- provide drainage services that enhance a developments aesthetics and allow it to proceed according to the community plan;
- protect the environment and cultural heritage sites;
- ensure that drainage services integrate multiple community objectives where possible;
- evaluate alternative designs across social, environmental and economic performance measures, including full life cycle cost analysis.

4.1.2 Existing Information and Infrastructure

The presence of an existing drainage system does not imply that the system has adequate capacity to receive the proposed design flows – upgrades may be required.

Prior to any planning or design, the Consulting Engineer must consult with the District to confirm site-specific requirements and to determine what existing information and studies are available at the District. These include, but are not limited to, Integrated Stormwater Management Plans (ISMPs) and studies related to drainage and natural hazards.

4.1.3 Other Requirements

Drainage management and infrastructure design must conform to all District bylaws, regulations and policies, as well as Metro Vancouver, provincial and federal statutes and regulations.

4.1.4 Glossary of Terms

The following table provides a glossary of terms.

Table 4a – Glossary of Terms	
Antecedent Moisture	A term used in drainage modeling or hydrologic calculations where moisture from previous rainfalls may be accounted for in runoff calculations.
Best Management Practices	Measures that protect the Water Balance by replicating natural conditions and mimicking pre-development hydrological processes (interception, evapotranspiration, infiltration and runoff).
Biodiversity	Is the variability among living organisms, and includes diversity within and among species and ecosystems.
Design Frequency	An average elapsed time between the occurrence of two events (storms, floods, etc.).
Discharge	A rate of flow, usually expressed in cubic meters per second.
Drainage	The natural or artificial removal of surface and sub-surface water from an area.
Drainage System	Refers to all natural and engineered assets used for maintaining the water balance and conveying drainage – includes frequent, minor, major and extreme drainage systems.
Creek	A watercourse which has a flow of water for all or part of the year and has a defined channel.
Ecosystem	A dynamic complex of living (biotic) communities and the non-living environment (abiotic), interacting as a functional unit.
Ecosystem Services	Benefits obtained from the natural environment. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreation, and social benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth.
Environmental Flow	In relation to a watercourse, means the volume and timing of water flow required for the proper functioning of aquatic ecosystems.
Extreme Flow	A flow greater than the 100-year return period peak flow event.

Flood Construction Level (FCL)	A minimum elevation for habitable (excludes parkades and similar spaces) floor areas in buildings that are subject to flood hazards. FCLs apply to the underside of wood floor systems or the top of concrete floor systems and includes a minimum freeboard of 0.6 m.
Flood Proofing	A combination of structural changes and adjustments to properties subject to flooding, used primarily for the reduction of flood damages.
Floodplain	A relatively flat or lowland area adjoining a watercourse, ocean, lake or other body of standing water which has been or may be covered temporarily with floodwater. For DNV administrative purposes, floodplains are considered areas that would be inundated by a 1 in 200 year rainfall event or combination of storm surge and high tide.
Frequent Flow	Up to a 2-year return period peak flow event.
Groundwater	Means water naturally occurring below the ground surface. Includes interflow and groundwater flow.
Hydrograph	A graph showing discharge with respect to time for a given point on a stream or conduit.
Hydrology	Science that considers rainfall and the nature of its subsequent collection and discharge.
Hyetograph	A graph showing rainfall, rainfall intensities or volume over specified areas with respect to time.
Impervious	A term applied to materials through which water cannot pass, or through which water passes very slowly.
Impervious-ness Coefficient	A ratio of impervious areas to total area within a watershed or drainage area.
Infiltration	a) The entering of water through the interstices or pores of a soil or other porous medium. b) The entrance of water from the ground into a sewer or drain through porous walls, breaks, or defective joints. c) The absorption of water by the soil either as it falls as precipitation, or from a stream flowing over the surface.

Integrated Stormwater Management Planning (ISMP)	A process of recognizing the relationships between the natural environment and built environment and managing them as integrated components within the watershed.
Intensity	The rate at which precipitation falls in a given period, usually expressed in millimeters per hour or inches per hour.
Inter Flow	Infiltration of rainwater and snowmelt into shallow ground, the unsaturated zone, and moving laterally through soils.
Intermittent Stream	A stream with a defined channel, but which is dry for periods of the year, usually in the late summer and fall periods of low precipitation and no snow melts.
Lag Time	A time between two occurrences, such as between rainfall and runoff.
Minor Flow	Up to the 10-year return period peak flow event
Major Flow	Up to the 100-year return period peak flow event
Overland Flow	The flow of water over the ground surface before it flows to a drainage system.
Pervious	A term applied to a material through which water passes relatively freely.
Precipitation	Any moisture that falls from the atmosphere, including snow, sleet, rain and hail.
Rainfall Mass Curve	A plot of accumulated precipitation against time from the beginning of the storm.
Return Period	An estimate of the likelihood of an event such as rainfall depth, flood or a river discharge flow to occur.
Runoff	That part of precipitation which results in surface flow and in turn reaches a stream, drain, sewer, etc., directly or indirectly.
Source Controls	Stormwater/drainage techniques and/or facilities for retaining and treating stormwater/drainage at its source to best preserve or mimic the natural hydrologic cycle for typically occurring storm events.
Storage, Detention	With respect to runoff analysis, is that water that is detained in a facility during a storm and is released at controlled rates.
Surcharge	A flow condition occurring in closed conduits when the hydraulic grade line is above the conduit crown, or the transition from open channel to pressure flow.

Synthetic Unit Hydrograph	A unit hydrograph developed for an ungauged drainage area, based on known physical characteristics of the basin.
Time of Concentration	A time required for storm runoff to flow from the most remote point of a watershed or drainage area to the outlet or point under consideration. It is not a constant, but varies with depth of flow, grades, length and condition of conduit and/or channel.
Unit Hydrograph	A runoff hydrograph resulting from one inch (25.4 mm) of excess rainfall applied to a given watershed over some specified time interval.
Water balance	The accounting of inflow and outflow of water in a system according to the components of the hydrologic cycle.
Watershed	An area or ridge of land that separates drainage flowing to different watercourses or bodies of water.
Watercourse	A channel through which water flows. Whether usually containing water or not, can include river, creek, canal, brook or underground stream.

4.1.5 **Drainage Management Principles**

Drainage management is the analysis, planning and implementation of hydrological processes and Best Management Practices that achieve a natural water balance at a development site and at the neighbourhood and watershed scales.

The two main components of drainage management that are impacted by land use are runoff and infiltration.

Any design must consider natural and anthropogenic systems interdependently to mitigate adverse hydrological impacts on the natural environment, such as increased peak storm flows and frequency, erosion, sedimentation, flooding, reduced infiltration, reduced minimum groundwater levels and stream base flows, water quality deterioration and degradation of aquatic and terrestrial wildlife habitats.

The design of drainage systems must incorporate techniques such as:

- Minor-major drainage systems;
- Parcel grading;

- Infiltration facilities such as rain gardens, swales, absorbent landscapes;
- Subsurface disposal;
- Detention and retention storage;
- Erosion control;
- Water quality control, such as sediment and dissolved pollutants removal;
- Groundwater interflow and base flow to creeks;
- Evaporation, temperature and habitat enhancement;
- Other methods to mitigate the impacts of land use;
- Consulting Engineers must consider the Districts Integrated Stormwater Management Plans (ISMPs) when designing drainage systems."

4.2 **Drainage Management Plan** – is amended by:

Adding the following subsections to section 4.2 in numerical order:

"

4.2.1 **Approach**

A Drainage Management Plan must include consideration and design for source controls, drainage facilities, parcel grading (showing pre- and post-construction ground elevations), major flood path routing, groundwater and all appropriate information pertinent to the design.

4.2.2 **Drainage Management Plan**

A Drainage Management Plan must be developed by the Consulting Engineer in two phases, as described below, and submitted to the Authorized Person for Review. Low maintenance and simple operational designs are preferred.

Phase 1: Preliminary Drainage Design (to be completed in support of a development application or a building permit)

A preliminary drainage design in a watershed is required to define the watershed objectives, to identify the proposed development impacts, to propose, examine and assess different drainage management alternatives, and to recommend a Drainage Management Plan including site-specific conditions. The Drainage Management Plan must be prepared according to the requirements of this

section and any watershed studies undertaken by the District.

Phase 2: Detailed Drainage Design (to be completed as a condition of development approval or the issuance of a building permit)

A detailed design is needed to implement the Drainage Management Plan and must include final sizing of source controls and drainage systems, grading, determination of hydraulic grade lines, lot grading plans, sediment and erosion control plans, water quality control plans (where requested), cost estimates, operation and maintenance responsibilities for drainage systems, and schedule for implementation.

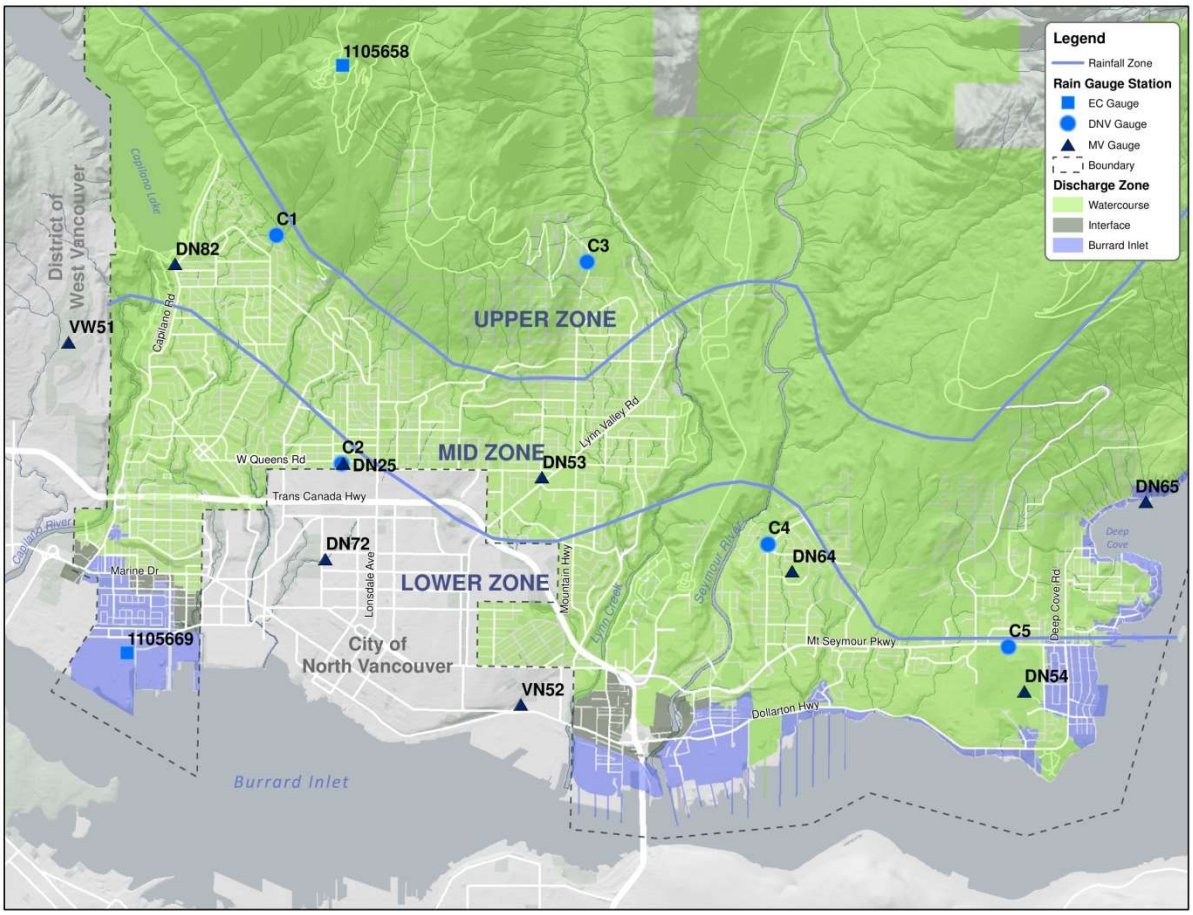
Summary reports of studies carried out in Phase 2 will be required with the submission of detailed engineering plans.

4.2.3 Drainage Management Criteria

.1 Rainfall and drainage management zones

Figure 4a should be used to determine rainfall and drainage management zones.

Figure 4a – Rainfall and Drainage Management Zones



.2 Mean Annual Rainfall Event Performance Targets

Table 4b should be used to determine performance targets for the Mean Annual Rainfall Event.

Table 4b: Performance Targets (Mean Annual Rain Event)			
	Lower Zone	**Mid Zone**	**Upper Zone**
MAR (mm)	116	166	215
50% of MAR (mm)	58	83	108

.3 Development Applications

New development refers to proposed development in areas that are currently forested and undeveloped.

Redevelopment refers to proposed development in areas that have existing development, but which are being redeveloped or changed to a new use or higher density form of development.

For new development in areas where drainage is directed towards creeks and rivers, drainage management targets and objectives set out in Tables 4c apply.

For redevelopment in areas where drainage is directed towards creeks and rivers, drainage management targets and objectives set out in Tables 4d apply.

For areas that do not drain to creek systems but discharge directly into Burrard Inlet, source controls may not be required for hydrological control, but they may be required for water quality treatment.

Table 4c – Drainage Criteria for New Development

Category	Target Amount	Objective
Rainfall Capture for Small Storms	0 to 50% of the MAR (1)	**Runoff volume reduction and water quality control.** Capture 90% of the rainfall in a typical year at the source (building parcels and roads) and infiltrate, evaporate, transpire or reuse it[2].
Runoff Control for Large Storms	50% to 100% of the MAR	**Runoff rate reduction.** Store runoff from infrequent large storms (e.g. a mean annual rainfall or MAR), and release at a rate that approximates the natural forested condition[3]. Decrease the erosive impact of the large storm events.
Flood Risk Management for Extreme Storms	> MAR up to 100-yr	**Peak flow conveyance.** Ensure that the drainage system is able to convey extreme storm events with only minimal damage to public and private property.

Notes:
[1] MAR is Mean Annual Rain Event (e.g. a two year storm event).
[2] Capture volume = 50% of MAR x Impervious Area.
[3] Maximum release rate based on 2-year 24-hour pre-development flows

Table 4d – Drainage Criteria for Redevelopment

(1) No net increase in the rate and volume of stormwater runoff from existing to developed conditions up to the MAR (2-year return period).

OR

(2) If existing imperviousness is greater than 50%, no net increase in the rate and volume of stormwater runoff beyond a maximum 50% imperviousness up to the MAR (2-year return period).

In the redevelopment scenarios described in Table 4d, the 2-year volume is defined as the volume required to control 2-year 24 hour

post-development flows to existing conditions for scenario (1) or 50% impervious condition levels for scenario (2).

.4 Infiltration Criteria

If an infiltration rate of 5 mm/hr is found to be appropriate for the area, then the surface area for the infiltration component of the drainage management plan must comprise 3% of the surface area of the development. If a rate of 5 mm/hr is not found to be appropriate, the Consulting Engineer must advise an alternate surface area.

.5 Capacity Analysis

The Consulting Engineer must ensure that all downstream drainage systems are capable of handling the projected increased in runoff created by the proposed development. Under special circumstances, drainage facilities in major drainage systems may be required to accommodate flows with a return period greater than 100 years."

4.3 **Minor and Major Systems** – is amended by:

Changing the title to "Drainage Systems" and deleting the MMCD Design Guidelines (2014) section and replacing it with the following:

4.3.1 **Frequent, Minor and Major Drainage Systems**

The frequent drainage system ("frequent system") consists of source controls designed to capture, treat and modify flows from frequent storm events and is designed to mimic the natural forested hydrologic cycle for frequent storm events (e.g. up to the 2-year return period event).

The minor drainage system ("minor system") consists of storm sewers, gutters, raingardens, catchbasins, driveway culverts, open channels, watercourses, soil, and flow control facilities designed and used to capture, convey, treat or modify flows from minor storm events. The minor system must be designed to prevent flooding and property damage and minimize public inconvenience from minor events up to the 10-year return period event. The runoff from the minor storm is referred to as the minor flow. Calculation of design flows and volumes used for the minor system must represent the entire 10-year return period storm event volume and peak flow from the upstream catchment area and must not include attenuated flow from undersized pipes or source control facilities.

The major drainage system ("major system") consists of flood paths, drainage outlets, roadways, watercourses, and flow control

facilities designed and used to capture, convey, treat or modify flows from rare and intense storm events. The major system must be designed to protect the public and prevent significant damage to property and the environment from frequent events up to the 100-year return period event. The runoff from the major storm is referred to as the major flow.

4.3.2 Creek Drainage Systems

Modifications to the creek system must be designed to protect the environment, protect the public and prevent property damage due to flooding caused by storm events up to the 200-year instantaneous peak flow. Infrastructure designed for the crossing of creeks such as culverts and bridges must be designed to the 200-year instantaneous peak flow without surcharging at the inlet. Adequate erosion protection will be required. The runoff from the extreme storm is called the extreme flow. The calculation of peak design flows used for the design of the creek system must represent the unobstructed flow from the upstream hydrology and must not include attenuated flow from undersized culverts, bridges, detention ponds or similar facilities.

Modifications to the creek system must also be designed to protect the environment and public from drought caused by a lack of flow. Minimum flows in creeks are required to sustain the environment, including ecosystem services, and for human use and values. The minimum allowable flow in a creek is called the environmental flow. The calculation of environmental flows used for the design of the creek system must represent the unobstructed interflow in the natural watershed."

4.4 **Runoff Analysis** – is replaced with the following:

"Assessment of the drainage system for post-development flow conditions must be completed using the District's Drainage Model. The Consulting Engineer must provide all pertinent information needed for the model analysis including land use changes and approximate percent impervious on an area basis to the Authorized Person.

Preliminary and detailed design of minor drainage conveyance systems may be completed using the Rational Method for catchment areas equal to or less than 10 hectares. For larger catchment areas, the District's Drainage Model or an equivalent SWMM based model must be used. All information pertinent to the design of the drainage system must be signed and sealed by the Consulting Engineer."

4.5 **Site and Lot Grading** – is amended by:

Deleting and replacing section 4.5 with the following:

"An approved parcel grading plan is required prior to the issuance of a building permit.

Grading is to comply with the BC Building Code and the following:

- Each parcel must be graded to drain into a District drainage system or a natural drainage path. Minimum parcel grades must be 2% (which supersedes the MMCD requirement). Parcel grading must be uniform and consistent, and can be reduced to 1% if an individual 600 mm diameter lawn basin is placed at the low side of the parcel.
- Areas around buildings (or proposed building sites) must be graded away from the (proposed) foundations to prevent flooding.
- Parcels lower than adjacent roadways must be designed using acceptable storm water management techniques to direct the runoff to an existing or proposed drainage system. Flood-proofing is required at the low points of roadways.
- Buildings must be sited above the hydraulic grade line of the Major Drainage System or Creek System.
- Other than sheet flow, individual parcels must not direct storm runoff into any natural creek, park or greenbelt areas.
- A 600 mm lawn basin is to be placed at the end of every on-site swale.
- To optimize rainfall capture and infiltration, soil composition and depth for pervious areas should be selected to meet rainfall capture targets."

4.6 **Minimum Building Elevations (MBE)** – is amended by:

Deleting the second paragraph and replacing it with the following:

"The MBE is to be at least 0.6m above the storm sewer service connection invert and at least 0.6m above the major drainage system hydraulic grade (HGL)."

Delete sections 4.6.1 and 4.6.2.

4.7 **Rational Method** – not amended, refer to MMCD Design Guidelines (2014).

4.7.1 **Runoff Coefficients** – is replaced with the following:

"Actual runoff coefficients must be used for the design of source controls. Drainage systems must use the runoff coefficients in Table 4e.

Table 4e – Runoff Coefficients			
Land Use	**Percent Impervious**	**2 and 10 Year Runoff Coefficient**	**100 Year Runoff Coefficient**

Park (alpine, regional)	5	0.1	0.3
Park (urban)	20	0.2	0.3
Road Right of way	90	0.8	0.85
Single Family Residential	70	0.65	0.7
Multi-Family Residential	90	0.8	0.85
Commercial / Industrial	95	0.85	0.95
Institutional	80	0.75	0.8

"

4.7.2 **Runoff Coefficient Adjustment Factor** – not amended, refer to MMCD Design Guidelines (2014).

4.7.3 **Rainfall Intensity** – is replaced with the following:

"Rainfall intensity must be determined from a rainfall Intensity-Duration-Frequency (IDF) curve based on the calculated time of concentration. The District has developed IDF curves that incorporate future climate change scenarios to the year 2100.

The appropriate IDF curve shall be selected based on geographic area as shown in Figure 4a – Rainfall and Drainage Management Zones. Three zones are identified: Upper, Mid and Lower and the IDF curves are based on data from the District's rainfall gauging stations.

Lower Zone – Rainfall Intensity (mm/hr)

Storm Duration	**Return Period**					
	2 yr	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**
5 min	61.9	86.0	104.8	129.3	148.2	167.9
15 min	36.3	48.5	57.8	70.0	79.5	89.0
30 min	24.4	31.9	37.6	45.1	50.9	56.9
1 hour	16.6	21.0	24.4	28.9	32.3	36.0
2 hour	12.5	15.6	17.8	20.6	22.7	24.7
6 hour	8.9	11.0	12.7	14.6	16.1	17.5
12 hour	6.8	8.6	9.8	11.2	12.2	13.2
24 hour	4.8	6.1	7.0	8.2	9.0	9.8

Lower Zone –Total Rainfall (mm)

Storm Duration	**Return Period**					
	2 yr	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**
5 min	5.2	7.2	8.7	10.8	12.4	14.0
15 min	9.1	12.1	14.5	17.5	19.9	22.3
30 min	12.2	15.9	18.8	22.5	25.5	28.5
1 hour	16.6	21.0	24.4	28.9	32.3	36.0
2 hour	25.1	31.3	35.7	41.2	45.3	49.5

6 hour	53.1	66.2	75.9	87.6	96.6	104.9
12 hour	81.4	103.5	117.3	133.9	146.3	158.7
24 hour	115.9	146.3	168.4	196.0	215.3	234.6

Mid Zone – Rainfall Intensity (mm/hr)

Storm Duration	**Return Period**					
	2 yr	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**
5 min	80.5	108.8	130.4	158.7	180.7	203.3
15 min	47.1	61.6	72.6	86.8	97.9	109.1
30 min	34.5	43.6	50.7	59.9	67.0	74.3
1 hour	24.6	29.8	34.0	39.6	43.9	48.5
2 hour	18.7	22.4	25.1	28.5	30.9	33.4
6 hour	12.4	15.3	17.3	19.8	21.6	23.3
12 hour	9.6	12.0	13.5	15.3	16.6	17.9
24 hour	6.9	8.7	9.9	11.4	12.5	13.6

Mid Zone –Total Rainfall (mm)

Storm Duration	**Return Period**					
	2 yr	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**
5 min	6.7	9.1	10.9	13.2	15.1	16.9
15 min	11.8	15.4	18.1	21.7	24.5	27.3
30 min	17.3	21.8	25.3	29.9	33.5	37.1
1 hour	24.6	29.8	34.0	39.6	43.9	48.5
2 hour	37.4	44.7	50.1	56.9	61.9	66.8
6 hour	74.5	91.8	103.8	118.7	129.7	140.1
12 hour	115.2	143.5	162.2	183.5	199.4	215.3
24 hour	165.6	208.4	238.7	274.6	300.8	327.1

Upper Zone – Rainfall Intensity (mm/hr)

Storm Duration	**Return Period**					
	2 yr	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**
5 min	99.1	131.7	156.1	188.1	213.1	238.7
15 min	57.8	74.8	87.3	103.6	116.3	129.1
30 min	44.6	55.4	63.7	74.6	83.0	91.7
1 hour	32.5	38.6	43.6	50.3	55.5	61.0
2 hour	24.8	29.1	32.3	36.3	39.2	42.1
6 hour	16.0	19.6	22.0	25.0	27.1	29.2
12 hour	12.4	15.3	17.3	19.4	21.0	22.7
24 hour	9.0	11.3	12.9	14.7	16.1	17.5

Upper Zone –Total Rainfall (mm)

Storm Duration	**Return Period**					
	2 yr	**5 yr**	**10 yr**	**25 yr**	**50 yr**	**100 yr**
5 min	8.3	11.0	13.0	15.7	17.8	19.9
15 min	14.5	18.7	21.8	25.9	29.1	32.3
30 min	22.3	27.7	31.9	37.3	41.5	45.8
1 hour	32.5	38.6	43.6	50.3	55.5	61.0
2 hour	49.7	58.2	64.6	72.7	78.4	84.2
6 hour	95.9	117.3	131.8	149.7	162.8	175.3
12 hour	149.0	183.5	207.0	233.2	252.5	271.9

24 hour	215.3	270.5	309.1	353.3	386.4	419.5

4.7.4 **Time of Concentration** – not amended, refer to MMCD Design Guidelines (2014).

4.7.5 **Design Summary Sheet** – not amended, refer to MMCD Design Guidelines (2014).

4.8 **Hydrograph Method** – is amended by:

Add the following paragraph after the first paragraph already in MMCD Design Guidelines (2014):

"The District's SWMM based Drainage Model is to be used for all minor and major drainage analysis that requires computer modelling of hydrologic characteristics of the watershed and generating runoff hydrographs. Estimation of the 200-year or Extreme Flow conditions must be completed using a regional analysis approach."

4.8.1 **Model Selection** – not amended, refer to MMCD Design Guidelines (2014).

4.8.2 **Modelling Procedures** – not amended, refer to MMCD Design Guidelines (2014).

4.8.3 **Submission of Modelling Results** – is amended by:

Adding the following bullet:

"

- drainage map showing the catchment and sub-catchment boundaries, slopes, land uses, and soil types."

4.9 **Minor System Design**

4.9.1 **Level of Service** – is amended by:

Deleting and replacing section 4.9.1 with the following:

"See section 4.3.1 above."

4.9.2 **Pipe and Channel Capacity** – is amended by:

Adding the following:

"Manning's "n" for culverts to be based on pipe material type – e.g. concrete pipe to have n value of 0.013. Calculations for Manning's "n" values for culverts with fish baffles to be provided by the Consulting Engineer."

4.9.3 **Flow Velocities** – is amended by:

Deleting and replacing section 4.9.3 with the following:

"Minimum design velocity for pipes flowing full or half full: 0.6 m/s.

There is no limit on the maximum velocity. However, if the design velocity exceeds 3.0 m/s and/or supercritical flow occurs, provisions for structural stability and durability of the pipe must be included. Anchor blocks are required where the pipe grade is steeper than 20%.

Where a storm sewer discharges into a watercourse, provide riprap bank protection and, if necessary, energy dissipation facilities. Avoid discharge perpendicular to stream flow.

Acceptable flow velocities in ditches and natural watercourses are highly variable depending on the soil characteristics. Fine non-cohesive soils such as sand are highly erodible, whereas course granular soils and highly cohesive soils are more resistive. In general, flow velocities exceeding 1 m/s can be problematic. It may be necessary to conduct sediment transport analysis to better assess the sensitivity of the watercourse, which will relate to the flow velocity, frequency, and duration.

Where drainage discharge enters a natural watercourse, the federal Department of Fisheries and Oceans and the provincial Ministry of Water, Land and Air Protection generally require adequate bank protection and to limit the maximum velocity to 1 m/s."

4.9.4 **Ditch Inlets** – not amended, refer to MMCD Design Guidelines (2014).

4.9.5 **Alignment** – not amended, refer to MMCD Design Guidelines (2014).

4.9.6 **Minimum Pipe Diameter** – is amended by:

Adding to section 4.9.6 the following clauses to the end of the last paragraph:

"Asbestos cement pipes, clay pipes and corrugated steel pipes are not acceptable for storm sewers.

The minimum size of storm sewers is 250 mm diameter except at a terminal section of a short cul-de-sac with no catch basin connections where the size may be reduced to 200 mm diameter.

A large diameter sewer refers to sizes 675 mm or larger and a small diameter sewer refers to sizes 600 mm and smaller."

4.9.7 **Minimum Grade** – not amended, refer to MMCD Design Guidelines (2014).

4.9.8 **Curved Sewers** – is not amended, refer to MMCD Design Guidelines (2014).

4.9.9 **Depth** – is amended by:

Deleting and replacing section 4.9.9 with the following:

"The minimum depth of cover must be 1.0 m for storm sewers up to 600 mm diameter. For pipe sizes larger than 600 mm, or for cover less than that specified above, an engineering design for cover will be required and must be accepted by the Authorized Person.

The depth of storm sewers must be adequate to service all adjacent developments as well as all existing properties within practical limits. The invert of storm sewers at the upstream end must be of sufficient depth to service all of the tributary lands. In common trench installations, the sanitary service connections will be permitted to cross over the top of the storm sewer."

4.9.10 **Pipe Joints** – is amended by:

Deleting and replacing section 4.9.10 with the following:

"All storm sewer systems must be designed for "gasketted" closed joint construction."

4.9.11 **Perforated Pipes** – not amended, refer to MMCD Design Guidelines (2014).

4.9.12 **Manholes** – is amended by:

Deleting and replacing section 4.9.12 with the following:

"

(i) Manhole Spacing – Manholes are required at:

- every intersecting sewer;
- all changes in pipe size;
- every 150 m for pipes less than 900 mm diameter;
- every 200 m for pipes 900 mm diameter and larger;
- all changes in direction that exceeds 1/2 of the maximum joint deflection recommended by the pipe manufacturer;
- downstream end of curvilinear sewers.

(ii) Common Design Requirements are:

- The "springline" of the downstream pipe will not be higher than that of the upstream pipe;
- Outside drop connections will be provided wherever the drop exceeds 0.6 m. For incoming pipes 600 mm and larger in diameter, special drop design will be required;
- Sudden and extreme changes in direction for large sewers should be avoided;

- For sewers 675 mm and larger with 90° directional change, the ratio of the radius of bend (measured to the pipe centerline) to the pipe inside diameter should be greater than 2. Otherwise, the maximum bend deflection at one point will be 45° (i.e. use two 45° bends to turn 90°);
- 90° bends in sewers, 675 mm and larger, will not be located inside a junction with other sewer connections. Separate manholes are required;
- To minimize the head loss in sewers 675 mm and larger, high incoming flows from the opposite direction should not impinge in the same manhole structure. Separate manholes are to be used;
- Manhole anchorage may be required for 90° bends with large flows or high velocity flows;
- Intermediate safety platforms are required for all manholes in excess of 6 m in depth;
- Invert drops across manholes are required to compensate for the hydraulic (energy) losses due to changes in flow directions. The required drop in invert levels is the hydraulic loss across the manhole."

(iii) Hydraulic Loss:

Invert drops across manholes are required to compensate for the hydraulic (energy) losses due to changes in flow directions. The required drop in invert levels is the hydraulic loss across the manhole.

For junctions involving large diameter sewers or high velocity flows, detailed engineering analyses may be required. For small diameter sewers (600 mm or smaller) and low velocity flows, the following equation can be used to calculate the head loss:

$$H_L = \frac{V^2}{\frac{k}{2g}}$$

Where H_L = head loss (m)

k = head loss coefficient

V = outlet flow velocity (m/s)

g = gravitational acceleration (9.81 m/s2)

The minimum drops are:

- straight run no drop required
- deflections up to 45° 20 mm drop
- deflection 45° to 90° 30 mm drop"

(iii) Construction:

- All manhole bases must be pre-benched and require a third Party Accredited Certification / Compliance for the manufacture of precast products (CSA and ASTM certified); and must also meet the following requirements:
  - Tylox Superseal Gasket Joints (or pre-approved equivalent); also required for MH riser sections;
  - "Gasketted" cores for pipe insertion;
  - All proposed tie-ins to existing manholes will first require District's approval of the condition of the existing manhole. A preliminary approval can be given through a visual inspection of the manhole from the surface, however the required final approval will be made after excavation and when the District is able to thoroughly inspect the outside of the manhole;
  - All approved tie-ins into existing manholes will require a core and the use of an inserta-tee and or pre-approved equivalent to make the connection. The coring is expected to extend into the existing channel, whereby creating the benching and a smooth transition into the channel of the main."

4.9.13 **Catch Basin Spacing** – is amended by:

Deleting and replacing section 4.9.13 with the following:

"The minimum diameter for catch basin leads is 200 mm for single catch basins and 250 mm for double catch basins. Catch basin leads should be taken directly into manholes if feasible. Double catch basins must not be directly connected together; instead the lead from each catch basin must be connected to a wye and into the manhole. The minimum grade for leads is 1%. The maximum length is 30 m.

Catch basins must be provided at regular intervals along roadways, at the upstream end of a curb return, at intersections and at low points (sags). Low points must not be located within curb returns at intersections. The Consulting Engineer must ensure that sufficient inlet capacity is available to collect the entire minor flow into the underground pipe system.

The spacing of the catch basins must be based on hydraulic requirements. The capacity of a single catch basin can be calculated by the orifice equation:

$$Q = 0.67\ C\ A\ (2\ g\ h)^{0.5}$$

Where Q = inlet capacity (m^3/s)
0.67 = clogging factor
C = orifice coefficient (0.8)
A = open area (0.068 m^2 for Dobney B-23 grate)
g = gravitational acceleration (9.81 m/s^2)
h = depth of ponding (m)

The maximum spacing must be established to permit each catch basin to drain a maximum area of 500 m^2 on road grades up to 5% and 350 m^2 on steeper grades. If the major flow is to be conveyed in the pipe system, additional catch basins are required.

All required changes in direction of the catch basin lead will require long radius bends with the maximum bend deflection being 45°.

All catch basin connections into new storm mains will require a manufactured wye.

For connections into existing mains, coring in conjunction with the use of an Inserta-tee (or pre-approved equivalent) is required (hammer taps and mortared joints are not allowed).

Clay mains will require a manufactured wye, attached using Flexseal shear band coupler (and/or approved equivalent) and require concrete encasement.

Video inspection is required for all catch basin laterals."

4.9.14 **Service Connections** – is amended by:

Adding the following clauses to the beginning of section 4.9.14:

"Service connections must be installed to provide a "gravity flow" connection to all buildings fronting the main, except where the land can drain to an acceptable alternate existing system. Pumped systems are only permitted under exceptional circumstances. The design requirements are:

- The minimum diameters are 150 mm for both residential and industrial/commercial/institutional;
- The minimum slope from the main to the property line must be 2%. All other sizes must be based on minimum velocity of 0.75 m/s;
- The connection must be located at the lower (downstream) portion of a larger parcel or land parcel. In urban developments,

connections will be as noted on the Supplemental Standard Detail Drawings;

- The service connection at the property line must be above the hydraulic grade line of the minor flow (10-year return period storm event);
- Each connection must only service one single parcel;
- When the design proposes to infill an existing ditch, all existing service connections must be connected to the proposed main;
- A manhole will be required on all service connections where the size of the connection is greater than 250 mm in diameter, unless the connection is more than two pipe sizes smaller than the main to which it is joining. A service connection exceeding 30 m in length will be treated as a regular main;
- For all service connections that do not require a manhole at the main, a manufactured wye will be required for all connections into new storm mains. For connections into existing mains, coring in conjunction with the use of an Inserta-tee is required (hammer taps and mortared joints are not allowed);
- The District reserves the right to require a manhole for all connections greater than 150 mm; and
- No ponding of water at service connections is allowed."

4.9.15 **Locations and Corridors** – is amended by:

Adding the following clauses to the beginning of section 4.9.15:

"Storm sewers must be designed inside the road right-of-way using the offsets shown in the typical road cross-sections in the Supplemental Standard Detail Drawings. Sewers and manholes must be offset from the vehicular wheel paths wherever possible to minimize the roughness of travel.

When a storm sewer and other appurtenances (i.e. manholes, valve chambers, etc.) are located within a right-of-way, the Developer must, for maintenance purposes, provide vehicular access from an existing municipal road. The maintenance access must be constructed to municipal road standards contained in this manual, adequate to support the maintenance vehicles for which the access is intended. Where an access is required, the access must be located entirely on one parcel."

The following subsections are added to section 4.9 in numerical order:

"

4.9.16 **Trench Design**

All proposed trenches must be designed such that they will not interrupt the natural groundwater flow patterns. This will preserve natural base flows to creek systems. The Consulting Engineer must provide sufficient detail on all drawings in order to prove this is accomplished.

4.9.17 **Lawn Basins**

Lawn basins must be provided as per the requirements of the site-specific Storm Water Management Plan. Lawn basin leads must have a minimum diameter of 150 mm and a minimum slope of 1%. Where a lawn basin lead connects directly to a storm sewer instead of a manhole, an inspection chamber is required at the property line.

All required changes in direction of the lawn basin lead will require long radius bends with the maximum bend deflection being 45°.

All lawn basin connections into new storm mains will require a manufactured wye.

For connections into existing mains, coring in conjunction with the use of an Inserta-tee is required (hammer taps and mortared joints are not allowed).

Video inspection is required for all lawn basin laterals.

4.9.18 **Temporary Cleanouts**

Temporary cleanouts may be provided at terminal sections of a main provided that all of the following conditions are met:

- future extension of the main is proposed or anticipated;
- the length of sewer to the downstream manhole does not exceed 45 m; and
- the depth of the pipe does not exceed 2 m at the terminal point.

Cleanouts cannot be considered permanent structures.

4.9.19 **French Drains**

The use of "french" drains will only be permitted where the topography and soil conditions are proven adequate to the satisfaction of the Authorized Person. A soils report will be required to support the design.

4.9.20 **Rockpit / Drywell**

Rockpits or drywell drainage will only be considered, solely at Authorized Person's discretion, in certain areas of the District where it can be demonstrated that the subsoil conditions will provide a percolation rate equal to, or in excess of, twice the minor runoff flows. A soils report will be required to confirm the suitability of the soils. This does not preclude the requirement for major flood path routing and all designs must incorporate a positive outlet for rainfall intensities in excess of the minor system design."

4.10 **Major System Design**

4.10.1 **General** – not amended, refer to MMCD Design Guidelines (2014).

4.10.2 **Surface Flow Routing** – is amended by:

Deleting and replacing section 4.10.2 with the following:

"Where feasible, new roadways, overland flow paths, channels and watercourses must be designed to ensure that the maximum hydraulic grade line is 0.6 m below the lowest existing or proposed flood construction level (FCL) of adjacent buildings. Surcharging at the inlet under the major flow is acceptable provided the headwater profile does not rise above the proposed FCL. Adequate erosion protection will be required where surcharging is proposed. In the event that the surface flow is not feasible or that the inlet facility is likely to be blocked or restricted, consideration will be given to sizing the storm sewer system to accommodate the major flow (i.e. creation of a drainage outlet).

The maximum depth of flow must not exceed 150 mm above the gutter line and the Consulting Engineer must consider the impact of surface routing on adjacent lateral roads. The design of intersections must ensure that surface flow can continue along the designated path crossing over lateral roads. Similar considerations are required if a change of surface flow direction is required. Overland flow routes are required at all sags and low points in roadways and other surface flow routes."

4.10.3 **Surface Flow Capacity** – not amended, refer to MMCD Design Guidelines (2014).

4.10.4 **Piped System** – not amended, refer to MMCD Design Guidelines (2014).

4.10.5 **Culverts and Bridges** – is amended by:

Deleting and replacing section 4.10.5 with the following:

"Culverts on creeks must be designed to convey the major flow (200-year return period instantaneous flow) or greater with the design headwater not exceeding the top of the culvert. The

Consulting Engineer must determine whether the culvert will operate under inlet or outlet control at design conditions.

Concrete culverts are preferred for general uses. HDPE and corrugated steel culverts may be considered under special circumstances when their use can be justified.

The minimum diameter of culverts on creeks is 450 mm. The minimum diameter of driveway culverts that form part of the minor system is 300 mm. The average water velocity in culverts should not exceed:

- 1.2 m/s for lengths up to 24.4 m;
- 0.9 m/s for lengths greater than 24.4 m.

The minimum depth of cover over culverts is 0.6 m, subject to the correct pipe loading criteria.

Inlet and outlet structures are required for all culverts designed for the 200-year return period instantaneous flow. Considerations for the installation of energy dissipation and erosion control must be included in the design.

Culverts on fish-bearing creeks must meet special conditions as specified by the District's Environment, Parks and Engineering Departments; Fisheries and Oceans Canada, and the BC Ministry of Forests, Lands and Natural Resource Operations (MFLNRO). Such culverts will be required to be passable to fish. Habitat restoration works will generally be required. The Consulting Engineer must consult the District to determine the requirement for individual projects.

Driveway culverts that form part of the minor system must have capacity for the runoff from the 10-year return period storm with the design headwater not to exceed the top of the culvert. All new driveway culverts must be sized to ensure that there is no adverse impact on adjacent properties under the 100-year return period runoff conditions.

Trash racks and/or debris barriers are required upstream of culvert installations. Refer to the Supplemental Standard Detail Drawings for debris barrier designs."

4.10.6 **Watercourses** – is amended by:

Deleting and replacing section 4.10.6 with the following:

"Watercourses are integral components of the drainage system and the ecological system. If the process of development or drainage design involves in-stream works, the Consulting Engineer must refer to the relevant Municipal, Provincial and Federal Statutes, Bylaws, Policies and Guidelines. Watercourse design

must incorporate the findings and recommendations from applicable ISMPs and site-specific studies and reports.

Any activity within a creek corridor or wetland is subject to the provisions of the District's Environmental Protection and Preservation Bylaw 6515.

All proposals for works within a watercourse must be forwarded by the Consulting Engineer to the Authorized Person. The Consulting Engineer must confirm which agencies are required to provide formal review and approval as well as facilitate the senior government liaison and consultation.

Detailed site-specific surveys, investigations, analysis and design are required to assess and evaluate watercourse constraints and characteristics. Natural channel design must include analysis of watershed hydrology, channel hydraulics, geometry and habitat requirements. Special consideration is needed for assessment of fluvial hydraulic forces to control bed and bank erosion and sediment deposition."

4.11 **Runoff Controls** – is amended as follows:

Replace the title with the following: "Drainage Control Facilities"

Deleting the introduction section of 4.11 and replacing with the following (see below for amendments to 4.11.1, onward):

"To meet the Districts drainage management principles, the following methods will be applied:

4.11.a Source Control Facilities must be designed to protect watershed health (aquatic life and habitat and creek integrity and stability) from frequent flows. Typically occurring frequent runoff volumes must be returned to natural pathways, through infiltration, evaporation, and transpiration to approximate natural forested watershed conditions. Runoff reduction and water quality improvements can be obtained by capturing and retaining rainfall on-site. This can be achieved using low impact development techniques and source control standards, where feasible, including:

- preserving or enhancing undisturbed natural areas;
- reducing road/driveway/parking widths;
- limiting surface parking;
- reducing building footprints;
- using increased depths of absorbent soil layers in landscaping areas;
- using rain gardens, porous pavers, roadside swales, cisterns, infiltration galleries, draining impervious areas to pervious areas, green roofs; and
- providing enhanced landscaping using native vegetation to evapotranspire rainfall.

Refer to the Metro Vancouver "Source Control Preliminary Design Guidelines", latest edition, as amended from time to time.

For small catchments (10 hectares or less), the design storage volume for the source control facility is to be calculated using the Modified Rational Method Analysis. For large catchment areas (over 10 hectares in size) the storage requirement will be computed using the District's Drainage Model.

The Consulting Engineer will determine the length of time required for the source control facility to completely drain after the design storm has finished. If the facility requires more than 24 hours to drain, the additional volume remaining after 24 hours will be added to the design storage volume. This provides an additional storage volume to compensate for consecutive storm events that will occur on the west coast of British Columbia.

Community and local flow control facilities may be considered when the cumulative benefits and cost savings over the lifespan of the facility outweigh source control solutions. The Consulting Engineer must consult with the District to determine the most suitable type or combination of source and flow control facilities.

4.11.b Flow Control Facilities must be designed according to the requirements of Integrated Stormwater Management Plans in consideration of the minor, major and creek drainage systems.

Any connection from an onsite stormwater/drainage source control system to the municipal storm sewer must have a restricted outlet for the dual purpose of mitigating both environmental impacts and minor flooding. The release rate shall be designed to control the 2-year 24 hour post development storm flow rate to match pre-existing conditions or the 50% impervious condition level as discussed in Section **4.2.3 Drainage Management Criteria**.

The Consulting Engineer must also verify that downstream infrastructure (storm sewers and ditches) can adequately convey runoff from the subject site. Existing facilities which are undersized or inadequate to accept additional drainage must be upgraded by the Developer.

For new development the 10-year return period event runoff rate must be controlled to meet natural forest conditions so as not to exceed the capacity of the existing downstream infrastructure.

For redevelopment the 10-year return period post-development runoff rates must be controlled to a level that can be accommodated by the downstream minor drainage system. This may be the 10-year existing condition peak flow."

4.11.1 **Parking Lot Storage** – is amended as follows:

Delete second bullet and replace with:

"Maximum ponding depth is 150 mm for a 2-year return period storm event."

4.11.2 **Underground Storage** – is amended as follows:

Delete sixth bullet and replace with:

"Underground storage must be located on-site."

4.11.3 **Dry Detention Ponds** – not amended, refer to MMCD Design Guidelines (2014).

4.11.4 **Wet Detention Ponds** – not amended, refer to MMCD Design Guidelines (2014).

4.11.5 **Subsurface Disposal/Infiltration Systems** – is amended as follows:

Deleting and replacing section 4.11.5 with the following:

"Infiltration measures include infiltration ponds, trenches, chambers, drywells, bio-retention basins, and pervious pavers. Infiltration measures are only permitted where the native soils demonstrate permeability greater than 15 mm/hr and the groundwater table is well below the invert of the facility (geotechnical investigation and Professional Engineer's certification required), or if underdrains are also provided. On-site infiltration facilities are to receive roof and foundation drainage only and must not experience severe sedimentation problems.

Conditions governing the use of infiltration systems are itemized as follows:

- Only permitted where the native soils demonstrate high permeability and groundwater table is well below the invert of the system (geotechnical investigation required). A soil log and classification sheet is required;
- Capacity of the system must be determined from site specific data;
- A positive drainage outlet is required;
- Infiltration trenches must consist of perforated storm sewer with a geotextile sleeve embedded in a geotextile wrapped drain rock filled trench;
- No system shall be designed where backflows may cause any part of the building to flood;
- Sediment traps are required at or before all inlets;
- Drywell (perforated) manholes must be used in place of standard manholes;

- Emergency overflows are required for storm events exceeding the design frequency;
- Release rate will be regulated by a standard flow control chamber; and
- The surface area of underlying permeable drain rock trenches should be sized to drain within ten (10) days in order to meet the criteria."

4.11.6 **Outlet Controls** – not amended, refer to MMCD Design Guidelines (2014).

4.11.7 **Biofiltration Swales and Constructed Wetlands** – is amended as follows:

Add the following to the end of the section:

"Swales must have a maximum flow depth of 150 mm and minimum freeboard of 150 mm and must conform to the Supplemental Standard Detail Drawings. All swales must be lined with turf on a minimum 100 mm of topsoil. Swales designed for major flow routing may have flow depths exceeding 150 mm. Easement widths shall be provided to accommodate the 1:100 year storm event and provide a minimum of 150 mm of freeboard. Swales must have a minimum 1% grade.

Swales must be designed to maximize infiltration."

4.11.8 **Oil and Grit Separators** – not amended, refer to MMCD Design Guidelines (2014).

4.11.9 **Oil / Water Separators** – not amended, refer to MMCD Design Guidelines (2014).

The following subsections are added to section 4.11 in numerical order:

"

4.11.10 **Inlet and Outlet Structures**

Pipes larger than 1200 mm diameter and non-circular culverts require specially designed inlet and outlet structures. Outlets having discharge velocities in excess of 1 m/s require riprap and/or energy dissipating structures for erosion control.

Trash racks are required at the inlets and outlets of all pipes over 450 mm in diameter and exceeding 30 m in length and may need to be designed to accommodate debris hazards (except large culverts in major watercourses where debris barriers or basins may be required). Trash racks may also be required on smaller diameter storm sewers at the discretion of the Authorized Person.

4.11.11 Flood Control and Debris Flow Hazards

Developments or Subdivisions may raise issues of slope or site stability, sub-surface soil conditions, liquefaction, groundwater and surface drainage of the development site or adjacent areas. The disturbance or removal of existing trees, vegetation and ground cover, and dewatering through the construction and excavation process can dramatically affect the soil stability and groundwater characteristics of the development site and adjacent areas.

Under these circumstances, or if the Development or Subdivision would be on land that the Authorized Person believes is subject to or is likely to be subject to flooding, mud flows, debris flows, debris torrents, erosion, landslip, rock falls, liquefaction, subsidence or avalanche, the Consulting Engineer must prepare a report which states whether the land may be used safely for the use intended. If the Consulting Engineer seals and certifies a report that the land may be used safely for the use intended, but only in accordance with conditions specified in the Consulting Engineer's report, development may only take place in accordance with the conditions. The Developer of the subject land must register a covenant per *Land Title Act* section 219 against title to the land to use the land only in the manner certified by the Consulting Engineer as enabling the safe use of the land for the use intended.

A gravity connection to the District's storm drainage system may be made only where the habitable portion of a dwelling is above the major system hydraulic grade line.

4.11.12 Limitations and Precautions to Implementing Source Controls in Slope Hazard Development Permit Areas

The implementation of source controls is prohibited in areas of potential slope instability areas as per the Slope Hazard DPA. Source controls encourage infiltration that saturate soils and further reduces the stability of these hazardous slopes. Adequate setbacks from the top of these slopes must be delineated by a qualified professional geotechnical engineer.

4.11.13 Groundwater Impact

A hydrogeologist must be retained to assess the final destination of infiltrated water to confirm that it does not pose an increased saturation/flooding risk to down slope areas and/or adjacent developed or undeveloped sites.

Designs must consider groundwater quantity protection with respect to: (1) provide adequate groundwater recharge; and (2) minimize or eliminate groundwater table interception.

For developments on flatter slopes (less than 5%), groundwater protection can be accomplished by limiting basement depths to ensure that perimeter foundation drains empty by gravity to the storm sewer system. In cases of potential impacts to the groundwater table as a result of development, a Hydrologist or Hydrogeologist report may be required.

No development will be permitted to pump groundwater from perimeter drains without permission from the Authorized Person.

4.11.14 Overflows

As with all drainage works, source controls must be designed to ensure that facility overflows and interflows drain to the municipal minor/major drainage system or natural drainage path and do not discharge to, or through, adjacent sites. Emergency overflows must be designed into all source controls.

4.11.15 Roof Drainage

Provided that a site is graded away from the building, and where surface water does not flow to adjacent parcels, roof drainage must be discharged to the ground and dispersed via splash pads at the downspouts. The intention is to allow roof drainage to infiltrate into lawn or garden areas.

If site grading is not possible or the site is greater than 10%, roof drainage must be collected at the source control facility and discharged into the municipal drainage system, at the discretion of the Authorized Person, where the size of the proposed or existing storm sewer has been designed for, or can be shown to accommodate the anticipated flows.

It should be noted that discharging roof drainage to the ground, as described above can be a simple and cost effective stormwater/drainage management practice of rainfall capture provided the soil composition and depth can store the required runoff volume.

4.11.16 Spill Controls

A Spill Response Plan must be developed where land use poses a “high risk” of liquid or material spills causing environmental damage. Areas requiring a spill response plans include but may not be limited to:

- Industrial sites (high concentrations of potential contaminants stored and generated);
- Commercial sites with deleterious substances (i.e. paint stores, gasoline retails, etc.), and;
- Parking parcels larger than 0.15 hectares.

Oil/grit separators can be used as spill control devices on commercial and industrial areas and large parking parcels. Oil/grit separators are not effective for stormwater/drainage treatment for residential areas."

4.12 **Erosions and Sediment Control (ESC)** – is amended by:

Adding the following clauses to the beginning of section 4.12:

"The Consulting Engineer must demonstrate how work will be undertaken and completed so as to prevent the release of silt, raw concrete, concrete leachate and other deleterious substances into any ditch, storm sewer, watercourse or ravine. Construction materials, excavation wastes, overburden soils, or other deleterious substances must be disposed of or placed in such a manner as to prevent their entry into any watercourse, ravine, storm sewer system, or restrictive covenant area.

Details of the proposed controls are to be included in the design drawings and will be the first constructed part of the works.

All siltation control devices must be situated to provide ready access for cleaning and maintenance. Proposed siltation control structures must be maintained throughout the course of construction and to the end of the maintenance period (final acceptance) or until 90% of the parcels have been built on, whichever occurs later. Changes in the design of the structure will be required if the proposed structure is found to be inadequate.

For additional information and details, refer to the District's Environmental Protection and Preservation Bylaw 6515 and to Hydrologist or Hydro-Geologist Report (ENV110) for proposed single family residential developments and to Soil Permit requirement (ENV117) for proposed multi-family or commercial developments."

4.12.1 **Erosion Control** – not amended, refer to MMCD Design Guidelines (2014).

4.12.2 **Drainage Pump Stations** – not amended, refer to MMCD Design Guidelines (2014).

4.12.3 **Domestic Wells and Streams** – not amended, refer to MMCD Design Guidelines (2014).

END OF SECTION – STORMWATER (DRAINAGE) MANAGEMENT

5.0 ROADS – MMCD is amended

5.1 **General** – is amended by:

Adding the following clauses to the end of section 5.1:

"The District will provide the design vehicle type applicable for each development.

Vehicle types and movement analysis assumptions must be submitted to the Authorized Person prior to any analysis, and the results of such analysis must be submitted to the Authorized Person for review and confirmation prior to any further design

Design guidelines relating to transportation demand management initiatives as well as pedestrian, cycling and transit infrastructure have evolved significantly in recent years. All development applications requiring road improvements will consider incorporating features and concepts described in Section 9.0 of the MMCD Design Guidelines (2014) or other emerging design guidelines deemed as best practice by the District."

5.2 **Road Classifications** – is amended by:

Adding the following clause to the beginning of section 5.2:

"The District will advise the Developer of the Classification of each Highway (road) and its appurtenances within or adjacent to any particular development, in accordance with District policy."

5.3 **Cross-Section Elements** – is amended by:

Replacing this section in its entirety with the following:

"The cross-section elements are identified in Tables 5a and 5b. The details are in general compliance with the TAC Geometric Design Guide except as modified herein. Overall road allowance and cross sections are subject to increases to accommodate the following scenarios:

- Intersections;
- Turn lanes;
- Bicycle facilities;
- Sidewalks and paths;
- Utilities;
- Local area terrain;
- Bus bays;
- Drainage;
- Snow storage;

- Expected traffic and vehicle types, traffic volume, operating speeds, and required accesses; and
- Expected transit facilities and multi-modal users.

The Supplemental Standard Detail Drawings must be considered when designing road cross-sections.

The Authorized Person may accept decreased lane widths where supported by other relevant guidelines."

Table 5a – Road Cross Section Summary

Features	Lane	Local	Collector	ARTERIAL		Rural
				Minor	Major	
Function	Land access	Land access	Land access / Person Mobility	Person Mobility	Person Mobility	Land access / Person Mobility
Expected Daily Traffic Volume	<1,500	<1,500	1,000-8,000	5,000-20,000	10,000-50,000	<2,000
Speed Limit (Km/Hr)	20	30-50	30-50	50-60	50-60	30-50
Connections	Local	Lanes, local and collector	Local, collector, minor & major arterials	Collectors, minor & major arterials	Collectors, minor & major arterials, highways	Lanes, local, collectors, minor arterials
Pedestrian Access	No restrictions	No restrictions	Sidewalk on both sides	Sidewalk on both sides	Sidewalk on both sides	No separate facility
Bicycle Access	No restrictions	No restrictions	Separate facility desirable	Separate facility - at District's discretion	Separate facility	No separate facility
Transit Service	Avoid	Generally avoid	Permitted	Permitted	Permitted	Generally avoid
Vehicle Type	Passenger and Service vehicles	Passenger and service vehicles	Passenger and service vehicles	All types	All types	Passenger and service vehicles
Driveway Access	Permitted	Permitted if lane access is not available	Limited	Limited	Not permitted (except as approved by Authorized Person)	Limited
Parking	Not provided	One or Both Sides- at District's discretion	One or Both Sides- at District's discretion	One or Both Sides- at District's discretion	Strongly discouraged	Not provided

Table 5b – Road Cross Section Derivation

Road Classification	Vehicle Lanes		Median		Shoulders		Parking		Sidewalks		Boulevards		Border	
	#	Width(m)	Y/ N	Width(m)	Y/ N	Width(m)	#	Width(m)	#	Width(m)	#	Width(m)	#	Width(m)
Arterial – Major														
Divided	4	3.3-3.5	Y	4.5	N	0	0	0	2	2.0-3.0	2	2.0	2	1.0
Undivided	2-4	3.3-3.5	N	0	N	0	0-2	2.8	2	2.0-3.0	2	2.0	2	1.0
Arterial – Minor														
Divided	4	3.3-3.5	Y	4.5	N	0	?	0	2	2.0-3.0	2	2.0	2	1.0
Undivided	2-4	3.3-3.5	N	0	N	0	0-2	2.8	2	2.0-3.0	2	2.0	2	1.0
Collector														
Commercial	2	3.3	N	2.0	N	0	0-2	2.4	2	2.0	2	2.0	2	1.0
Industrial	2	3.5	N		N	0	0-2	2.4	2	1.8	0-2	2.0	2	1.0
Residential	2	3.3	N	2.0	N	0	0-2	2.4	2	1.8	2	2.0	2	1.0
Local														
Commercial & Industrial	2	3.5	N	0	N	0	1-2	2.4	2	2.0	2	2.0	2	1.0
Multi-family Residential	2	3.2	N	0	N	0	1-2	2.4	2	1.8	2	1.8	2	1.0
Single-family Residential	2	3.0	N	0	N	0	1-2	2.2	1	1.8	2	1.8	2	1.0
Lane														
Residential, Commercial & Industrial	1	One-way: 4.5 Two-way: 6.0	N	0	N	0	0	0	0-1	1.5	0	0	2	.65
Rural	2	3.0-3.7	N	0	Y	0-3.0	0	0	0	0	0	0	2	0-1.0

- Refer to Section 9.11 of the MMCD Design Guidelines for bicycle lane widths.
- Roads must be designed to accommodate a variety of users, including but not limited to, people walking, bicycling and driving as well as for heavy goods vehicles, transit, and emergency services.
- Refer to both Section 5.0 and Section 9.0 of the MMCD Design Guidelines when designing pedestrian, cyclist and transit facilities.
- The spectrum of bicycle facilities ranges from sharing travel lanes with vehicles to separated facilities. The type of bicycle facility required for a segment depends on the volume and speed of the vehicle traffic, which may or may not be related to road classification.
- TransLink Bus Guidelines must be complied with and referenced for roads with bus routes.
- Cross section nomenclatures, definitions and criteria are from the TAC Geometric Design Guide.

5.4 **Alignments** – is amended as follows.

5.4.1 **Grades** – not amended, refer to MMCD Design Guidelines (2014).

5.4.2 **Vertical Curves** – not amended, refer to MMCD Design Guidelines (2014).

5.4.3 **Cross-Slopes** – is amended by:

In paragraph two, replacing the 4% maximum cross slope value with 2%.

Adding the following clause to the end of section 5.4.3:

"Where applicable, the design must ensure that the road cross-sections are established to accommodate the major flood path routing."

The following section is added to MMCD Design Guidelines (2014):

5.4.4 **Embankments** – new section is added to MMCD Design Guidelines (2014):

"Maximum side slope in earth fills or cuts must be 2H:1V. Flatter slopes will be used where unstable soil conditions are encountered. Cut or fill slopes and retaining structures must be accommodated outside the road rights-of-way shown on the typical cross section Supplemental Standard Detail Drawings.

Wherever the side slopes, beginning at a point 1.0 m from the back of the sidewalk or boulevard, whichever is closest to the property line, create a depth of vertical cut or fill at the property line in excess of 600 mm at 2H:1V an acceptable retaining wall structure must be designed and constructed."

5.5 **Intersections** – not amended, refer to MMCD Design Guidelines (2014).

5.5.1 **General** – is amended by:

Adding the following paragraph to the end of section 5.5.1:

Vehicle movement analysis assumptions, such as for bikeways, curb returns and queue lengths must be submitted to the Authorized Person for review and acceptance prior to completing the design analysis. Information regarding vehicle specification shall be obtained from the District.

5.5.2 **Curb Returns** – is amended by:

Adding the following paragraph after the first paragraph, and deleting the remainder of 5.5.2, in MMCD Design Guidelines (2014):

"The curb radius at an intersection must be designed to the smallest feasible dimension to accommodate the following:

- shorten the pedestrian crossing distance;
- optimize visibility between all road users (drivers, pedestrians and cyclists);
- allow for a continuous path with the connecting sidewalks and crosswalks; and
- moderate the speeds of turning vehicles.

Intersection corners must be designed to take into account the effective vehicle turning path, which is affected by:

- the expected type and volume of vehicles turning at the intersection;
- the lane configuration and width of the intersecting streets;
- impact of bike lanes, paths and parking lanes;
- intersection geometry, including curb extensions, skews, and islands; and
- presence of traffic signals."

Deleting Table 5.5, Minimum Design Curb Radii, and replacing it with the following Table 5.c:

Table 5c – Design Curb Radii

Intersection Type	Typical Radius
Collector Road to Collector Road and all combinations of lesser road classification	6.0 m
Any road into an Arterial road classification	7.5 m

5.5.3 **Corner Cuts** – not amended, refer to MMCD Design Guidelines (2014).

5.5.4 **Left Turn Channelization** – not amended, refer to MMCD Design Guidelines (2014).

5.5.5 **Sight Distances** – not amended, refer to MMCD Design Guidelines (2014).

5.5.6 **Curb Extensions** – not amended, refer to MMCD Design Guidelines (2014).

5.5.7 **Turn Delineation** – not amended, refer to MMCD Design Guidelines (2014).

5.6 **Roundabouts** – not amended, refer to MMCD Design Guidelines (2014).

5.7 **Railway Grades Crossings** – not amended, refer to MMCD Design Guidelines (2014).

5.8 **Traffic Control Devices** – not amended, refer to MMCD Design Guidelines (2014).

5.9 **Cul-De-Sac** – not amended, refer to MMCD Design Guidelines (2014).

5.10 **Traffic Barriers** – not amended, refer to MMCD Design Guidelines (2014).

5.11 **Sidewalk and Pedestrian Crossings** – is amended

5.11.1 **Sidewalk** – is amended by:

Adding the following clauses at the end of the last paragraph in section 5.11.1:

“Refer to clause added in Section 5.1.

Sidewalk requirements and cross-sections are stipulated in the Supplemental Standard Detail Drawings and as clarified below.

Sidewalks on both sides of a road may be required. Sidewalks must be continuous around curb returns for a minimum of 3.0 m beyond the curb return and provide a smooth and safe transition to the existing ground.

If the back edge of a sidewalk ends in a vertical drop of greater than 600 mm or a slope of greater than 1V:2H then a 1.2 m high handrail must be constructed to provide a barrier for pedestrian safety.

For a combined curb and sidewalk or a separate sidewalk, the sidewalk base and subbase must be constructed to a point of at least 0.5 m wider than the edge of the sidewalk.”

5.11.2 **Pedestrian Crossings** – is amended by:

Deleting the third bullet of the fourth paragraph referring to “Pedestrian Crossing Control Manual for British Colombia, current edition, as amended or replaced”.

The following subsections are added to section 5.11 in numerical order:

“

5.11.3 **Pedestrian Accessibility**

With respect to accessibility, the following design considerations for sidewalks and pathways must be addressed by the Consulting Engineer:

- The design for wheelchair ramps must be in accordance with the Supplemental Standard Detail Drawings.
- Sidewalks must stay as close as possible to the standard 2% cross slope rather than sloping with driveways and should be no steeper than a 4% cross slope wherever possible.
- Wherever feasible, the pedestrian sidewalk or pathway must be as straight as possible.
- Transitions and tie-ins with existing sidewalks must be smooth, without lips or dips.
- All wheelchair letdowns at any given intersection must have a consistent style, pattern, placement direction, and width.
- A catch basin must be located to intercept road drainage in advance of the wheelchair ramp. This may influence road grade designs or cross slopes.
- Sidewalks must have a maximum grade of 5% on the approaches to wheelchair ramps. At intersections, the wheelchair ramps must have noticeable texture and width in the three ramp grooves to enable visually impaired persons to recognize the entrance portion of the ramp.
- Refer to Supplemental Standard Detail Drawings."

5.12 **Bikeways** – is amended by:

Adding the following clauses after the first paragraph of section 5.12:

"Refer to clause added in Section 5.1.

Refer to Supplemental Standard Detail Drawings for cross sections as noted therein. Other MMCD Design Guidelines (2014) requirements remain the same."

5.12.1 **On Street Bikeways** – is amended by:

Adding the following new bullet:

"

- Wayfinding and directional signage must follow "Wayfinding Guidelines for Utility Cycling in Metro Vancouver" published by TransLink."

5.12.2 **Off Street Bikeways** – not amended, refer to MMCD Design Guidelines (2014).

5.13 **Transit Facilities** – not amended, refer to MMCD Design Guidelines (2014).

5.14 **Driveways** – is amended as follows:

5.14.1 **Residential Access to Arterial Roads** – not amended, refer to MMCD Design Guidelines (2014).

5.14.2 **Number of Driveways** – is amended by:

Under "Urban Residential Zones" (first paragraph)

Deleting the first bullet and replacing it with the following:

"

- One driveway per road frontage and per lot."

Deleting the second bullet referring to "Second driveway permitted for corner lot if the driveway is not on an arterial or collector road".

Deleting the third bullet and replacing it with the following:

"

- Where a residential lot abuts roads of different classifications, the driveway must access the road of the lower classification."

5.14.3 **Driveway Location and Width** – is amended by:

Delete section 5.14.3 in its entirety and replace with the following:

"Driveway access must be provided from abutting Highways with the lower classification. No boulevard crossing or access improvement will be permitted within 1.5 m clear distance from an above ground utility structure or obstacle. Driveway openings shall be designed to be the smallest feasible dimension to accommodate the use and to optimize visibility and safety amongst all Highway users (vehicular and non-vehicular) and to moderate speeds of turning vehicles.

The following additional requirements apply:

a. Residential – Single Family and Duplex Developments:

Driveways in urban developments with barrier curbs will require letdowns consistent with the Supplementary Standard Detail Drawings. Driveways located on corner parcels must be designed and located to provide adequate sight distances and meet the intersection and parking requirements, but be no closer than 10.0 m from the parcel corner nearest the intersection.

All single family and duplex residential driveways must have a minimum width of 3.0 m and a maximum width of 4.5 m.

Where single family and duplex residences share driveways the maximum driveway width is 6.0 m.

In the case of corner parcels, where site conditions prevent access on flanking streets, a driveway will be permitted at the front of a parcel having a frontage of 10.0 m or less; and the driveway must be located adjacent to the interior lot line and have a maximum driveway width of 4.5 m.

b. Commercial, Industrial, Institutional, Comprehensive and Residential Multi Family Developments:

Driveways to Commercial, Industrial, Institutional, Comprehensive and Multi Family parcels must be designed and located to provide adequate sight distances and meet the road/intersection and parking requirements, but be located no closer than 15.0 m from the parcel corner nearest the adjoining road. Refer to the Supplementary Standard Detail Drawings for typical layouts. The minimum width of a driveway to a property having one or more accesses 4.5 m for one way access and 6.0 m for two-way access with a maximum width of 9.0 m.

c. Driveways for Aboveground and Underground Parking Structures:

Driveways for aboveground and underground parking structures must be designed to allow for adequate sight distances and passage affecting motorized and non-motorized movements, which may require widths larger than noted. In instances where a corner parcel adjoins roads of different classification, the principal driveway must be constructed so as to access the road of the lower classification, except for auto fueling service stations where access may be provided from both adjoining roads. The minimum overhead clearance will be 5.5 m. The second access for service stations must be designed and located to provide adequate sight distances, separation from intersections and other local crossings and driveways, and be compatible with adjoining road characteristics and design features."

5.14.4 **Driveway Grades** – not amended, refer to MMCD Design Guidelines (2014).

5.14.5 **Driveway Letdown and Curb Return** – not amended, refer to MMCD Design Guidelines (2014).

5.14.6 **Access Management** – not amended, refer to MMCD Design Guidelines (2014).

5.14.7 **Queuing Storage** – not amended, refer to MMCD Design Guidelines (2014).

5.14.8 **Clearances** – not amended, refer to MMCD Design Guidelines (2014).

5.14.9 **Clearance at Bridges** – not amended, refer to MMCD Design Guidelines (2014).

5.14.10 **Aerial Utilities** – not amended, refer to MMCD Design Guidelines (2014).

5.14.11 **Signs and Poles** – is amended by:

Replacing the second bullet of the first paragraph with the following:

"

- Roadways with curbs: 0.45 m minimum. 1.0 m preferable except where sidewalk is adjacent to the curb, where poles should be located to the back of the sidewalk."

5.14.12 **Trees** – is amended by:

Deleting the section and replacing it with:

"Minimum horizontal clearance from the edge of travel lane to tree trunk: 0.75 m. Horizontal clearance from edge of driveway, curb return or above ground utility to tree trunk: 2.5 m.

Vertical clearance must be provided between the ground and tree or hedge canopy so that there is a clear sightline for both vehicular and non-vehicular traffic at crossings and intersections."

5.14.13 **Drainage Structures and Traffic Barriers** – not amended, refer to MMCD Design Guidelines (2014).

5.15 **Underground Utility Locations** – is amended by replacing the third and sixth bullets with:

"

- Watermains under the road;
- Electrical, telephone and gas in a sidewalk or boulevard."

5.16 **Pavement Structures** – is amended as follows.

5.16.1 **General** – not amended, refer to MMCD Design Guidelines (2014).

5.16.2 **Pavement Design** – not amended, refer to MMCD Design Guidelines (2014).

5.16.3 **Pavement Alternatives** – is amended by:

Replacing Table 5.17.3.1, Minimum Pavement Structure for Asphaltic Concrete (A.C.) Pavement with the following table.

Table 5d – Minimum Structure for Asphaltic Concrete (AC) Pavement						
Road Classification	Granular Section		Asphalt Concrete Pavement Section		Max. Seasonally Adjusted Design Deflections (mm)	
	Min. Thickness (mm)		Min. Thickness (mm)			
	Subbase	Base	Base	Surface	Granular Section	Asphalt Pavement Section
Arterial	300	150	85	65	1.10	0.75
Collector-Residential	300	150	80	50	1.40	1.00
Collector-Commercial/Industrial	300	150	80	50	1.40	1.00
Local-Residential (and Rural)	200	150	60	40	1.90	1.30
Local-Commercial/Industrial	300	150	60	40	1.40	1.00
Lane-Residential	200	150	60	40	1.90	1.30
Lane-Commercial/Industrial	300	150	60	40	1.40	1.00

Supplementary Notes to Table 5d:

1. The road structure must match the existing abutting structure, or the designs noted in the table above, whichever is greater.
2. Where rebound readings are greater than the design reading for the granular base course, the subgrade must be further investigated for potential weakened areas.
3. The standard pavement material is hot mix, machine laid asphalt concrete.
4. When asphalt base and surface courses are required, the surface course placement must be withheld until building construction and property improvements are completed and all underground utilities have been successfully tested and the results have been certified and approved by the Consulting Engineer and accepted by the Authorized Person.
5. Asphalt pavement driveways must be 65 mm minimum asphalt pavement thickness on a minimum 150 mm thick 19 mm minus crushed granular base material.
6. Concrete pavement driveways must be 120 mm minimum for residential and 200 mm for commercial and industrial driveways on a minimum of 100 mm of 19 mm minus crushed granular base.
7. Milled asphalt surfaces require inspection by the Consulting Engineer and the District prior to any overlay. All base failures must be repaired to the satisfaction of the Consulting Engineer, and reported as such by the Consulting Engineer, and subsequently approved by the Authorized Person prior to any overlay.

5.17 **Bridges** – not amended, refer to MMCD Design Guidelines (2014).

5.18 **Hillside Standards** – not amended, refer to MMCD Design Guidelines (2014).

5.18.1 **Roads** – not amended, refer to MMCD Design Guidelines (2014).

5.18.2 **Hillside Emergency Access** – not amended, refer to MMCD Design Guidelines (2014).

5.18.3 **Cross-section Elements** – not amended, refer to MMCD Design Guidelines (2014).

5.18.4 **Alignments** – not amended, refer to MMCD Design Guidelines (2014).

5.19 **Traffic Calming** – is amended by:

Adding the following clause to the beginning of section 5.20:

“Traffic Calming measures must be consistent with the District’s Traffic Calming Policy, available on the District’s website.”

5.20 **Street Parking** – not amended, refer to MMCD Design Guidelines (2014).

The following sections are added to section 5.0 in numerical order:

"

5.21 **Pathways**

Portions of a Highway or statutory right of way which are allocated, marked, graded or surfaced for pedestrian, bicycle or other non-motorized vehicle traffic ("Pathways") must be designed by the Consulting Engineer in accordance with the following requirements:

- Pathway surface width must be a minimum of 3.0 m and pathway clear right-of-way width must be the width of the pathway plus 1.0 m.
- Urban Pathways must be asphalt concrete. Gravel or other acceptable permeable surfaces may be considered provided the alternative surfacing is designed in accordance with recognized engineering standards and both surface and sub-surface drainage features are properly incorporated into the design, and must receive approval from the Authorized Person in advance.
- Pathways designs must address adjacent utilities, subsurface conditions, drainage, signage and markings, protection against tree and vegetation roots and obstructions, and provide handicap access.
- The desirable maximum longitudinal grade is 8%, or 15% if the pathway is less than 100.0 m in total length. The maximum grade must not exceed 15%, unless steps, wheelchair ramps and handrails that are independent of the chain link fencing are provided. If ramps are provided, the maximum continuous length of any ramp is 15.0 m. Ramps or steps for Pathways longer than 15.0 m must be constructed by alternating the ramp from one side of the steps to the other, equally over the length of the Pathway, and each transition landing area must be flat.
- Pathways must have pedestrian-level lighting at the access and egress points and along the Pathway.
- If Pathways are to be shared with cyclists, then the Pathway must be a minimum 4.0 m in width and meet the design criteria outlined for Bikeways.
- Reference is also made to Transportation Association of Canada's guidelines for the planning, design and implementation of pathways and relevant appurtenances.

5.22 **Retaining Wall Structures**

5.22.1 **Conditions Requiring Stability Retention**

Stability retention of land will be required under the following conditions:

- Where the slopes, either existing or altered, are steeper than their natural geological angle of repose or steeper than 2H:1V, whether terraced or otherwise.
- Where it is deemed necessary by the Consulting Engineer and/or the Authorized Person to provide stability to existing or altered slopes or to control potential erosion, protect Works and Services or provide access to Works and Services, retain other land or structures, control surface drainage by altering the contours of the land, and retain landscaping or existing trees.

5.22.2 Mandatory Design Requirement

The design and inspection of any retaining wall system or structure greater than 1.2 m in height above finished ground elevation must be prepared and carried out by the Consulting Engineer.

In their completed form, retaining walls, fences or any site obstructions must not hinder vehicular and non-vehicular traffic access and egress sightlines.

5.22.3 Unacceptable Designs

Consideration must be given to the aesthetic appearance of retaining walls. The following types of structures will not be permitted as permanent structures:

a. Modular interlocking precast concrete units (unreinforced concrete blocks approximately 750 mm x 750 mm x 1500 mm) unless:
   - No more than two (2) courses of blocks are exposed (i.e. maximum exposed height of 1.5 m) with the top surface being flat without locking stubs;
   - Ends of the wall system include sloping transition blocks where topography is sloping; and
   - Exposed faces and surfaces, including the top surfaces of such systems, are faced or surfaced with either exposed aggregate or granite rock finish, or an acceptable textured finish.

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b. Wood crib retaining walls are not permitted over 1.0 m in height or terraced at a slope steeper than 2H:1V. Creosoted timber walls are not permitted under any circumstances.

5.22.4 Engineered Retaining Wall Structures (greater than >1.2 m in height)

Building Permits and engineered drawings must be prepared and submitted to the Building Department for review and acceptance

for all retaining wall structures which are more than 1.2 m high and/or terraced at a slope steeper than 2H:1V.

Building permit applications must be accompanied by the following documentation signed and sealed by the Consulting Engineer with experience and training in geotechnical study and geo-hazard assessments:

- Scale and CADD drawn site plan showing the location of the retaining wall structures in relation to any property lines, rights-of-way or easements, other structures, underground utilities or services or natural features, and confirmed by a B.C. Land Surveyor, if deemed necessary;
- Scale and CADD drawn structural, geotechnical and drainage details; and
- Assurance of Professional Design and Commitment for Field Review, and Assurance of Professional Field Review and Compliance provided by the Consulting Engineer in accordance with APEGBC requirements and forms."

END OF SECTION – ROADS

6.0 ROADWAY LIGHTING – MMCD is amended

6.1 **General** – is amended by:

Adding the following clauses at the end of the last paragraph of section 6.1:

"The District promotes active transportation travel modes (walking and cycling) and requires that roads, rear lanes (in multi-family, commercial and industrial areas), pedestrian paths and cycle paths be constructed or upgraded with lighting that supports walking and cycling.

Parking facilities must be illuminated in accordance with Illuminating Engineering Society of North America's (IESNA) Lighting for Parking Facilities manual, latest edition, as amended from time to time, supplemented by TAC "Guide for the Design of Roadway Lighting", latest edition, as amended from time to time.

Prior to starting a project, the Consulting Engineer must verify the Road Classification (arterial, collector, local, etc.) and the pedestrian activity classification with the Authorized Person.

The light source for luminaires must be Light Emitting Diodes (LED) with house site shield optics.

The District's Development Permit Area and Town and Village Centre requirements have to be met.

Where conduits cross an existing road, they must be installed by a suitable trenchless technology to avoid cutting pavement and interrupting traffic.

Cobra head roadway luminaires must be based on British Columbia Ministry of Transportation and Infrastructure recognized products."

6.2 **Codes, Rules, Standards and Permits** – not amended, refer to MMCD Design Guidelines (2014).

6.2.1 **Codes, Rules and Regulations** – not amended, refer to MMCD Design Guidelines (2014).

6.2.2 **Standards and Guidelines** – is amended by:

Adding the following references to the beginning of section 6.2.2:

"

- Illuminating Engineering Society of North America's (IES) lighting handbooks and design guides;
- British Columbia Ministry of Transportation and Infrastructure recognized products."

6.2.3 **Permits** – not amended, refer to MMCD Design Guidelines (2014).

6.3 **Roadway and Pedestrian Criteria** – is amended by:

Adding the following clause following paragraph 4:

"Any reliance on pedestrian counts to determine pedestrian activity should recognize that the District promotes walking as a form of travel and as such lighting levels must envision future, not just current, pedestrian activity. The potential for sidewalk network expansion should be considered, and the Authorized Person may require a higher pedestrian activity level to be considered than currently exists."

6.4 **Lighting Measurements** – not amended, refer to MMCD Design Guidelines (2014).

6.4.1 **Illuminance** – not amended, refer to MMCD Design Guidelines (2014).

6.4.2 **Luminance** – not amended, refer to MMCD Design Guidelines (2014).

6.4.3 **Uniformity** – not amended, refer to MMCD Design Guidelines (2014).

6.4.4 **Veiling Luminance** – not amended, refer to MMCD Design Guidelines (2014).

6.5 **Variable Lighting Criteria** – not amended, refer to MMCD Design Guidelines (2014).

6.5.1 **Light Sources and Luminaires** – not amended, refer to MMCD Design Guidelines (2014).

6.5.2 **Light Loss Factor (LLF)** – is amended by:

By adding the following clause to the end of section 6.5.2:

"A 20-year useful life shall be considered when designing with LEDs."

6.6 **Street Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.7 **Sidewalk Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.8 **Intersection Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.9 **Crosswalk Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.10 **Walkways** – not amended, refer to MMCD Design Guidelines (2014).

6.11 **Roundabout Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.12 **Tunnel Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.13 **Poles** – not amended, refer to MMCD Design Guidelines (2014).

6.14 **Pole Foundations** – not amended, refer to MMCD Design Guidelines (2014).

6.15 **Luminaires** – not amended, refer to MMCD Design Guidelines (2014).

6.16 **Power Supply and Distribution** – not amended, refer to MMCD Design Guidelines (2014).

6.17 **Design** – not amended, refer to MMCD Design Guidelines (2014).

6.17.1 **Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.17.2 **Decorative Lighting** – not amended, refer to MMCD Design Guidelines (2014).

6.17.3 **Electrical** – not amended, refer to MMCD Design Guidelines (2014)

6.17.4 **Drawing Requirements** – not amended, refer to MMCD Design Guidelines (2014).

The following section is added:

“

6.17.5 **Banner Arm Attachment**

Where a banner arm is required, the following information is required for the Authorized Person’s review:

- Consult District of North Vancouver’s List of Acceptable Materials and Products;
- Detailed information, specifications and drawings for the pole/mast, banner arm and its components; and
- Shop drawings for masts and poles, where the banner arm will be attached to, and for the proposed banner arm attachment.

A record of the review and approval from the Consulting Engineer for the location(s), application and banner arm attachment and mechanism are required prior to installation.”

END OF SECTION – ROADWAY LIGHTING

7.0 TRAFFIC SIGNALS – MMCD is amended

7.1 **General** – is amended by:

Adding the following clauses at the end of the last paragraph of section 7.1:

"The Developer must employ a consulting engineer with a Professional Traffic Operations Engineer (PTOE) certification to complete traffic engineering and traffic signal design.

Where conduits cross an existing road they must be installed by a suitable trenchless technology to avoid cutting pavement and interrupting traffic.

Traffic signal interconnection and fibre optic conduit design must be prepared in conjunction with street lighting designs."

7.2 **Standardization** – not amended, refer to MMCD Design Guidelines (2014).

7.3 **Codes, Rules, Standards and Permits** – not amended, refer to MMCD Design Guidelines (2014).

7.3.1 **Codes, Rules and Regulations** – is amended by:

Adding the following clause at the end of section 7.3.1:

"Traffic signal designs must conform to British Columbia *Motor Vehicle Act*."

7.3.2 **Standards** – not amended, refer to MMCD Design Guidelines (2014).

7.3.3 **Permits** – not amended, refer to MMCD Design Guidelines (2014).

7.4 **Signal Heads** – not amended, refer to MMCD Design Guidelines (2014).

7.5 **Pole Placement** – not amended, refer to MMCD Design Guidelines (2014).

7.6 **Left Turn Phasing** – not amended, refer to MMCD Design Guidelines (2014).

7.7 **Advanced Warning Flashers** – not amended, refer to MMCD Design Guidelines (2014).

7.8 **Signal Pre-emption** – not amended, refer to MMCD Design Guidelines (2014).

7.9 **Audible Pedestrian Signals** – not amended, refer to MMCD Design Guidelines (2014).

7.10 **Control Types** – not amended, refer to MMCD Design Guidelines (2014).

7.11 **Detection Methods** – not amended, refer to MMCD Design Guidelines (2014).

7.12 **Signal Timing Plans** – not amended, refer to MMCD Design Guidelines (2014).

7.13 **Signal Coordination** – not amended, refer to MMCD Design Guidelines (2014).

7.14 **Pedestrian Controlled Signals** – not amended, refer to MMCD Design Guidelines (2014).

7.15 **Poles and Foundations** – not amended, refer to MMCD Design Guidelines (2014).

7.16 **Controller Cabinets** – not amended, refer to MMCD Design Guidelines (2014).

7.17 **Power Supply and Distribution** – not amended, refer to MMCD Design Guidelines (2014).

7.18 **Uninterruptable Power Supplies (UPS's)** – not amended, refer to MMCD Design Guidelines (2014).

7.19 **Signs** – not amended, refer to MMCD Design Guidelines (2014).

7.20 **Drawing Requirements** – not amended, refer to MMCD Design Guidelines (2014).

END OF SECTION – TRAFFIC SIGNALS

8.0 SUSTAINABILITY CONSIDERATIONS 2014 – WATER DISTRIBUTION – MMCD is amended

8.1 **General** – is amended by:

Adding the following clause to the beginning of section 8.1:

"This section should primarily be considered for information purposes, as the District's water sustainability requirements have been incorporated into Sections 2, 3 and 4 of this document."

8.2 **Supply Side Management** – not amended, refer to MMCD Design Guidelines (2014).

8.3 **Demand Site Management** – not amended, refer to MMCD Design Guidelines (2014).

8.3.1 **Metering** – not amended, refer to MMCD Design Guidelines (2014).

8.3.2 **Fire Flows** – not amended, refer to MMCD Design Guidelines (2014).

8.3.3 **Irrigation Water Requirements** – not amended, refer to MMCD Design Guidelines (2014).

8.4 **Hydraulic Design** – not amended, refer to MMCD Design Guidelines (2014).

8.5 **Sanitary Sewers General** – not amended, refer to MMCD Design Guidelines (2014).

8.6 **Greywater Systems** – not amended, refer to MMCD Design Guidelines (2014).

8.7 **Alternative Collection Systems** – not amended, refer to MMCD Design Guidelines (2014).

8.7.1 **Low Pressure Sewers** – not amended, refer to MMCD Design Guidelines (2014).

8.7.2 **Vacuum Sewers** – not amended, refer to MMCD Design Guidelines (2014).

8.7.3 **Small Diameter Gravity Sewers** – not amended, refer to MMCD Design Guidelines (2014).

8.8 **Stormwater Management General** – not amended, refer to MMCD Design Guidelines (2014).

8.9 **Stormwater Management (SWM)** – not amended, refer to MMCD Design Guidelines (2014).

8.10 **Integrated Storm Water Management Plan (ISMP)** – not amended, refer to MMCD Design Guidelines (2014).

8.11 **Minor and Major Systems** – not amended, refer to MMCD Design Guidelines (2014).

8.12 **Runoff Analysis** – not amended, refer to MMCD Design Guidelines (2014).

8.13 **Rainfall Data** – not amended, refer to MMCD Design Guidelines (2014).

8.14 **Discharge Quantity and Quality** – not amended, refer to MMCD Design Guidelines (2014).

8.14.1 **Storm Water Quantity** – not amended, refer to MMCD Design Guidelines (2014).

8.14.2 **Storm Water Quality** – not amended, refer to MMCD Design Guidelines (2014).

8.15 **Site and Lot Grading** – not amended, refer to MMCD Design Guidelines (2014).

8.16 **Minimum Building Elevations** – not amended, refer to MMCD Design Guidelines (2014).

8.17 **Rational Method** – not amended, refer to MMCD Design Guidelines (2014).

8.18 **Hydrograph Method** – not amended, refer to MMCD Design Guidelines (2014).

8.19 **Minor System Design** – not amended, refer to MMCD Design Guidelines (2014).

8.20 **Major System Design** – not amended, refer to MMCD Design Guidelines (2014).

8.21 **Runoff Controls** – not amended, refer to MMCD Design Guidelines (2014).

8.21.1 **Planning** – not amended, refer to MMCD Design Guidelines (2014).

8.21.2 **Source Controls** – not amended, refer to MMCD Design Guidelines (2014).

8.21.3 **On Site Controls** – not amended, refer to MMCD Design Guidelines (2014).

8.21.4 **Infiltration Controls** – not amended, refer to MMCD Design Guidelines (2014).

8.21.5 **Storage Controls Pre-Treatment Controls** – not amended, refer to MMCD Design Guidelines (2014).

8.21.6 **Conveyance Controls** – not amended, refer to MMCD Design Guidelines (2014).

8.21.7 **End-of-Pipe Measures** – not amended, refer to MMCD Design Guidelines (2014).

8.22 **Hydrogeological Investigation** – not amended, refer to MMCD Design Guidelines (2014).

8.22.1 **Infiltration Rate** – not amended, refer to MMCD Design Guidelines (2014).

8.22.2 **Stratigraphy** – not amended, refer to MMCD Design Guidelines (2014).

8.22.3 **Hydraulic Conductivity, Transmissivity and Storage** – not amended, refer to MMCD Design Guidelines (2014).

.1 Hydraulic Conductivity – not amended, refer to MMCD Design Guidelines (2014).

.2 Transmissivity – not amended, refer to MMCD Design Guidelines (2014).

.3 Storage – not amended, refer to MMCD Design Guidelines (2014).

8.22.4 **Groundwater Flow Direction** – not amended, refer to MMCD Design Guidelines (2014).

8.23 **Groundwater Implications** – not amended, refer to MMCD Design Guidelines (2014).

8.23.1 **Quantity** – not amended, refer to MMCD Design Guidelines (2014).

8.23.2 **Quality** – not amended, refer to MMCD Design Guidelines (2014).

8.24 **Groundwater Recharge Systems** – not amended, refer to MMCD Design Guidelines (2014).

8.24.1 **Non-Structural** – not amended, refer to MMCD Design Guidelines (2014).

8.24.2 **Structural** – not amended, refer to MMCD Design Guidelines (2014).

8.24.3 **Infiltration System** – not amended, refer to MMCD Design Guidelines (2014).

END OF SECTION – SUSTAINABILITY CONSIDERAONS 2014 – WATER DISTRIBUTION

9.0 SUSTAINABILITY CONSIDERATIONS 2014 – ROADS – MMCD is amended

9.1 **General** – is amended by:

Adding the following clause to the beginning of section 9.1:

"This section should primarily be used to consider how infrastructure can be designed to support the District's objective of increasing walking, cycling and transit trips."

9.2 **Road Classifications – Planning Considerations** – not amended, refer to MMCD Design Guidelines (2014).

9.3 **Cross-Section Elements** – not amended, refer to MMCD Design Guidelines (2014).

9.4 **Alignments** – not amended, refer to MMCD Design Guidelines (2014).

9.5 **Intersections** – not amended, refer to MMCD Design Guidelines (2014).

9.6 **Modern Roundabouts** – not amended, refer to MMCD Design Guidelines (2014).

9.7 **Railway Grade Crossings** – not amended, refer to MMCD Design Guidelines (2014).

9.8 **Traffic Control Devices** – not amended, refer to MMCD Design Guidelines (2014).

9.9 **Cul-de-Sac** – not amended, refer to MMCD Design Guidelines (2014).

9.10 **Pedestrian Facilities** – is amended by:

Deleting the following first sentence from the second paragraph:

"As per Section 5.11, Sidewalk and Pedestrian Crossings, the design of sidewalks and pedestrian crosswalks must conform to the Pedestrian Crossing Control Manual for British Columbia, latest edition, as amended or replaced."

9.11 **Bicycle Facilities** – not amended, refer to MMCD Design Guidelines (2014).

9.12 **Transit Facilities** – not amended, refer to MMCD Design Guidelines (2014).

9.13 **Driveways and Laneways** – not amended, refer to MMCD Design Guidelines (2014).

9.14 **Clearances from Environmental Features** – not amended, refer to MMCD Design Guidelines (2014).

9.15 **Underground Utility Locations** – not amended, refer to MMCD Design Guidelines (2014).

9.16 **Pavement Structures** – not amended, refer to MMCD Design Guidelines (2014).

9.16.1 **Pavements Alternatives** – not amended, refer to MMCD Design Guidelines (2014).

.1 Permeable or Pervious Pavements – not amended, refer to MMCD Design Guidelines (2014).

.2 Permeable Pavement Structure – not amended, refer to MMCD Design Guidelines (2014).

.3 Quiet Pavement – not amended, refer to MMCD Design Guidelines (2014).

.4 Perpetual Pavements – not amended, refer to MMCD Design Guidelines (2014).

.5 Warm Mix Asphalt – not amended, refer to MMCD Design Guidelines (2014).

.6 Reduce, Reuse, Recycle – not amended, refer to MMCD Design Guidelines (2014).

.7 Reclaimed Pavement – not amended, refer to MMCD Design Guidelines (2014).

.8 Foamed Asphalt Stabilization – not amended, refer to MMCD Design Guidelines (2014).

9.17 **Hillside Standards** – not amended, refer to MMCD Design Guidelines (2014).

9.17.1 **Traffic Calming** – not amended, refer to MMCD Design Guidelines (2014).

9.18 **Traffic Barriers** – not amended, refer to MMCD Design Guidelines (2014).

9.19 **Parking** – not amended, refer to MMCD Design Guidelines (2014).

END OF SECTION – SUSTAINABILITY CONSIDERATIONS 2014 – ROADS

10.0 SUSTAINABILITY CONSIDERATION 2014 – LIGHTING & SIGNALIZATION – not amended, refer to MMCD Design Guidelines (2014)

10.1 **General** – not amended, refer to MMCD Design Guidelines (2014).

10.2 **Light Sources** – not amended, refer to MCD Design Guidelines (2014).

10.3 **Unity Power Density (UPD)** – not amended, refer to MMCD Design Guidelines (2014).

10.4 **Adaptive Lighting** – not amended, refer to MMCD Design Guidelines (2014).

10.4.1 **Reduce Initial Light Output to Maintained** Levels – not amended, refer to MMCD Design Guidelines (2014).

10.4.2 **Dimming Areas Over Lighted to Meet** Uniformity – not amended, refer to MMCD Design Guidelines (2014).

10.4.3 **Match Light Output to Pedestrian Activity Levels** – not amended, refer to MMCD Design Guidelines (2014).

10.5 **Traffic Signal Coordination** – not amended, refer to MMCD Design Guidelines (2014).

END OF SECTION – SUSTAINABILITY CONSIDERATION 2014 – LIGHTING & SIGNALIZATION

11.0 CHANGE SUMMARY – not amended, refer to MMCD Design Guidelines (2014)

11.1 **General** – not amended, refer to MMCD Design Guidelines (2014).

11.2 **Change History** – not amended, refer to MMCD Design Guidelines (2014).

END OF SECTION – CHANGE SUMMARY

The following new section is added in numerical order:

“

12.0 LANDSCAPING

12.1 General

Landscape plans must be prepared by a Landscape Architect. All landscaping must meet the British Columbia Society of Landscape Architects’ (BCSLA) and British Columbia Landscape & Nursery Association’s (BCLNA) standards.

12.2 Coordination of Plans

All landscape plans must be coordinated with the design of on-site and off-site Works. It is the responsibility of the Developer, through its Landscape Architect, to coordinate with other District bylaws and requirements and to obtain information to indicate on the landscape plans all existing and proposed Works and Services, utilities and servicing infrastructure, including:

a. Environmental Protection and Preservation;
b. Street Tree Master Plan;
c. Highways (Roads) and connecting infrastructure;
d. Services and connections;
e. Street lighting and traffic control systems;
f. Above-ground and underground wiring, conduits, utilities and services (including utility and telecommunication);
g. Coordination with on- and off-site grading and drainage plans; and
h. Other Works and Services.

Particular attention must be paid to tree retention and protection. A report by a Professional Arborist certified by International Society of Arboriculture is required to assess the health of all existing on-site and boulevard trees. All efforts must be made by the Developer to retain existing healthy trees as part of the landscape plan.

12.3 Planting Design Criteria

12.3.1 Roadway Corridor – General

Landscaping and trees of a species and spacing acceptable to the Authorized Person will be required. Planting is required in all boulevards.

In accordance with the District’s Street Tree Master Plan, street tree planting and roadway planting must be designed in accordance with the following principles:

a. The need to designate a place or corridor for trees within the road allowance;

b. The need to plan appropriate road allowance widths;

c. The need to plan within the context of the surrounding community;

d. The need to plan the position of the boulevard relative to the position of the sidewalk and the roadway;

e. The need to avoid conflicts with the overhead and underground utilities;

f. The need to provide safe refuge from vehicles for pedestrians passing along the road;

g. The need to address driver visibility and avoid blocking of sightlines by overgrown or otherwise inappropriate boulevard planting; and

h. Meeting the minimum clearance and sightline requirements noted in Section 5, Roads, and in this Bylaw.

Refer to Supplemental Standard Detail Drawings for road cross sections and location of various infrastructures.

12.3.2 **Boulevards**

Newly planted street trees must be spaced from 9.0 m to 15.0 m apart depending on the site conditions and species used. A minimum of one (1) tree per single-family parcel is required.

Deciduous trees must be planted at a minimum caliper size of 7 cm and a minimum 1.5 m standard height.

Coniferous trees must be planted at a minimum height of 2.0 m.

Boulevard shrub and groundcover plantings must be designed to fill in as a mass planting within three (3) years of installation and generally follow the BCSLA and BCLNA landscape standards.

Where visibility and site lines may be a concern within the boulevard areas, as determined by the Authorized Person, height of mature shrubs must not exceed 0.6 m and trees must be limbed so that there is a 3.0 m clearance from the grade. Additionally, planting within a 1.0 m setback from the face of curb must provide clear sightlines between 0.6 m and 1.5 m in height.

Topsoil and turf installation and/or seeding of corridors and boulevards may be required at the discretion of the Authorized Person, where it appears that the boulevards will not be developed or upgraded in the near future.

12.3.3 **Medians**

Roadway medians must generally be planted with trees and/or shrubs acceptable by the Authorized Person, in consultation with the District Parks Department. Medians 1.5 m or wider may be planted with trees, shrubs and/or groundcovers. Medians 1.0-1.5 m wide may be planted with shrubs and groundcovers. Medians less than 1.0 m wide may be hard surfaced , only if accepted by the Authorized Person.

12.4 Planting Trees Near or Under Power Lines

Trees planted near or under power lines must comply with the utility provider's requirements, including the following general terms:

a. Newly planted trees within 5.0 m of a power line should have a maximum mature height of 6.0 m or less.
b. Coniferous trees should only be planted on wider boulevards where power lines are not present, and wherever possible, "narrow columnar" varieties should be planted to avoid future conflicts with traffic or pedestrian safety.

12.5 Tree Corridor and Tree planting Spaces – Minimum Tree Planting Clearances

Street trees in different road categories as defined in the District's Street Tree Master Plan must be planted at offsets shown in the Supplemental Standard Detail Drawings. The following criteria apply to street tree distances from other infrastructure.

Table 12a – Minimum Planting Clearances for Road Trees	
Infrastructure	**Minimum Planting Clearances** (measured from the closest points between the tree and the infrastructure)
Lamp Posts	6.0 m
Stop Signs & Traffic Signals	6.0 m
Utilities (water, sanitary, storm, gas, communication, hydro)	• For new road design, refer to Supplemental Standard Detail Drawings. • For existing roads that are not being modified, minimum 0.75 m from utilities.
Hydrants	2.0 m
Manholes, valve boxes	1.2 m
Corners	Minimum 6 sight triangle and clearance as determined by the Stopping Sight Distance (SSD) in Section 1.2.5.2 of the TAC Geometric Design Guide for Canadian Roads.
Driveways	2.0 m minimum and clearance as determined by the Stopping Sight Distance (SSD) in Section 1.2.5.2 of the TAC Geometric Design Guide for Canadian Roads.
Overhead power lines	As per the utility owner
Planting strip area (between sidewalk and curb)	• Face of curb – 0.75 m • Edge of sidewalk – 0.6 m

12.6 Species Selection

Street tree and boulevard planting designs must be in context with existing plantings and surrounding community character and follow the District of North Vancouver Street Tree Master Plan. Variations, as required, may occur at intersections or areas requiring special emphasis.

12.7 Landscape Works Acceptance and Maintenance

All landscape works must be completed and installed to the satisfaction of the Authorized Person, and be certified by a Registered Landscape Architect and include BCSLA Schedules for Assurance of Professional Design and Commitment for Field Review and Assurance of Professional Field Review and Compliance.

12.8 Tree Removal on Boulevards

No tree removal or pruning of existing trees on boulevards is permissible, except as authorized through permit by the District.

12.9 Protection of Trees During Construction

All boulevard trees, any on-site trees identified for retention, and trees on neighbouring properties must be protected during construction. When construction occurs near such trees, tree protection must be installed and accepted by the Authorized Person prior to the commencement of any construction. Refer to Supplemental Standard Detail Drawings for tree protection."

END OF SECTION – LANDSCAPING

SCHEDULE A – PART 2: SUPPLEMENT TO THE MMCD SPECIFICATIONS (INCLUDED IN MMCD PLATINUM EDITION VOLUME II, 2009)

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Any sections listed in this schedule without any amendments are adopted as published in the Master Municipal Specifications (2009).

MMCD SECTION 01 33 01 – PROJECT RECORD DOCUMENTS – MMCD is amended

1.0 GENERAL – is amended by:

Adding the following section in numerical order:

“

.2 The Consulting Engineer is responsible for the preparation, certification and submission to the Authorized Person the record drawings (which has the same meaning as as-constructed drawings), and record documents (refer to MMCD Section 01 33 01), which typically include test results and certifications, and submission of any specialty infrastructure manuals, user guides, warranty information, manufacturer information, utility agreements, and maintenance agreements. The Consulting Engineer is also responsible for gathering, coordinating, checking and submitting such documentation prepared by other professionals, including by the Landscape Architect.”

1.1 Section Includes – is amended by:

Adding the following sections in numerical order:

“

.5 Record Drawings

.6 Service Record Cards

.7 Independent testing certificates

.8 Project Records”

1.2 Related Sections – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Submission – is amended by:

Item 1.3.2 is amended by deleting “Total Performance” and substituting “Substantial Completion”.

Item 1.3.3 is amended by deleting “Total Performance” and substituting “Substantial Completion”.

1.4 Format – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Contents, Each Volume – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Record Documents and Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Recording Actual Site Conditions – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

The following sections are added in numerical order:

“

1.9 Record Drawings

.1 Record Drawings (as-built drawings) – Record drawings submission must meet the Districts current policy requirements. The following procedures must be followed by the Consulting Engineer in the submission of record drawings:

.1 Survey for the record drawings must be prepared by a British Columbia Professional Land Surveyor.

.2 Record drawings must be presented in the same format and content as referred to in the District’s CAD Standards, available on the District’s website.

.3 The Consulting Engineer must submit two complete sets of full-size paper prints for the Authorized Person’s review.

.4 The District will return to the Consulting Engineer one marked-up set of the record drawings paper prints for revision. The Consulting Engineer will resubmit two sets revised and certified paper prints for Authorized Person’s review.

.5 When the Authorized Person is satisfied with the record drawings submission, the Consulting Engineer must submit the following:

(i) Two sets of full size paper prints with the following certification:

"I certify this drawing represents the Works and Services as designed, installed, and inspected."

The signature and seal will be by the Consulting Engineer who performed or carried out the required field reviews. Additional certification may be required by other professionals as applicable, such as the Landscape Architect.

(ii) An electronic project file as outlined in the District's online CAD Standards. Drawings must have the words "CERTIFIED RECORD DRAWINGS" appear in bold letters on all drawing sheets.

.2 Service Record Cards

For each new parcel serviced, the District will require a completed service record card as illustrated on the Supplemental Standard Detail Drawing SSD-G.2 titled "Sample Service Record Card". The card for each parcel developed is to be completed by the Consulting Engineer to indicate clearly and accurately the location, size, offsets, etc., of each municipal utility connection. Service record cards are considered part of the Record Drawing submission.

1.10 Project Records

Project record documents must be prepared, made available and submitted in accordance with MMCD, as amended herein. Project records must be submitted with the record drawings. A copy of all project professional reports and records, such as any geotechnical reports and testing reports, CCTV inspections, stormwater/drainage management plans, and other pertinent reports must be submitted to the Authorized Person one in hard copy and one in PDF format. Specialty infrastructure manuals, user guides, testing certifications, warranty information and manufacturer information must be submitted to the Authorized Person one in hard copy and one in PDF format – CCTV inspection video to be submitted electronically."

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009)."

END OF MMCD SECTION 01 33 01 – PROJECT RECORD DOCUMENTS

MMCD SECTION 01 42 00 – REFERENCE SPECIFICATIONS – SITE AND INFRASTRUCTURE – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009)

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 01 42 00 – REFERENCE SPECIFICATIONS – SITE AND INFRASTRUCTURE

MMCD SECTION 01 51 01 – TEMPORARY UTILITIES AND LIGHTING – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 01 51 01 – TEMPORARY UTILITIES AND LIGHTING

MMCD SECTION 01 52 01 – TEMPORARY STRUCTURES – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 01 52 01 – TEMPORARY STRUCTURES

MMCD SECTION 01 53 01 – TEMPORARY FACILITIES – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 01 53 01 – TEMPORARY FACILITIES

MMCD SECTION 01 55 00 – TRAFFIC CONTROL, VEHICLE ACCESS AND PARKING – MMCD is amended

1.0 GENERAL – is amended by:

Item 1.0.4 is amended by deleting “48 h” and replacing it with “7 working days”.

1.1 Section Includes – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 Installation and Removal – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Dewatering – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Sanitary Facilities – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Site Storage / Loading – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Hoarding – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Security – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 First Aid Facilities – not amended, refer to MMCD Master Municipal Specifications (2009).

1.9 Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.10 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – is amended by:

Adding the following sections in numerical order:

“

.1 Construction Traffic Management Plan (CTMP):

A Construction Traffic Management Plan (CTMP) as per the District’s Construction Traffic Management Plan Guidelines document must be prepared and submitted to the Authorized Person for acceptance and, only upon acceptance by the Authorized Person, may a Building Permit be issued or any site activity take place. Amend and re-submit CTMP as required to achieve District’s acceptance.

The CTMP will be subject to review by the Authorized Person as the work progresses. Amend the CTMP as required. The CTMP will consist of, but is not limited to:

.1 Detailed description of project (including number of storeys and parkade levels) and schedule for each major phase (demolition, excavation, construction, off-site works).

.2 Estimated truck trips for each major phase (demolition, excavation, construction) along with proposed truck routing.

.3 Plan views of site at each stage of development (demolition, excavation, construction) illustrating proposed locations of:

- Site access/egress
- Wheel wash
- Site trailers and other temporary structures including sedimentation tanks
- Trucking routes
- Truck staging area
- Building Zone – area where deliveries (including concrete) will be accepted

.4 Traffic (vehicular and non- vehicular) control plans for all activities expected to disrupt typical uses of the Highway.

.5 Parking plan for trades/workers, including number of worker vehicle expected per phase. Parking of trades/workers on District roads is not acceptable.

.6 Communications plan.

.7 Plan for coordinating with other nearby construction projects (private and civil).

All plans must be compliant with:

- Manual of Uniform Traffic Control Devices for Canada (MUTCD) published by Transportation Association of Canada
- British Columbia Ministry of Transportation and Infrastructure Traffic Control Manual for Work on Roadways
- The District of North Vancouver Construction Traffic Management Guidelines

.2 Protection of Public Traffic:

.1 Comply with requirements of Acts, Regulations and Bylaws in force for regulation of vehicle, pedestrian, and bicycle traffic or use of roadways in areas affected by the work.

.2 Submit detailed traffic control plans to the Authorized Person for approval 7 working days in advance of expected start date. Do not proceed with work until a Highway Use Permit has been issued.

.3 When working on a road allowance, ensure delimited work zone and equipment placement minimizes interference and hazards to the travelling public.

.4 Do not close any portion of the road allowance without approval of the District. Before re-routing any traffic, erect suitable traffic controls in accordance with MUTCD.

.5 Keep travelled portions well graded, free of potholes and of sufficient width for required number of lanes of traffic and parking.

.6 Provide traffic control personnel (flaggers) certified in traffic control by an organization approved by BCCSA and comply with the requirements of Part 18 of the WCB Occupational Health & Safety Regulations regarding supervision of the Traffic Control Personnel at the Work Zone.

.3 Operational Requirements:

.1 Maintain existing conditions for vehicle traffic, pedestrians, and cyclists throughout the period of work except where a traffic control plan has been submitted to and accepted by the Authorized Person to restrict existing conditions when required for construction.

.2 Maintain existing conditions for vehicle traffic, pedestrians, and cyclists crossing the right of way.

.3 Maintain access/egress and passage to properties adjacent to the site.

.4 Maintain access and passage for emergency vehicles."

END OF MMCD SECTION 01 55 00 – TRAFFIC CONTROL, VEHICLE ACCESS AND PARKING

The following section is added:

"SECTION 01 56 39 – TEMPORARY TREE AND PLANT PROTECTION – new section

1.0 GENERAL

.1 This section specifies activities to be undertaken for the protection of existing vegetation to remain. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1	Clearing and Grubbing (MMCD)	Section 31 11 01
.2	Shrub and Tree Preservation (MMCD)	Section 31 11 41
.3	Site Grading (MMCD)	Section 31 22 01
.4	Growing Medium Preparation and Placement	Section 32 91 21

1.2 References

.1 British Columbia Landscape Standard

.2 Canadian System of Soil Classification

.3 International Society of Arboriculture: Guide for Establishing Values of Trees and Other Plants

1.3 Existing Services and Utilities

.1 Prior to commencing any excavation work, the Developer must establish the location of any existing active underground utilities or service lines, including service entry points. These locations must be clearly marked on site to prevent accidental disturbance.

1.4 Tree and Plant Protection Requirements

.1 The Developer and the District's arborist must inspect and clearly identify on site all plant material identified on design drawings to be preserved.

.2 Prior to start of any site work or clearing, temporary protective fencing must be installed by the Developer around existing trees, understorey plants and shrubs, which have been noted on the plans as to remain. Damage to trees and shrubs on public property during construction must be reported immediately to the District for assessment and direction with regard to repairs or replacements by the Developer.

.3 The Developer must notify the Authorized Person in writing a minimum of seven (7) working days prior to the removal of

temporary protective fencing. Temporary protective fencing may be removed only after all work potentially injurious to the trees, understorey plants or shrubs is complete and written request has been reviewed and accepted by the Authorized Person.

.4 The Developer must protect the existing and remaining trees, understorey plants and shrubs and their root systems from:

.1 Dumping of refuse.

.2 Stockpiling of materials.

.3 Chemically injurious materials and liquids.

.4 Noxious materials in solution caused by runoff and spillage during mixing and placement of construction materials, and drainage from stored materials.

.5 Continual or prolonged puddling of running water.

.6 Flooding, erosion, excessive wetting and drying resulting from de-watering and other operations.

.7 Vehicular and non-vehicular traffic, to ensure that compaction of soil over root systems is avoided.

.8 Cutting, breaking, skinning or other mechanical damage to roots, branches and trunks.

2.0 PRODUCTS

2.1 Materials

.1 38 mm X 89 mm (2” X 4”) wood frame of a height, length and extent shown on design drawings.

.2 DuPont Vexar L-70 or Tensar BX20551 plastic orange snow fencing or other approved equal

.3 Growing medium fill material as per Section 32 91 21 – Topsoil and Finish Grading

3.0 EXECUTION

3.1 Installation of Protective Fencing

.1 Prior to the start of any demolition or construction activity, erect temporary protection fence wood frame as shown on the Supplementary Standard Detail Drawings around all vegetation marked to remain.

.2 Place snow fencing around the entire perimeter of fence frame, tension and affix with staples on wood frame.

.3 Erect protective barrier at the boundaries of the vegetation protection zone, no closer to the plant material than the drip line, or as marked on the design drawings and approved by the District's arborist.

.4 Install and maintain barrier in good condition throughout the construction process and immediately repair any damage.

3.2 Excavation Around Vegetation to Be Protected

.1 Notify the District prior to any work.

.2 Do not excavate within drip lines of vegetation to be protected.

.3 If any excavation within the drip line of vegetation is necessary:

.1 Hand-excavate to minimize damage to root systems.

.2 Use narrow tine spading forks to probe and comb soil to expose roots.

.3 Relocate roots into backfill areas whenever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate roots without breaking.

.4 Utility trenching within drip line of trees:

.1 Tunnel under and around roots by hand digging.

.2 Do not cut main lateral roots.

.5 Cutting of smaller roots that interfere with installation of new work must be done with clean, sharp pruning tools.

.6 Those roots encountered immediately adjacent to location of new construction that cannot be readily relocated, must be cut 150 mm (6") back from new construction.

.7 Do not allow exposed roots to dry out prior to placement of permanent cover. Provide one of the following temporary remedial measures:

.1 Provide temporary earth cover.

.2 Pack with wet peat moss.

.3 Pack with four (4) layers of wet, untreated burlap.

.8 Temporarily support and protect exposed roots from damage until they are permanently relocated and covered with backfilled topsoil. Thoroughly water the backfilled topsoil around roots to eliminate voids and air pockets.

.9 All pruning operations, including root systems, must be carried out by an ISA Certified Arborist using clean, sharp pruning tools. Do not break, chop and mutilate roots or branches during pruning operations.

.10 Remaining trees and shrubs must be thoroughly watered as required to maintain a healthy condition throughout the construction period. The Developer must document all watering operations and submit to the Authorized Person one (1) copy of documentation prior to acceptance of a Certificate of Substantial Completion by the Authorized Person.

.11 All excavation within root zones must be performed under the direction and supervision of the District arborist or an ISA Certified Arborist.

3.3 Grading Around Vegetation to be Protected

.1 Do not raise or lower grades within the drip line of vegetation to be protected.

3.4 Clean Up

.1 Clean site of all surplus material or equipment associated with Work of this Section.

.2 Recycle or dispose of off-site at approved disposal location, all surplus material and refuse.

.3 Do not burn or bury any surplus material or refuse."

END OF SECTION 01 56 39 – TEMPORARY TREE AND PLANT PROTECTION

MMCD SECTION 01 57 01 – ENVIRONMENTAL PROTECTION – not amended, refer to MMCD Master Municipal Specifications (2009).

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 01 57 01 – ENVIRONMENTAL PROTECTION

MMCD SECTION 01 58 01 – PROJECT IDENTIFICATION – not amended, refer to MMCD Master Municipal Specifications (2009).

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 01 58 01 – PROJECT IDENTIFICATION

MMCD SECTION 03 20 01 – CONCRETE REINFORCEMENT – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 03 20 01

MMCD SECTION 03 30 20 – CONCRETE WALKS, CURBS AND GUTTERS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – is amended by adding the following:

3.1 Subgrade Preparation

"

.3 All existing curb, gutter and sidewalk that are undermined, and / or damaged, must be removed and replaced - at a minimum 2 meters for the curb and gutter, and one panel for the sidewalk. Backfilling of undermined sections and surface treatments, including curb, gutter and sidewalk, is not allowed."

END OF MMCD SECTION 03 30 20 – CONCRETE REINFORCEMENT

MMCD SECTION 03 40 01 – PRECAST CONCRETE – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 03 40 01 – PRECAST CONCRETE

MMCD SECTION 03 30 53 – CAST-IN-PLACE CONCRETE – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Construction Quality Control – is amended by:

Adding the following sections in numerical order:

"

.2 Concrete to develop a minimum compressive strength as specified by the Consulting Engineer on the design drawings, performed in accordance with CSA A23.2-9C.

.3 The Authorized Person may request necessary corrective action, if required, due to results of the 7-day test.

.4 In the event that the cylinders tested at 28 days fail to achieve the specified 32 MPa minimum compressive strength, the Developer must, upon notification, obtain cores for further testing. The cores are to be taken from the portions of the structure in question and tested prior to the 38th day.

.5 The core tests must be performed in accordance with CSA 23.2-14C. The compressive strength of the concrete, based on core tests, will be interpreted from CSA A23.1-94, Clause 17.5.8.2.

.6 Concrete not meeting the minimum compressive strength criteria will be rejected and must be completely removed and replaced.

.7 One strength test (3 specimen cylinders) must be made for each 150 lineal metres of work constructed. In no case, however, will there be less than one strength test for concrete placed in one day. One cylinder must be tested at 7 days and two cylinders must be tested at 28 days.

.8 Cores must be tested following moisture conditioning in accordance with CSA procedures."

1.4 **Construction Quality Control** – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 **Measurement and Payment** – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 **Inspection and Testing** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 **PRODUCTS** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.1 **Materials** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.2 **Concrete Mixes** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.3 **Forms** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.4 **Form Release Agent** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 **EXECUTION** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 **General** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 **Formwork** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 **Workmanship** – is amended by:

Adding the following section:

“

.11 Repairs to barrier curbs and gutters that are less than 3m long will require pinning the repaired section to existing undisturbed barriers curb and gutter.”

3.4 **Joint Fillers** – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 03 30 53 – CAST-IN-PLACE CONCRETE

MMCD SECTION 03 40 01 – PRECAST CONCRETE – not amended, refer to MMCD Master Municipal Specifications (2009).

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 03 40 01 – PRECAST CONCRETE

The following section is added:

"SECTION 11 68 19 – PLAYGROUND EQUIPMENT – new section

1.0 GENERAL

.1 This section specifies the design, supply, installation and performance requirements for playground equipment that may include, but not be limited to, the following. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

.1 Climbing equipment

.2 Swings

.3 Decks, bridges and slides

.4 Motion equipment (spinning, rotating or spring mounted equipment)

.5 Overhead equipment (zip lines, monkey bars)

.6 Balancing equipment

.7 Sensory play

1.1 Related Work

.1 Poured-in-Place Playground Safety Surfacing Section 32 18 16.13

1.2 References

.2 CAN/CSA Z614 - Standard for Children's Playspaces and Equipment

.3 ASTM F1487 - Performance Specification for Playground Equipment

.4 ASTM F1951 - Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment

.5 ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment

1.3 Scheduling

.1 The Developer must arrange for a meeting amongst the Authorized Person, the Contractor, the designer, the installer, and the Consulting Engineer to review and confirm project requirements, foundation, structural, sub-grade and other general site conditions; and, provide playground equipment manufacturer's installation instructions and warranty requirements for installation compliance, at least seven (7) working days prior to commencement of work.

.2 Shop Drawings Submittals: prior to construction, the Developer must submit shop drawings for review by the Authorized Person, including:

.1 Layout of all play structures, indicating fall zones as specified by manufacturer, fall heights, usage zones, dimensions and distances of components.

.2 Footing details that have been engineered and stamped by a Structural Professional Engineer licenced to practice in the province of British Columbia.

.3 Play equipment anchoring details, as per manufacturer's specifications.

.4 Finished elevations, patterns and colours of the safety surfacing.

.5 Equipment schedule indicating name of manufacturer, model names/numbers and colours and finishes of all play structures and equipment.

.6 Playground furnishings schedule (tables, chairs, benches, refuse containers etc.), indicating name of manufacturer, model names/numbers and colours of all furnishings

.3 Product Data Submittals: the Developer must provide to the Authorized Person for each type of product specified, including:

.1 Component or material construction performance data and fire ratings.

.2 Engineering data on loading and stresses.

.3 Test and evaluation reports performed by manufacturer.

.4 Manufacturer's Product Certification Submittals: For each type of product specified the Developer must submit manufacturer's certificates of compliance with all applicable CSA Standards.

.5 Professional Qualifications Submittals: the Developer must submit manufacturer's and installer's professional qualification certificates.

.4 Instructions Submittals: the Developer must submit manufacturer's installation instructions for all specified components.

.5 Prior to acceptance of a Certificate of Substantial Completion by the Authorized Person the Developer must submit to the Authorized Person three (3) bound copies of manufacturer-issued maintenance instruction manuals and inspection and maintenance schedules for all specified components.

.6 The Developer must furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:

.1 Clamps: No fewer than 2 full-size units for each size indicated

.2 Cables: 5 full-size units for each size indicated

.3 Hardware: Provide manufacturer's packets of spare hardware as required for each specified playground equipment system

.4 Touch-Up Kit: Touch-up primer, appropriate colour touch-up paint, sandpaper, appropriate colour touch-up PVC, and graffiti remover

.5 No fewer than two (2) additional complete installation tool kits for tamper-proof fasteners

.7 The Developer must supply documentation by a Canadian Playground Safety Institute (CPSI) certified inspector stating that all specified components and their installation are in compliance with all ASTM and CSA Standards and all safety regulations of authorities having jurisdiction

.8 Prior to acceptance of a Certificate of Substantial Completion by the Authorized Person, the Developer must submit to the Authorized Person the manufacturer's general and special warranties and guarantees executed by authorized by each manufacturer's official, for all installed components.

1.4 Handling and Storage

.1 Play equipment must be delivered in the original manufacturer's packaging and protective wrapping.

.2 Unload, handle and store equipment in a manner to prevent bending, warping, denting, chipping and other mechanical damage.

1.5 Site Examination

.1 A written report by the Consulting Engineer prior to commencing construction and installation of Works and Services, indicating any conditions or defects encountered on the site, upon which the Work and Services of this section depends on, or which may adversely affect the performance of the Works and Services installed.

.2 Do not commence installation work until such conditions or defects have been investigated and corrected, and certified as such in a written report by the Consulting Engineer.

1.6 Quality Assurance

.1 All workmanship and materials within this section must conform to the manufacturer's specification and installation instructions and guarantees.

.2 All playground equipment and installation must comply with all applicable CSA and ASTM standards.

.3 Manufacturer Qualifications: Manufacturer with minimum 10 years' documented experience in designing, fabricating, manufacturing, and

installing playground equipment and related products. Manufacturer must meet the following requirements:

a. Quality Management System: Current certification to ISO 9001, latest edition, as amended from time to time;
b. Environmental Management System: Current certification to ISO 14001, latest edition, as amended from time to time; and
c. Manufacturer must be a member in good standing of the International Play Equipment Manufacturers' Association (IPEMA).

.4 Installer Qualifications: Installer with minimum 5 years' documented experience in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer. In addition, installer must have the Canadian Playground Safety Institute (CPSI) Certification.

2.0 PRODUCTS

2.1 Materials

.1 Sheet Metals:

.1 Hot-rolled pickled and oiled (HRPO) steel sheet: ASTM A1011, low carbon commercial steel Type B

.2 Cold-Rolled steel sheet: ASTM A1008, Commercial Steel (CS), Type B; suitable for exposed applications

.2 Plastic Components: Play system components, as specified, that are manufactured from colour impregnated and mold resistant polyethylene, formulated for maximum colour and UV-light stabilization:

.1 High density Polyethylene (HDPE): fabricated from virgin plastic resin meeting the following:

a. Thickness: 19 mm

b. Density: 0.960 grams per cubic centimeter, per ASTM D1505

c. Tensile Strength: Minimum 16.55 MPa, per ASTM D638

d. Colour: Solid colour HDPE as selected from manufacturer's full range.

.2 2-Colour High-Density Polyethylene (HDPE): fabricated from virgin plastic resin meeting the following:

a. Thickness: 19 mm consisting of 2 separate layers (exterior layers: 2.5 mm, interior core: 14 mm)

b. Nominal Density: 0.940 to 0.959 grams per cubic centimeter, per ASTM D1505

c. Tensile Strength: Minimum 16.55 MPa, per ASTM D638

d. Colour: as selected from manufacturer's full range.

.3 Recycled High-Density Polyethylene (HDPE): fabricated from virgin and recycled plastic resin meeting the following:

a. Recycled Content of Polyethylene: postconsumer recycled content not less than 73% (exterior layers: 100% virgin resin, interior core: 100% recycled content)

b. Thickness: 19 mm consisting of 2 separate layers (exterior layers: 2.5 mm, interior core: 14 mm)

c. Nominal Density: 0.940 to 0.959 grams per cubic centimeter, per ASTM D1505

d. Tensile Strength: Minimum 16.55 MPa, per ASTM D638

e. Colour: as selected from manufacturer's full range.

.4 Rotationally molded polyethylene: fabricated from low-density polyethylene (LDPE) into double-walled components:

a. Wall thickness: Varies between 4.7 mm (3/16") and 8 mm (5/16"), depending on component

b. Size: as indicated on components

c. Nominal Density: 0.940 to 0.959 grams per cubic centimeter, per ASTM D1505

d. Tensile Strength: Minimum 16.55 MPa per ASTM D638

e. Colour: As selected from manufacturer's full range

.3 Posts:

.1 Steel posts: Manufactured from 3.2 mm steel tubing meeting the following:

a. Tensile strength: Minimum 345 MPa, per ASTM A500

b. Yield Strength: Minimum of 379 MPa, per ASTM A500

c. Elongation: 25% in 51 mm, per ASTM A500

d. Modulus of elasticity: 6894.8 MPa, per ASTM A500

e. Finish: hot dipped galvanized or powder coated

f. Colour: as selected from manufacturer's full range

.2 Aluminum posts: Manufactured from 6005-T5 extruded aluminum tubing with wall thickness of 3.2 mm, per ASTM B221.

a. Tensile strength: Minimum 345 MPa, per ASTM B221

b. Yield Strength: Minimum of 379 MPa, per ASTM B221

c. Elongation: 25% in 51 mm, per ASTM B221

d. Modulus of elasticity: 6894.8 MPa, per ASTM B221

e. Finish: powder coated

f. Colour: as selected from manufacturer's full range

.4 Decks: Fabricated from 2.7 mm (12-gauge) thick HRPO sheet steel to meet specified modular design. Provide decks with no unsupported area larger than 0.33 sq. m and with sides that are flush with outside edge of supporting posts.

.5 Wood Panels: Fabricated from high-grade marine plywood and painted with UV-stabilized polyurethane paint. All edges to be rounded and sanded smooth.

.6 Ropes and Nets: Made of steel reinforced, UV-stabilized polypropylene.

3.0 EXECUTION

3.1 Site and Equipment Examination

.1 Examine areas where playground equipment is scheduled to be installed, with Installer present. Verify compliance with manufacturer's requirements for installation tolerances and other conditions affecting installation and performance.

.2 Verify that site conditions, including sub-surface preparation and drainage meet playground manufacturer's requirements for play equipment installation.

.3 Ensure that all utility work in the play area has been completed prior to proceeding with installation work.

.4 Ensure that all unsatisfactory conditions have been corrected prior to proceeding with installation.

.5 Carefully examine all equipment that has been delivered to the site for physical damage prior to installation.

.6 Do not install any products found to be defective or damaged upon delivery to the site. Notify the Authorized Person and arrange for replacement of defective or damaged products.

3.2 Layout of Work

.1 Stake and mark location of playground equipment, including equipment anchoring locations, safety and user zones, perimeter of protective surfacing, access and egress points, hard surfaces, and other work associated with work of this section, prior to commencement of installation.

.2 Verify that safety and user zones do not overlap with hard surfaces.

.3 Verify that safety and user zones are free of obstructions that extend into protective surfacing.

.4 Immediately notify the Authorized Person of potential obstructions or any other conflicts.

3.3 Installation

.1 Coordinate work of this Section with work of Section SS-32 18 16.13 – Poured-in-Place Playground Safety Surfacing.

.2 Verify that footing depths will result in proper safety surfacing depth for the specified play structure. Top of footings must be no higher than the bottom of impact layer of the safety surfacing.

.3 Anchor playground equipment to footings as required for each type of equipment and with the hardware specified or supplied by the manufacturer.

.4 Ensure that proper clearances and safety zones are maintained at all times, as per the manufacturer's specifications and CAN/CSA Z614.

.5 Protect playground equipment from damage during handling and installation. Any products that are found to be damaged or defective upon final inspection will be rejected and replaced by the Developer.

.6 Do not use any connectors, brackets, fasteners, bearings or accessories other than ones specified and supplied by the manufacturer.

.7 Do not, under any circumstances, modify play equipment to suit site conditions.

.8 Ensure that all Work complies with CAN/CSA Z614 standards and the manufacturer's specifications and instructions.

3.4 Clean Up

.1 Clean site and play areas of surplus materials or equipment associated with work of this section. Clean play areas and surfaces of dirt, stains, filings, and other refuse occurring from performance of work.

.2 Clean play equipment using cleaning methods and agents as recommended by Manufacturer.

.3 Clean playground areas of excess construction materials, waste, and debris. Dispose of off-site or recycle as appropriate and in accordance with all applicable regulations of authorities having jurisdiction.

3.5 Protection

.1 Protect play areas and equipment from damage by construction operations by others until Substantial Completion."

3.6 Warranty

.1 The manufacturer's warranty is in addition to and in no way limits any other rights the District may have."

END OF SECTION 11 68 19 – PLAYGROUND EQUIPMENT

MMCD SECTION 26 42 13 – CATHODIC PROTECTION – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 26 42 13 – CATHODIC PROTECTION

MMCD SECTION 26 56 01 – ROADWAY LIGHTING – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – is amended by:

Adding the following section in numerical order:

“

.8 Concrete Walks, Curb and Gutter Section 03 30 20”

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Shop Drawings – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Electrical Energy Supply – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Contractor Qualifications – is amended by:

Adding the following section in numerical order:

“

.3 Those retained to complete the work during the start-up must be Certified Electricians familiar with traffic controller operation and maintenance. As a minimum they will have IMSA Level 2 Signals Certification and/or have completed at least three (3) similar signal projects.”

1.6 Permits and Tests – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Work Regulations – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 Record Drawings – not amended, refer to MMCD Master Municipal Specifications (2009).

1.9 Measurement and Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.10 Inspection – not amended, refer to MMCD Master Municipal Specifications (2009).

The following section is added in numerical order:

“

1.11 Work Schedule

.1 The Developer must submit a construction schedule to the Authorized Person for review and acceptance prior to commencement of construction.

The schedule will set out the order of electrical works to be undertaken, the coordination requirements with the District and other utilities, and any impacts on existing infrastructure. The Authorized Person may alter the order of Works and the schedule to accommodate existing systems."

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

2.1 General – is amended by:

Adding the following section in numerical order:
"

.6 Accepted products will be as listed in District's List of Accepted Materials and Products, which will supersede MMCD Master Municipal Specifications (2009)."

2.2 Conduit – not amended, refer to MMCD Master Municipal Specifications (2009).

2.3 Trench Marker Tape – not amended, refer to MMCD Master Municipal Specifications (2009).

2.4 Plastic Junction Boxes – not amended, refer to MMCD Master Municipal Specifications (2009).

2.5 Concrete Junction Boxes – not amended, refer to MMCD Master Municipal Specifications (2009).

2.6 Concrete Bases – not amended, refer to MMCD Master Municipal Specifications (2009).

2.7 Poles and Anchor Bolts – not amended, refer to MMCD Master Municipal Specifications (2009).

2.8 Conductors and Cables – not amended, refer to MMCD Master Municipal Specifications (2009).

2.9 Conductor Tags – not amended, refer to MMCD Master Municipal Specifications (2009).

2.10 Conductor Connectors – not amended, refer to MMCD Master Municipal Specifications (2009).

2.11 Fuses and Fuse Holders – not amended, refer to MMCD Master Municipal Specifications (2009).

2.12 Grounding Equipment – not amended, refer to MMCD Master Municipal Specifications (2009).

2.13 Receptacles – not amended, refer to MMCD Master Municipal Specifications (2009).

2.14 Luminaires – not amended, refer to MMCD Master Municipal Specifications (2009).

2.15 Nuts, Bolts, Screws – not amended, refer to MMCD Master Municipal Specifications (2009).

2.16 Cold Galvanizing Compound – not amended, refer to MMCD Master Municipal Specifications (2009).

2.17 Extruded Aluminum Signs – not amended, refer to MMCD Master Municipal Specifications (2009).

2.18 Powder Coat Materials – is amended by:

Adding the following section in numerical order:

"

2.18.5 The District's acceptable colours are as follows, which supersede MMCD Master Municipal Specifications (2009):

- Per Development Permit Area Requirements;
- Per Town and Village Centre Requirements; and
- Per District's List of Accepted Materials and Products

The powder applicator will provide a colour sample to the Authorized Person prior to applying the product to the equipment."

The following section is added in numerical order:

"

2.19 Wet Coat Painting

.1 The District may consider the use of a wet spray application on galvanized steel poles and products. The use of a fluoropolymer resin based coating system, for example, must meet or exceed the specified product and testing requirements applied to powder manufacture and applicator noted within these Supplemental Specifications. Acceptance for this alternate method of coating is at the sole discretion of the Authorized Person."

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 General – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Excavating, Trenching and Backfilling – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Concrete Bases – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 Junction Boxes and Vaults – is amended by:

Adding the following section in numerical order:

"

.5 Galvanized steel lids for District of North Vancouver Fibre Optic pull boxes will be marked with welded letters "DNVFO" prior to galvanizing.

.6 No junction boxes to be installed in the roadway."

3.5 Underground Conduit – is amended by:

Adding the following section in numerical order:

"

.6 Conduit depth of bury must be recorded when a trenchless technology method is used. This record must be provided to the Authorized Person prior to acceptance of a Certificate of Substantial Completion by the Authorized Person.

.7 All conduits must begin and terminate in a junction box.

.8 All installed conduits must have a pull string to remain in place."

3.6 Poles and Related Equipment – is amended by:

Deleting section 3.6.10

3.7 Electrical – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 Wiring – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 Pole Mounted Receptacles – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 Luminaires and Photocells – not amended, refer to MMCD Master Municipal Specifications (2009).

3.11 Grounding & Bonding – not amended, refer to MMCD Master Municipal Specifications (2009).

3.12 Cold Galvanizing Compound Application – not amended, refer to MMCD Master Municipal Specifications (2009).

3.13 Pole Finish Application – not amended, refer to MMCD Master Municipal Specifications (2009).

The following sections are added in numerical order:

“

3.14 District Supplied Materials

.1 The Developer, or its representative, must notify the Authorized Person in writing (seven) 7 days prior to the time materials (supplied by the District) are required.

.2 Any materials supplied by the District must be made available at the District of North Vancouver Operations Centre. The Developer must make all necessary arrangements and pay the costs for pick up from the District and for delivery to, protection, and incorporation into the Works and Services.

.3 The Developer must complete a Materials Release Form at the time materials are picked up.

.4 District supplied materials generally consist of:

a) Traffic controllers and cabinets;

b) Video detector systems;

c) Pedestrian walkway luminaires;

d) Padlocks;

e) Street name signs; and

f) Wayfinding signs.

For each site, a list of materials to be supplied by the District will be provided to the Developer. The cost for the supply and/or installation of all District supplied materials will be borne by the Developer.

3.15 Powder Coating

.1 Prior to producing a powder finish product the Developer’s supplier must produce a copy of their quality control program and written confirmation they intend to follow these specifications. The supplier will submit to the Authorized Person the name their independent testing agency.

.2 The application process will be as follows:

.1 The pole or product will be hot dip galvanized.

.2 Powder must only be applied after the product is completely fabricated. No welding or bending will take place after the powder is applied.

.3 The pole or product must be thoroughly cleaned by brush blasting in accordance with SSPC-SP7 (Steel Structures Painting Council). The brush blast will maintain a minimum profile of 0.5 mm. If brush

blasting takes place off site then the product must be covered and shielded from any dirt or moisture during its return to the powder applicator's facility. Unsatisfactory poles or products must be returned for further brush blasting.

.4 Once at the applicator's facility the pole or product must be thoroughly cleaned and dried with an air gun. All hand marks or grease spots must be cleaned with a mild solvent.

.5 After brush blasting the entire pole or product must be pre-baked in an oven at 220 degrees Celsius for at least 30 minutes to 1 hour, depending on steel thickness. The pre-baking must be done to prevent out-gassing during the curing cycle.

.6 The base powder coat must then be applied electrostatically while the pole or product is cooling from the 220 degrees Celsius pre-bake period to allow the powder to melt and fuse to the surface. The base coat must be a minimum of 3 mm in thickness.

.7 After base coat is applied and set, the topcoat must be applied to a thickness of 3 to 5 mm. The pole or product must be returned to the oven and heated to 190 to 220 degrees Celsius (no to exceed pre-bale temperature) for a minimum of 25 minutes, depending on steel thickness. Thicker product material may require longer bake cycles to fully cure. Upon removal of the pole or product from the oven it will be left to rest until the pole or product is cool enough to the touch.

.8 Once the topcoat has cured and the poles or product cooled, they must then be individually wrapped (minimum 4 inches by overlapping method) with 1/8 inch foam wrap over the entire pole or product. The poles or product must be bundled together and separated with suitable wood dunnage to avoid contact between the poles, product or other bundles. All bundles themselves must be fully wrapped with foam and with stretch-wrap as noted above. The poles or products must be handled and shipped in a manner to prevent damage – damaged products will be rejected.

.3 The testing process will be as follows:

.1 Each run of product in an oven must have at least one sample tested for:

a) Adhesion – The finished powder surface must have minimum pull-off strength exceeding 1000 PSI as tested in accordance with ASTM D4541.

b) Quality – The finished powder surface must be free from any holidays as tested in accordance with ASTM D4541. The

product must also be free from wrinkles, orange peel, cracking, pinholes, fish eyes, blisters, etc. by visual inspection.

c) Colour – The colour must be verified to be within 3 DE of specialized colour.

.2 The Developer will employ an independent testing firm that is qualified to test powder finish products to perform testing. Test results must be included in the product supplier's QC documentation and must be made available to the Authorized Person. Failed products will be rejected until the testing is completed and the product deemed acceptable by the testing agency.

.3 Where the tested product fails on a given production run then a minimum of 30% of the entire production run must be tested. If no other failures are found then the individual failed product must be stripped, reapplied and re-tested until it passes. If any of the 30% of product tested fails then the entire order will be stripped, reapplied and retested until it passes.

.4 Field repairs must be undertaken to fix any scratches or imperfections in the final finish. Field repairs must be done as follows:

.1 Feather the damaged area with sandpaper.

.2 Clean area with solvent.

.3 Let dry.

.4 Neatly brush on an application of Aliphatic Urethane Acrylic Semi-Gloss High Build applied at 2-4 mm Dry Film Thickness (DFT) over the entire sanded and damaged area. The ambient conditions must be dry and over 10 degrees Celsius when the paint is applied.

.5 The Developer, through its pole supplier, must warranty the integrity of the surface for a minimum of 1 year from the date of installation. The warranty will include all labour and materials required to provide replacement product if required. The warranty will apply to fading, blistering, cracking or chipping of the surface."

END OF SECTION 26 56 01 – ROADWAY LIGHTING

MMCD SECTION 31 05 17 – AGGREGATES AND GRANULAR MATERIALS – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 05 17 – AGGREGATES AND GRANULAR MATERIALS

MMCD SECTION 31 11 01 – CLEARING AND GRUBBING – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 11 01 – CLEARING AND GRUBBING

MMCD SECTION 31 11 41 – SHRUB AND TREE PRESERVATION – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 11 41 – SHRUB AND TREE PRESERVATION

MMCD SECTION 31 15 60 – DUST CONTROL – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 15 60 – DUST CONTROL

MMCD SECTION 31 22 01 – SITE GRADING – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 22 01 – SITE GRADING

MMCD SECTION 31 22 16 – RESHAPING GRANULAR ROADBED – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 22 16 – RESHAPING GRANULAR ROADBED

MMCD SECTION 31 22 16.1 – RESHAPING EXISTING SUBGRADE – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 22 16.1 – RESHAPING EXISTING SUBGRADE

The following section is added:

"

SECTION 31 23 00 – EXCAVATION AND BACKFILL UNDER LANDSCAPE AREAS – new section

1.0 GENERAL

.1 This section relates to excavation, backfill and grading as indicated on the design drawings and as specified herein. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1	Aggregates and Granular Materials	Section 31 05 17
.2	Excavating, Trenching and Backfilling (MMCD Master Municipal Specifications (2009))	Section 31 23 01
.3	Tree, Shrub & Groundcover Planting	Section 32 90 00

1.2 Street Maintenance

.1 The Developer is responsible for:

.1 Cleaning tires of vehicles exiting the site and for street cleaning for the duration of the construction and installation of the Works and Services to the satisfaction of the Authorized Person.

.2 Protecting all catch basins affected by the Works from silt run-off for the duration of the construction and installation of the Works and Services and to the satisfaction of all authorities having jurisdiction.

.3 Providing dust control in accordance with all bylaws and regulations.

1.3 Site Access

.1 Maintain access to existing roads and properties adjacent to work site at all times.

.2 Obtain the required District permits, such as the Highway Use Permit, and provide a Construction Traffic Management Plan as required, prior to start of any Works and Services.

1.4 Existing Services and Utilities

.1 Prior to commencing any excavation work, the Contractor must establish the location of any existing active buried utilities or service lines, including service entry points. These locations must be clearly marked on site to prevent accidental disturbance during the work.

.2 Any utility or service which is presently in use or not established as abandoned, but which must be moved or otherwise disturbed, must be referred to the utility or service company concerned, so that they may advise on, coordinate and inspect necessary operations for relocation.

.3 The Developer must obtain a written approval from utility and service companies and the District prior to disturbing any existing utilities.

2.0 PRODUCTS

2.1 Materials

.1 Refer to MMCD Master Municipal Specifications (2009) 31 05 17, Aggregates and Granular Materials, Sections 2.1 (Materials – General) and Section 2.10 (Granular Base).

.2 Native Material Fill: native material intended to be used as general fill must be approved by the Authorized Person in writing prior to use. Native material must not be used as base for paved areas.

3.0 EXECUTION

3.1 Excavation

.1 Prior to commencing excavation the Developer must:

.1 Verify locations of all underground utilities.

.2 If required, obtain documented permission from adjacent property owners and the District before overcutting property line.

.2 Grade to elevations and dimensions indicated or required by the work of this section or related sections, providing sufficient space to permit erection of forms and all other work required, including inspection of foundations.

.3 Excavation must be made to clean lines to minimize quantity of fill required.

.4 At the cut face, the Developer must phase his operation so that a stable slope is maintained at all times as the excavation progresses.

.5 All exposed faces must be covered and protected from weather as soon as possible after being cut.

.6 Bottom of excavation must be level and free from loose material and debris.

.7 Remove all boulders encountered during excavation.

.8 Excavate any rock to produce clean undisturbed surfaces

.9 Remove stones larger than 150 mm (6”) in diameter from excavated surfaces, and fill cavities with granular material. Compact to 95% Modified Proctor Density.

.10 All necessary precautions must be taken to preserve all materials outside the required excavations in an undisturbed condition.

.11 Protect excavations against freezing. Frozen areas must be thawed and protected from further frost until subsequent work has been completed.

.13 Do not allow water to accumulate and pond at the bottom of excavated areas. Pump or otherwise continuously remove all water that has accumulated in excavation during the progress of the work. Do not divert water onto adjacent property.

3.2 Placement of Granular Material

.1 Concrete foundation walls and footings must have reached specified strength prior to backfilling.

.2 Prior to backfilling, all excavations must be inspected and approved by the Consulting Engineer. All backfill materials must be approved by the Authorized Person prior to placement. Each lift of backfill material must have been approved by the Consulting Engineer and tested for compaction density prior to placement of the next lift.

.3 Place granular sub–base in maximum 300 mm (1’-0”) lifts to depths indicated on the design drawings and compact to 95% Modified Proctor Maximum Dry Density.

.4 Place granular base in maximum 150 mm (6”) lifts to depths indicated on the design drawings. Compact to 95% Modified Proctor Maximum Dry Density.

.5 Place all backfill in uniform 300 mm (1’-0”) compacted lifts, mechanically compact each lift to 95% Modified Proctor Density.

.6 Place base and sub-base materials using methods that do not lead to segregation or degradation of aggregate.

.7 Place material to full width in uniform lifts. Shape each lift to smooth contour and compact to specified density before succeeding lift is placed.

.8 Shape and compact alternately to obtain smooth, even and uniformly compacted base.

.9 Apply water as necessary during compaction to obtain specified density. If material is excessively moist aerate by scarifying with suitable equipment until moisture content is suitable for compaction.

.10 Mechanical compaction equipment must be used with extreme caution to prevent any undue pressure on foundation work. Do not use motorized compaction equipment directly adjacent to foundations or retaining walls.

.11 Where backfill is required on both sides of foundation walls it must be placed and compacted simultaneously on both sides of the wall.

.12 Undisturbed or disturbed sub-grade must be compacted to 95% Modified Proctor Density. Soft spots must be cut out to such depths as necessary to obtain the specified compaction density.

3.3 Grading

.1 Grade site to final sub grade for depth of granular base or finish materials as noted on the design drawings.

.2 Provide uniform slopes between designed elevations.

.3 Gently round changes in slope to ensure smooth even transitions.

.4 Grade to ensure finished surface of base has no irregularities. Correct all surface irregularities by loosening and adding or removing material until surface is smooth and even.

3.4 Clean Up

.1 Promptly, as the work proceeds and on Completion, clean up and remove from the site any debris and waste material or rubbish resulting from the work of this section.

.2 Transport all surplus excavated materials and debris to appropriate dumping sites or disposal areas. Excavated materials or debris must not be left on the site or on adjoining property."

END OF SECTION 31 23 00 – EXCAVATION AND BACKFILL UNDER LANDSCAPE AREAS

MMCD SECTION 31 23 01 – EXCAVATING, TRENCHING AND BACKFILLING – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 23 01 – EXCAVATING, TRENCHING AND BACKFILLING

MMCD SECTION 31 23 17 – ROCK REMOVAL – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 23 17 – ROCK REMOVAL

MMCD SECTION 31 23 23 – CONTROLLED DENSITY FILL – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 23 23 – CONTROLLED DENSITY FILL

MMCD SECTION 31 24 13 – ROADWAY EXCAVATION, EMBANKEMENT AND COMPACTION – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 General – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Excavation – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Inspection of Native Surface – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 Placing – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 Compaction – is amended by:

Adding the following in numerical order:

“

.7 Compaction must be performed and tested in lifts no larger than 200 mm in lose thickness. Thicker lifts may be permitted, only if demonstrated to the Authorized Person beforehand that the desired compaction results can be achieved. Compaction test results must be submitted to the Authorized Person.”

3.6 Finished Tolerances – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 Proof Rolling – is amended by:

Adding the following in numerical order:

“

.6 A 24-hour notice to the District is required prior to any proof rolling or Benkelman Beam testing. The Consulting Engineer must be present during proof rolling and Benkelman Beam testing.

.7 All roadways must be Benkelman beam tested prior to placement of subbase and base gravels.

.8 Benkelman beam tests must be conducted at minimum 20 m intervals along each lane, with staggered tests on adjacent lanes, and on utility trenches. Conduct tests at the following offsets for travel lanes:

a) two-lane roadways: 1.8 m from curb face.

b) 4-lane roadways: 1.8 m and 5.5 m from outside curb face.

.9 Where Benkelman beam tests reveal unsuitable subgrade or trench backfill material, remove unsuitable materials to depth and extent as directed by the Authorized Person and replace with new materials in accordance with Section 31 23 01 – Excavating, Trenching and Backfilling and this Section (where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, it will be at no extra cost to the District)."

3.8 Place Topsoil – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 Maintenance – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 31 24 13 – ROADWAY EXCAVATION, EMBANKEMENT AND COMPACTION

MMCD SECTION 31 32 19 – GEOSYNTHETICS – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 23 19 – GEOSYNTHETICS

MMCD SECTION 31 36 13 – GABIONS – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 36 13 – GABIONS

MMCD SECTION 31 37 10 – RIPRAP – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 31 37 10 – RIPRAP

MMCD SECTION 32 01 11 – Pavement Surface Cleaning and Removal of Pavement Markings – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 01 11 – Pavement Surface Cleaning and Removal of Pavement Markings

MMCD SECTION 32 01 16.7 – Cold Milling – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 01 16.7 – Cold Milling

MMCD SECTION 32 01 16.8 – Full Depth Reclamation – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 01 16.8 – Full Depth Reclamation

MMCD SECTION 32 01 17.6 – Sealing Pavement Cracks for Maintenance Purposes – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 01 17.6 – Sealing Pavement Cracks for Maintenance Purposes

MMCD SECTION 32 01 17.7 – Pavement Crack Sealing and Filling Prior to Overlay – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 01 17.7 – Pavement Crack SEALING AND FILLING PRIOR TO OVERLAY

The following section is added:

"SECTION 32 05 33 – ESTABLISHMENT MAINTENANCE SERVICES (LANDSCAPING) – new section

1.0 GENERAL

.1 This section specifies requirements for the landscape maintenance during the post-construction maintenance period. The intent of establishment services is to provide sufficient care to newly installed plant material to ensure or increase the long-term success of the planting. The objective is the adaptation of plants to a new site in order to obtain the desired effect from the planting while reducing the rate of failure and unnecessary work associated with improper establishment. This section applies to all plant material including new trees, shrubs and groundcovers, herbaceous plants and sodded and seeded grasses.

.2 This section describes establishment services requirements for the Warranty Period. Any plant failures during this period will extend the specific Warranty Period for an additional one year.

1.1 Related Work

.1	Tree, Shrub & Groundcover Planting	32 93 01
.2	Growing Medium Preparation and Placement	32 91 21
.3	Hydraulic Seeding	32 92 19
.4	Sodding	32 92 23

1.2 References

.1 ANSI A300 Standards for Tree, Shrub, and Woody Plant Maintenance, latest edition, as amended from time to time.

.2 British Columbia Landscape Standard, latest edition, as amended from time to time.

.3 Plant Health Care for Woody Ornamentals, International Society of Arboriculture, latest edition, as amended from time to time.

.4 Canadian Standard for Nursery Stock, latest edition, as amended from time to time.

.5 Canadian Fertilizer Code.

.6 Federal, Provincial and Municipal laws, bylaws and regulations: all work must be performed in accordance with regulations of any and all authorities having jurisdiction, which may restrict or prohibit certain activities such as pesticide or herbicide applications.

Table 32 05 33 (a) – Jurisdictions

Jurisdiction	Regulation/Bylaw	Relevance
Federal	*Plant Protection Act* S.C. 1990, c.22	Identifies a list of plants that are considered Pests in Canada. Regulates the distribution of these species.
	Seeds Act, R.S.C. 1985, c. S-8	Regulates the distribution of the seeds of species that are designated as Prohibited Noxious Weeds.
	Pest Control Products Act	Regulates pesticide registration and re-evaluation; human health and safety; environmental impact; and, compliance and enforcement through Health Canada (PMRA)
Provincial	*Integrated Pest Management Act*	The IPMA provides detailed requirements related to specific types of pesticide use, revolving around licences, permits or pesticide use confirmations which must be obtained before pesticides can be used, and associated public notices and consultations.
	Weed Control Act [RSBC 1996] CHAPTER 487	Identifies plants that are classified as noxious weed species in BC. Places a duty on all land owners to control these species. This does not apply to federal lands.

1.3 Delivery, Storage and Handling

.1 Deliver and store fertilizer, seed and chemicals in waterproof containers showing contents, mass, analysis, date manufactured and the name of the manufacturer.

1.4 Damage to Property

.1 The Developer must repair and pay for damages caused by the Developer's personnel and equipment.

.2 The Developer must report damages immediately to the Authorized Person.

.3 The Developer must immediately return any damaged areas, including grass and sod areas, plant materials, equipment and any other public property to their original condition prior to damage. Scalping of turf and mechanical damage to trees, including tearing of bark, will be considered as damage.

1.5 Maintenance Log

.1 Keep daily maintenance log throughout and including during the Warranty Period.

.2 Include in log: detail activities, areas in which activities were carried out, and approximate time for start-up and CLandsompletion of each log.

.3 Maintenance logs must be submitted monthly during maintenance season.

.4 Establishment maintenance must be carried out year-round and at times and seasons appropriate to each specific task.

1.6 Field Reviews

.1 During the establishment period, the Consulting Engineer must perform monthly field inspections. Deficiency and action items must be communicated in a timely manner to the Authorized Person.

.2 The Developer must correct all deficiencies during the next reporting period. Actions taken must appear in the maintenance log as additional items.

.3 In addition to the above inspections, there must be a minimum of three (3) field reviews during each growing season (April 1st to October 15th), attended by the Developer's Contractor and the Authorized Person.

1.7 Failure to Perform Services

.1 If establishment services are not performed according to this Specification, the District reserves the right, after seven (7) days written notice to the Developer to proceed with the required services and recover the costs from the Developer.

2.0 PRODUCTS

2.1 General

.1 Products and materials, including plant material, growing medium, mulch etc. must be as specified in other sections of this Bylaw.

2.2 Fertilizers and Chemical Control

.1 Use of "weed and feed" products or fertilizers containing phosphates is not permitted under the District's Pesticide Use Control Bylaw.

.2 Apply nutrients and soil amendments as required and as indicated by plant condition, or as determined by soils analysis.

2.3 Pest and Disease Control

.1 Only as specifically reviewed and approved by the District's arborist and in accordance with regulations of all authorities having jurisdiction.

.2 The Developer must provide the District with at least seven (7) days advance notification of intent, methodology and procedures for weed and insect control.

3.0 EXECUTION

3.1 General

.1 Perform each operation continuously and complete all work within a reasonable time period.

.2 Perform all maintenance, including keeping all areas neat, clean, and in healthy growing condition.

.3 Collect and dispose of excess material and debris at an approved disposal facility weekly, or recycle as appropriate.

.4 Report vandalism or other third party damage immediately to the Authorized Person.

.5 Maintain and submit a maintenance log for each project showing maintenance activities performed and date of activities. Submit maintenance log monthly, as well as with each invoice.

.6 Establishment Maintenance Services operations must be carried out year-round.

3.2 Spring Clean-Up

.1 Lawns:

.1 Complete spring cleanup as soon as working conditions are favourable, or by May 1.

.2 Collect and dispose of sand, gravel, salt and debris accumulated during winter months, to an approved disposal facility.

.3 Cut sod areas to 25 mm height.

.4 Rake lawn and remove dead vegetation, leaves and debris. Do heavy raking with flexible grass rake on area with "snow mold".

.5 Aerate lawn areas as described in this section.

.2 Planting beds:

.1 Clean shrub and planting areas of debris and dead plant material. Loosen and cultivate growing medium lightly without disturbing roots below surface.

.2 Trim grass edges around planting beds neatly in lines as in original layout.

.3 Clean paved areas adjacent to planting beds by brushing and hosing paved areas. Remove sand, gravel and growing medium. Perform this work in early spring, as soon as working conditions are favorable.

.4 Clean out lawn basins and area drains from accumulated silt and debris.

.5 Cut back all perennials to 50 mm (2”) high before new growth begins.

3.3 Plant Repair and Replacements

.1 Re-sodding:

.1 Re-sod areas where turf has been damaged.

.2 Remove existing dead sod, weeds and debris from area to be re-sodded. Loosen top layer by disking or rototilling. Prepare a smooth, loose surface for laying sod.

.3 Apply fertilizer at a rate recommended by the growing medium test. Rake into top 100 mm (4") layer of the growing medium.

.4 Place sod with sections closely butted, without overlapping of gaps, smooth and even with adjoining areas. Stagger sod joints when sodding large areas. Roll lightly and tamp.

.5 Apply water to obtain moisture penetration of 75 mm (3"). Continue watering at intervals to maintain sufficient growth.

.2 Top-dressing and re-seeding:

.1 Top-dressing and reseeding must be performed during the seasons of spring (April 1st to June 15th) and fall (August 15th to September 30th). Seeding must not take place during freezing or abnormally hot or dry weather.

.2 Mow areas to receive top-dressing to height of 38 mm (1-1/2”).

.3 Growing medium to be spread to thickness 6 mm (1/4”) to 12 mm (1/2”) filling in low areas and bare spots. Growing medium for top dressing must consist of mixture, at a 1:1 ratio, of growing medium and sand, as specified in other specification sections.

.4 Over-seed with seed mixture. Seed at rate of 1 Kg/10m^2 (3lbs per 100 sqft). Seed mix to match varieties in existing lawn.

.5 Apply water to obtain moisture penetration of 75 mm (3"). Continue watering at intervals to maintain sufficient growth

.6 Re-seeded areas to be mowed when grass reaches a height of 38 mm (11/2”).

.3 Planting:

.1 Remove and replace dead, diseased or damaged plant material (trees, shrubs, groundcovers and perennials) on a yearly basis.

.2 All replacement plant material to be of the same species and of the same size and/or caliper as originally specified on the design drawings.

.3 Plant substitutions must be approved by the Authorized Person prior to planting. Provide a list of plant substitutions seven (7) days prior to ordering, for District’s review.

3.4 Aerating Lawn Areas

.1 Lawn aeration must take place in early spring when growing medium is sufficiently dry to allow breaking up of growing medium particles.

.2 Clean lawn areas to be aerated and mow grass to height of 50 mm (2").

.3 Aerate lawns using aerating equipment which extracts and deposits at location of extraction earth plugs a minimum of 50 mm (2") deep and spaced a maximum of 125 mm (5") on centres.

.4 Drag heavy mat over grass or rake to break up plugs and spread resulting growing medium evenly through grass.

3.5 Mowing Lawn Areas

.1 Commence lawn mowing April 15th (as weather permits) and continue until October 15th. Operation must be continuous and completed within reasonable period.

.2 Remove all refuse and debris from lawn area prior to mowing.

.3 Mowing height: maintain grass height of 38 mm-65 mm (1/12”-21/2”) throughout the mowing season.

.4 Mowing frequency: all lawn areas are to be mowed at not less frequently than seven (7) day intervals.

.5 Rotary type mowers to be in good working order, with sharp cutting blades.

.6 Remove grass clippings from lawn after mowing. Hand trim or use edger for grass adjacent to structures, pavement, trees or fences. Trim grass edges around planting beds neatly to lines established in original layout. Carry out trimming operation in conjunction with each mowing operation.

.7 Do not damage shrubs or trees during trimming or cutting operations. All damaged plant material to be replaced by the Developer.

3.6 Fertilizing

.1 Lawn areas:

.1 Apply fertilizer three times per year: Spring (March 15-April 15), early summer (in June) and late summer (late August-September 15).

.2 Use mechanical spreading equipment. Apply at a rate recommended by soil testing agency. Check calibration to ensure specified rate is spread evenly.

.3 Rectify uneven spreading as soon as it becomes apparent. Spread additional fertilizer over areas affected or rake out excess application.

.2 Planting beds:

.1 Apply fertilizer in April at the rate recommended by a soil testing laboratory.

.2 Fertilizer Application - Trees: Auger 25 mm (1”) diameter by 300 mm (12") to 375 mm (15") deep holes, starting at drip line of branches and working towards the tree trunk. Auger holes to come within 300 mm (12") of trunk. Auger holes to be at one (1) foot on centre. Divide fertilizer equally among all holes and water in well. Top dress hole with growing medium.

.3 Fertilizer Application - Shrubs: Apply fertilizer as per manufacturer’s recommendations to all shrub beds.

3.7 Watering and Irrigation

.1 During the first growing season, new plants must be watered at a maximum interval of every ten (10) days between April 1st and July 31st, and every twenty (20) days between August 1st and September 15th.

.2 During the second growing season, new plants must be watered at a maximum interval of every twenty (20) days between April 1st and July 31st and once between August 1st and September 15th.

.3 Soil moisture must be monitored during the growing season and watering must be done more frequently when plants are reaching the permanent

wilting point. Scheduled applications of water may be missed only when rainfall has penetrated the soil fully as required.

.4 Apply sufficient water to ensure continuous, healthy growth of all plant materials, with sufficient time between water applications to promote deep root growth. Apply water in soft spray to avoid compacting or erosion of soil. Do not impede use of sidewalks and other paved areas.

.5 Areas with automatic irrigation system:

.1 Operate system per manufacturer's manuals. Irrigation systems in the vicinity of pedestrian areas must not be operated during hours of high volume of pedestrian traffic.

.2 Inspect irrigation system on a weekly basis to ensure optimum performance and complete head to head coverage.

.3 Make adjustments and repairs as necessary, including supply and installation of new heads due to damage or vandalism, on a timely basis to ensure uninterrupted and optimal operation of irrigation system.

.4 Carry out winter blow out and drain down of complete system to prevent damage due to winter freezing prior to first heavy frost in fall.

.6 Areas with no underground irrigation systems: supply labour, hoses and sprinkler equipment necessary to provide adequate watering.

3.8 Mulching

.1 Mulching must be performed during the month of May. Prior to topping up and adding additional mulch ensure litter and debris has been removed from all planting beds

.2 Mulches must be maintained in the original areas and to the original depths.

.3 Mulch products must conform to Specification 32 90 00 - Tree, Shrub & Groundcover Planting.

3.9 Cultivating Shrub Areas

.1 Prior to cultivating shrub areas, collect and dispose of all litter, debris and dead plant material, such as branches, leaves, flowers and seed pods.

.2 Cultivate shrub beds as required to keep top layer of growing medium, loose, friable and free from weeds. Cultivating operation must be continuous without interruption.

.3 Take care not to damage roots of shrubs or flowers. Use small hand tools for flower borders and areas of closely planted shrubs.

3.10 Staking and Guying

.1 Maintain all stakes, guy wires and ties for duration of the maintenance period.

.2 Ties must be checked at least every four months to ensure that they are not causing a depression in the bark and must be loosened, repaired or replaced as necessary.

.3 All stakes, guy wires and ties must be removed after the second growing season except where large trees require continuing support.

3.11 Pruning

.1 All trees and shrubs must be inspected at least every two months during the growing season and must be pruned to remove all dead, weak or diseased wood.

.2 Pruning must be scheduled and carried out during times of year that are optimal for each plant species.

.3 All pruning tasks must be performed by experienced personnel, under the direct supervision of an ISA Certified Arborist.

.4 Prune all plant material in accordance with ANSI A300 Standards, current edition, as amended or replaced.

3.12 Winter Preparation

.1 Rake and remove leaves after leaf fall.

.2 Ensure all catch basins, swales and ditches are clear and draining freely.

.3 Deep-water trees and shrubs between October 15 and 31 and as required during warm periods between November 1 and February 1 to prevent desiccation of plant materials.

.4 Conduct autumn blow out, winterizing and start-up procedures of the irrigation system in accordance with manufacturer’s specifications and maintenance manual.

.5 Cut “Low Maintenance” seeded areas to height of 150 mm.

3.13 Weed and Invasive Plant Control

.1 Definitions:

.1 Weeds: A weed is defined as any plant growing where it is not wanted or intended. This definition includes unwanted plants in planting beds, unplanted areas and paving, as well as invasive weeds which are rapidly spreading non-native plants. This definition also includes grass varieties that detract from the desired appearance or function of sodded or hydro seeded areas.

.2 Noxious weeds: noxious weeds are only those plants listed in the BC *Weed Control Act*. Noxious Weeds in the District include Knotweed (Fallopian) species, Giant Hogweed, Purple Loosestrife and Yellow Flag-iris.

.3 Invasive plants: invasive plants are listed in the District's Invasive Plant Management Strategy and defined as "those [plants] that occur outside of their natural range and have significant ecological, social and/or economic impacts once established.

.2 During the growing season, all planted areas must have all weeds (roots and rhizomes included) removed and disposed of a minimum of once per month or as necessary to maintain the specified weed control standard for planted areas. Weeds must be removed by hand pulling or digging. Herbicides may be used if they are included in Schedule 2 of the BC Integrated Pest Management Regulation. All other herbicide may only be used if the user has applied for and obtained a Pesticide Use Permit according to the District's Pesticide Use Control Bylaw. Cultivation and hoeing must not be used to control weeds, as these practices disturb mulch layer and soil structure, and do not adequately control weeds.

.3 Weed control consists of: killing weeds; removing and properly disposing of weeds; encouraging the growth of desired plants that can compete with weeds; reducing the growth rate of weeds; preventing or reducing the entrance of weeds into the area; and preventing or reducing the spread of weeds by roots, seeds or runners within the area and into other areas.

.4 Weed control operations must be scheduled and carried out such that the spread of weeds by seed, roots, runners, etc. is minimized.

.5 Weed control operations must be carried out in accordance to the following Weed Control Standards table. Maintenance level for each planted area within the scope of work will be determined by the Authorized Person.

Table 32 05 33 (a) – Weed Control Standards

Maintenance Level	Standard
1. Well-groomed	No weeds permitted to grow larger than 25 mm (1") in width or height; remove all weeds when observed. The ability to perform weed control (both mechanical and chemical) must be present during each visit.

Table 32 05 33 (a) – Weed Control Standards	
Maintenance Level	**Standard**
2. Groomed	No weeds are permitted to grow larger than 50 mm (2”) in width or height. Kill or remove all apparent weeds when observed or at next regular visit (within two weeks). The ability to perform weed control (both mechanical and chemical) must be present during every second visit.
3. Moderate	Weeding must be done when isolated small weed patches have a width or height of 150 mm (6”). Weeding (mechanical or chemical) must kill or remove 90% of weeds or the process must be repeated within the next two site visits. NOTE: “isolated” means a weed distribution no greater than two patches per 5 m2.
4. Open Space/Play	Weeding must be done when isolated weedy patches have a width or height of 300 mm (12”). Weeding (mechanical or chemical) must kill or remove 80% of weeds or the process must be repeated within one month. NOTE: “isolated” means a weed distribution no greater than four patches per 5 m2 (54 square feet).
5. Background and 6. Service and Industrial	No limitations on weeds, except that spread of weeds (especially noxious weeds) to adjacent areas must be prevented. Control height and spread to prevent interference with activities. If better appearance is desired upgrade to Level 4.

.6 Noxious Weeds and Invasive Plant Control: The description of these plants, including their control and management, is included in the District’s Invasive Plant Management Strategy. These species are of particular concern and are to be removed immediately. Removal is not limited to these species. Consult with the District about obtaining a Pesticide Permit to remove noxious weeds such as knotweed species and giant hogweed. All other invasive plants must be removed by physical, cultural and/or biological methods.

3.14 Insect and Disease Control

.1 All planted areas must be inspected for pests and diseases periodically and at least every two months during the growing season. Treatment for pests or diseases must be carried out promptly and consistently for maximum effectiveness. The principles of Integrated Pest Management (IPM) must be applied in controlling pests and diseases, that is, methods used should be a combination of physical, cultural and/or biological methods chosen for the most effective, safe and economical control of pests and diseases. A Pest Management Plan must be approved by the Authorized Person prior to implementation.

.2 Under the Pesticide Use Control Bylaw there are no insect pests for which a Pesticide Permit will be issued. Consult the BC Integrated Pest Management Regulation for those products which may be used.

.3 Confirm proper, positive identification of infestations and consult with the Developer before taking corrective action. Strictly adhere to manufacturer's specifications if chemical applications are being utilized.

.4 Determine susceptibility of plant species to chemical damage prior to any chemical application.

.5 Perform treatments with due regard for climactic conditions, the public, and the surroundings.

3.15 Litter Removal

.1 All non-vegetative litter and refuse within the maintenance area must be collected and disposed of. General litter removal must be a routine part of maintenance.

.2 Vegetative litter (e.g. fallen leaves, twigs, trimmings) must be removed from planted areas only in a scheduled procedure before it rots or accumulates sufficiently to detract from the use or appearance of the area or damages the landscape.

.3 Vegetative litter should be composted for re-use on site or off site where possible, or disposed of in an appropriate manner."

END OF SECTION 32 05 33 – ESTABLISHMENT MAINTENANCE SERVICES (LANDSCAPING)

MMCD SECTION 32 11 16.1 – Granular Subbase – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 11 16.1 – Granular Subbase

MMCD SECTION 32 11 23 – Granular Base – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 11 23 – Granular Base

MMCD SECTION 32 12 13.1 – Asphalt Tack Coat – is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Application – is amended by:

Adding the following in numerical order:

“

.13 Tack coat must be applied to all cold joints and overlays that have reached a temperature lower than 100 degrees Celsius.”

END OF MMCD SECTION 32 12 13.1 – Asphalt Tack Coat

MMCD SECTION 32 12 13.2 – Asphalt Prime – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 12 13.2 – Asphalt Prime

MMCD SECTION 32 12 16 – HOT-MIX ASPHALT CONCRETE PAVING – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Material Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Measurement and Payment – is amended by

Adding the following:

"

1.5.9 The Consulting Engineer must provide both theoretical and actual tonnage calculations and the resulting amounts for all proposed paving. The theoretical tonnage shall be submitted to the Authorized Person no later than 72 hours prior to paving."

1.6 Inspection and Testing – is amended by

Adding the following in numerical order:

"

1.6.3 Asphalt mix sampling will be required at a minimum frequency of one per pave and/or every 500 tonne, whichever generates a greater number of sampling.

1.6.4 Meeting asphalt compaction requirements will be through utilizing nuclear density gauge, and compaction testing will be conducted randomly at a minimum frequency of one per every 150m² area or minimum of 10 randomly selected shots, whichever produces a higher frequency of testing."

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 Plant and Mixing Requirements – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Equipment – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Preparation – is amended by:

Adding the following in numerical order:

“

.7 All roadways will be Benkelman beam tested prior to placement of asphaltic concrete pavement.

.8 Conduct Benkelman beam tests at locations and offsets specified in Supplemental Specifications Section 31 24 13, Roadway Excavation, Embankment and Compaction.

.9 Where Benkelman beam tests reveal deficient pavement structure, remove unsuitable materials to depth and extent as directed by the Authorized Person and replace with new materials in accordance with Section 32 11 23 – Granular Base, Section 32 11 16.1 – Granular Subbase, and this Section (where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, it will be at no extra cost to the District).”

3.4 Transportation of Mix – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 Placing – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 Compaction – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 Joints – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 Pavement Patching – is amended by**.**

Adding the following in numerical order:

“

3.8.3 Utility cut must be permanently restored as follows:

Rebuild the entire aggregate pavement structure within the cut in accordance with District standards for the road design.

Thickness of repairing asphalt pavement must match the adjacent pavement structure or the specifications for the road designation, whichever is greater.

3.8.4 Asphalt trench repairs must conform to this Bylaw. Tack coat will be required at all cold joints – with cold joints being defined as the interface between existing asphalt and newly placed asphalt mix, as well as any newly placed asphalt that is left to cool below 100 degrees Celsius. These repairs will consist of:

a. A single mix of LC#1 with a minimum lift thickness of 40 mm and a maximum lift thickness of 80 mm. The asphalt repair material must be uniformly spread and thoroughly compacted to a minimum of 40 mm lift thickness. The grade and camber of the repairs must be smooth and true. Lift thicknesses within this range will be dictated by the means used to achieve no less than 97% Marshall Density. Nuclear density gauge testing will be required on each lift of asphalt, and all test results must be submitted to the Authorized Person.

b. Longitudinal cuts must be repaired at the surface such that the final longitudinal asphalt joint is not in line with the traffic wheel path (i.e., final longitudinal joints must be at lane lines, or in the center of the lane).

c. Efforts must be made to provide the best possible seamless joints by raking of finer materials to fill in all the gaps directly adjacent to the joints.

d. A non-flush grade between existing and cut repair surfaces is not acceptable.

3.8.5 Acceptance of the trench repair will be predicated on test results, workmanship, materials, and ride quality.

3.8.6 All existing curb, gutter and sidewalk that are undermined, and / or damaged, must be removed and replaced - at a minimum 2.0 meters for the curb and gutter, and one panel for the sidewalk. Backfilling of undermined sections and surface treatments, including curb, gutter and sidewalk, is not allowed."

3.9 Sidewalks, Driveways and Curbs – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 Finished Tolerances – not amended, refer to MMCD Master Municipal Specifications (2009).

3.11 Defective Work – is amended by:

Adding the following in numerical order:

"

3.11.3 Repair all peripheral damage to the road which has been caused by the trench and utility cut activities. This includes overcuts and damage to the surrounding paving structure which has caused that structure to crack or deteriorate or become unstable. In such cases, the Contractor is responsible for, and must ensure that the entire damaged area of pavement, plus the standard minimum 200 mm cutback, is repaired to the District's requirements."

3.12 Clean-Up – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 32 12 16 – HOT-MIX ASPHALT CONCRETE PAVING

MMCD SECTION 32 12 17 – SUPERPAVE HOT MIX ASPHALT CONCRETE PAVING – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 Plant and Mixing Requirements – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Equipment – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Preparation – is amended by:

Adding the following in numerical order:

"

.7 All roadways must be Benkelman beam tested prior to placement of asphaltic concrete pavement.

.8 Conduct Benkelman beam tests at locations and offsets specified in Supplemental Specifications Section 31 24 13, Roadway Excavation, Embankment and Compaction.

.9 Where Benkelman beam tests reveal deficient pavement structure, remove unsuitable materials to depth and extent as directed by the Authorized Person and replace with new materials in accordance with Section 32 11 23 – Granular Base, Section 32 11 16.1 – Granular Subbase, and this Section (where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, it will be at no extra cost to the District)."

3.4 **Transportation of Mix** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 **Placing** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 **Compaction** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 **Joints** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 **Pavement Patching** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 **Sidewalks, Driveways and Curbs** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 **Finished Tolerances** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.11 **Defective Work** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.12 **Clean-Up** – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 32 12 17 – Superpave Mot-Mix Asphalt Concrete Paving

MMCD SECTION 32 12 33 – Surface Treatments – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 12 33

MMCD SECTION 32 13 13 – Portland Cement Concrete Pavement – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 13 13 – SUPERPAVE HOT MIX ASPHALT CONCRETE PAVING

MMCD SECTION 32 13 16.1 – Roller Compacted Concrete Paving – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 13 16.1 – Roller Compacted Concrete Paving

MMCD SECTION 32 14 01 – Unit Paving – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 14 01 – Unit Paving

The following section is added:

"SECTION 32 14 01.1 – PRE-CAST CONCRETE UNIT PAVING – new section

1.0 GENERAL

.1 The Section 32 14 01.1 refers to those portions of the work that are unique to the supply and installation of unit paving without mortar joints. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

.2 The work includes the supply and installation of concrete unit pavers as indicated on the design drawings and as specified herein, including but not limited to:

.1 Crushed Granular Sub-Base and Base Courses

.2 Setting Bed

.3 Concrete Unit Pavers

.4 Jointing Sand

1.1 Related Work

.1	Roadway Excavation, Embankment and Compaction	Section 31 24 13
.2	Aggregates and Granular Materials	Section 31 05 17
.3	Granular Base	Section 32 11 23
.4	Granular Subbase	Section 32 11 16.1
.5	Concrete Walks, Curbs and Gutters	Section 03 30 20
.6	Cast-in-Place Concrete	Section 03 30 53
.7	Excavation and Backfill under Landscape	Section 32 23 00
.8	Unit Paving	Section 32 14 01

1.2 References

.1 Interlocking Concrete Pavement Institute (ICPI): Structural Design of Interlocking Concrete Pavement for Municipal Streets and Roadways (ASCE/T&DI/ICPI 58-10, 2010)

.2 CSA A231.1-06/A231.2-06, Precast Concrete Pavers

.3 CSA A23.2A, Sieve Analysis of Fine and Coarse Aggregates

.4 CSA A82.56-(M1976) Aggregate for Masonry Mortar

.5 CSA A23.1-FA1, Concrete Materials and Methods of Concrete Construction

.6 ASTM C902-(84) Specification for Pedestrian and Light Traffic Paving Brick

.7 ASTM C136, Method for Sieve Analysis of fine and Coarse Aggregates

.8 ASTM C117, Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing

.9 ASTM E11-(87) Specification for Wire Cloth Sieves for Testing Purposes

.10 ASTM D698 - (78) Test Methods for Moisture-Density Relations of Soils and Soil - Aggregates Mixtures, Using 5.5 lb (2.49 kg) Rammer and 12 inch (304.8 mm) Drop

.11 CAN/CGSB - 8.2 (M88) Sieves, Testing, Woven Wire, Metric

1.3 Measurement and Payment

Payment for excavation, embankment fill (subgrade fill) and subgrade preparation must be made under payment items in Section 31 24 13 – Roadway Excavation, Embankment, and Compaction.

Payment for granular subbase (if required) and granular base must be made under payment items in Section 32 11 16.1 – Granular Subbase and Section 32 11 23 – Granular Base respectively.

Payment for unit paving includes edge restraints, granular laying course and various unit pavers to provide the patterns given on the design drawings.

1.4 Site Conditions

.1 Report in writing to the Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

.3 Commencement of work implies acceptance of surfaces and conditions and no claim for damages or resulting extra work will be accepted except where such conditions cannot be determined prior to construction.

.4 Do not install paving in excessively wet or freezing conditions.

1.5 Submittals

.1 Submit sample of each unit paver type for Authorized Person’s approval prior to start of installation.

.2 Submit to the Authorized Person, product and test data of each unit paver type which notes compliance with CSA A231.1-06/A231.2-06, Precast Concrete Pavers.

.3 Submit to the Authorized Person sieve analysis, density and moisture content test results for sub-grade, sub-base and base aggregate material and bedding and jointing sand, as per section 1.7 Testing.

.4 Submit for the Authorized Person's review 2m X 2m paved area samples illustrating joint sizes, lines, laying patterns, colours and textures, for all types of concrete unit pavers shown on the landscape drawings. The mock-ups will form the standard for all subsequent concrete unit paving work.

.5 Submit to the Authorized Person the paving installer's ICPI credentials.

1.6 Inspections and Testing

.1 All testing specified herein must be provided by the Developer at the Developer's cost, including any additional tests or inspection requirements resulting from, or in compliance with, geotechnical reports and recommendations.

.2 All testing and inspections must be in accordance with MMCD General Condition 4.12, Tests and Inspections.

.3 Test results must be submitted to the Authorized Person for review and approval. No subsequent work may take place until finished work has been reviewed and approved by the Authorized Person.

.4 All required testing must be completed by a Canadian Standards Association (CSA) and/or Canadian Council of Independent Laboratories (CCIL) certified facility. Technicians must be certified to carry out the particular testing procedures described herein.

.5 Aggregates and Granular Materials:

.1 A sieve analysis and a modified proctor density test for each type of material being delivered from each source of supplier must be submitted a minimum of one (1) week prior to delivery of the material to site.

.2 The testing must have been completed by a certified independent facility no more than three (3) months prior to the date of delivery of the material on site.

.3 The testing of undisturbed sub-grade, sub-base, base and bedding materials for roadways, pathways and sidewalks must be as follows:

Table 32 14 01.1 (a) – Material Analysis	
Sieve Analysis of Aggregates (ASTM C-117 and C-136)	One (1) test per 1000 m3 of material delivered and each change in source or supplier
Modified Proctor Density	One (1) test per 100m3 of material delivered and each change in source or supplier
Field Density – Nuclear Method	Sub-grade: One (1) test per 20 m, per 500 mm depth. Test locations to be staggered across the width of the lane. Sub-base and Base Courses: One (1) test per 20m per lift. Test locations to be staggered across the width of the lane. Sidewalks and pathways: One (1) test per 40 m and one test at each driveway. Test locations to be chosen at random across the width of the path.
Moisture content-Nuclear Method	Same as field density tests above.

1.7 Quality Assurance

.1 Installation of the work must be carried out by an installer with at least five (5) years' experience in placing interlocking concrete unit pavers.

.2 The paving installer must be Interlocking Concrete Pavement Institute (ICPI) accredited.

1.8 Delivery, Storage and Handling

.1 The Developer must comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

.2 Concrete unit pavers must be delivered to the site in steel banded, plastic banded, or plastic wrapped palettes capable of transfer by fork lift or clamp lift.

.3 Pavers must be unloaded at the job site in such a manner that no damage occurs to the product.

.4 Products must be protected and kept free from mud, dirt and other foreign materials.

.5 Stockpiled sub-base and base material and jointing sand must be covered with waterproof covering to prevent exposure to rainfall or removal by wind. Ensure covering is secured in place

1.9 Protection of Existing Infrastructure

.1 Prior to commencing any excavation work, the Developer must establish the location of any existing active buried utilities or service lines, including service entry points. These locations must be clearly marked on site to prevent accidental disturbance during the work.

.2 Any utility or service which is presently in use or not established as abandoned, but which is affected by the work, must be referred to the utility or service company concerned, so that they may advise on, coordinate and inspect necessary operations for relocation.

.3 The Contractor must prevent damage to all existing infrastructure and adjacent properties. Any damage resulting from the works described in this section must be made good by the Developer without additional costs to the District.

.4 The Developer must provide access to buildings at all times. The Developer must coordinate paving schedule to minimize interference with normal use of premises.

2.0 PRODUCTS

2.1 Materials

.1 Concrete Unit Pavers must meet the following minimum requirements:

.1 Minimum average compressive strength of 50 MPa (7250 psi) (CAN3 - A231.2 - M85).

.2 Maximum absorption of 5% (ASTM C140).

.3 Resistance of 50 freeze thaw cycles (ASTM C67).

.4 Additional requirements:

.1 Pedestrian areas: 60 mm minimum paver thickness.

.2 Vehicular areas: 80 mm minimum paver thickness, aspect ratio equal or smaller than 3:1, 45° or 90° “Herringbone” pattern.

.5 See landscape drawings for manufacturer, type, shape, size, pattern and colour of pavers.

.6 Concrete constituent materials, physical requirements, permissible variations in dimensions, inspection criteria must be as set out in the manufacturer's specifications and will form part of this section.

.2 Crushed Granular Sub-base Course: As per MMCD Sections 31 05 17 – Aggregates and Granular Materials and 32 11 16.1 - Granular Sub-Base, unless otherwise specified by Geotechnical and Civil Engineer

.3 Crushed Granular Base Course: Must be 19 mm (3/4”) minus crushed granular base course, consisting of sound, durable particle free from clay, organic material or other deleterious matter, evenly graded, conforming to the following gradation requirements:

Sieve Size (mm)	Percent Passing
19	100
12.5	75-100
9.5	60-90
4.75	10-70
2.36	27-55
1.18	16-42
0.60	8-30
0.30	5-20
0.15	5-15
0.074	2-8

.4 Setting Bed: must be sand free of deleterious soluble salts and other contaminants, which may cause efflorescence and comply with ASTM, C33, CAN/CSA A231.1-M9-0. Setting Bed sand must meet the following gradation requirements:

Sieve Size (mm)	Percent Passing
10	100
5	95-100
2.5	80-100
1.25	50-90
0.630	25-65
0.315	10-35
0.160	2-10
0.075	<1

Jointing Sand: Heavy duty polymeric jointing sand such as Techniseal HP2 or approved equal. Install as per Manufacturer's recommendations.

Filter Fabric: Polypropylene fibre nonwoven geotextile, such as Nilex 4551 or approved equal, or as per paver manufacturer's specifications, or as per Geotechnical Engineer's recommendations.

.6 Paver sealer (optional, as per project requirements, for pedestrian areas only): High solids content, gas and oil resistant, acrylic sealer. Apply as per paver manufacturer's specifications.

.7 Edge restraints:

.1 Edge restraints must be installed at all interfaces of paved areas with soft landscape.

.2 See landscape drawings for locations.

.3 Edge restraints must be plastic or metal, specifically fabricated for this purpose, or concrete banding.

.4 Staked wood boards must not be used, except as temporary edge restraint material.

3.0 EXECUTION

3.1 Inspection

.1 Areas of work to receive concrete pavers must be examined by the Consulting Engineer and unsatisfactory conditions reported to the Authorized Person; commencement of work will imply acceptance of conditions.

.2 The subgrade must be well drained. Sub-base and base course acceptance must be subject to testing and examined for uniform surface.

3.2 Subgrade Preparation

.1 The subgrade must be compacted to 98% Modified Proctor Density. Or as specified by Consulting Engineer.

.2 Any soft areas that cannot meet the specified compaction rates must be removed to such depths as necessary and filled with sub-base or base aggregate material.

.3 Do not allow water to accumulate and pond at the bottom of excavated areas. Pump or otherwise continuously remove all water that has accumulated in excavation during the progress of the work. Do not divert water onto adjacent property. Dewatering must be done in accordance with all applicable municipal, provincial and federal laws, bylaws, regulations and standards.

.4 Do not place sub-base or base courses over frozen or excessively wet sub-grade.

3.3 Crushed Granular Sub-base and Base Courses

.1 Place crushed granular sub-base and/or base course over sub–grade in layers which when compacted will yield a final depth as noted on the design drawings.

.2 Place granular sub-base in maximum 300 mm (1’-0”) lifts to depths indicated on the design drawings. Compact each lift to 95% Modified Proctor Density, or as specified by Consulting Engineer.

.3 Place granular base in maximum 150 mm (6”) lifts to depths indicated on the design drawings. Compact each lift to 95% Modified Proctor Density, or as specified by Consulting Engineer.

.4 Prior to installation of subsequent courses, each course must be tested and approved by Consulting Engineer and the Authorized Person.

3.4 Setting Bed

.1 Consulting Engineer must review crushed granular base course prior to the placement of the filter medium layer and the sand bedding course.

.2 Place filter fabric over the crushed granular base prior to placing sand setting bed.

.3 The setting bed must be spread evenly over the area not greater than required to receive concrete pavers in one working day. Setting bed must be screeded to a level that will produce the required maximum thickness as noted on the design drawings when the pavers are placed and vibrated.

.4 Ensure that setting bed is dry (4-8% moisture content), prior to placement of concrete unit pavers.

.5 Once screeded and leveled the setting bed must not be disturbed in any way, and must be protected against accidental pre-compaction and against rain.

.6 Setting bed material must not be used to correct variations in the sub-grade or crushed granular base grades.

3.5 Paver Installation

.1 The concrete unit pavers must be laid to pattern as indicated and detailed in the landscape drawings.

.2 The concrete unit pavers must be laid in such a manner that the desired pattern is maintained. Joints between the units must not exceed the specific paver type manufacturer's specifications. Full units must be laid first. Partial pieces must be fitted subsequently and must be saw cut.

.3 Permanent edge restraints must be installed at all otherwise unrestrained paver edges, as per manufacturer's specifications.

.4 Temporary edge restraints must be provided as required during construction.

.5 Any gaps bigger than 12.5 mm (1/2") at the interface between concrete pavers and the concrete edge restraints must be filled with sawcut edge pieces. Other edge conditions must be filled with pavers that are sawcut to fit. All saw cuts must be straight and even without cracks or chips.

.6 The pavers must be vibrated to their final level by not fewer than three passes of a vibrating plate compactor. The compactor must be a low amplitude unit capable of at least 5,000 lbs (22 KN) at a frequency of 75 to 100 Hhz.

.7 Pavers with irregular or patterned finished surfaces must be compacted using a plate compactor with a rubber or polyurethane pad, or other softening device attached to the bottom of the compactor plate.

.8 After placement of paving units, jointing sand must be brushed over the surface, fully broomed and vibrated into the joints so as to completely fill the joints. Jointing sand must be broomed into the joints after each subsequent pass with the vibrating plate, until joints are completely filled.

.9 All work within 2.0 m of the laying edge must be left fully compacted with sand-filled joints at the end of each day or compacted upon acceptance of the work. Cover the laying edge or any incomplete areas with plastic sheets overnight if not closed with cut and compacted pavers with joint sand to prevent exposed bedding sand from becoming saturated from rainfall.

.10 Upon completion of installation, remove any excess jointing sand from paved surface prior to wetting.

.11 After placement of jointing sand, the finished surface must be gently and thoroughly wetted.

.12 After final compaction, the surface must be true to elevation and must not vary by more than 6 mm tested with a 3.0m straight edge at any location on the surface. Paver surfaces must abut flush with adjacent paving materials.

.13 The finished surface elevation of pavers must be 3-6 mm above adjacent drainage inlets, concrete collars or channels.

.14 Foot or vehicular traffic must be barred from the paver installation area until final adjustments are completed.

3.6 Clean-up

.1 Clean site of all surplus material or equipment associated with work of this section.

.2 Recycle or dispose of off-site at approved disposal location, all surplus material and refuse.

3.7 Acceptance

Before acceptance of finished surface all irregular, cracked or otherwise defective sections to be entirely removed and replaced to satisfaction of Consulting Engineer and the Authorized Person."

3.8 Warranty

.1 Manufacturer's warranty is in addition to and does not limit any other rights the District may have."

END OF SECTION 32 14 01.1 – PRE-CAST CONCRETE UNIT PAVING

The following section is added:

"SECTION 32 14 40 – STONE PAVING – new section

1.0 GENERAL

.1 This section refers to paving stonework as shown on the design drawings and as specified herein. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1 Site Grading (MMCD) Section 31 22 01

.2 Excavation and Backfill-Landscape Areas Section 31 23 00

.3 Cast-in-Place Concrete Paving (MMCD) Section 32 13 13

1.2 Site Conditions

.1 Report in writing to the Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

.3 Commencement of work implies acceptance of surfaces and conditions and no claim for damages or resulting extra work will be accepted except where such conditions cannot be determined prior to construction.

.4 Do not install paving in excessively wet or freezing conditions.

1.3 Samples

.1 Supply samples for the District's review, indicating colour, texture and size range of all stone paving material specified. The ranges supplied must be indicative of the maximum variations to be expected. The samples must be used over the period of construction, to compare colour and texture ranges of installed products. Any material outside of the sample range will be rejected and will require replacement.

1.4 Quality Assurance

.1 Work of this section must be performed by tradesmen fully experienced in this type of work. Written evidence of credentials and experience along with a list of relevant projects must be submitted to the Authorized Person prior to proceeding with the work.

1.5 Delivery, Storage and Handling

.1 Deliver stone paving to the site in steel banded, plastic banded, or plastic wrapped palettes capable of transfer by fork lift or clamp lift. Unload product at the job site in such a manner that no damage occurs to the product.

.2 Materials required for the mixing of the mortar setting bed must be stored in sealed packages in an enclosed area to prevent exposure to moisture, rain or other adverse conditions.

1.6 Inspection

.1 Report in writing to the Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

.3 The subgrade must be well drained. Base course must be examined for adequate compaction and uniform surface.

2.0 PRODUCTS

2.1 Materials

.1 Natural stone paving must be in the pattern, size, thickness, colour and finish specified in the design drawings

.2 Crushed Granular Base Course: Must be 19 mm (3/4”) minus crushed granular base course consisting of sound, durable particle free from clay, organic material or other deleterious matter, evenly graded, conforming to the following gradation requirements:

Sieve Size (mm)	Percent Passing
19	100
12.5	75-100
9.5	60-90
4.75	10-70
2.36	27-55
1.18	16-42
0.60	8-30
0.30	5-20

0.15	5-15
0.074	2-8

.3 Mortar setting bed and joints: Type 10 Portland cement mixed three parts sand to one part water. Sand must be coarse grade concrete sand.

.4 Filter Fabric: Polypropylene fibre non-woven geotextile, such as Nilex 4551 or approved equal.

3.0 EXECUTION

3.1 Subgrade Preparation

.1 The sub-grade must be compacted to 95% Modified Proctor Density.

3.2 Granular Subbase and Base

.1 Place sub-base and/or crushed granular base course material to design grades as shown on the design drawings.

.2 Place sub-base and/or base course in maximum 150 mm (6”) layers and compact to at least 95% Modified Proctor Density (MPD).

.3 Place granular base material to lines, widths, and depths as indicated on the design drawings.

.4 The compaction of both the sub-base and base courses must be tested prior to installation of subsequent courses. Test results must be submitted for review to the Consulting Engineer. Obtain Authorized Person’s approval prior to installing subsequent courses.

3.3 Setting Bed

.1 The Consulting Engineer and the District must review crushed granular base course prior to the placement of the filter medium layer and the bedding course.

.2 Place filter medium over the crushed granular base prior to placing setting bed.

.3 The setting bed must be spread evenly over an area not greater than required to receive stone pavers in one working day. Setting bed must be screeded to a level that will produce the required maximum thickness as noted on the design drawings when the stone pavers are placed.

.4 Once screeded and leveled the setting bed must not be disturbed in any way and must be protected against mechanical disturbance and adverse weather.

.5 Setting bed material must not be used to correct variations in the sub-grade or crushed granular base grades.

.6 Obtain the Consulting Engineer's and the Authorized Person's approval of setting bed course prior to placing the stone paving.

3.4 Stone Paver Installation

.1 The stone pavers must be laid to patterns indicated and detailed in the landscape drawings.

.2 Clean stone pavers to remove dirt and foreign substances from edges and surfaces.

.3 Dry mix mortar by adding 3 parts coarse graded concrete sand to 1 part type 10 Portland Cement. Slowly add water until desired consistency is achieved. Mortar thickness for bedding must be minimum 25 mm (1"), unless otherwise indicated on the design drawings.

.4 Set stone pavers plumb and accurately in position.

.5 Gaps between cut stone pavers and concrete unit pavers must not exceed 5 mm (1/4"). Gaps must be filled with concrete unit paver jointing sand.

.6 After final installation, the surface must be true to elevations indicated in the landscape drawings. Surfaces must abut flush with adjacent materials.

.7 Foot or vehicular traffic must be barred from the paver installation area until final adjustments are completed.

.8 Temporary edge restraints must be provided as required during construction.

3.5 Clean Up

.1 Clean site of all surplus material or equipment.

.2 Recycle or dispose of all surplus material and refuse off-site at approved disposal location.

3.6 Warranty

.1 The Developer must warrant that the stone paving areas, including all areas where vehicular access is expected (including service vehicles and delivery and fire trucks), will remain free of defects (including but not limited to cracking, breaking, separating and rutting).

.2 In addition to the manufacturer's warranty, the Developer's, warranty requirements specified in section 12.1 of Part 1 of this Bylaw remain in place."

END OF SECTION 32 14 40 – STONE PAVING

MMCD SECTION 32 17 23 – Painted Pavement Markings – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 17 23 – Painted Pavement Markings

The following section is added:

"SECTION 32 18 16.13 – POURED-IN-PLACE PLAYGROUND SAFETY SURFACING – new section

1.0 GENERAL

.1 This section specifies the supply, installation and performance requirements for poured-in-place safety playground surfacing system. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1 Playground Equipment Section 11 68 19

1.2 References

.1 CAN/CSA Z614 - Standard for Children's Playspaces and Equipment

.2 ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension

.3 ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

.4 ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine

.5 ASTM D2859 - Standard Test Method for Flammability of Finished Textile Floor Covering Materials

.6 ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion

.7 ASTM E303 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester

.8 ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment

.9 ASTM F1951 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment

1.3 Samples and Submittals

.1 Refer to Section 01 33 00 - Submission Procedures.

.2 Prepare a 2.0m X 2.0m sample in the specified colour(s) for review by the Consulting Engineer prior to installation. Notify the Consulting Engineer 72 hours prior to review date.

.3 Submit to the Authorized Person manufacturer's product and test data sheets and installation instructions and/or specifications.

.4 Submit to the Authorized Person certificate(s) of qualifications of the playground surfacing installer.

.5 Prior to acceptance of a Certificate of Substantial Completion by the Authorized Person, submit to the Authorized Person all warranty documents for both the product and the installation.

1.4 Design Performance Requirements

.1 Performance Requirements: Provide a 2-layer rubber-urethane playground surfacing system which has been designed, manufactured and installed to meet the following criteria:

.1 Shock Attenuation (ASTM F1292):

a. Gmax: Less than 200.

b. Head Injury Criteria: Less than 1000.

.2 Flammability (ASTM D2859): Pass

.3 Flash Point: 343°C-427°C (650°F-800°F)

.4 Thermal Conductivity: K=0.75

.5 Tensile Strength (ASTM D412): 60 psi (413 kPa)

.6 Tear Resistance (ASTM D624): 140%

.7 Abrasion Resistance (ASTM D1044): 0.3812G Loss

.8 Coefficient of Friction (ASTM D2047): 1.0 dry/0.9 wet

.9 Skid Resistance (ASTM E303): 89 dry/57 wet

.10 Water Permeability: 1.7 l/m2/sec (0.4 gal/sq. yd./sec)

.11 Compressive Endurance: no deterioration at 10,000 cycles with 10 ton load

.12 Thermal Stability: -50°C to 100°C (-58°F-212°F)

.13 Freeze/Thaw: no change

.14 Chlorine Resistance: 122 psi immersed in 2.1% sodium hypochlorite solution

.15 Accessibility: Compliance with requirements of ASTM F1951 and CAN/CSA

1.5 Administrative Requirements

.1 The Developer must convene with the Consulting Engineer, the installer and Authorized Person to review and confirm project requirements, foundation, structural, sub-grade and other general site conditions, one (1) week prior to commencement of work.

1.6 Site Conditions

.1 Report in writing to the Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

.3 Commencement of work implies acceptance of surfaces and conditions.

.4 Install surfacing system when minimum ambient temperature is 4°C (40°F) and maximum ambient temperature is 32°C (90°F). Do not install in steady or heavy rain.

1.7 Quality Control

.1 All workmanship and materials within this section must conform to the manufacturer's specification and installation instructions and guarantees.

.2 All playground equipment and installation must comply with all applicable CSA and ASTM standards.

.3 The playground surfacing installer must be trained and approved by the manufacturer of the playground surfacing system, having experience with other projects of the scope and scale of the work described herein.

.4 The playground surfacing installer must be certified by the manufacturer as an approved applicator of the playground surfacing system.

.5 Both the manufacturer and the installer must be certified members in good standing of the International Play Equipment Manufacturers Association (IPEMA) and the Canadian Playground Safety Institute.

1.8 Waste Management and Disposal

.1 Separate and recycle and/or dispose of waste materials in accordance with all applicable local, provincial and federal regulations.

.2 Place waste materials defined as hazardous or toxic in designated containers and dispose of off-site in accordance with all regulations of authorities having jurisdiction.

.3 Ensure chemical containers are sealed and stored safely.

1.9 Delivery, Storage and Handling

.1 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.2 Store materials protected from exposure to harmful environmental conditions and at a minimum temperature of 4°C (40°F) and a maximum temperature of 32°C (90°F).

2.0 PRODUCTS

2.1 Materials

.1 Poured-in-place primer:

.1 Material: Polyurethane

.2 Poured-in-place basemat:

.1 Material: blend of 100% recycled SBR (styrene-butadiene rubber) and urethane

.2 Thickness: thickness of the basemat layer must be determined by the height of the playground components. Refer to playground component Manufacturer's specifications, ASTM F1292 - Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment and CAN/CSA Z614 - Standard for Children's Playspaces and Equipment.

.3 Thickness of the basemat layer may vary around the site, based on type of playground equipment and potential fall height.

.4 Ensure that basemat specified for a specific play structure covers the entire play structure's fall and safety zone.

.3 Poured-in-Place top surface:

.1 Material: Blend of recycled EPDM (ethylene-propylene-diene monomer) rubber and aromatic or aliphatic urethane binder.

.2 Thickness: Nominal 12.7 mm (1/2"), minimum 9.5 mm (3/8"), maximum 15.9 mm (5/8")

.3 Colour: Colours and patterns as specified on the design drawings.

.4 Surface grading: The playground surface must be designed to ensure positive drainage towards drainage structures.

.5 Surface performance requirements: Refer to section 1.5, this specification, for Static Coefficient of Friction and Skid Resistance requirements.

3.0 EXECTUION

3.1 Manufacturer's Instructions

.1 The poured-in-place safety playground surfacing system installation must comply with all instructions, specifications and recommendations of the playground surface manufacturer.

3.2 Examination

.1 Substrate preparation must be in accordance with surface manufacturer's specification. New asphalt must be fully cured - up to 30 days. New concrete must be fully cured - up to 7 days.

.2 The Developer must take all necessary steps to determine that conditions are acceptable to receive installation of primary products.

.3 Proper drainage is critical to the longevity of the Poured-in-Place surfacing system. The Developer must ensure that an adequate number of drainage structures for the play area have been installed.

3.3 Installation

.1 Do not proceed with playground surfacing installation until all applicable site work, including substrate preparation, fencing, playground equipment installation and other relevant work, has been completed.

.2 Allow basemat to cure for sufficient time so that indentations are not left in the basemat from applicator foot traffic or equipment, prior to installing top surfacing.

.3 Allow top surface to cure for a minimum of 48 hours.

.4 Protect surface from foot traffic or any other use that can cause damage during curing period.

.5 At the end of the minimum curing period, verify that the top surface is sufficiently dry and firm to allow foot traffic and use without damage to the surface.

3.4 Clean Up

.1 Clean site of all surplus material or equipment associated with Work of this Section.

.2 Recycle or dispose of all surplus material and refuse off-site at approved disposal location."

3.5 Warranty

.1 Manufacturer's Warranty: Submit to the Authorized Person manufacturer's standard warranty documents executed by authorized company official. Manufacturer's warranty is in addition to and does not limit any other rights the District may have under contract documents.

.2 Proper drainage is critical to the longevity of the Poured-in-Place surfacing system. Inadequate drainage will cause premature breakdown of the poured system in affected areas and void the warranty.

.3 In addition to the manufacturer's warranty, the Developer's warranty requirements specified in section 11.1 of Part 1 of this Bylaw remain in place."

END OF SECTION 32 18 16.13 – POURED-IN-PLACE PLAYGROUND SAFETY SURFACING

MMCD SECTION 32 31 13 – Chain Link Fences and Gates – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 31 13 – Chain Link Fences and Gates

The following section is added:

"SECTION 32 32 19 – CONCRETE MASONRY UNIT RETAINING WALLS – new section

1.0 GENERAL

.1 Work includes furnishing and installing modular concrete block retaining wall units to the lines and grades designated on the design drawings and as specified herein. This section must be referenced to and interpreted simultaneously with all other sections pertinent to the works described herein.

1.1 Related Work

.1	Site Grading (MMCD)	Section 31 22 01
.2	Excavation and Backfill-Landscape Areas	Section 31 23 00

1.2 References

.1 Consulting Engineer's analysis and report.

.2 Unit masonry retaining wall manufacturer's written instructions and/or specifications.

1.3 Delivery, Storage and Handling

.1 Deliver Concrete Masonry Unit (CMU) blocks to the site in steel banded, plastic banded, or plastic wrapped palettes capable of transfer by fork lift or clamp lift. Unload blocks at the job site in such a manner that no damage occurs to the product

.2 The Developer must check the materials upon delivery to assure proper material has been received.

.3 The Developer must prevent excessive mud, wet cement, and like materials from coming in contact with the CMU blocks.

.4 The Developer must protect the materials from damage. Damaged material must not be incorporated in the project.

1.4 Site Conditions

.1 Report in writing to the Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

1.5 Quality Assurance

.1 Work of this section must be performed by tradesmen fully experienced in this type of work. Written evidence of credentials and experience along with a list of relevant projects must be submitted to the Consulting Engineer prior to proceeding with the work.

2.0 PRODUCTS

2.1 Materials

.1 Concrete Masonry Unit (CMU) wall blocks and caps:

.1 CMU wall units and wall caps must be of the make, type, colour and pattern specified as approved by the Authorized Person:

.2 CMU units must have minimum 28-day compressive strength of 20.67 MPA. The concrete units must have adequate freeze-thaw protection with an average absorption rate of 120 kg/m^3 for northern climates and 160 kg/m^3 for southern climates.

.3 Exterior dimensions must be uniform and consistent. Maximum dimensional deviations are 3 mm not including textured face.

.4 CMU units must provide a minimum of 1,764 kg/m^3. Fill contained within the units may be considered 80% effective weight.

.2 Soil reinforcing geotextile:

.1 Soil reinforcing geotextile products must be of high-density polyethylene or polyester yarns encapsulated in a protective coating specifically fabricated for use as a soil reinforcement material.

.2 Soil reinforcement: geotextile must have the following properties:

.1 Tensile Strength 70kN/m per ASTM D 4595.

.2 Elongation: 20 percent per ASTM D 4595.

.3 Apparent opening size: 0.3 mm per ASTM D4751.

.4 Tearing Strength: 1.3kN per ASTM D 4533.

.5 Ultraviolet Stability: 80 percent per ASTM D 4355.

.3 Crushed Granular Base Course:

.1 Must be 19 mm (3/4”) minus crushed granular base course, consisting of sound, durable particles free from clay, organic or other deleterious matter, evenly graded, conforming to the requirements of MMCD Specifications 31 05 17 (Aggregates and Granular Materials), section 2.10, Granular Base.

.4 Drain Course:

.1 Must be 19 mm (3/4”) clear crushed granular material, consisting of clean, sound, durable particles free from clay, organic or other deleterious matter, evenly graded, conforming to the following gradation requirements:

Sieve Size (mm)	Percent Passing
19	100
12.5	95-100
9.5	70-100
4.75	0-55
2.36	0-10
0.074	0-3

.5 Native material fill: Native material intended to be used as backfill must be approved in writing by Consulting Engineer prior to use.

.6 Construction adhesive: Exterior grade, heavy duty construction adhesive such as Liquid Nails-Landscape Block (LN-905), or approved equal.

.7 Filter Fabric: Polypropylene fibre non-woven geotextile, such as Nilex 4551 or approved equal.

3.0 EXECUTION

3.1 Mock-Ups

.1 Before installation of retaining wall, the Developer must construct sample wall panels to verify selections and demonstrate aesthetic effects and qualities of materials and execution.

.2 Locate mock-ups in locations of CMU retaining walls as indicated on the design drawings or as directed by Consulting Engineer.

.3 Build mock-ups for each type of CMU retaining wall for a length of 1800 mm and a height of 900 mm

.1 Include typical base and cap or finished top construction.

.2 Include typical end construction at one end of mock-up.

.3 Include one 900 mm return at one end of mock-up with typical corner construction.

.4 Notify the Authorized Person seven (7) days in advance of the dates and times of the mock-up review. The Authorized Person

must approve mock-up prior to the commencement of construction of concrete unit retaining walls

3.2 Excavation

.1 The site must be excavated to the lines and grades shown on the design drawings. Use caution not to over-excavate beyond the lines shown or to disturb the base elevations beyond those shown.

3.3 Foundation Sub-Grade Preparation

.1 Foundation sub-grade soil must be excavated as dimensioned on the plans and compacted to a minimum 95% Modified Proctor Density prior to placement of the base material.

.2 Foundation sub-grade must be examined by the Consulting Engineer to ensure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength must be removed and replaced with acceptable material.

3.4 Base Preparation

.1 Base material must be placed as shown on construction drawing. Top of base must be located so as to allow bottom wall units to be buried to proper depths as per wall heights and specifications of the Consulting Engineer.

.2 Base material must be installed on undisturbed native soils or suitable replacement fills as approved by the Consulting Engineer, compacted at 95% Modified Proctor Density.

.3 Base must be compacted at 95% Modified Proctor Density, or as specified by the Consulting Engineer, to provide a level, hard surface on which to place the first course of blocks. The base must be constructed to ensure proper wall embedment and the final elevation shown on the plans. Well-graded sand may be used to smooth the top 25 mm on the leveling pad.

.4 Base material must be 150 mm minimum depth, unless otherwise specified in construction documents.

3.5 CMU Block Installation

.1 Wall units must be placed on the prepared base as per manufacturer's written instructions and/or specifications. The units must be checked for level and alignment as they are placed.

.2 Ensure that units are in full contact with base. Proper care must be taken to develop straight lines and smooth curves on base course as per wall layout.

.3 All cavities in and around the base row must be filled with base materials and compacted. Backfill front and back of entire base row to firmly lock

units in place. Check again for level and alignment. All excess material must be swept from top of units.

.4 Install next course of wall units on top of base row. Position blocks to be offset from seams of blocks below. Perfect “running bond” is not essential, but a 75 mm minimum offset is recommended. Check each block for proper alignment and level. Fill all cavities in and around wall units and to a 300 mm depth behind block with drainage material. Spread backfill in uniform lifts not exceeding 200 mm. Employ methods using lightweight compaction equipment that will not disrupt the stability or batter of the wall. Hand-operated plate compaction equipment must be used on the block and within .9m of wall to achieve consolidation. Compact to 90% M.P.D., or as specified by geotechnical engineer in backfill beyond consolidation zone.

.5 Install each subsequent course in like manner. Repeat procedure to the extent of wall height.

.6 Affix wall caps on top of wall units with construction adhesive, ensuring that caps are aligned straight and flush with each other.

3.6 Soil Reinforcement Geotextile Installation

.1 Install segmental retaining wall to designated height of first soil reinforcement geotextile layer, as specified on the design drawings, backfill and compact behind wall to depth equal to designed geotextile length.

.2 Cut soil reinforcement geotextile to designed embedment length and place on top of CMU unit to back edge of lip. Extend horizontally on compacted backfill.

.3 Place next course of CMU unit on top of geotextile and fill block cores with drainage fill to lock in place. Remove slack in geotextile and stake to maintain tension.

.4 Lay soil reinforcement geotextile at the proper elevation and orientations shown on the design drawings, or as directed by the Consulting Engineer.

.5 Correct orientation (strength direction) of the soil reinforcement geotextile must be verified by the Consulting Engineer.

.6 Follow manufacturer's guidelines for overlap requirements.

3.7 Drainage

.1 Drainage materials and execution to conform to project specifications.

.2 Locate subsurface drainage behind wall as indicated on the design drawings. Wrap drainage pipe with filter fabric and place in drain rock as indicated, sloped 1:50 to drain.

.3 Place geotextiles with sewn seams oriented perpendicular to retaining walls.

3.8 Backfill Placement

.1 Backfill material must be placed in lifts and compacted as specified in section 3.5 - CMU Block Installation.

.2 Backfill must be placed, spread and compacted in such a manner that minimizes the development of wrinkles in and/or movement of the soil reinforcement geotextile.

.3 Only hand-operated compaction equipment must be allowed within 900 mm of the wall face.

.4 Tracked construction equipment must not be operated directly on the soil reinforcement geotextile. A minimum backfill thickness of 150 mm is required prior to operation of tracked vehicles over the soil reinforcement geotextile. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the soil reinforcement geotextile.

.5 Rubber-tired equipment may pass over the geotextile reinforcement at slow speeds, less than 15 km/h. Sudden braking and sharp turning must be avoided.

.6 The backfill must be compacted to achieve 95% Modified Proctor Density or as specified by geotechnical engineer. Soil tests of the backfill material must be submitted to the Consulting Engineer for review and approval prior to the placement of any backfill.

.7 Do not dump fill material directly from trucks onto geotextile.

.8 Before compacting, place sufficient depth of fill over reinforcement to produce compacted depth of 100 mm for wheeled vehicles or 150 mm for tracked vehicles.

.9 Do not turn vehicles on fill until first layer of fill is compacted and second layer is placed over each soil-reinforced layer.

3.9 Clean-Up

.1 Clean site of all surplus material or equipment associated with work of this section.

.2 Recycle or dispose off-site all surplus material and refuse at approved disposal location.

3.10 Warranty

.1 The Developer hereby warrants that the stone paving areas, including all areas where vehicular access is expected (including service vehicles and

delivery and fire trucks), will remain free of defects (including but not limited to cracking, breaking, separating and rutting).

.2 In addition to the manufacturer's warranty, the Developer's warranty requirements specified in section 11.1 of Part 1 of this Bylaw remain in place."

END OF SECTION 32 32 19 – CONCRETE MASONRY UNIT RETAINING WALLS

The following section is added:

"SECTION 32 37 00 – EXTERIOR SITE FURNISHINGS – new section

1.0 GENERAL

.1 This section specifies Works necessary to install exterior site furnishings, including, but not limited to: benches; bike racks; trash and recycling receptacles; movable planters; bollards; drinking fountains; tree grates.

.2 This section does not include the supply and installation of light standards or light bollards.

1.1 Related Work

.1 Cast-in-Place Concrete Paving (MMCD) – Section 32 13 13

.2 Pre-Cast Concrete Unit Paving – Section 32 14 01.01

.3 Stone Paving – Section 32 14 40

1.2 Site Conditions

.1 Prior to commencing work, report in writing to the Authorized Person, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

.3 Commencement of work implies acceptance of surfaces and conditions.

1.3 Delivery, Storage and Handling

.1 Exterior site furnishings must be delivered in the original manufacturer's packaging and protective wrapping.

.2 Unload, handle and store furnishings in a manner to prevent bending, warping, denting, chipping and other mechanical damage.

2.0 PRODUCTS

.1 The Developer must provide all site furnishings (including but not limited to benches, bike racks, trash and recycling receptacles, bollards, etc.) of the types, models, colours and numbers shown on the design drawings.

.2 The Developer must provide all hardware necessary for the assembly and installation of all furnishings.

3.0 EXECUTION

3.1 Inspection

.1 Prior to assembly and installation carefully examine all furnishings delivered to the site for physical damage and defects.

.2 Do not install any products found to be defective.

3.2 Installation

.1 Assemble and install site furnishings in accordance with the manufacturers' specifications and instructions.

.2 Bolt to concrete footing and/or paving using stainless steel brackets (if required) and 19 mm (3/4") stainless steel bolts with tamper-proof heads.

.3 Use manufacturer's anchoring hardware when provided.

3.3 Clean Up

.1 Clean site of all surplus material or equipment associated with Work of this Section.

.2 Surplus material and refuse must be disposed of off-site at approved disposal location.

3.4 Warranty

.1 Manufacturer's Warranty: Submit to the Authorized Person, manufacturer's standard warranty documents executed by authorized company official for all specified equipment.

.2 In addition to the manufacturer's warranty, theDeveloper's, warranty requirements specified in section 11.1 of Part 1 of this Bylaw remain in place."

END OF SECTION 32 37 00 – EXTERIOR SITE FURNISHINGS

SECTION 32 91 21 – TOP SOIL AND FINISH GRADING – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Source Quality Control – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Measurement and Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Inspection and Testing – is amended by:

Adding the following subsections to section 1.5 in numerical order:

“

.2 Submit to the Authorized Person a copy of a growing medium analysis from a recognized laboratory approved by the Authorized Person. The analysis must be of tests done on the proposed growing medium from samples taken at the supply source within three weeks immediately prior to soil placement.. Results of these tests must be presented to the Authorized Person for review before any growing medium delivery to site.

.3 The analysis must include measurement of percent sand, fines, (silt and clay), and organic matter to total 100%, pH, lime required to achieve pH 6.5, water soluble salts, total carbon to total nitrogen ratio, total nitrogen and available levels of phosphorus, potassium, calcium and magnesium.

.4 The analysis must outline the testing laboratory’s recommendations for amendments, fertilizer and other required additions and/or modifications to make the proposed growing medium meet the requirements of this specification.

.5 Submit up to two additional samples, at intervals outlined by the District, of growing medium taken from material delivered to site. Samples must be taken from a minimum of three random locations and mixed to create a single uniform sample for testing. Results of these tests must be presented to the Authorized Person for review.”

The following subsections are added to section 1.0 in numerical order:

“

1.6 Site Conditions

.1 Report in writing to the Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.2 Do not commence work until such conditions or defects have been investigated and corrected.

.3 Do not install paving in excessively wet or freezing conditions."

1.7 Utilities

.1 Before commencing work, establish location and extent of all utility lines in the area of any excavations.

.2 Stake in field and maintain utility locations until job is completed.

1.8 Samples

.1 Growing Medium Sample: Submit for review by Authorized Person one composite sample. Sample must be a composite of at least three samplings from the proposed source and must be at least one (1) litre in volume.

1.9 Product Handling

.1 Do not move or work growing medium or additives when they are excessively wet, extremely dry, frozen or in any manner which will adversely affect growing medium structure. Growing medium whose structure has been compromised by handling under adverse conditions will be rejected and must be replaced by the Developer.

.2 Protect growing medium and additives against extreme wetting by rain or other agents and against contamination by weeds and insects.

.3 Deliver fertilizer and other chemicals in manufacturer's original containers. Protect against damage and moisture until incorporated into the work.

.4 All imported growing medium must be delivered to site premixed from a recognized growing medium source, ensuring consistency throughout the mix."

2.0 PRODUCTS – not amended

2.1 General – not amended, refer to MMCD Master Municipal Specifications (2009).

2.2 Applications – not amended, refer to MMCD Master Municipal Specifications (2009).

2.3 Native Topsoil – not amended, refer to MMCD Master Municipal Specifications (2009).

2.4 Imported Topsoil – not amended, refer to MMCD Master Municipal Specifications (2009).

2.5 Peat Moss – not amended, refer to MMCD Master Municipal Specifications (2009).

2.6 Sand – is amended by:

Adding the following subsections to section 2.6 in numerical order:

"

.4 Sand must be river pump sand or pit run sand satisfying the following gradation, (dry weight basis):

Sieve Size	Classification	% Retained
No. 4 (4.76 mm)	Gravel	0
No. 10 (2.0 mm)	Fine gravel	0-5
No.18 (1.0 mm)	Very coarse sand	5-10
No.35 (0.50 mm)	Coarse sand	15-20
No.60 (0.25 mm)	Medium sand	50-75
No.140 (0.105 mm)	Fine sand	5-15
No. 270	Very find sand	0-2
Passing No. 270	Silt, clay	0"

2.7 Manure – not amended, refer to MMCD Master Municipal Specifications (2009).

2.8 Wood Residuals – is amended by:

Adding the following subsections to section 2.8 in numerical order:

"

.3 Content of wood residuals such as Fir or Hemlock sawdust present in the growing medium must not cause the total Carbon to total Nitrogen ratio to exceed 40:1. Cedar or redwood sawdust must not be present in growing medium."

2.9 Fertilizers – is amended by:

Adding the following subsections to section 2.9 in numerical order:

"

.7 Complete commercial synthetic slow release fertilizer meeting the requirements of the *Canada Fertilizer Act*, packed in waterproof containers, clearly marked with the name of the manufacturer, weight and N-P-K analysis.

.8 Formulation ratio: as per soil test recommendations.

.9 Fertilizers must not be used in bio-filtration areas."

2.10 Growing Medium – is amended by:

Adding the following subsections to section 2.10 in numerical order:

"

.18 Sodded, seeded and planted areas:

Particle Size Class and Properties	**% of Dry Weight of Total Growing Medium**	
	Lawns	**Shrub/Tree Beds**
Coarse Gravel (larger than 25 mm) All Gravel (Larger than 2.0 mm)	0-1% 0-5%	0-1% 0-5%
	% of Dry Weight of Growing Medium Excluding Gravel	
Sand (0.05-2.0 mm) Silt (0.002-0.05 mm) Clay (<0.002 mm)	75-90% 2-15% 2-15%	0-1% 8-18% 2-18%
Maximum Clay/Silt Combined	15	20
Organic Content Acidity (pH)	5-10% 6.0 - 7.0	5-10% 6.0 - 7.0

.19 Bio-filtration areas:

Particle Size Class and Properties	% of Dry Weight of Growing Medium
Fine Gravel (2.0-3.4 mm)	<3%
Coarse sand (1.0-2.0 mm)	7-10%
Medium to Coarse Sand (0.25-1.0 mm)	40-60%
Fine Sand (0.15-0.25 mm)	10-30%
Very Fine Sand (0.05-0.15 mm)	5-30%
Clay/Silt Combined (<0.05 mm)	<3%
Organic Content	6-10%
Acidity (pH)	5.5 – 7.5

.20 Salinity: Maximum saturation extract conductivity: 3.0 millihos/cm at 25° C

.21 Carbon to nitrogen ratio: Maximum 40:1

.22 Hydraulic conductivity: Percolation must be such that no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rain or irrigation."

The following subsections are added to section 2.0 in numerical order:

"

2.11 Imported Growing Medium

.18 Growing medium must be imported and stockpiled on site in an approved location. Stockpiling work must be such that the soil is not damaged or contaminated.

.19 Growing medium must be substantially free of pests, roots, wood, construction debris, undesirable grasses including crabgrass or couchgrass, noxious weeds or other foreign deleterious objects.

2.12 On-site Growing Medium

.1 On-site growing medium must not be used in tree pits, shrub beds or sodded areas.

.2 Stripped and stockpiled topsoil from on-site sources may be used for hydro seeded areas only, providing that it meets the following requirements:

.1 Topsoil consists of the existing "A" horizon containing the accumulated organic matter.

.2 Topsoil is loose and friable and is substantially free of subsoil admixtures, stumps, branches, roots (particularly of invasive plant species), large rocks over 50 mm in diameter, noxious weeds, refuse and other deleterious materials that can negatively affect soil structure and impede plant growth.

.3 On-site excavated topsoil must be tested and amended following the procedures outlined in section 1.6 Inspection and Testing.

.4 Following soil amending, the Contractor must obtain additional samples of the amended growing medium. Samples must be taken from a minimum of three random locations and mixed to create a single uniform sample for testing. Results of these additional tests must be presented to the Consulting Engineer and Authorized Person for review.

.5 The amended on-site growing medium must meet all conditions for structure, particle size and chemical composition outlined in this specification in its entirety.

2.13 Bio-Filtration Medium

.1 Bio-filtration medium must generally consist of three layers of media:

a. Growing medium

b. Transition layer(s), consisting of sand and/or pea gravel

c. Drainage layer, consisting of drain rock

.2 The depth of each layer must be as per the landscape drawings and must depend on the type of plant material specified, native soil infiltration capacity (hydraulic conductivity), geotechnical report, and the Consulting Engineer's recommendations.

.3 The bio-filtration growing medium must be specifically engineered and formulated for use in rain gardens, bio-swales, detention ponds and other such engineered vegetated drainage applications, such as Ecomedia by Veratech, or approved equal.

.4 The bio-filtration growing medium must be able to achieve hydraulic conductivity of 200-300 mm/hr, based on ASTM F1815-06 testing method.

2.14 Materials – Other

.1 Lime: Coarse (unless noted otherwise), ground dolomite limestone, containing minimum 85% of total carbonates.

.2 Organic Material: Organic Material must be Soil Amender, black/brown in colour, manufactured by a recognized growing medium manufacturing facility. Submit sample prior to shipping to site."

3.0 EXECUTION – not amended

3.1 Stripping of Topsoil – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Preparation of Subgrade – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Processing Growing Medium – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 Placing Growing Medium – is amended by:

Deleting and replacing section 3.4.5 with the following:

“

.5 Place growing medium to the required finished grades with adequate moisture, in uniform layers, during dry weather, over approved, dry, unfrozen sub grade where planting is indicated to the following minimum depths:

.1 Trees pits: 900 mm (36”)

.2 Shrub beds: 450 mm (18”)

.3 Ground cover areas: 300-450 mm (12-18”)

.4 Sodded lawn areas: 300 mm (12”)

.5 Seeded grass areas: 100-150 mm (4-6”)”

3.5 Applying Fertilizers – is amended by:

Deleting and replacing section 3.5 with the following:

“

.1 Fertilizers must be added to bring growing medium fertility within the ranges set out in this standard, as recommended by the laboratory soil specialist on the basis of testing of the growing medium.

.2 Lime, (if required) may be added to the growing medium at the time of screening. All other fertilizers (such as nitrogen, phosphorus and micronutrients) must be added to the growing medium, as required, by thorough cultivation after it is in place. Top dressing lime must be cultivated in to the top 100 mm of the growing medium.

.3 Spread lime with mechanical spreaders over entire area of growing medium at rate recommended by the testing laboratory. Mix lime thoroughly into upper 100 mm (4”) of growing medium.

.4 Spread fertilizers with mechanical spreaders over entire surface area of growing medium at rate recommended by the testing laboratory. Do not mix fertilizer into the growing medium.

.5 Mix amendments well into the depth of supplied growing medium recommended by soil analysis for growing medium and utilizing the recommended method of tillage.

.6 Applied lime must not come in contact with the nitrogen - phosphate - potash fertilizers. There must be at least one week separation between the application of lime and fertilizers."

3.6 Finished Grading – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 Acceptance – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 Restoration of Stockpile Sites – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 Clean-up – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 32 91 21 – TOP SOIL AND FINISH GRADING

MMCD SECTION 32 92 19 – HYDRAULIC SEEDING – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Scheduling – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Handling and Storage – is amended by:

Adding the following subsections to section 1.4 in numerical order:

“

.2 Deliver grass seed in original containers showing:

.1 Analysis of seed mixture.

.2 Percentage of pure seed.

.3 Year of production.

.4 Date when tagged and location.

.5 Percentage germination.

.6 Name and address of distributor.

.3 Deliver wood fibre mulch in moisture-proof containers indicating manufacturer, content and net air-dry mass.

.4 Deliver erosion control agent in moisture-proof containers showing manufacturer, content and net mass.

.5 Store all seed, hydraulic mulch, fertilizers and related materials in dry, weather proof storage place and protect from damage by heat, moisture, rodents or other causes until time of seeding. Do not deface labels or other identification.”

1.6 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Site Examination – is amended by:

Adding the following subsections to section 1.7 in numerical order:

“

.2 Report in writing to Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this

section depends, and which may adversely affect the performance of the work.

.3 Do not commence work until such conditions or defects have been investigated and corrected."

1.8 Measurement and Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.9 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended

2.1 Grass Seed – is amended by:

Adding the following subsections to section 2.1 in numerical order:

"

.6 Grass Seed Mixture: Certified Canada No. 1 Grade in accordance with Government of Canada *Seeds Act* and Regulations and having minimum germination of 75% and minimum purity of 95%.

.7 Source: Premiere Pacific Seeds, Surrey, B.C. (604-881-1323)

.8 Composition and Rate:

Species	% by weight
Lolium perenne (Perennial Ryegrass)	26
Festuca rubra var. rubra (Creeping Red Fescue)	24
Trifolium hybridum (Alsike Clover)	14
Festuca trachyphylla (Hard Fescue)	13
Trifolium repens (White Clover)	9
Phleum pratense (Timothy)	8
Poa compressa (Canada Bluegrass)	4
Agrostis gigantea (Redtop)	2
TOTAL	**100**

Seeding Rate: 70kg/ha"

2.2 Hydraulic Mulch – is amended by:

Adding the following subsections to section 2.2 in numerical order:

"

.4 Mulch: high performance, specially manufactured for use in hydraulic seeding equipment, green colouring, free of germination and growth inhibiting factors with following properties:

.1 Non-toxic.

.2 Water activated.

.3 Made from wood cellulose fibre.

.4 Organic matter content: 95% plus or minus 0.5%.

.5 Value of pH: 6.0.

.6 Potential water absorption: 900%.

.7 Mulching rate:

.1 Slopes < 3:1: 2000kg/ha

.2 Slopes > 3:1: 5000kg/ha"

2.3 Water – not amended, refer to MMCD Master Municipal Specifications (2009).

2.4 Fertilizer – is amended by:

Adding the following subsections to section 2.4 in numerical order:

"

.2 To Canada "*Fertilizers Act*" and "Fertilizers Regulations".

.3 Complete synthetic, slow release fertilizer with 35% of nitrogen content in water insoluble form.

.4 Apply at a rate of 300kg/ha and as per section 3.3, this specification."

The following section is added to section 2.0 in numerical order:

"

2.5 Tackifier

Water soluble, vegetable carbohydrate powder: Guar J 3000 or approved equal. 10% of total volume."

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 Finish Grade Preparation – is amended by:

Adding the following subsections to section 3.1 in numerical order:

"

.6 Sub-Grade Preparation:

.1 Prepare sub-grade to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours.

.2 Ensure grade transitions are smooth and even, such that ponding cannot occur on sub grade surface.

.3 Remove any rocks bigger than 100 mm (4”) in diameter, tree or shrub roots, foreign materials, or any other debris.

.4 Rough grade to a depth of 100 mm (4”) below finished grade in all hydro seeded areas, as shown on landscape drawings.

.5 Scarify sub-grade to a depth of 100 mm (4”) to ensure proper drainage in all seeded areas.

.6 Do not disturb existing soil within dripline of trees or shrubs to be retained.

.7 Growing Medium Placement:

.1 As per Section 32 91 21 – Topsoil and Finish Grading.

.2 Fine-grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.

.3 Cultivate areas to be seeded to a depth of 50 mm (2”).

.4 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

.5 Obtain the Developer’s approval of finished grade before seeding application.”

3.2 **Seeding** – **General** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 **Equipment** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 **Protection** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 **Application for Hydraulic Seeding** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 **Erosion Control Blanket** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 **Clean-up** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 **Grass Maintenance** – not amended, refer to MMCD Master Municipal Specifications (2009)**.**

3.9 **Conditions for Total Performance** – is amended by:

Adding the following subsections to section 3.9 in numerical order:

“

.2 Seeded areas will be accepted provided that:

.1 Seeded areas have been maintained for a minimum period of 90 days after Completion.

.2 Seeded areas are uniformly established.

.3 Seeded areas are free of rutted, eroded, bare or dead spots and are 98% free of weeds.

.4 Areas have been mown at least twice.

.5 No surface growing medium is visible when grass has been cut to height of 38 mm (1-1/2").

.6 Areas have been fertilized.

.3 Areas seeded after October 1st will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.”

3.10 **Guarantee / Maintenance** – is amended by:

Adding the following subsections to section 3.10 in numerical order:

“

.4 Maintenance of plants must begin immediately after planting operation and must continue until Final Acceptance of the work.

.5 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.

.6 Mow grass to 50 mm whenever it reaches height of 70 mm. Remove clippings, which will smother grass.

.7 Fertilize seeded areas after first cutting in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles; water in well.

.8 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices. If chemical means are used, comply with approved Integrated Pest Management Program and all applicable municipal bylaws. Consult with the District prior to commencement of work.

.9 Keep soil moist during germination period and adequately water grassed areas.

.10 Apply water to ensure moisture penetration of 75 mm to 100 mm (3” to 4”). Control water application to prevent wash-outs.

.11 The Developer warrants that the work of this section will remain free of defects in accordance with and for the period specified in the General Conditions, from the date of Completion.

.12 End of Warranty Period inspection will be conducted by the Authorized Person to identify deficiencies to be corrected by the Developer in accordance with this specification.”

The following subsections are added to section 3.0 in numerical order:

“

3.11 Fertilizing Program

.1 Fertilize prior to fine-grading, ensuring that fertilizer is well incorporated into and equally distributed through growing medium.

.2 Fertilize on a monthly basis during establishment and Warranty Periods between April 30th and August 1st.

3.12 Preparation of Slurry

.1 Measure quantities of materials by weight or weight calibrated volume measurement. Supply equipment required for this work.

.2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.

.3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.13 Slurry Application

.1 Hydraulic seeding equipment:

.1 Slurry tank.

.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.

.3 Capable of seeding by 50m hand-operated hoses and appropriate nozzles.

.4 Tank volume to be certified by certifying authority and identified by authority's "Volume Certification Plate".

.2 Seed operations must take place in spring (April 1st to June 15th) and fall (Sept. 1st to September 30th), when conditions are most favourable for the establishment of a healthy stand of grass. No seed operations may take place during freezing or abnormally hot, dry weather or on frozen surfaces or surfaces covered with standing water.

.3 Apply when winds less than 10 km/h using equipment suitable for area involved.

.4 Measure quantities of material by mass or mass-calibrated volume measurement.

.5 Do not leave seed, fertilizer, mulch and water slurry in tank for more than 4 hours. Slurry left in tank over specified time is not to be used and is to be disposed of off-site.

.6 Slurry mixture applied per hectare:

.1 Seed and mulch application rates: See section 2.1, this specification.

.2 Water, minimum: 17000 litres. (4490 gal.)

.7 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.

.1 Using correct nozzle for application.

.2 Using hoses for surfaces difficult to reach and to control application.

.8 Re apply where application is not uniform.

.9 Remove slurry from items and areas not designated to be sprayed.

.10 Protect seeded areas from trespass.

.11 Remove protection devices as directed by the Consulting Engineer.

3.14 Maintenance during Warranty Period

.1 Perform following operations from time of acceptance until end of Warranty Period:

.1 Repair and reseed dead or bare spots.

.2 Mow seeded areas and remove clippings, as directed by Site Supervisor, and in accordance with following schedule:

.1 Frequency: Bi-weekly

.2 Height of cut: 38 mm (1 ½")

.3 Fertilize seeded areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well."

3.15 Workmanship

.1 Take care to prevent overspray onto buildings, signs, railings, fences, plant material, utilities and surfaces other than the ones intended.

.2 Upon completion of application, clean up any material resulting from overspray, to the satisfaction of the Authorized Person.

.3 Do not perform work under adverse field conditions such as heavy rainfall, wind speeds over 10 km/h, frozen ground or ground covered with mud, snow, ice or standing water.

.4 Protect seeded areas from trespass with fencing until plants are established."

END OF SECTION 32 92 19 – HYDRAULIC SEEDING

MMCD SECTION 32 92 20 – Seeding – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 32 92 20 – Seeding

MMCD SECTION 32 92 23 – SODDING – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – is amended by:

Adding the following subsections to section 1.1 in numerical order:

"

.6 Growing Medium Preparation and Placement Section 32 91 21

.7 Establishment Maintenance Services Section 32 93 40"

1.2 References – is amended by:

Adding the following subsections to section 1.2 in numerical order:

"

.3 Canadian Nursery & Landscape Association (CNLA) Standard for Nursery Stock.

.4 The British Columbia Landscape & Nursery Association (BCLNA) Standard."

1.3 Scheduling – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Handling and Storage – is amended by:

Adding the following subsections to section 1.4 in numerical order:

"

.5 Schedule deliveries in order to eliminate storage at job site.

.6 Deliver and unload sod on pallets.

.7 Deliver sod to site within 24 hours of being lifted.

.8 Do not deliver small, irregular or broken pieces of sod.

.9 Dry or discoloured pieces will be rejected.

.10 During wet weather allow sod to dry sufficiently to prevent tearing during lifting and handling.

.11 Protect sod from sun and drying winds. Water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Dry sod will be rejected.

.12 Protect sod during transportation to prevent drying out. Sod to arrive at site in fresh and healthy condition.

.13 Lay all sod within 24 hours of delivery to the site."

1.5 Drainage Control – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Samples – is amended by:

Adding the following subsection to section 1.6 in numerical order:

"

.2 Submit a 1 m^2 sod sample to the Authorized Person for review."

1.7 Site Examination – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 Measurement and Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.9 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

The following subsection is added to section 1.0 in numerical order:

"

1.10 Source Quality Control

.1 Obtain review of sod by the District prior to installation.

.2 When proposed source of sod is reviewed and approved, use no other source without written authorization."

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

2.1 Sod – is amended by:

Deleting and replacing section 2.1 with the following:

"

.1 Quality and source to comply with standards outlined in Guide Specification for Nursery Stock, published by Canadian Nursery Trades Association, the B.C. Standard for Turfgrass Sod and the Government of Canada *Seed Act*.

.1 The sod must be No. 1 Premium Grade nursery cultivated turfgrass sod grown from:

.1 40% Elka II Perennial Ryegrass

.2 20% Red Fescue

.3 40% Kentucky Blue Grass

.4 or pre-approved equal.

.2 Sod must not contain any Poa annua.

.3 Sod must not be grown on netting.

.4 Sod must be cut by machines designed for that purpose and by accepted methods and rolled for shipment.

.5 Soil portion of sod must not exceed 25 mm (1") or be less than 12 mm (1/2")."

2.2 Water – is amended by:

Deleting and replacing section 2.2 with the following:

"

.1 Water: potable, free of impurities that would inhibit lawn growth. The Developer must ensure that adequate water is available to maintain sod in its original healthy state."

2.3 Fertilizer – is amended by:

Deleting and replacing section 2.3 with the following:

"

.1 To Canada *Fertilizers Act* and all applicable Fertilizers Regulations.

.2 Complete, synthetic, slow release with 65% of Nitrogen content in water-insoluble form.

.3 Wooden Pegs: lath pegs of sufficient length. Use as necessary to ensure satisfactory anchorage of sod."

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 Finish Grade Preparation – is amended by:

Adding the following subsections to section 3.1 in numerical order:

"

.6 Cultivate areas to be sodded to four inch depth. Fine grade, free of humps and hollows and free of deleterious and refuse material. All sticks and stones over 50 mm (2") in any direction must be removed from the cultivated soil.

.7 Place growing medium as specified in Section 32 91 21 – Growing Medium Preparation and Placement.

.8 All areas to be sodded which are misshapen or eroded must be restored to specified condition, grade and slope as directed just prior to sodding. Minor adjustment and refinement of finish grade to be made as recommended by the Consulting Engineer.

.9 Crown or slope for surface drainage and eliminate all low spots or depressions.

.10 The Consulting Engineer must review finish grading and growing medium depth prior to placement of sod."

3.2 Sodding – is amended by:

Adding the following subsections to section 3.2 in numerical order:

"

.13 Lay sod during growing season. Sodding during hot, dry summer periods, at freezing temperatures, or over frozen or excessively wet soil is not acceptable.

.14 Lay sod sections in rows, perpendicular to slope, smooth and even with adjoining areas, and with joints staggered. Abut sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with a sharp knife.

.15 Lay sod smooth and flush with adjoining grass areas, paving and top surfaces of curbs unless shown otherwise on plans.

.16 On slopes exceeding 3:1, lay sod lengthwise up slope and peg every row with wooden pegs at intervals of not more that eighteen inches. Drive pegs flush with sod.

.17 Provide close contact between sod and soil by means of light roller. Heavy rolling to correct irregularities in grade is not permitted."

3.3 Clean-up – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 Grass Maintenance – is amended by:

Adding the following subsections to section 3.4 in numerical order:

"

.3 Maintenance of plants must begin immediately after planting operation and must continue until all deficiencies noted in the Certificate of Substantial Completion have been rectified to the satisfaction of the Consulting Engineer. The Developer must notify the Authorized Person in writing 48 hours prior to stopping maintenance operations.

.4 All maintenance equipment and practices must conform to the BC Landscape Standard.

.5 Water sodded areas in sufficient quantities and at required frequency to maintain growing medium immediately under sod continuously moist for depth of 75 mm (3").

.6 First grass cutting to occur at 65 mm (2 1/2") height. Grass must be cut to a height of 38 mm (1 1/2") thereafter. Remove clippings. Continue regular weekly cutting until acceptance.

.7 Sodded areas must be kept free of pests, disease, and noxious weeds and grasses.

.8 Fertilize sodded areas as per recommendations of growing medium analysis. Application of fertilizer must follow manufacturer's recommendations. Sod placed after October 1 must not be fertilized until April 15th of the following spring."

3.5 Conditions for Total Performance – is amended by:

Adding the following subsections to section 3.5 in numerical order:

"

.2 Conditions for Total Performance of sod:

.1 Sodded areas have been maintained for a minimum period of (90) days after Completion.

.2 Sodded areas exhibit fully established root systems.

.3 Sod is free of bare and dead spots and without weeds.

.4 No surface growing medium is visible when grass has been cut to height of 68 mm (2 3/4").

.5 Sodded areas have been cut a minimum of two, (2) times, a minimum seven (7) days apart.

.6 Sodded areas are a uniform green colour.

.7 Sodded areas exhibit a thick, dense, uniform and healthy appearance.

.8 Lawns sodded after November 1st will not be accepted until April 30th of the following growing season. All acceptance conditions must be fulfilled at that time."

3.6 Guarantee / Maintenance – is amended by:

Deleting and replacing section 3.6 with the following:

"

.1 The Developer warrants that the work of this section will remain free of defects in accordance with and for the duration of the Warranty Period.

.2 End-of-warranty inspection will be conducted by the District to identify deficiencies to be corrected by the Developer in accordance with this specification."

END OF SECTION 32 92 23 – SODDING

MMCD SECTION 32 93 01 – PLANTING OF TREES, SHRUBS AND GROUND COVERS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – is amended by:

Adding the following subsections to section 1.1 in numerical order:

"

.6 Growing Medium Preparation and Placement Section SS-32 91 21

.7 Establishment Maintenance Services Section SS-32 05 33"

1.2 References – is amended by:

Adding the following subsections to section 1.2 in numerical order:

"

.4 Canadian Nursery & Landscape Association (CNLA) Standard for Nursery Stock.

.5 The British Columbia Landscape & Nursery Association (BCLNA)."

1.3 Source Quality Control – is amended by:

Adding the following subsections to section 1.3 in numerical order:

"

.3 The Developer must supply all plant material in quantities sufficient to complete the work shown on the landscape drawings. In case of discrepancy, quantities indicated on the design drawings will take precedence over quantities shown on the plant schedule. Report any discrepancies to the Authorized Person.

.4 The Consulting Engineer must confirm in writing availability of plant material noted on the plant list prior to Authorized Person's review at source.

.5 Substitutions: The Developer must provide in writing to the Authorized Person a list of proposed substitutions for review. No substitutions will be accepted without approval by the Authorized Person. Plant substitutions must be of similar genus and species and of equal or greater size as those originally specified. The list must contain the following information:

.1 Quantity of plants.

.2 Botanical name.

.3 Common name.

.4 Pot size and plant size in the nursery.

.6 Plant Material Review at the source:

.1 The Developer must notify the Authorized Person at least seven (7) days prior to review of plant material at source.

.2 The Developer's Contractor must accompany the Developer during review.

.3 Prior to a plant material shipment, all plant material, including substitutions, must be gathered at one location for review.

.4 The Consulting Engineer must make one (1) visit to the source for review of plant material prior to every plant material shipment, and report to the Authorized Person.

.5 Shipping of plant material to project site must not proceed until the Consulting Engineer has reviewed and accepted plant material.

.7 Plant Material Review at Project Site: All plant material must be reviewed at the project site by the Consulting Engineer and the Authorized Person prior to planting.

.8 Imported Plant Material:

.1 Plant material imported from out of province and out of country must be accompanied by all necessary federal and provincial permits and import licenses.

.2 The Developer must conform to all federal and provincial laws and regulations with regard to horticultural inspection of domestic and imported plant material.

.7 Plant material collected from wild sources will not be accepted. The Developer may be required to submit supplier invoices for review by the District, prior to acceptance of plant material.

.9 Weeds in Plant Material Rootball:

.1 Plants must be substantially weed-free.

.2 Plants with horsetail or morning glory growing in rootball will not be accepted.

.3 Maintenance Period will be extended in order to maintain eradication program.

.10 Trees grown and or supplied in "in-ground fabric containers" will not be acceptable."

1.4 Scheduling – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Handling and Storage – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Drainage Control – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 Site Examination – is amended by:

Adding the following subsections to section 1.8 in numerical order:

"

.2 Report in writing to the Authorized Person, prior to commencing work, any conditions or defects encountered on the site, upon which the work of this section depends, and which may adversely affect the performance of the work.

.3 Do not commence work until such conditions or defects have been investigated and corrected."

1.9 Measurement and Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.10 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

The following subsections are added to section 1.0 in numerical order:

"

1.11 Utilities

.1 Before commencing work, establish location and extent of all utilities in the area of any excavations.

.2 The Developer must stake in field and maintain utility locations until job is completed.

1.12 Standards

.1 Except as modified in this specification, all plant material specified must conform to the latest edition, as amended from time to time, of the:

.1 Canadian Nursery & Landscape Association (CNLA) Standard for Nursery Stock.

.2 The British Columbia Landscape & Nursery Association (BCLNA).

.3 The BCLNA and the BCSLA Landscape Standard.

.4 ANSI A-300 Tree Pruning Guidelines.

.2 Plant material sizes indicate the minimum acceptable standard

.3 Any plant material not conforming to the above standards for size, variety and condition, as indicated on the District approved plant list, must be replaced by the Developer .

1.13 Shipment and Pre-Planting Care

.1 Coordinate shipping of plant material and excavation of planting pits to ensure minimum time lapse between nursery digging and on site planting.

.2 Ensure branches of trees and shrubs are bound securely into a confined mass during handling and transport.

.3 Do not bind planting stock with rope or wire which would damage bark, break or damage branches, or damage the natural shape of the plant

.4 Protect plant material against abrasion and exposure to extreme temperature change during transit.

.5 Cover plant foliage and branches with tarpaulin to prevent loss of moisture during transit.

.6 Fully support root ball of large trees during all lifting operations.

.7 Do not lift trees or shrubs by the trunk or branches. Plant material must be moved by lifting the rootball or container.

.8 Remove broken and damaged roots with clean cuts using sharp pruning shears.

.9 Temporary Storage of Plant Material on Site:

.1 Heel-in all trees, shrubs and miscellaneous plant material which cannot be planted immediately.

.2 Ensure temporary heel-in area is shaded and protected from the wind.

.3 Provide sufficient water at regular intervals to ensure health of plant material.

1.14 Plant Material Search Area

.1 Search area for availability of plant material must not exceed LEED restrictions for material transportation (800km by truck, 2400km by rail).

1.15 Plant Material Replacements

.1 The Developer must remove from the site any plant material, which has been determined to have died or failed to grow, or has suffered mechanical damage, in a satisfactory manner during the Warranty Period or maintenance period.

.2 The Developer must replace dead plant material immediately after removal from the site.

.3 The Developer must extend the Warranty Period on replacement plant material for an additional one (1) year.

.4 The Developer must continue such replacement and warranty of plant material to the satisfaction of the Authorized Person."

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

2.1 Plant Material – is amended by:

Adding the following subsections to section 2.1 in numerical order:

"

.13 Plant Size:

.1 Overall plant spread to be measured when branches are in their natural position.

.2 Height and spread dimensions refer to main body of plant and not from branch tip to branch tip.

.14 Grade: Trees and shrubs and miscellaneous plant material must be No. 1 grade or better.

.15 Plant material obtained from areas with milder climatic conditions from those of site is acceptable provided:

.1 Plant material is moved to the site prior to the breaking of buds at their original climatic zone.

.2 Plant material is heeled-in at a protected area until the climatic conditions are suitable for planting.

.16 Trees and shrubs must have structurally sound, strong fibrous root system free of disease, insects, defects or injuries.

.17 Trees must have straight trunks and a well-formed branch system which is characteristic of the species.

.18 Root Pruning at Source:

.1 Plant material must have been root pruned on a regular basis at the nursery.

.2 Plant material must be root pruned at least one growing season prior to digging and shipment to the project site.

.3 Large trees must be half root pruned during each of two successive growing seasons. The second root pruning must have been carried out a minimum of one growing season prior to shipment to the site.

.19 Shade, Ornamental and Evergreen Trees:

.1 Trees must have vigorous growth.

.2 Trees must have good twig extension growth, branch spacing and trunk taper.

.3 Tree foliage must be evenly distributed on upper 2/3 of the tree.

.4 Trees must not have upright branches other than leaders.

.5 Trees must have spreading branches with a single trunk and a single leader and, unless otherwise noted on plans or plant list.

.6 Tree trunks and branches must not have any mechanical damage.

.7 Trees must be in good health with no presence of insects or disease.

.8 Trees must not be headed back.

.9 Tree root balls must be solid, kept moist at all times and/or protected from drying.

.10 Trees must not exhibit symptoms of root circling or girdling.

.20 Container Grown Plant Material:

.1 Root ball to container relationship must be of sufficient ratio to ensure room for healthy, vigorous root development.

.2 Plant material must have been container grown for a minimum of one growing season but not longer than two growing seasons.

.3 The plant material root systems must have the ability to "hold" growing medium when removed from the container.

.4 Root bound plant material is not acceptable.

.21 Balled and Burlapped Plant Material:

.1 Coniferous and broadleaf evergreens over 2.4m (7’-8”) tall must be dug with firm soil root ball.

.2 Deciduous trees in excess of 3.0m (10’-0”) height must be dug with firm soil root ball.

.3 Root ball diameter must be a minimum of 230 mm (9”) for each 25 mm (1”) caliper size.

.4 Secure root-balls with burlap, heavy twine and rope.

.5 Large tree root balls must be double layer burlap wrapped. Burlap to be secured with drum laces made up of 10 mm (3/8”) (minimum) diameter rope.

.22 Tree Spade Dug Plant Material:

.1 Plant material must be dug with mechanized hydraulic spade or clamshell type digging equipment.

.2 Root ball diameter must be a minimum of 230 mm (9”) for each 25 mm (1”) caliper size.

.3 Wire basket must be lined with burlap. Root ball must be laced and tied to wire basket with heavy rope.

.4 Ensure trunk of tree is not damaged by wire basket, ties or rope.”

2.2 Water – not amended, refer to MMCD Master Municipal Specifications (2009).

2.3 Fertilizer – not amended, refer to MMCD Master Municipal Specifications (2009).

2.4 Mulch – is amended by:

Deleting and replacing section 2.4 with the following:

“

.1 9 mm (3/8”) Composted Bark Mulch, black/brown in colour, manufactured by Fraser Richmond Bio-Cycle, Richmond, B.C. or pre-approved equal. The Developer will submit a one (1) litre sample to Consulting Engineer for review prior to shipping to the site.”

2.5 Stakes – not amended, refer to MMCD Master Municipal Specifications (2009).

2.6 Guying Collar – not amended, refer to MMCD Master Municipal Specifications (2009).

2.7 Wire Tightener – not amended, refer to MMCD Master Municipal Specifications (2009).

2.8 Guying Wire – not amended, refer to MMCD Master Municipal Specifications (2009).

2.9 Clamps – not amended, refer to MMCD Master Municipal Specifications (2009).

2.10 Anchors – not amended, refer to MMCD Master Municipal Specifications (2009).

2.11 Anti-desiccant – is amended by:

Deleting and replacing section 2.11 with the following:

“

.1 Wax-like emulsion which will provide a transpiration reducing film over the plant surface. The Developer must submit three (3) copies of manufacturer product data and specification for Consulting Engineer’s review prior to application.”

2.12 Flagging Tape – not amended, refer to MMCD Master Municipal Specifications (2009).

The following subsections are added to section 2.0 in numerical order:

“

2.13 Tree Trunk Protection

.1 Extrusion mold process, polyethylene with UV protectors: “Arborgard” manufactured by DeepRoot Products Canada, Inc., Vancouver, B.C., or pre-approved equal.

2.14 Root Barrier

.1 Copolymer Polypropylene panels with minimum 75% recycled content. Manufactured by DeepRoot Products Canada, Inc., Vancouver, B.C., or pre-approved equal. Root barrier must be 600 mm (24”) deep.

2.15 Burlap

.1 Must be untreated, free from toxic contaminants and of sufficient strength to hold the rootball in a compact, stable mass that does not move relative to the main stem(s) of the tree or shrub.

2.16 Wire Baskets

.1 Non-galvanized metal basket designed and manufactured for the purpose of tree moving. Basket must be shaped to ensure that the root ball will allow a stable planting condition in accordance with BCNTA/BCSLA Landscape Standard.

2.17 Tree Ties

.1 8 Arbor Tie by Deep Root or approved equal. Flat woven polypropylene material. 20 mm (3/4”) wide, 544 Kg. (1200 lb), break strength tree tie.

2.18 Tree Guy Anchor

.1 Anchors must be buried, 100 mm (4”) diameter steel disc, screw–in type.

2.19 Stakes

.1 CCA pressure treated wood 75 mm dia. (3") round, 2500 mm (8’-0”).”

3.0 EXECUTION not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 Pre-Planting Operations – is amended by:

Adding the following subsections to section 3.1 in numerical order:

“

.4 Place stakes on site to identify location of trees and plant beds as per the landscape drawings. The District must review all tree plant locations and

plant bed layout prior to start of plant bed preparation and planting operation.

.5 Anti-desiccant must be applied only as directed by the Authorized Person. Application of anti-desiccant must be in accordance with manufacturer's instructions."

3.2 Subgrade Preparation – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Planting– is amended by:

Adding the following subsections to section 3.3 in numerical order:

"

.7 The Developer must submit planting schedule to Authorized Person prior to start of planting operation. All planting operations must be done in a timely manner.

.8 Planting operations must be carried out under conditions that are conducive to healthy, vigorous growth of plant material.

.9 Layout of plant materials must be completed as per the Planting Plans. Layout must be approved by Authorized Person prior to planting.

.10 Plant trees, shrubs and miscellaneous plant material vertical, straight and plumb at locations staked in field and or noted on landscape plans.

.11 Do not install plants during extreme heat, drought, heavy rain, freezing or other adverse environmental conditions.

.12 Tree planting must conform to the regulations and requirements of all utility authorities having jurisdiction. The Developer is responsible for all necessary coordination.

.13 Ensure orientation of plant material will give best appearance in relation to structures, roads and walks.

.14 Ensure planting depth of root ball is equal to the depth of root ball originally established in the nursery. The top of root ball must be level with adjacent growing medium.

.15 Ball and Burlap Plant Material: After plant has been lowered into plant bed or tree pit loosen burlap from around trunk and cut away minimum top 1/3 without disturbing root ball.

.16 Container Grown Plant Material: Remove entire container (including biodegradable containers) without disturbing rootball. Score rootball vertically at six (6) locations evenly spaced around entire root ball to minimize girdling of roots.

.17 Tree Spade Dug Rootballs: Cut wire basket around entire perimeter of rootball. Bend down top 2/3 of wire basket without disturbing rootball.

.18 Backfill tree pit in 150 mm (6”) lifts to 2/3 of the depth of the tree pit tamping each lift of growing medium around root system to eliminate air voids. Do not use frozen or saturated growing medium for backfill operation.

.19 Prior to placing remaining growing medium, fill tree pit with water. Complete backfill operation only after water has completely penetrated into growing medium.

.20 Build 100 mm high by 150 mm wide (4” high by 6” wide) saucer around outer edge of tree pit to assist with maintenance watering.

.21 Trees bigger than 10cm caliper must be secured by guy anchors as directed by the Consulting Engineer. Ensure guy pins are untreated wood and are not placed through the root ball. Trees that have had root balls penetrated by guy pins will be rejected

.22 Finish grade of planting medium and required mulch layer must be kept 12 mm (1/2”) below adjacent hard landscape edge.”

3.4 Tree Support – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 Watering – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 Pruning – is amended by:

Adding the following subsections to section 3.6 in numerical order:

“

.7 All pruning cuts must be made with pruning saws or hook and blade pruning tools designed and manufactured for pruning operations. Anvil-type pruning tools must not be used in any pruning operations.

.8 Remove dead or damaged branches on trees or shrubs.

.9 Prune trees and shrubs after planting operation as directed by the Authorized Person.

.10 Employ clean sharp tools and make cuts without damaging the branch collar.

.11 Do not damage the leader, lead branches or remove smaller twigs along the main structural branches.”

3.7 Mulching – is amended by:

Adding the following subsections to section 3.7 in numerical order:

“

.3 The Consulting Engineer must review all plant beds and tree planting prior to the addition of any mulch material.

.4 Ensure that all fine grading is complete, the growing medium is loose and friable and all debris and weeds have been removed from plant beds and tree pits prior to the application of mulch material.

.5 Bark mulch must be coarse 50 mm minus shredded Douglas Fir or Hemlock bark. The mulch must be free of soil, rocks, seeds, chemicals or other deleterious materials.

.6 Spread mulch to minimum thickness of 50 mm (2”).

.7 Ensure mulch is kept 200 mm (8”) away from trunks of trees and 75 mm (3”) away from stems of shrubs.

.8 It may be necessary for smaller plant material, such as groundcovers, to be planted higher than intended, to account for the depth of mulch. Ensure that smaller plants are not covered after mulch application.

.9 As necessary, mulch must periodically be topped to its intended depth.”

3.8 Clean-up – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 Maintenance – is amended by:

Adding the following subsections to section 3.9 in numerical order:

“

.2 Maintenance of plants must begin immediately after planting operation and continue until all deficiencies noted in the Certificate of Substantial Completion review have been rectified to the satisfaction of the Authorized Person. The Developer must notify the Authorized Person in writing 48 hours prior to stopping maintenance operations.

.3 Maintenance of plant material includes but is not limited to watering at intervals sufficient to maintain healthy, vigorous growth, weeding of plant beds and tree pits, cultivating of growing medium, pruning, treatment of insects, molds, fungi or disease. The appropriate level of maintenance for planted areas will be determined by the Authorized Person based on the British Columbia Landscape Standard, latest edition, as amended from time to time.

.4 Plant material must be deep watered at least once per day when temperatures exceed 25 degrees Celsius (77 degrees F).

.5 Ensure adequate moisture in root zone prior to winter freeze-up.

.6 Ensure that all plants that have settled are reset to level of surrounding finished grade.

.7 Ensure tree guards, stakes and tree ties are kept secure, taught and in proper repair until the end of maintenance period.

.8 Ensure flagging tape is maintained on tree ties at all times."

3.10 Conditions for Total Performance – not amended, refer to MMCD Master Municipal Specifications (2009).

3.11 Guarantee / Maintenance – is amended by:

Deleting and replacing section 3.11 with the following:

"

.1 The Developer warrants that the plant material will remain free of defects from the date of Completion and for the duration of the Warranty Period. The Developer must make all corrections, adjustments and replacements required as a result of failure of all plant material in this section.

.2 The District accompanied by the Developer will undertake an end-of-warranty inspection to identify plant material that will be replaced by the Developer .

.3 The District reserves the right to extend the Developer's, Warranty Period and responsibilities for an additional year if, at end of the initial Warranty Period, the leaf development and growth of the plant material is not sufficient to ensure future survival."

The following subsections are added to section 3.0 in numerical order:

"

3.12 Excavation

.1 Tree Pits:

.1 Excavation of the depth of the tree pit must be equal to the height of root ball or as detailed in the landscape drawings.

.2 Width of tree pit must be a minimum of 450 mm to 600 mm (1'-6" to 2'-0") greater than diameter of the root ball or as indicated on landscape drawings.

.3 Tree pit widths in heavy or compacted soils must be increased to three (3) to five (5) times the width of the root ball.

.4 Scarify the sides of tree pits created with a tree spade to eliminate glazed surface.

.2 Ensure tree pits dug in heavy or compacted soils exhibit the ability to drain freely. Notify the Consulting Engineer if tree pits in any soil condition do not drain freely or if tree pit fills with ground water.

.3 Protect bottom of tree pit(s) against freezing.

.4 Ensure tree pits and plant beds are kept well drained and free of contaminants and construction debris.

.5 Remove water, which may have collected in bottom of tree pit prior to planting.

.6 Root Barrier: Install root barrier along adjacent paved surfaces, such as sidewalks, pedestrian paths, curbs etc. Length of root barrier to be equal to the length of tree pit, or as specified in the landscape drawings.

3.13 Weed Control

.1 Eliminate all weeds and weed roots from rootballs of all plant material.

.2 Have method for elimination of weeds reviewed by the District prior to any action.

3.14 Final Acceptance

.1 Conditions for Final Acceptance:

.1 Plant material has been maintained for a period of ninety (90) days after Completion.

.2 All plant material is healthy and is exhibiting signs of vigorous growth."

END OF SECTION 32 93 01 – PLANTING OF TREES, SHRUBS AND GROUND COVERS

MMCD SECTION 33 01 30.1 – CCTV Inspection of Pipelines – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 33 01 30.1 – CCTV Inspection of Pipelines

MMCD SECTION 33 01 30.2 – Cleaning of Sewers – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 33 01 30.2 – Cleaning of Sewers

MMCD SECTION 33 05 23 – Trenchless Sewer Pipe Bursting – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 33 05 23 – Trenchless Sewer Pipe Bursting

MMCD SECTION 33 05 24 – Cured-In-Place-Pipe Liners – not amended, refer to MMCD Master Municipal Specifications (2009)

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF MMCD SECTION 33 05 24 – Cured-In-Place-Pipe Liners

MMCD SECTION 33 11 01 – WATERWORKS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Material Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Shop Drawings and Technical Data – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Record Drawings – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Scheduling of Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 Measurement and Payment – is amended by:

Adding the following clause to section 1.8.2 after the second paragraph:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for supply and installation of watermains and service connections will also include trench dewatering."

1.9 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – is amended by:

Adding the following section 2.0.1 in numerical order:

"

.1 Accepted products will be those listed in District's List of Approved Materials and Products."

2.1 General – is amended by:

Deleting and replacing section 2.1.1 with the following:

"

2.1.1 Only one type of watermain pipe material will be allowed, unless approved by the Authorized Person for a specific application - excluding main pipe within chambers which will be steel - which will be Ductile Iron Class 50

wall thickness, cement mortar lined pipe. This type of pipe will also be used exclusively for hydrant leads."

2.2 Mainline Pipe, Joints and Fittings – is amended by:

Deleting and replacing section 2.2.1.1 with the following:

"

2.2.1.1 Pipe: to AWWA C151 Class 50 wall thickness, cement mortar lined. Cement mortar lining will conform to AWWA C104/A21.4."

Deleting the following sections:

- 2.2.2
- 2.2.3
- 2.2.4.1
- 2.2.4.4
- 2.2.4.5
- 2.2.4.13.6
- 2.2.4.13.8
- 2.2.4.13.10
- 2.2.4.13.11
- 2.2.7.13.11"

2.3 Valves and Valve Boxes – is amended by:

Deleting and replacing section 2.3.2.2 with the following:

"

2.3.2.2 To AWWA C515: 400 mm and larger to working pressure 1725 kPa, ductile iron body with fusion bonded epoxy coating, resilient seated, non-rising stem, hub, flanged or mechanical joint ends."

Deleting and replacing section 2.3.2.3 with the following:

"2.3.2.3 To AWWA C509: 75 mm to 300 mm to working pressure 1725 kPa, ductile iron body with fusion bonded epoxy coating, resilient seated, non-rising stem, hub, flanged or mechanical joint ends."

Deleting section 2.3.3.

Deleting and replacing section 2.3.5.1 with the following:

"2.3.5.1 Ductile Iron body, with fusion bonded epoxy coating."

Adding the following section 2.3.6.1.3 in numerical order:

"2.3.6.1.3 Mainline valve boxes must be MR style."

2.4 Valve and Large Meter Chambers – not amended, refer to MMCD Master Municipal Specifications (2009).

2.5 Service Connections, Pipe, Joints and Fittings – is amended by:

Deleting and replacing section 2.5.1 with the following:

"

2.5.1 Pipe diameter 19 mm to 75 mm will be Type K annealed copper, to ASTM B88M."

Deleting and replacing section 2.5.2 with the following:

"

2.5.2 Pipe diameter 100 mm and larger to be Ductile Iron class 50 to AWWA C151, cement mortar lined to AWWA C104/A21.4."

Deleting section 2.5.3.3 with respect to "Saddles for PVC pipe …".

2.6 Hydrants – is amended by:

Deleting and replacing section 2.6.1.1 with the following:

"

2.6.1.1 Shut-off, compression type or slide gate as per District's Supplemental Standard Detail Drawings."

Adding the following:

"

2.6.1.12 Hydrants must be Tyton (TYT) and restrained with EBAA 15-PF-00TD, Tru-Dual or approved equivalent."

2.7 Underground Service Line Valves and Fittings – is amended by:

Deleting and replacing section 2.7.2 with the following:

"

2.7.2 Corporation Stops to be as per District's Supplemental Standard Detail Drawings."

Deleting and replacing section 2.7.3.5 with the following:

"

2.7.3.5 Curb stops to have electric insulators on the private property side of the service."

2.8 Granular Pipe Bedding and Surround Material – not amended, refer to MMCD Master Municipal Specifications (2009).

2.9 Backfill Material – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended

3.1 General – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Preparation – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Trenching – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 Concrete Bedding and Encasement – is amended by:

Adding the following section:

"

3.4.4 Where ductile iron pipe is encased in concrete, the pipe must be wrapped in polyethylene encasing in accordance with ANSI/AWWA C105 / A21.5"

3.5 Granular Bedding – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 Pipe Installation – is amended by:

Deleting and replacing section 3.6.2 with the following:

"

3.6.2 Lay and join pipes to manufacturer's instructions and specifications except as noted otherwise herein. Ductile iron pipe to AWWA C151."

Deleting the following sections:

- 3.6.6
- 3.6.10.10

3.7 Valve Installation – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 Valve Chambers – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 Under-crossing – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 Service Connection Installation – is amended by:

Deleting and replacing section 3.10.1 with the following:

"

3.10.1 Install service connections to 3.6 of this section and as shown on the District's Supplemental Standard Detail Drawings."

Deleting section 3.10.6.

Deleting and replacing section 3.10.7 with the following:

"

3.10.7 Tap main as shown on the District's Supplemental Standard Detail Drawings, not closer to a joint, nor closer to adjacent service connections than recommended by manufacturer, or 1 m, whichever is greater. No two adjacent connections on same pipe length to be on same plane of pipe."

Deleting and replacing section 3.10.10 with the following:

"

3.10.10 Electrically insulated curb stops and adjacent piping to be wrapped with petroleum based tape for at least 900 mm in both directions from the curb stop. Curb stop electrical insulator to be installed on the private property side. All wrapping shall be in accordance with the wrapping manufacturer's instructions and ANSI/AWWA C209."

3.11 Tapping Sleeve Installation – not amended, refer to MMCD Master Municipal Specifications (2009).

3.12 Hydrants – is amended by:

Deleting and replacing section 3.12.2 with the following:

"

3.12.2 Install hydrant assemblies in accordance with AWWA Manual of Practice No. M17 and in accordance with the District's Supplemental Standard Detail Drawings."

3.13 Thrust Blocks – not amended, refer to MMCD Master Municipal Specifications (2009).

3.14 Corrosion Protection – not amended, refer to MMCD Master Municipal Specifications (2009).

3.15 Pipe Surround – is amended by:

Deleting and replacing section 3.15.4 with the following:

"

3.15.4 Install concrete encasement where shown, or as directed by the Authorized Person. For Ductile Iron mainline or for hydrant leads, ensure hub joint occurs 0.3 m minimum to 0.5 m maximum from end of encasement. Wrap the encased section of the ductile iron

pipe in polyethylene in conformance with ANSI / AWWA C105 / A21.5"

3.16 Backfill – not amended, refer to MMCD Master Municipal Specifications (2009).

3.17 General Procedure Flushing, Testing, and Disinfection – not amended, refer to MMCD Master Municipal Specifications (2009).

3.18 Cleaning and Preliminary Flushing – is amended by:

Adding the following sentence to 3.18.2:

"

3.18.2 The District is not responsible for any time delays or costs as a result of how an existing gate valve may or may not function."

3.19 Testing Procedure – is amended by:

Deleting and replacing the fifth sentence (starting with "Maximum allowable leakage rate….") of section 3.19.2 with the following:

"

3.19.2 …… During leakage testing the water pressure must be maintained for a minimum of two (2) consecutive hours with zero pressure loss. No leakage is acceptable."

Deleting and replacing section 3.19.4 with the following:

"

3.19.4 Water pressure, leakage and bacteriological testing will be performed by an independent third party testing company, with the supervision of the Consulting Engineer."

Adding the following section 3.19.7:

"

3.19.7 All testing must be conducted and reported by an experienced third party testing company under the supervision of the Consulting Engineer."

3.20 Disinfection, General – is amended by:

Adding the following:

"

3.20.3 Procedures to follow the standard for disinfecting watermains per ANSI / AWWA C651-14."

3.21 Disinfection and Flushing Procedures – is amended by:

Adding the following subsection to section 3.21 in numerical order:

"

3.21.10 Chlorinated water to be flushed to sanitary sewer or de-chlorinated prior to discharge to storm sewers. Obtain permission from the Authorized Person prior to flushing to the District's sanitary or storm sewer systems."

3.22 Servicing Fire Hydrants – not amended, refer to MMCD Master Municipal Specifications (2009).

3.23 Connections to Existing Mains – is amended by:

Deleting and replacing section 3.23.1 with the following:

"

3.23.1 Connections to existing watermains to be performed by the District's forces. Provide at least 3 weeks notification to the Authorized Person before any connections are required."

Adding the following subsection to section 3.23 in numerical order:

"

3.23.2 Traffic control, including barriers, lights and signs, must be provided and maintained until the District's forces have completed the connections. The permanent surface restoration must be completed to the complete satisfaction of the Authorized Person.

3.23.3 The District is not responsible for any time delays or costs as a result of how an existing gate valve may or may not function."

END OF SECTION 33 11 01 – WATERWORKS

MMCD SECTION 33 30 01 – SANITARY SEWERS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Material Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Scheduling of Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Measurement and Payment – is amended by:

Adding the following to section 1.6.2 after the second paragraph:

"Payment for sanitary sewer mains and service connections also includes trench dewatering."

Adding to section 1.6.3 after the second paragraph, with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for service connections includes trench excavation and dewatering, supply and installation of tee or wye to the main line and related fittings and components specified and/or shown on the District's Supplemental Standard Detail Drawings, cost of coupling to existing sewer services (where applicable). Payment includes all applicable service pipes, materials and work described in 1.6.2."

Adding to section 1.6.4 after the first paragraph, with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for inspection chambers includes all materials, works and components specified and/or shown on the District's Supplemental Standard Detail Drawings."

1.7 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – is amended by:

Adding the following subsection to section 2.0 in numerical order:

"

.1 Accepted products will be those listed in the District's List of Accepted Materials and Products, superseding MMCD Master Municipal Specifications (2009) requirements."

2.1 Concrete Pipe – not amended, refer to MMCD Master Municipal Specifications (2009).

2.2 Plastic Pipe, Mainline Smooth Profile – not amended, refer to MMCD Master Municipal Specifications (2009).

2.3 Service Connections – is amended by:

Adding the following subsections to section 2.3 in numerical order:

"

2.3.8.3 Inserta-Tees will only be permitted for connections to existing systems. Manufactured wyes must be used on all new sanitary sewer systems.

2.3.8.4 Hammer taps and mortared joints are not allowed on existing mains; only coring and manufactured wyes are permitted.

2.3.8.5 Flexseal shear band coupler (or a pre-approved equivalent) and concrete encasement must be used on wyes on existing mains.

2.3.8.5 All connections into existing mains that require the installation of a manufactured wye will require video inspection of the main.

2.3.8.6 Hammer taps and mortared joints are not allowed"

2.4 **Concrete** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.5 **Granular Pipe Bedding and Surround Material** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.6 **Backfill Material** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 **EXECUTION –** not amended

3.1 **General** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 **Preparation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 **Trenching** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 **Concrete Bedding and Encasement** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 **Granular Bedding** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 **Pipe Installation** – is amended by:

Deleting and replacing section 3.6.6.2 with the following:

“

3.6.6.2 Smooth PVC pipe: Bending of PVC pipe will not be permitted, unless with prior written acceptance from the Authorized Person.”

3.7 Pipe Surround – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 Connections to Existing Mainline Pipes – is amended by:

Adding the following subsections to section 3.8 in numerical order:

"

3.8.4 Hammer taps and mortared joints are not allowed on existing mains; only coring and manufactured wyes are permitted.

3.8.5 Flexseal shear band coupler (and/or approved equivalent) and concrete encasement must be used on wyes on existing mains.

3.8.6 All connections into existing mains that require the installation of a manufactured wye will require video inspection of the main.

3.8.7 All service connections require video inspection"

3.9 Backfill – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 Service Connection Installation – is amended by:

Deleting and replacing section 3.10.1 with the following:

"

3.10.1 Install service connections to 3.6 of this section and as shown on the District's Supplemental Standard Detail Drawings."

Deleting and replacing section 3.10.2 with the following:

"

3.10.2 Install 40 x 90 marker stake at service terminus. Paint and mark as shown on the District's Supplemental Standard Detail Drawings."

Deleting and replacing section 3.10.3 with the following:

"

3.10.3 Install inspection chamber at specified location, set plumb and to specified elevation. If the inspection chamber is located in a driveway, lane or paved surface, install cover or lid as shown on the District's Supplemental Standard Detail Drawings."

3.11 Cleaning and Flushing – is amended by:

Adding the following subsection to section 3.11 in numerical order:

"

3.11.7 Cleaning and flushing methodology, including possible discharging of deleterious material and assessment of the downstream sewer capacity, must be prepared by the Developer and approved by the Authorized Person prior to any

work taking place. Discharge of materials or flows in excess of the downstream sewer capacity is not allowed."

3.12 Leakage Testing General – is amended by:

Adding the following subsection to section 3.12 in numerical order:

"

3.12.4 Testing of mains must be carried out by independent third party testing company and witnessed by the Consulting Engineer. Leakage testing is required for all new mainline pipes and for new service connections with inspection chambers.

3.12.5 All testing procedures must be submitted to the Authorized Person in advance of any testing for his/her review and approval prior to any related work taking place. Once approved by the Authorized Person, all testing must be successfully completed prior to any final surface restoration or paving and such successful completion is a requirement for achieving Substantial Completion."

3.13 Water Exfiltration Test – not amended, refer to MMCD Master Municipal Specifications (2009).

3.14 Low Pressure Air Test – not amended, refer to MMCD Master Municipal Specifications (2009).

3.15 Infiltration Test – not amended, refer to MMCD Master Municipal Specifications (2009).

3.16 Short Term Deflection Test – is amended by:

Deleting the second sentence of 3.16.1

Adding the following subsection to section 3.16 in numerical order:

"

3.16.2 Short term deflection test is required for all new mainline pipes.

3.16.3 A visual lamp test from manhole to manhole to confirm pipe alignment and grade is required for all new mainline pipes. Such test must be carried out by a testing firm approved by the Authorized Person and by using a strong light or mirrors. All sanitary sewers, when lamped, must have a minimum of 75% of the pipe diameter exposed when measured horizontally and a minimum 100% of the diameter exposed when measured vertically."

3.17 Individual Joint Test – is amended by:

Adding the following:

"

3.17.9 Individual joint testing is required, in lieu of air testing or exfiltration testing, where access to the sanitary sewer main line or service line does not allow for sealing of the section being tested."

3.18 Video Inspection – is amended by:

Deleting and replacing section 3.18 with the following:

"

.1 Video inspection, testing and reporting the results must be done by experienced independent third party firms.

.2 New Sanitary Sewer Mains: Carry out a video inspection test of all new sanitary sewer main lines within the entire scope of the project. Perform the video inspection within 48 hours of completion of construction of all surface works. Video inspections must be carried out and be accepted by the Authorized Person prior to any final surface restoration or final paving.

.3 Sanitary Sewer Service Connections: Carry out a video inspection test of all service connections within the entire scope of the project. Perform the video inspection within 48 hours of completion of all surface works.

.4 Existing Sanitary Sewer Mains: For a single service, the service and the main must be video inspected to check for integrity and ensure that the connection does not intrude into the main. Where there are two or more service connections required between manholes of an existing main, the system must be video inspected and mandrel tested. In the case of fewer than three connections, the District will inspect the direct connection work at the main and accept or reject. Failure to request inspection by the District will result in a request for video inspection of the existing main at the connection point.

.5 Video inspection reports and sewer evaluations must utilize WRc standards. Video equipment and testing procedures must be conducted in a manner acceptable to the Authorized Person. The final videos and reports must be submitted certifying the work and requesting acceptance of the system by the Authorized Person.

.6 The entire system must be cleared thoroughly and flushed prior to carrying out a video inspection test.

.7 If in the opinion of the Authorized Person it is required, the District reserves the right to request that the Developer provide additional video inspection of sanitary sewers and/or connections prior to Warranty Period termination date."

3.19 Installation Standard – is amended by:

Adding the following subsection to section 3.19 in numerical order:

“

.6 No ponding of water in service connections is allowed. ”

3.20 Connections To Existing Mains – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 33 30 01 – SANITARY SEWERS

MMCD SECTION 33 34 01 – SEWAGE FORCEMAINS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Material Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Shop Drawings and Technical Data – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Record Drawings – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Scheduling of Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 Measurement and Payment – is amended by:

Adding to section 1.8.2 after the second paragraph, with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for sanitary sewage force mains also includes trench dewatering."

Adding to section 1.8.5 after the first paragraph, with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for test points, air-release/air-vacuum and combination air valves and apparatus and blow-off or blow-down assemblies, as separate items, includes all materials, works and appurtenances detailed and specified. Payment includes all applicable work described in 1.8.2 and herein."

Deleting sections 1.8.6 and 1.8.7.

1.9 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – is amended by:

Adding the following subsection to section 2.0 in numerical order:

"

.1 Accepted products will be those listed in the District's List of Accepted Materials and Products."

2.1 **General** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.2 **Pipe, Joints and Fittings** – is amended by:

Deleting and replacing section 2.2.5.1 with the following:

“

.1 Gray cast iron fillings are not acceptable.”

2.3 **Valves and Valve Boxes** – is amended by:

Deleting and replacing section 2.3.2.2 with the following:

“

.2.2 To AWWA C515: 400 mm and larger to be to working pressure 1,725kPa, non-rising stem with fusion or mechanical joint ends.”

Deleting and replacing section 2.3.4.1 with the following:

“

.4.1 Ductile Iron Body with fusion bonded epoxy coating.”

2.4 **Valve Chambers** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.5 **Granular Pipe Bedding and Surround Material** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.6 **Backfill Material** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 **EXECUTION –** not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 **General** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 **Preparation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 **Trenching** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 **Concrete Bedding and Encasement** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 **Granular Bedding** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 **Pipe Installation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 **Valve Installation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 **Valve Chambers** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 **Thrust Blocks** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 **Corrosion Protection** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.11 **Pipe Surround** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.12 **Backfill** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.13 **General Procedures Flushing and Testing** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.14 **Cleaning and Flushing** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.15 **Pressure Testing Procedure** – is amended by:

Deleting and replacing section 3.15.2 with the following:

“

.2 Before pipe is filled with water, pipe bedding, concreting of all valves and fittings and backfilling must be completed as required in this specification. Each section of pipe must be filled and allowed to remain full of water for a period of at least 24 hours prior to commencement of any pressure tests. Pipeline must be submitted to a test pressure of 1.5 x design peak transient pressure condition applied at highest elevation in section. At no time may test pressure exceed pipe or thrust restraint design pressures. Maximum allowable leakage rate at test pressure must not exceed 1.25 litres per millimetre diameter or pipe per kilometre per 24 hour period. Minimum duration of test period is 24 hours.”

Adding the following:

“

.8 Forcemains must be tested by pigging or passing a mandrel / rubber ball / test plug having 95% of the base inside diameter of the pipe completely through the pipeline. A lamp test may not be used in lieu of the ball test. CCTV inspection may be used in lieu of the mandrel inspection.

.9 All testing must be completed after sewer installation and backfill to the underside of the final surface treatment (i.e. asphalt) and successful passing is a requirement to achieve Substantial Performance.”

3.16 Connections to Existing Mains – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 33 34 01 – SEWAGE FORCEMAINS

MMCD SECTION 33 40 01 – STORM SEWERS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Material Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Scheduling of Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Measurement and Payment – is amended by:

Adding the following to the first sentence of section 1.6.2:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for storm sewers also includes trench dewatering."

Adding the following subsection to section 1.6 in numerical order:

"

.12 Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for boulevard swale not exceeding 300 mm in depth will be measured and paid on a lineal metre basis."

1.7 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – is amended by:

Adding the following subsections to section 2.0 in numerical order:

"

.1 Accepted products will be as listed in the District's Accepted Materials and Products list.

.2 Inserta-Tee's – Inserta-Tees's will only be permitted for connections to existing systems. Manufactured wyes must be used on all other new storm sewer systems."

2.1 **Concrete Pipe** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.2 **PVC Pipe, Mainline, Smooth Wall** – is amended by:

Deleting and replacing section 2.1.1 with the following:

"

.1 Polyvinyl chloride (PVC) pipe up to and including 375 mm diameter, DR35. Pipe to have minimum pipe stiffness (F/Y) of 320 kPa at 5% deflection, ASTM D2412. Pipe to be manufactured to ASTM D3034 and certified to CSA B182.2"

2.3 **PVC Pipe, Mainline Profile** – is amended by:

Adding the following subsection to section 2.3 in numerical order:

"

.6 PVC Ribbed Pipe: PVC ribbed pipes and fittings to conform to ASTM F794 and certified to CSA B 182.4, 450 mm up to and including 750 mm diameters. Legs and fittings may be of PVC pipes certified to CSA B182.2 and ASTM D3034/F679."

2.4 **HDPE Pipe, Mainline Open Profile** – is deleted.

2.5 **Spiral Rib Pipe-Steel –** is deleted.

2.6 **Service Connections** – is amended by:

Deleting and replacing section 2.6.1 with the following:

"

.1 Storm sewer service connections must be minimum 150 mm diameter."

Deleting and replacing section 2.6.2 with the following:

"

.2 Storm sewer service connections, minimum 150 mm diameter, to be PVC type PSM DR 28 sewer pipe."

Deleting and replacing section 2.6.3 with the following:

"

.3 150 mm DR 28 PVC storm sewer service connection pipe must have a minimum pipe stiffness of 625 kPa. Pipe must be manufactured to ASTM D3034 and certified by Canadian Standards Association to CSA B182.2."

Deleting and replacing section 2.6.8.1 with the following:

"

.1 In-situ installations of tees and wyes into concrete, PVC or PVC ribbed pipe must be made with an accepted PVC saddle installed to the manufacturer's specifications into a neatly cored hole in the pipe wall."

2.7 Perforated Drain Pipe – not amended, refer to MMCD Master Municipal Specifications (2009).

2.8 Concrete – not amended, refer to MMCD Master Municipal Specifications (2009).

2.9 Granular Pipe Bedding and Surround Material – not amended, refer to MMCD Master Municipal Specifications (2009).

2.10 Backfill Material – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 General – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Preparation – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Trenching – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 Concrete Bedding and Encasement – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 Granular Bedding – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 Pipe Installation – is amended by:

Deleting and replacing section 3.6.6.1 with the following:

"

.1 For concrete pipe, PVC and ribbed profile .1 PVC plastic pipe, do not exceed one-half (1/2) permissible joint deflection recommended by pipe manufacturer."

Deleting and replacing section 3.6.6.2 with the following:

"

.2 Smooth profile PVC pipe: for 100 mm to 375 mm, bending of the pipe barrel is not permitted."

3.7 Pipe Surround – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 Connections to Existing Mainline Pipes – is amended

By adding the following text in numerical order:

"

3.8.5 Hammer taps and mortared joints are not allowed on existing mains; only coring and manufactured wyes are permitted.

3.8.6 Flexseal shear band coupler (and/or approved equivalent) and concrete encasement must be used on wyes on existing mains.

3.8.7 All connections into existing mains that require the installation of a manufactured wye will require video inspection of the main.

3.8.8 All service connections require video inspection"

3.9 Backfill – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 Service Connection Installation – is amended by:

Deleting and replacing subsections 3.10.1, 3.10.2 and 3.10.3 with the following:

"

.1 Install service connections to 3.6 and as shown on the District's Supplemental Standard Detail Drawings.

.2 Install 40 x 90 mm marker stake at service terminus. Paint and mark as shown on the District's Supplemental Standard Detail Drawings.

.3 Where specified, install inspection chamber at specified location, set plumb and to specified elevation as shown on the District's Supplemental Standard Detail Drawing and MMCD Drawing S10, as applicable. If inspection chamber is located in a driveway, lane or paved surface, install cover or lid as shown on the District's Supplemental Standard Detail Drawing or MMCD Drawing S10."

3.11 Cleaning and Flushing – not amended, refer to MMCD Master Municipal Specifications (2009).

3.12 Inspection and Testing – is amended by**:**

Adding the following subsections to section 3.12 in numerical order:

"

.4 New Storm Sewer Mains: Carry out a video inspection test of all main lines within the entire scope of Works and Services.

.5 Storm Sewer Service Connections: Carry out video inspections of all service connection leads within the entire scope of Works and Services.

The video inspections must be done immediately following the completion of storm sewer construction.

.6 Existing Storm Sewer Mains: Where there is three or more service connections required between manholes of an existing main, the system must be video inspected. In the case of fewer than three connections, the District will inspect the direct connection work at the main and accept or reject. Failure to request inspection by the District will result in a request for video inspection of the existing main at the connection point.

.7 The video inspections must be conducted and the results reported to the Authorized Person immediately following sewer installation and backfill to the underside of the final surface treatment or paving.

.8 All video testing procedures must be submitted to the Authorized Person and approved before testing takes place. No final surfacing or paving shall take place until video testing has been undertaken and the successful results have been submitted to and accepted by the Authorized Person.

.9 Video inspection reports and sewer evaluations must utilize WRC (Water Research Centre) standards. Video equipment and testing procedures must be conducted in a manner acceptable to the Authorized Person. The final videos and reports must be submitted certifying the work and requesting acceptance of the system by the Authorized Person.

.10 The entire system must be cleaned thoroughly and flushed prior to carrying out a video inspection test.

.11 The District reserves the right to request that the storm sewers and/or the connections be video inspected again before the end of the eleventh month of the Warranty Period, if problems are encountered during the Warranty Period."

3.13 Installation Standard – is amended by:

Deleting and replacing subsection 3.13.5 with the following:

".5 No ponding of water in service connections is allowed "

3.14 Connections to Existing Mains – not amended, refer to MMCD Master Municipal Specifications (2009).

3.15 Perforated Drain Pipe – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 33 40 01 – Storm Sewers

MMCD SECTION 33 42 13 – PIPE CULVERTS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Material Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Measurement and Payment – is amended by:

Adding to the beginning of section 1.5.2 with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for pipe also includes trench dewatering."

Adding to the beginning of section 1.5.3 with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for pipe also includes trench dewatering."

Adding to the beginning of section 1.5.4 with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for pipe also includes trench dewatering."

Adding to the beginning of section 1.5.5 with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for pipe also includes trench dewatering."

Adding to the beginning of section 1.5.6 with the following:

"Where this work is being done for the District of North Vancouver by a contractor, unrelated to any Works and Services, payment for pipe also includes trench dewatering."

1.6 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – is amended by:

Adding the following clause to section 2.0:

"Accepted products will be those listed in the District's List of Accepted Materials and Products."

2.1 Corrugated Steel Pipe – is amended by:

Deleting and replacing section 2.1.1 with the following:

"

.1 Corrugated steel pipe: to CAN3-G401. Pipe to be asphalt coated inside and outside."

2.2 Concrete Pipe – not amended, refer to MMCD Master Municipal Specifications (2009).

2.3 Plastic Pipe, Smooth Profile – is amended by:

Deleting and replacing section 2.3.1 with the following:

"

.1 .Polyvinyl chloride (PVC) pipe up to and including 375 mm diameter, DR35. Pipe to have minimum pipe stiffness (F/Y) of 320 kPa at 5% deflection, ASTM D2412. Pipe to be manufactured to ASTM D3034 and certified to CSA B182."

2.4 PVC Pipe Profile – is amended by:

Deleting and replacing section 2.4.1 with the following:

"

.1 PVC Ribbed Pipe: PVC ribbed pipes and fittings conforming to ASTM F794 and certified by Canadian Standards Association to CSA B 182.4, 450 mm up to and including 750 mm diameter. Legs and fittings may be of PVC pipes certified to CSA B182.2 and ASTM D3034/F679."

2.5 **HDPE Plastic Pipe, Open Profile** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.6 **Concrete** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.7 **Granular Pipe Bedding and Surround Material** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.8 **Backfill Material** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.0 **EXECUTION –** not amended

3.1 **Excavation, Trenching and Backfilling** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 **Bedding** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 **Laying Corrugated Steel Pipe Culverts** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 **Joints: Corrugated Steel Culverts** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 **Laying Concrete Pipe Culverts** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 **Joints: Concrete Culverts** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 **Installation, Other Approved Materials** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 **Backfill** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 **Fluming** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 **Endwalls** – is amended by:

Deleting and replacing section 3.10.1 with the following:

“

.1 Construct endwalls as shown on the District’s Supplemental Standard Detail Drawings.”

END OF SECTION 33 42 13 – Pipe Culverts

MMCD SECTION 33 44 01 – MANHOLES AND CATCHBASINS – MMCD is amended

1.0 GENERAL – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 Related Work – not amended, refer to MMCD Master Municipal Specifications (2009).

1.2 References – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 Samples – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 Material Certification – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 Measurement and Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.6 Inspection and Testing – not amended, refer to MMCD Master Municipal Specifications (2009).

2.0 PRODUCTS – is amended by:

Adding the following clause to section 2.0:

"Accepted products will be those listed in the District's List of Accepted Materials and Products, superseding MMCD Master Municipal Specifications (2009) requirements."

2.1 Materials – is amended by:

Deleting and replacing section 2.1.4 with the following:

"

.4 Pre-cast manhole sections: to be pre-cast reinforced concrete to ASTM C478M complete with ladder rungs, and to the safety regulations of Work Safe B.C."

Deleting and replacing section 2.1.7 with the following:

"

.7 Cast iron frame and cover: as shown on the District's Supplemental Standard Detail Drawings. Low profile manhole frames are not allowed."

Deleting and replacing section 2.1.11 with the following:

"

.11 Catch basin leads to be minimum 200 mm diameter and of PVC DR 35 pipe material."

Deleting and replacing section 2.1.14 with the following:

"

.14 Joints: make watertight using rubber gaskets to ASTM C443."

Deleting and replacing section 2.1.23 with the following:

"

.23 Manhole risers and bases must be pre-cast concrete only. Manhole bases must be pre-benched at the manufacturer's plant. Cast-in-place manhole risers and bases (including overbuild manholes) will only be permitted with prior approval of the Authorized Person."

3.0 EXECUTION – not amended, refer to MMCD Master Municipal Specifications (2009).

3.1 Excavation and Backfill – not amended, refer to MMCD Master Municipal Specifications (2009).

3.2 Concrete Work – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Manhole Installation – is amended by:

Deleting and replacing section 3.3.9 with the following:

"

3.3.9 Set remaining precast rise sections plumb with joints consisting of gaskets to ASTM C443M. All manhole riser sections must have gasket joints and all inside joints must be mortared. Mortar connection joints are not allowed."

Deleting and replacing section 3.3.18 with the following:

"

3.3.18 Connections to existing manholes must be carried out with a concrete coring machine. Such connection cones must penetrate all the way through the existing manhole benching such that the new connection has a smooth finish in the manhole base and well marries the existing benching."

3.4 **Cleanout Installation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.5 **Catchbasin Installation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.6 **Lawn Drain Installation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.7 **Endwall Installation** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.8 **Grillage Trash Screens** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 **Adjusting Tops of Existing Units** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 **Remove Existing Units** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.11 **Leakage Test** – not amended, refer to MMCD Master Municipal Specifications (2009).

END OF SECTION 33 44 01 – Manholes and Catchbasins

MMCD SECTION 34 41 13 – TRAFFIC SIGNALS – MMCD is amended

1.0 **GENERAL** – not amended, refer to MMCD Master Municipal Specifications (2009).

1.1 **Related Work** – is amended by:

Adding the following subsections to section 1.1 in numerical order:

“

.8 Concrete Walks, Curb and Gutter Section 03 30 20.”

1.2 **References** – not amended, refer to MMCD Master Municipal Specifications (2009).

1.3 **Shop Drawings** – not amended, refer to MMCD Master Municipal Specifications (2009).

1.4 **Electrical Energy Supply** – not amended, refer to MMCD Master Municipal Specifications (2009).

1.5 **Contractor Qualifications** – is amended by:

Adding the following subsections to section 1.5 in numerical order:

“

.3 Those retained to complete the work during the start-up must be Certified Electricians familiar with traffic controller operation and maintenance. As a

minimum they must have IMSA Level 2 Signals Certification and/or have completed at least three (3) similar signal projects."

1.6 Permits and Tests – not amended, refer to MMCD Master Municipal Specifications (2009).

1.7 Work Regulations – not amended, refer to MMCD Master Municipal Specifications (2009).

1.8 Record Drawings – not amended, refer to MMCD Master Municipal Specifications (2009).

1.9 Measurement and Payment – not amended, refer to MMCD Master Municipal Specifications (2009).

1.10 Inspection – not amended, refer to MMCD Master Municipal Specifications (2009).

The following section is added to section 1.0 in numerical order:

"

1.11 Work Schedule

.1 The Developer must submit a construction schedule to the Authorized Person for review and acceptance prior to commencing construction. The schedule will set out the order of electrical works to be undertaken, the coordination requirements with the District and other utilities, and any impacts on existing infrastructure. The District may alter the order of Works and the schedule to accommodate existing systems."

2.0 PRODUCTS – not amended

2.1 General – is amended by:

Adding the following subsections to section 2.1 in numerical order:

"

.6 Accepted products will be as listed in District's List of Accepted Materials and Products, which will supersede MMCD Master Municipal Specifications (2009)."

2.2 **Conduit** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.3 **Trench Marker Tape** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.4 **Plastic Junction Boxes** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.5 **Concrete Junction Boxes** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.6 **Poles and Anchor Bolts** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.7 **Conductors and Cables** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.8 **Conductor Tags** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.9 **Conductor Connectors** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.10 **Fuses and Fuse Holders** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.11 **Service Panels** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.12 **Telephone Demarcation** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.13 **Grounding Equipment** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.14 **Receptacles** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.15 **Loop Sealant and Backer Rod** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.16 **Traffic and Pedestrian Signals** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.17 **LED Signal Modules** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.18 **Traffic Signal Lamps** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.19 **Signal Mounting Hardware** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.20 **Audible Signals** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.21 **Pedestrian / Cyclist Pushbuttons** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.22 **Luminaries** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.23 **High Intensity Discharge Lamps** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.24 **Photo Controls** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.25 **Post Mount Flasher** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.26 **NEMA Traffic Controllers** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.27 **Video Detection System** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.28 **Uninterruptable Power Supply** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.29 **Illuminated Crosswalk Signs** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.30 **Nuts, Bolts, Screws and Washers** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.31 **Cold Galvanizing Compound** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.32 **Extruded Aluminum Signs** – not amended, refer to MMCD Master Municipal Specifications (2009).

2.33 **Powder Coat Materials** – is amended by:

Adding the following subsections to section 2.33 in numerical order:

“

.5 The District’s acceptable colours are as follows, which supersede MMCD:

- Per Development Permit Area Requirements.
- Per Town and Village Centre Requirements.
- Standard davit pole green – DuraCoat #5202-6 or RAL equivalent.
- Standard pedestrian pole bronze – DuraCoat # to SCH-1637 or RAL equivalent.

- Marine Drive Black #BK70XPT385.
- Lynn Valley Town Centre green – RAL #6012.
- Lynn Valley Town Centre butterscotch RAL #1011.
- Edgemont Village red RAL # 3001.
- Handrail black DuraCoat#P2042-5 or RAL #9005.

The powder applicator must provide a colour sample to the Authorized Person prior to applying the product to the equipment."

The following subsections are added to section 2.0 in numerical order:

"

2.34 Wet Coat Painting

.1 The District may consider the use of a wet spray application on galvanized steel poles and products. The use of a fluoropolymer resin based coating system, for example, must meet or exceed the specified product and testing requirements applied to powder manufacture and applicator noted within these Supplemental Specifications. Acceptance for this alternate method of coating is at the sole discretion of the Authorized Person.

2.35 Fibre Optic Cable for Traffic Signal Interconnection

.1 All optical fibre cables must be tight buffered, multimode, six (6) optical fibre strands, all dielectric construction, 62.5/125 micron (core/clad), suitable for outdoor use in conduit and will be CSA accepted. Maximum attenuation of the cable will be 35 dB / Km, measured at room temperature at 850nm (Optical Cable Corporation Catalogue # DX06-055D-WLX-900-OFNR or accepted alternate. The outer jacket colour will be black."

3.0 EXECUTION – not amended

3.1 General – is amended by:

Adding the following subsections to section 3.1 in numerical order:

"

.5 Place new signalized systems in "flash mode" for a period of time specified by the District prior to switching to full operation. Signals start-ups on a Monday or Friday will be avoided.

.6 The District will perform any required programming and timing of the controller following energization of the controller cabinet.

.7 The Developer must supply and install all "new signal ahead" signs in advance of the intersection prior to signal start-up. The Developer must also remove all such signs after the appropriate time period."

3.2 Excavating, Trenching and Backfilling – not amended, refer to MMCD Master Municipal Specifications (2009).

3.3 Concrete Bases – not amended, refer to MMCD Master Municipal Specifications (2009).

3.4 Junction Boxes and Vaults – is amended by:

Adding the following subsection to section 3.4 in numerical order:

"

.5 Galvanized steel lids for District of North Vancouver Fibre Optic pull boxes must be marked with welded letters "DNVFO" prior to galvanizing."

3.5 Underground Conduit – is amended by:

Adding the following subsection to section 3.5 in numerical order:

"

.6 Conduit depth of bury must be recorded when a trenchless technology method is used. This record must be provided to the Authorized Person prior to acceptance of a Certificate of Total Performance."

3.6 Poles and Related Equipment – is amended by:

Deleting section 3.6.12.

3.7 Traffic and Pedestrian Signal Head Mounting – is amended by:

Adding the following subsection to section 3.7 in numerical order:

"

.5 Install stainless steel safety cables (aircraft grade) between pole arms and overhead signal heads. Banding must be used for mounting all traffic and pedestrian signal head equipment, unless otherwise specified."

3.8 **Audible Signals** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.9 **Pedestrian Pushbuttons** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.10 **Luminaires and Photocells** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.11 **Electrical & Telephone Services** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.12 **Electrical Services and Telephone Demarcation Panels** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.13 **Electrical Service Panels** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.14 **Wiring** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.15 **Pole Mounted Receptacles** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.16 **Traffic Controller** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.17 **Detector Loops** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.18 **Flasher Luminaires** – is amended by:

Section 3.18 is deleted.

3.19 **Advance Warning Signs** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.20 **Grounding & Bonding** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.21 **Cold Galvanizing Compound Application** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.22 **Pole Finish Application** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.23 **Telephone Interconnect Conduits** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.24 **Telephone Panels** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.25 **Video Detection** – not amended, refer to MMCD Master Municipal Specifications (2009).

3.26 Uninterruptible Power Supply – not amended, refer to MMCD Master Municipal Specifications (2009).

3.27 Illuminated Crosswalk Signs – not amended, refer to MMCD Master Municipal Specifications (2009).

The following subsections are added to section 3.0 in numerical order:

"

3.28 District Supplied Material

.1 The Developer or its representative must notify the Authorized Person in writing (seven) 7 days prior to the time materials (supplied by the District) are required.

.2 Any materials supplied by the District will be made available at the District of North Vancouver Operations Centre. The Developer will be responsible for all necessary arrangements and the costs for pick up from the District and for delivery to, protection, and incorporation into the Works and Services.

.3 The Developer must complete a Materials Release Form at the time materials are picked up.

.4 District supplied materials generally consist of:

a. Traffic controllers and cabinets;
b. Video detector systems;
c. Pedestrian walkway luminaires;
d. Padlocks;
e. Street name signs; and
f. Wayfinding signs.

For each site, a list of materials to be supplied by the District will be provided to the Developer. The cost for the supply and/or installation of all District supplied materials will be borne by the Developer or the Developer as the case may be.

3.29 Powder Coating

.1 Prior to producing a powder finish product, the Developer's supplier must produce a copy of their quality control program and written confirmation they intend to follow these specifications. The supplier must submit to the Authorized Person the name of their independent testing agency.

.2 The application process will be as follows:

.1 The pole or product must be hot dip galvanized.

.2 Powder must only be applied after the product is completely fabricated. No welding or bending may take place after the powder is applied.

.3 The pole or product must be thoroughly cleaned by brush blasting in accordance with SSPC-SP7 (Steel Structures Painting Council). The brush blast must maintain a minimum profile of 0.5 mm. If brush blasting takes place off site then the product must be covered and shielded from any dirt or moisture during its return to the powder applicator's facility. Unsatisfactory poles or products will be returned for further brush blasting.

.4 Once at the applicator's facility, the pole or product must be thoroughly cleaned and dried with an air gun. All hand marks or grease spots must be cleaned with a mild solvent.

.5 After brush blasting, the entire pole or product must be pre-baked in an oven at 220 degrees Celsius for at least 30 minutes to 1 hour, depending on steel thickness. The pre-baking must be done to prevent out-gassing during the curing cycle.

.6 The base powder coat must then be applied electrostatically while the pole or product is cooling from the 220 degrees Celsius pre-bake period to allow the powder to melt and fuse to the surface. The base coat will be a minimum of 3 mm in thickness.

.7 After base coat is applied and set; the topcoat must be applied to a thickness of 3 to 5 mm. The pole or product must be returned to the oven and heated to 190 to 220 degrees Celsius (no to exceed pre-bale temperature) for a minimum of 25 minutes, depending on steel thickness. Thicker product material may require longer bake cycles to fully cure. Upon removal of the pole or product from the oven, it must be left to rest until the pole or product is cool enough to the touch.

.8 Once the topcoat has cured and the poles or product cooled, they must then be individually wrapped (minimum 4 inches by overlapping method) with 1/8 inch foam wrap over the entire pole or product. The poles or product must be bundled together and separated with suitable wood dunnage to avoid contact between the poles, product or other bundles. All bundles themselves must be fully wrapped with foam and with stretch-wrap as noted above. The poles or products must be handled and shipped in a manner to prevent damage – damaged products will be rejected.

.3 The testing process will be as follows:

.1 Each run of product in an oven must have at least one sample tested for:

a. Adhesion – The finished powder surface must have minimum pull-off strength exceeding 1000 PSI as tested in accordance with ASTM D4541.
b. Quality – The finished powder surface must be free from any holidays as tested in accordance with ASTM D4541. The product must also be free from wrinkles, orange peel, cracking, pinholes, fish eyes, blisters, etc. by visual inspection.
c. Colour – The colour must be verified to be within 3 DE of specialized colour.

.2 The Developer will employ an independent testing firm that is qualified to test powder finish products to perform testing. Test results must be included in the product supplier's QC documentation and must be made available to the Authorized Person. Failed products will be rejected until the testing is completed and the product deemed acceptable by the testing agency.

.3 Where the tested product fails on a given production run then a minimum of 30% of the entire production run will be tested. If no other failures are found then the individual failed product will be stripped, reapplied and re-tested until it passes. If any of the 30% of product tested fails then the entire order will be stripped, reapplied and retested until it passes.

.4 Field repairs must be undertaken to fix any scratches or imperfections in the final finish. Field repairs must be done as follows:

.1 Feather the damaged area with sandpaper.

.2 Clean area with solvent.

.3 Let dry.

.4 Neatly brush on an application of Aliphatic Urethane Acrylic Semi-Gloss High Build applied at 2-4 mm Dry Film Thickness (DFT) over the entire sanded and damaged area. The ambient conditions will be dry and over 10 degrees Celsius when the paint is applied.

.5 The Developer, through its pole supplier, must warranty the integrity of the surface for a minimum of 1 year from the date of installation. The warranty will include all labour and materials required to provide replacement product if

required. The warranty will apply to fading, blistering, cracking or chipping of the surface.

3.30 Fibre Optic Cable for Traffic Signal Interconnection

.1 Fibre optic cables must be terminated to an eight port field cable panel, complete with adapters (Econolite, model as designed for the District) mounted in each controller cabinet, utilizing 3M or ADC ST style connectors or accepted equal to match the modem style connectors. Four (4) optical channels must be terminated in this manner. "Spare 3" and "Spare 4" channels must be capped and secured in the lower panel section. Field panel must be pre-installed in each signal cabinet by the traffic controller manufacturer.

.2 When installing Fibre Optic Communications Conduit, Fibre optic warning tape (150 mm wide orange plastic tape labelled "WARNING FIBRE OPTIC COMMUNICATIONS CABLE") must be placed over all conduits containing fibre optic cable.

.3 During installation of new boxes, or with all existing boxes, ensure that they have been cleared of any soil, sand or gravel and other materials that have accumulated in the base of the junction box. Ensure that all conduits have a proper RPVC coupling and cap inserted (friction fit – do not glue) into each duct until cable installation, when the cap is removed and a Bell Coupling is inserted and glued, as per MMCD Standard Detail Drawing.

.4 All communications conduits must be flushed with water and dried with compressed air. This process must be followed by pulling through a 2 inch Blowing Mouse, a clean soft cloth and new nylon pull string.

.5 Perform a visual inspection of the proposed cable route and report any potential problem areas. Locations in which cables will be terminated must be inspected and plans made for hardware and cable slack storage. Space and access for termination of the cable should be considered prior to starting the Works and Services. Develop a cable placement plan based upon the cable route survey and available equipment and personnel resources. Submit a plan to the Authorized Person for acceptance prior to starting work.

.6 Any damage due to excessive pulling, bending, or crushing, may alter the cable's transmission characteristics to the extent that the cable section will have to be replaced at the Developer’s expense.

.7 Fibre optic cables must be installed in continuous runs in conduit between the traffic signal controller cabinets (no splices are allowed).

.8 Do not exceed the minimum bend radius of the fibre. During installation this value typically is 20 times the cable's outer diameter. A typical 6-fibre

tight buffered cable will have a maximum bend radius of 82 mm during installation and 55 mm after installation.

.9 Do not improperly pull or exceed the cable's rated pulling tension as specified by the cable manufacturer. Excess pulling may cause breakage or cause fibre attenuation to increase so that the installed system may not operate within the specified requirements.

.10 Do not exceed the vertical rise separation as specified by the cable manufacturer unless intermediate tension relief is used. Secure the cable to new or existing supports.

.11 Protect reeled and unreeled cable from any source of damage, whether attended or unattended. Particular attention is required with pre-connected sections of cable produced to meet specific length requirements as any damage to the cable will require replacement of the entire section.

.12 If the cable must be unreeled during installation, the "figure eight" configuration to be used to prevent kinking or twisting. Do not coil the cable in a continuous direction except for lengths of 30.0 meters or less. The preferred size of the "figure eight" is about 4.5 meters in length, with each loop about 1.5 meters to 2.4 meters in diameter.

.13 If a cable puller is used, the recommended pulling tension of the cable must not be exceeded. Do not pull through junction boxes, especially 90-degree conduit fittings, unless precautions are taken to maintain the minimum bend radius.

.14 When installing cable in conduits, the conduit must not exceed the minimum bend radius. Avoid pull boxes unless the maximum bend radius can be maintained. In controller cabinets, fibre optic cables must be tied together with ty-wraps. Each cable must be labelled within 10 cm of the terminated ends with a tag and text stating the street intersection of the opposite cable end. Cables must be tagged in the controller cabinet and all other access points with "CAUTION, FIBRE OPTIC CABLE" tags. Cable slack at termination points is required to allow the cable to be routed through the termination hardware to a polishing/splicing table, plus a minimum of 3.0 meters additional slack. Cable slack must be coiled and secured with Velcro ties for breakaway protection. Cable to termination panel must be secured to cabinet with ty-wraps

.15 If cable lubricants are necessary, they must be compatible with the cable's outer sheath. Refer to the lubricant supplier's specification sheet to ensure compatibility. Use of detergent based lubricants is not allowed, as these types of lubricants promote stress cracks.

.16 Excess cables inside pull boxes must be coiled and mechanically secured in place with Velcro straps such that the minimum bend radius is not

exceeded and the cable is suspended above the pull box. The Velcro straps are to provide `breakaway' protection in the event of an accidental dig up between pull boxes.

.17 Adhesive warning labels 3M – 5016 – FO type or accepted alternative must be affixed to each fibre optic cable in each access point. Access points include pull boxes and traffic signal controller cabinets. Decal strip holders, 3M – 5012 or accepted alternative, must be used and must be secured in place using cable ties. Warning labels must be oriented so they are visible and are not blocked by other cables or equipment.

.18 After installation, each segment of each fibre must be tested using an Optical Time Domain Reflectometer (OTDR) and power meter equipment. Testing must be done in each direction on each fibre and at both 850nm and 1300nm wavelengths. Launch cable must be used as per the OTDR manufacturer's specifications. Those retained to complete the work must provide a word-processed report detailing the results of each test including OTDR test results in graphical format, cable length, any fibre breaks or anomalies, attenuation of fibre's connectors and fibre uniformity.

.19 Final testing and inspection of the cable installation must be conducted with the District present on-site.

.20 All workmanship, material and/or installation practices and activity must be equal to or better than the standards established by the CAN/CSA T529 530 M90 Standards and the Canadian Electrical Code.

.21 Those retained to complete the work must be authorized, trained and certified by the manufacturers they represent. They must have a minimum of two (2) years' experience installing and testing multimode cables of all types as well as experience with ST (Straight Tip) connectors.

.22 Those retained to complete the work must have experience installing cabling for FDDI (Fibre Distribution Data Interface) compliant 100 Mbit/sec, SONET (Synchronous Optimal Network), ATM (Asynchronous Transfer Mode), Token Ring or Ethernet networks using industry accepted systems and practices. Experience with leading manufactures fiber products and systems would be beneficial

.23 Those retained to complete the work must be prepared, trained and equipped to properly test the fibre cabling system, including the fibre transmission media and connectors. Each optical fibre of each section of cable must be tested using an Optical Time Domain Reflectometer (OTDR) and must meet the specifications before installation. After installation an Optical Light loss Testing Sets (OLTS) will be mandatory to determine cable length, locate any fibre breaks or anomalies, measure attenuation of fibres, connectors and assess fibre uniformity. Those

retained to complete the work must provide a word-processed report showing all values measured during these tests."

END OF SECTION 34 41 13 – TRAFFIC SIGNALS

SCHEDULE A – PART 3: SUPPLEMENT TO THE MMCD STANDARD DETAIL DETAILED DRAWINGS (INCLUDED IN MMCD PLATINUM EDITION VOLUME II, 2009)

MMCD Standard Detail Drawings is amended herein.

1.0 GENERAL – new section added to MMCD Standard Detail Drawings

These District of North Vancouver 'Supplemental Standard Detail Drawings' (SSDD) are to be used in conjunction with Master Municipal Construction Documents (MMCD) Platinum Edition produced by the Master Municipal Construction Documents Association dated 2009 Standard Detail Drawings. Any MMCD Standard Detail Drawings not amended herein are adopted as published in the Master Municipal Specifications (2009). Where there are conflicts or discrepancies between these District of North Vancouver 'Supplemental Standard Detail Drawings' and the MMCD 'Standard Detail Drawings', the District of North Vancouver 'Supplemental Standard Detail Drawings' will take precedence.

2.0 TABLE OF CONTENTS – new section added to MMCD

2.1 Drawing Table of Contents – **Major Sections** – new section added to MMCD

Section	Drawing Description
C	Concrete and Miscellaneous Details
CE	Concrete Base
SSD-D	Storm Sewers
E / SSD-E	Electrical
G / SSD-G	General Details
SSD-L	Landscape
R / SSD-R	Roadworks
S	Storm and Sanitary Sewers
SSD-S	Sanitary Sewers
W / SSD-W	Waterworks & Cathodic Protection

2.2 Drawing Table of Contents – **All Sections** – new section added to MMCD, and amends MMCD

The following table of contents references the MMCD and indicates where revisions or deletions to the MMCD, or new drawings, have been incorporated as part of the Bylaw.

MMCD STANDARD DETAIL DRAWINGS are listed in their entirety followed by the District of North Vancouver - SUPPLEMENTAL STANDARD DRAWINGS

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C1	Concrete Sidewalk, Infill and Barrier Curb	MMCD		
C2	Concrete Sidewalk and Barrier Curb	MMCD		
C3	Concrete Sidewalk and Rollover Curb	MMCD		
C4	Concrete Curbs - Narrow Base	MMCD	Superseded	R-13
C5	Concrete Curbs - Wide Base	MMCD		
C6	Concrete Median Curb and Interim Curbs	MMCD		
C7	Driveway Crossing for Barrier Curbs	MMCD	Superseded	R-17
C8	Wheelchair Ramp for Sidewalk, Infill and Barrier Curbs	MMCD	Superseded	R-14 & R-15
C9	Wheelchair Ramp for Sidewalk and Barrier Curbs	MMCD	Superseded	R-14 & R-15
C10	Concrete Walkway	MMCD		
C11	Bicycle Baffle	MMCD		
C12	Removable Restriction Post	MMCD	Superseded	G-9
C13	Chain Link Fence for Walkway	MMCD		
C14	Handrail on Concrete Retaining Wall	MMCD		
		MMCD		
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CE1.7	Type C4 & C5 Spread Footing Concrete Bases	MMCD		
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CE1.11	Types F1, L1 & S1 Spread Footing Shape Concrete Bases	MMCD		

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CE1.19	Pole Base Installation Details	MMCD		
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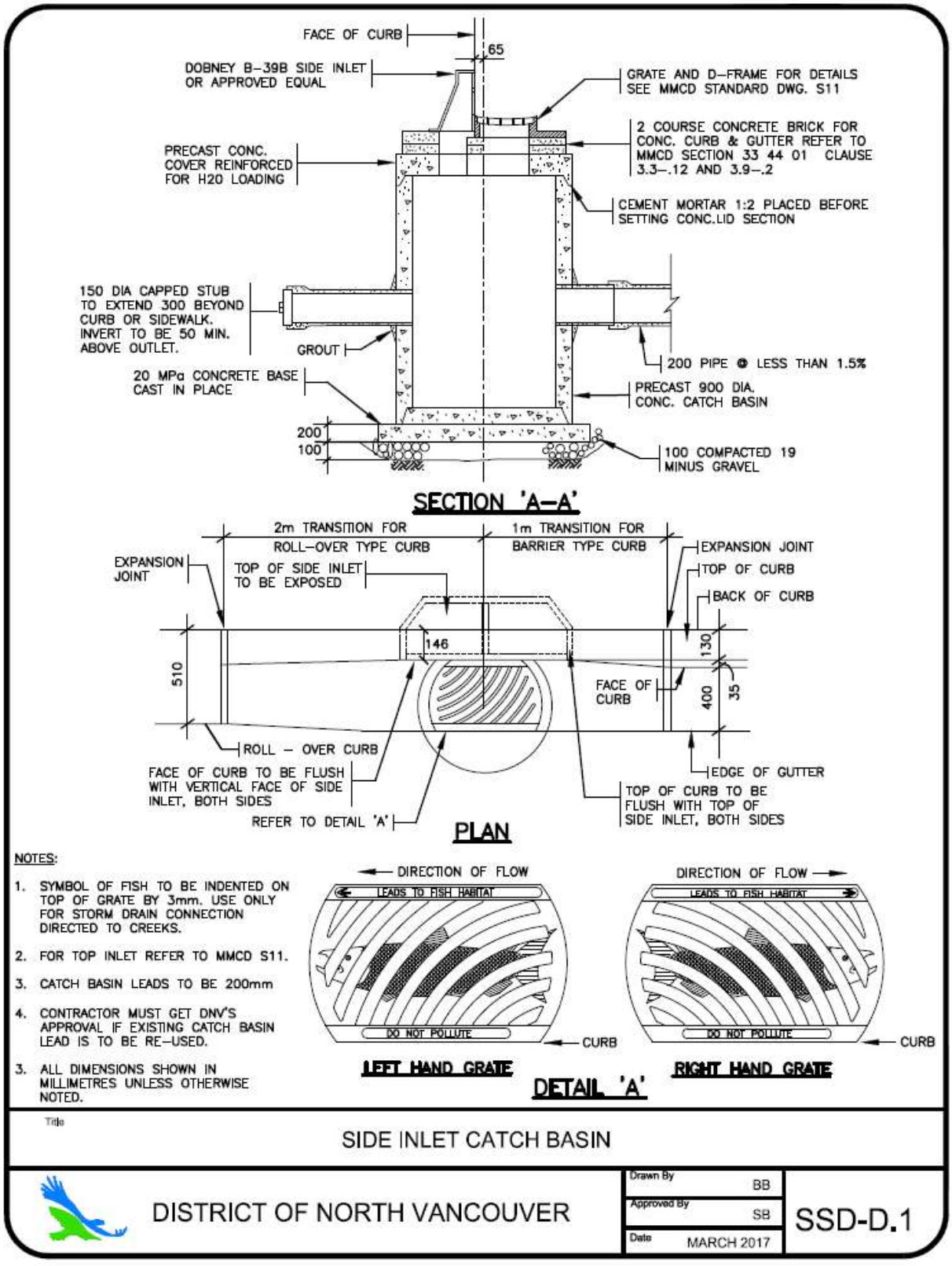
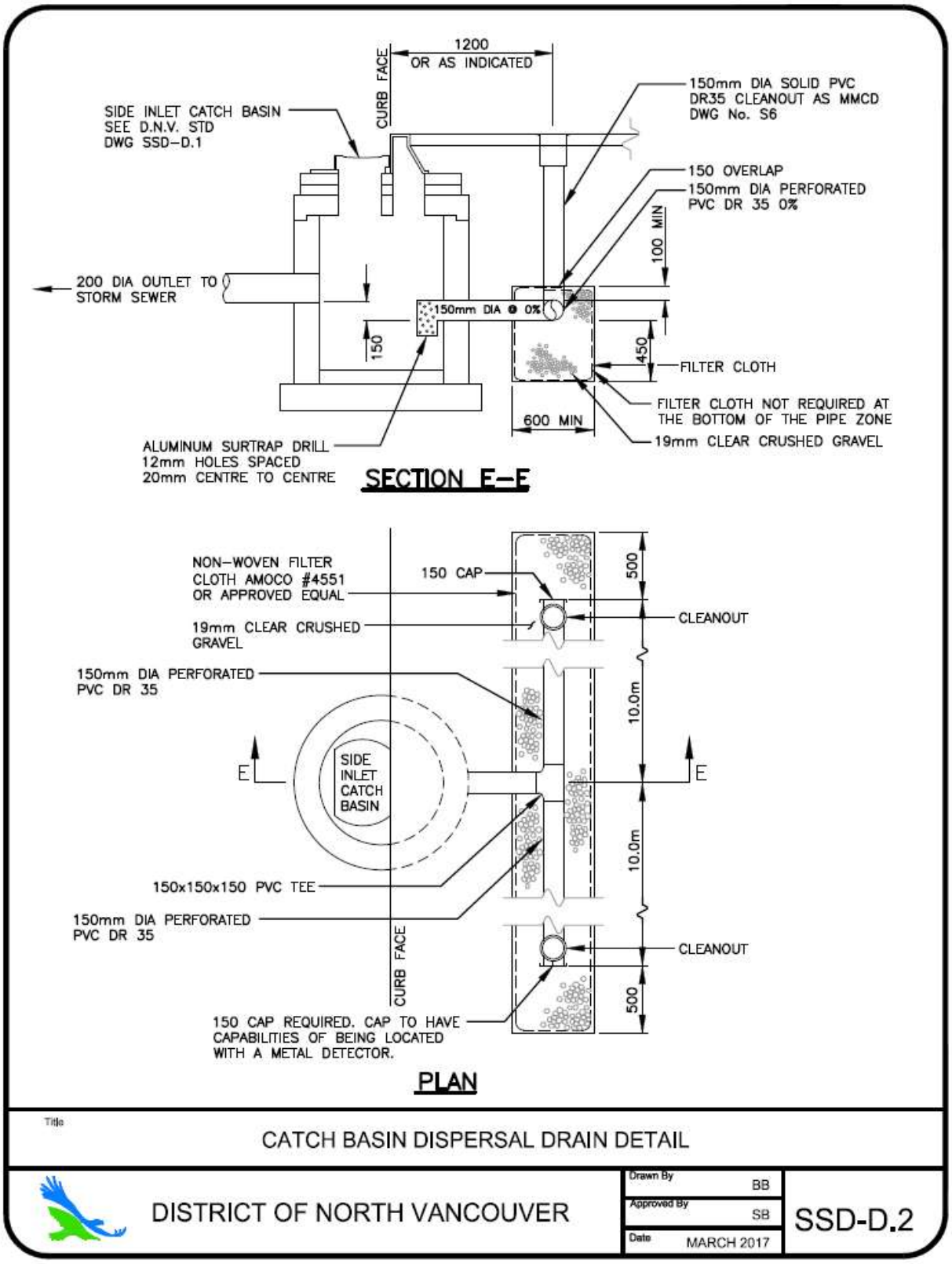
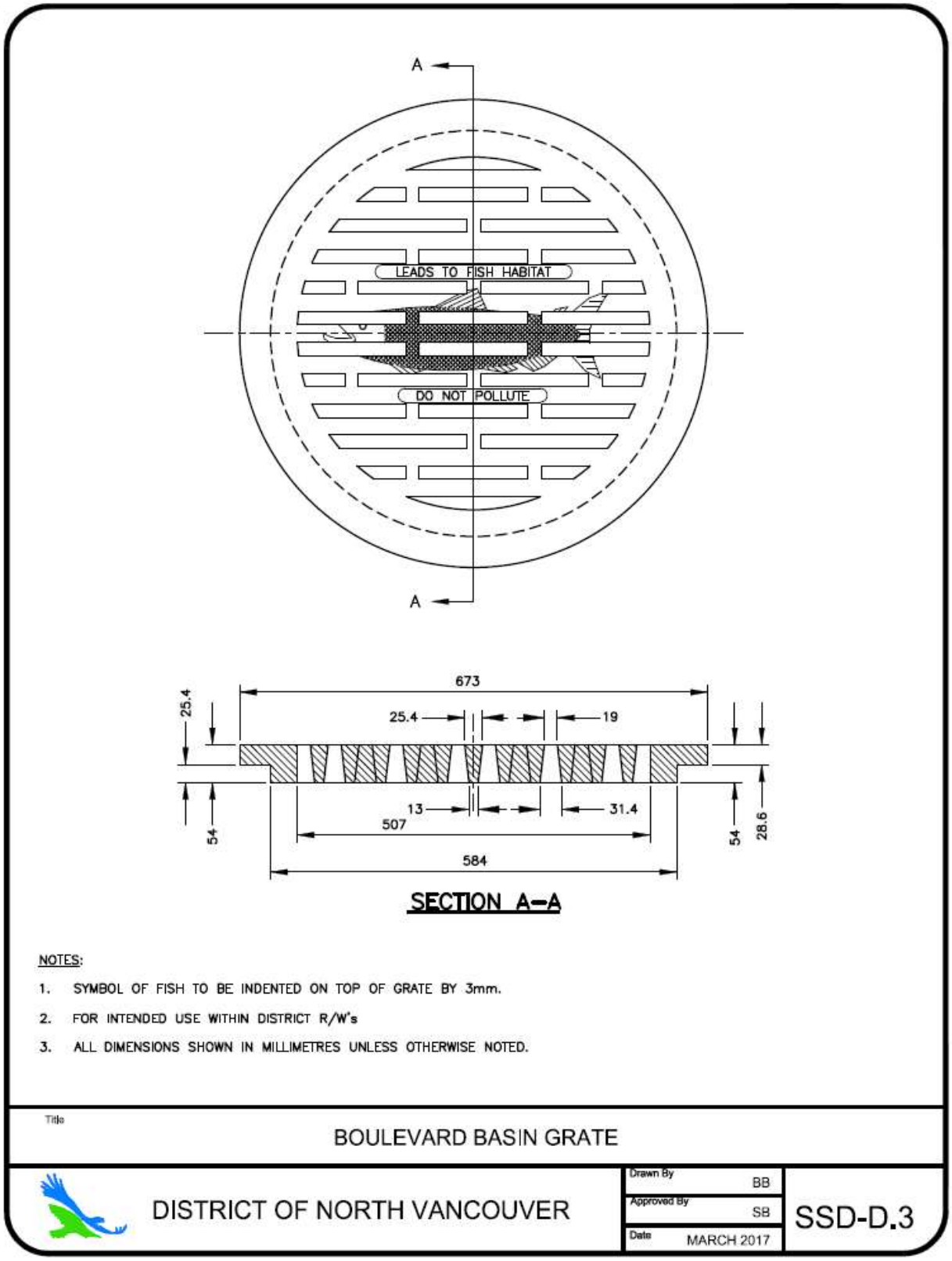

FACE OF CURB
65
DOBNEY B-39B SIDE INLET OR APPROVED EQUAL
GRATE AND D-FRAME FOR DETAILS SEE MMCD STANDARD DWG. S11
2 COURSE CONCRETE BRICK FOR CONC. CURB & GUTTER REFER TO MMCD SECTION 33 44 01 CLAUSE 3.3-.12 AND 3.9-.2
PRECAST CONC. COVER REINFORCED FOR H20 LOADING
CEMENT MORTAR 1:2 PLACED BEFORE SETTING CONC.LID SECTION
150 DIA CAPPED STUB TO EXTEND 300 BEYOND CURB OR SIDEWALK. INVERT TO BE 50 MIN. ABOVE OUTLET.
GROUT
200 PIPE @ LESS THAN 1.5%
20 MPa CONCRETE BASE CAST IN PLACE
PRECAST 900 DIA. CONC. CATCH BASIN
200
100
100 COMPACTED 19 MINUS GRAVEL
SECTION 'A-A'
2m TRANSITION FOR ROLL-OVER TYPE CURB
1m TRANSITION FOR BARRIER TYPE CURB
EXPANSION JOINT
TOP OF SIDE INLET TO BE EXPOSED
EXPANSION JOINT
TOP OF CURB
BACK OF CURB
146
510
130
FACE OF CURB
400
35
ROLL - OVER CURB
EDGE OF GUTTER
FACE OF CURB TO BE FLUSH WITH VERTICAL FACE OF SIDE INLET, BOTH SIDES
REFER TO DETAIL 'A'
TOP OF CURB TO BE FLUSH WITH TOP OF SIDE INLET, BOTH SIDES
PLAN
NOTES:
1. SYMBOL OF FISH TO BE INDENTED ON TOP OF GRATE BY 3mm. USE ONLY FOR STORM DRAIN CONNECTION DIRECTED TO CREEKS.
2. FOR TOP INLET REFER TO MMCD S11.
3. CATCH BASIN LEADS TO BE 200mm
4. CONTRACTOR MUST GET DNV'S APPROVAL IF EXISTING CATCH BASIN LEAD IS TO BE RE-USED.
3. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS OTHERWISE NOTED.
DIRECTION OF FLOW
LEADS TO FISH HABITAT
DO NOT POLLUTE
CURB
LEFT HAND GRATE
DIRECTION OF FLOW
LEADS TO FISH HABITAT
DO NOT POLLUTE
CURB
RIGHT HAND GRATE
DETAIL 'A'
Title
SIDE INLET CATCH BASIN
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-D.1


1200
OR AS INDICATED
CURB FACE
SIDE INLET CATCH BASIN
SEE D.N.V. STD
DWG SSD-D.1
150mm DIA SOLID PVC
DR35 CLEANOUT AS MMCD
DWG No. S6
150 OVERLAP
150mm DIA PERFORATED
PVC DR 35 0%
100 MIN
200 DIA OUTLET TO
STORM SEWER
150mm DIA @ 0%
150
450
FILTER CLOTH
FILTER CLOTH NOT REQUIRED AT
THE BOTTOM OF THE PIPE ZONE
600 MIN
19mm CLEAR CRUSHED GRAVEL
ALUMINUM SURTRAP DRILL
12mm HOLES SPACED
20mm CENTRE TO CENTRE
SECTION E-E
NON-WOVEN FILTER
CLOTH AMOCO #4551
OR APPROVED EQUAL
150 CAP
500
CLEANOUT
19mm CLEAR CRUSHED
GRAVEL
150mm DIA PERFORATED
PVC DR 35
10.0m
E
E
SIDE
INLET
CATCH
BASIN
150x150x150 PVC TEE
150mm DIA PERFORATED
PVC DR 35
CURB FACE
CLEANOUT
500
150 CAP REQUIRED. CAP TO HAVE
CAPABILITIES OF BEING LOCATED
WITH A METAL DETECTOR.
PLAN
Title
CATCH BASIN DISPERSAL DRAIN DETAIL
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-D.2



SECTION A–A

NOTES:

1. SYMBOL OF FISH TO BE INDENTED ON TOP OF GRATE BY 3mm.
2. FOR INTENDED USE WITHIN DISTRICT R/W's
3. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS OTHERWISE NOTED.

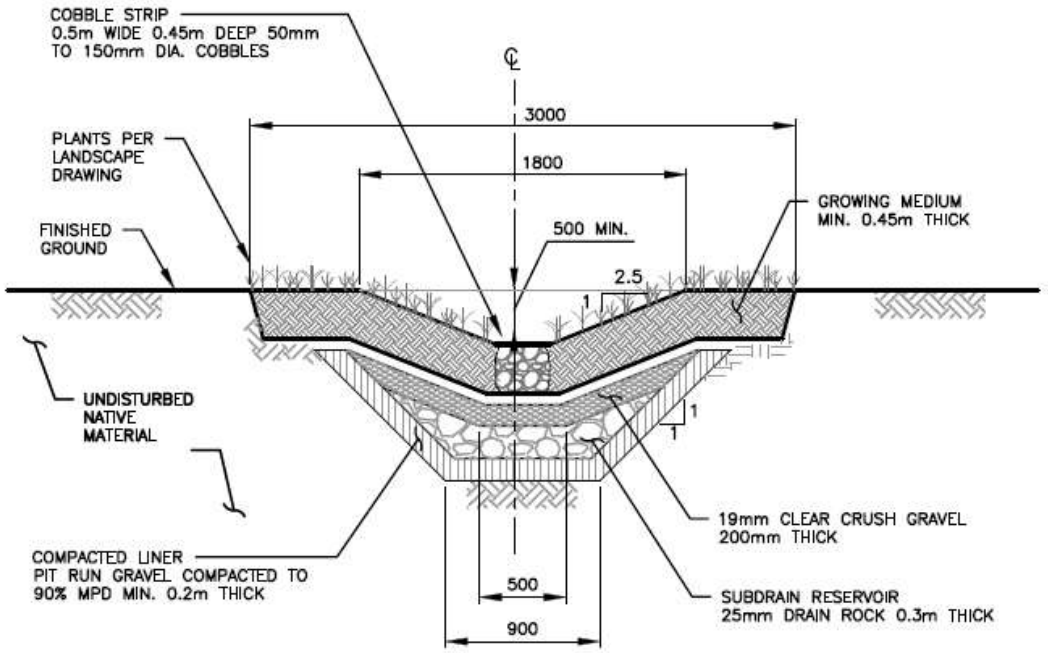
Title

BOULEVARD BASIN GRATE

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-D.3



NOTES:

1. SWALE TYPICALLY CENTERED ON 3.0m RIGHT OF WAY.
2. SOD TO BE PLACED ON MINIMUM 100mm TOPSOIL.
3. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
4. THE DNV RESERVES THE TO REQUEST THE USE OF NON-WOVEN GEOTEXTILE NILEX 4553 OR EQUIVALENT.

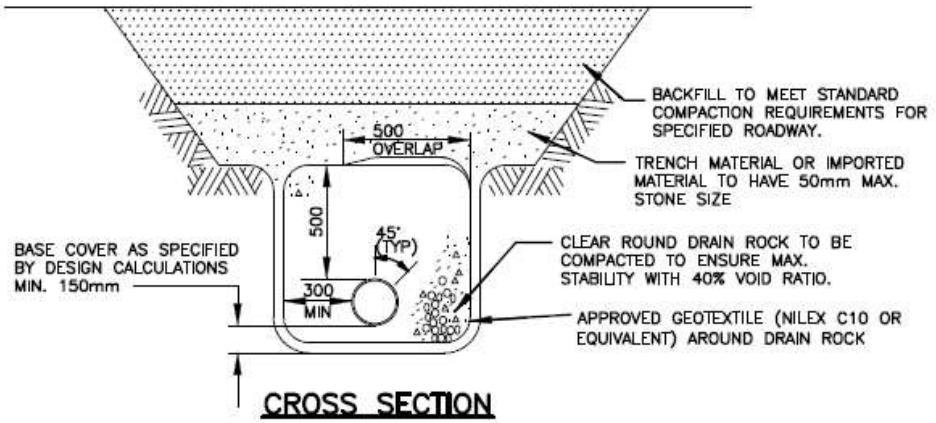
Title

TYPICAL BIOSWALE DETAIL

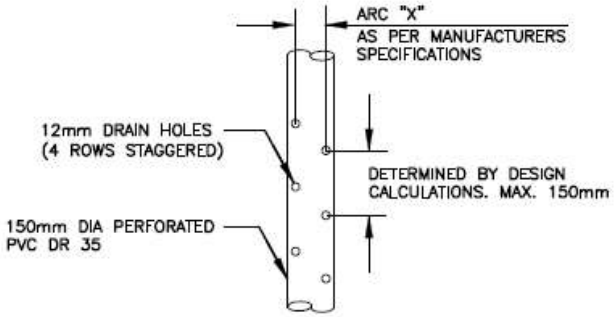
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-D.4



CROSS SECTION



PLAN VIEW

NOTES:

1. USE PERFORATED PVC PIPES.
2. FIELD PERFORATION OF PIPE SHALL BE TO THIS STANDARD. FACTORY PERFORATED PIPE MUST BE APPROVED BY THE MUNICIPAL ENGINEER.
3. PROVIDE 0.5m MINIMUM OVERLAP FOR LONGITUDINAL OR TRANSVERSE JOINTS IN FABRIC.
4. FILTER FABRIC TO BE APPROVED BY THE MUNICIPAL ENGINEER.
5. CLEAR DRAIN ROCK TO BE 25mm SIZE.
6. ENSURE NO SILT OR CLAY LENS ADJACENT TO TRENCH WALL.
7. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

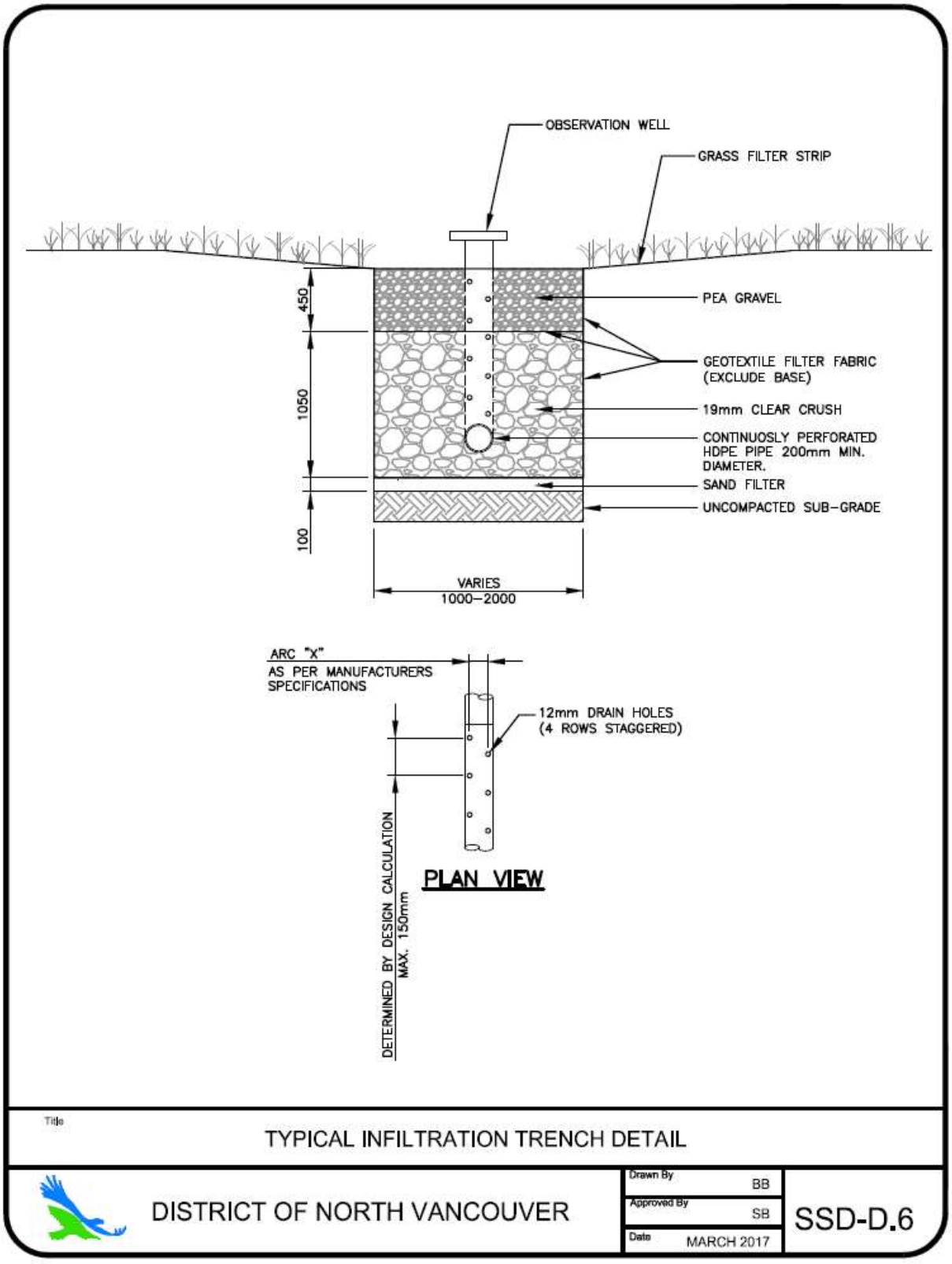
Title

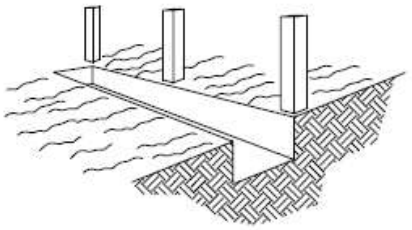
TYPICAL EXFILTRATION TRENCH DETAIL

DISTRICT OF NORTH VANCOUVER

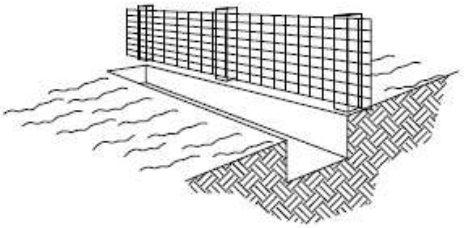
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-D.5

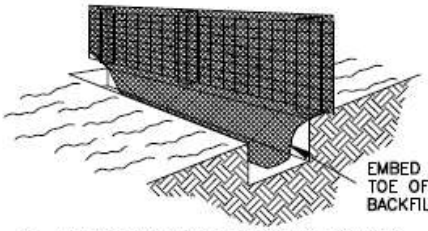

OBSERVATION WELL
GRASS FILTER STRIP
450
1050
100
PEA GRAVEL
GEOTEXTILE FILTER FABRIC
(EXCLUDE BASE)
19mm CLEAR CRUSH
CONTINUOSLY PERFORATED
HDPE PIPE 200mm MIN.
DIAMETER.
SAND FILTER
UNCOMPACTED SUB-GRADE
VARIES
1000-2000
ARC "X"
AS PER MANUFACTURERS
SPECIFICATIONS
12mm DRAIN HOLES
(4 ROWS STAGGERED)
DETERMINED BY DESIGN CALCULATION
MAX. 150mm
PLAN VIEW
Title
TYPICAL INFILTRATION TRENCH DETAIL
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-D.6



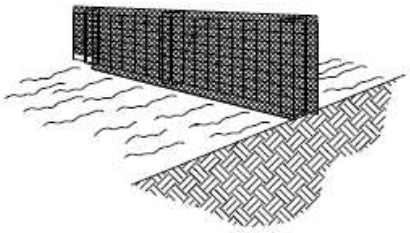
1. SET POSTS AND EXCAVATE A 100 x 100mm TRENCH UPSLOPE FROM AND ALONG THE LINE OF POSTS.



2. STAPLE WIRE FENCING TO THE POSTS.



3. ATTACH THE FILTER FABRIC TO THE WIRE FENCE AND EXTEND IT INTO THE TRENCH.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.

INSTALLATION PROCEDURE

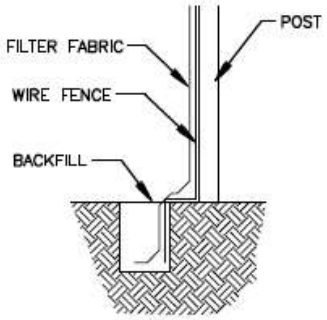
1. LAY OUT A SUITABLE FENCE LINE AND SET POSTS ALONG IT. ON SLOPES, ALIGN THE FENCE ALONG THE CONTOUR AS CLOSELY AS POSSIBLE. IN SMALL SWALES, CURVE THE FENCE LINE UPSTREAM AT THE SIDES TO DIRECT THE FLOW TOWARDS THE MIDDLE OF THE FENCE. THE ENDS SHOULD BE HIGHER THAN THE CENTRE. EXCAVATE A TRENCH APPROXIMATELY 100mm DEEP ALONG THE LINE OF THE POSTS ON THE UPHILL SIDE OF THE BARRIER.
2. FASTEN WIRE MESH TO THE UPHILL SIDE OF THE FENCE POSTS, USING HEAVY–DUTY WIRE STAPLES (MIN. 25mm LONG). EXTEND WIRE AT LEAST 150mm INTO THE TRENCH, AND LEAVE APPROXIMATELY 900mm HEIGHT ABOVE THE GROUND. IF EXTRA–STRENGTH FABRIC IS USED AND FENCE POST SPACING DOES NOT EXCEED 1.8m, THE WIRE MESH MAY BE OMITTED.
3. FASTEN THE FILTER FABRIC TO THE UPHILL SIDE OF THE FENCE POSTS USING STAPLES OR TIE WIRES. EXTEND FABRIC AT LEAST 150mm INTO THE TRENCH, AND LEAVE A MAXIMUM OF 900mm HEIGHT ABOVE THE GROUND. CUT THE FABRIC FROM A CONTINUOUS ROLL TO AVOID THE USE OF JOINTS. WHERE JOINTS ARE NECESSARY, SPLICE THE FABRIC AT A POST WITH A MINIMUM 150mm OVERLAP, AND SECURELY FASTEN BOTH SECTIONS TO THE POST.
4. BACKFILL THE TRENCH OVER THE TOE OF THE FABRIC, AND COMPACT THE SOIL TO MEET THE ORIGINAL GRADE.

MATERIALS

FILTER FABRIC:
- NICOLAN CONTROL AND CONTROL PLUS
- AMOCO 1380
- NILEX P100 OR AS APPROVED
- EXXON GTF 150
- EXXON GTF 200

WIRE MESH:
- MIN. 14 GAUGE STEEL WIRE
- MIN. 150mm MESH SPACING

FENCE POSTS:
- WOOD POSTS – MIN. 100 x 100 x 1500 LONG
- STEEL POSTS – MIN. 1.97kg/m x 1500 LONG



NOTES:

1. INSPECT AFTER EVERY RAINFALL.
2. REMOVE SEDIMENT BEFORE DEPTH REACHES 1/2 HEIGHT OF FENCE
3. REPAIR AS REQUIRED
4. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

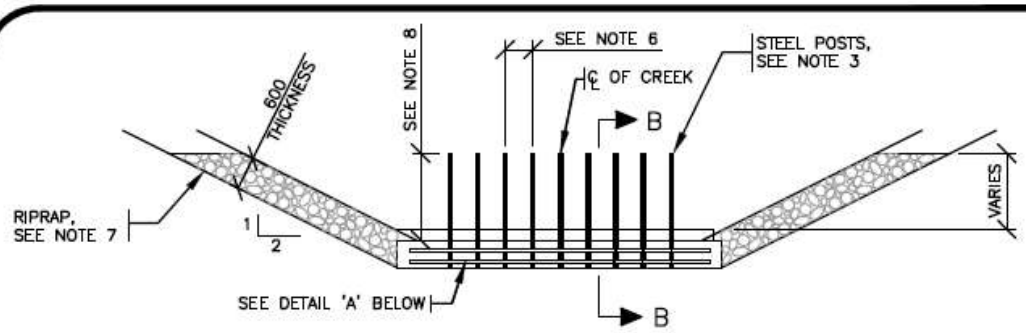
Title

TYPICAL SILT FENCE INSTALLATION

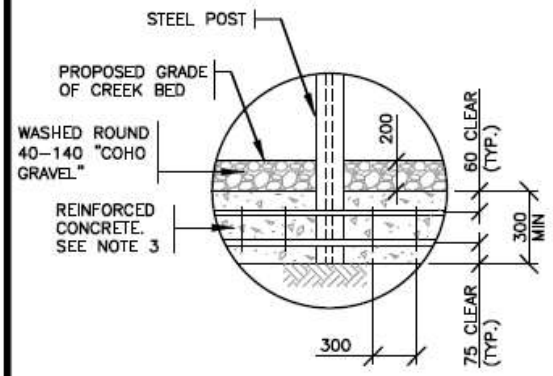
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

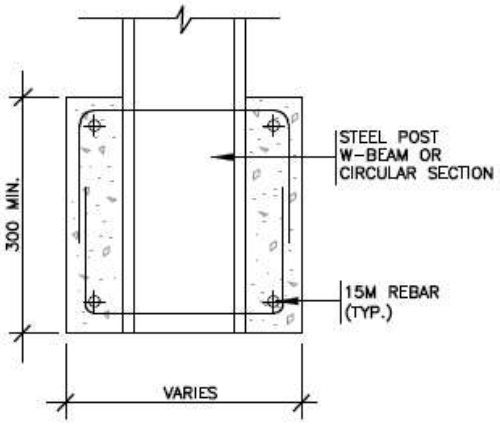
SSD-D.7



FRONT VIEW



DETAIL 'A'



SECTION 'B–B'

NOTES:

1. DRAWING DETAILS INTENDED FOR GENERAL GUIDELINE ONLY. ALL CONSTRUCTION DRAWINGS TO BE STAMPED AND SEALED BY PROFESSIONAL ENGINEER REGISTERED IN BRITISH COLUMBIA.
2. CONSTRUCTION OF DEBRIS BARRIERS IN CREEKS REQUIRES PRIOR APPROVAL FROM DISTRICT OF NORTH VANCOUVER AND MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS.
3. MATERIAL SPECIFICATIONS:
   - STEEL POSTS TO BE HOT DIPPED GALVANIZED;
     - W–BEAM: W200 X 100 TO CSA–G40.20 350W, OR;
     - CIRCULAR POST: DN200 SCHEDULE 80 TO ASTM A53, GRADE CAPPED OR CONCRETE FILLED. (CIRCULAR POSTS TO BE CONSIDERED WHERE AESTHETICS IS CRITICAL.)
   - CONCRETE: CSA A23.1, EXPOSURE CLASS F–1, 28 DAY COMPRESSIVE STRENGTH 35MPA MIN.
   - REINFORCEMENT: CSA G30.18 GRADE 400W
4. LOCATE BARRIER MINIMUM 4.0 METRES FROM CULVERT INLET (IF APPLICABLE). OPTIMUM LOCATION IS AS CLOSE TO THE 4.0 METRE SETBACK AS POSSIBLE.
5. IN EVENT OF BLOCKAGE. FLOW INTENDED TO PASS AROUND OUTSIDE OF BARRIER.
6. OPEN WIDTH BETWEEN POSTS SHOULD BE 1.5 TIMES D_{50} OF DESIGN PARTICLE SIZE TO BE CAPTURED. (USE 500mm IF PARTICLE SIZE UNKNOWN.)
7. RIP RAP IN ACCORDANCE WITH SSD–D.9. LIGHT, HEAVY OR CUSTOM RIP RAP TO BE SPECIFIED BY APPROVING ENGINEER.
8. POST HEIGHT PROJECTION TO SUIT CHANNEL AND PROVIDE MEANS FOR OVERFLOW WHEN BLOCKED FULL HEIGHT. AT CULVERT INLETS, SHOULD EXTEND 0.5 METRES ABOVE HEIGHT OF CULVERT. MINIMUM PROJECTION HEIGHT 1.0 METRES.
9. DESIGN AND LAYOUT TO ALLOW FOR ACCESS TO CLEAR DEBRIS FROM STRUCTURE BY A BACKHOE WITH A MAXIMUM REACH OF 6.0 METRES.
10. MAINTENANCE ACCESS ROAD (IF REQUIRED FOR ACCESS) TO BE MIN 3.0 METRES WIDTH. GRADE WITH 75mm MINUS SUB–BASE AS REQUIRED AND TOP WITH MIN. 150mm THICK 19mm BASE.
11. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS NOTED OTHERWISE.

Title

DEBRIS BARRIERS FOR WATERCOURSES

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-D.8

BROKEN ROCK RIPRAP SPECIFICATIONS
LIGHT RIPRAP AND HEAVY RIPRAP

SI METRIC UNITS

% BY WEIGHT FINER THAN	MASS (kg)	APPROX. EQUIVALENT DIAMETER (mm)
100	300	660
NOT MORE THAN 50	140	450
NOT MORE THAN 10	5	150

IMPERIAL UNITS

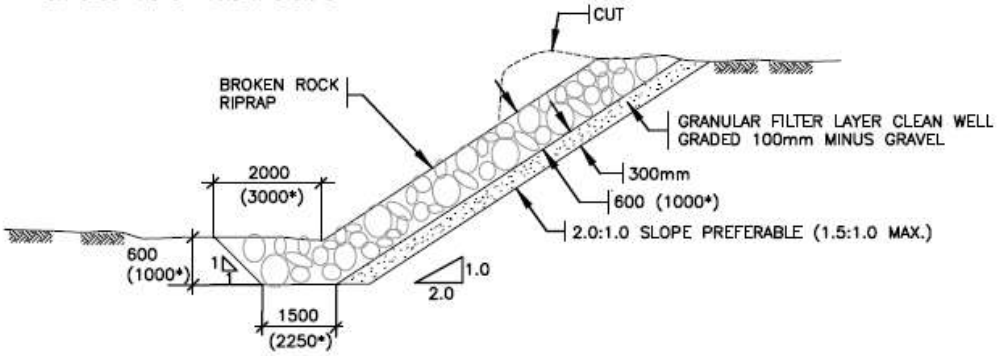
% BY WEIGHT FINER THAN	MASS (lb)	APPROX. EQUIVALENT DIAMETER (inches)
100	660	24
NOT MORE THAN 50	300	18
NOT MORE THAN 10	10	6

ROCK RIPRAP SHALL:

1. CONSIST OF DENSE, DURABLE, ROUGHLY EQUI–DIMENSIONAL, ANGULAR PIECES.
2. BE CLEAN AND REASONABLY WELL GRADED COVERING THE COMPLETE ALLOWABLE SIZE RANGE FOR EVERY LOAD LEAVING THE QUARRY.
3. BE FREE FROM CRACKS, SEAMS AND OTHER DEFECTS THAT WOULD TEND TO INCREASE UNDULY ITS DETERIORATION FROM NATURAL CAUSES.
4. BE FREE OF OBJECTIONABLE QUANTITIES OF DIRT, SAND, CLAY AND ROCK FINES.
5. BE SHAPED SUCH THAT NEITHER THE BREADTH NOR THICKNESS OF ANY INDIVIDUAL PIECE SHALL BE LESS THAN ONE THIRD OF ITS LENGTH.

RIPRAP PLACEMENT:

1. ROCK RIPRAP SHALL BE PLACED IN SUCH A MANNER AS TO PRODUCE A REASONABLY WELL GRADED MASS OF ROCK WITH THE MINIMUM PRACTICABLE PERCENTAGE OF VOIDS.
2. NO ROCK SHALL PROTRUDE MORE THAN 300mm ABOVE THE LINES AND GRADES SHOWN.
3. THE FINISHED RIPRAP SHALL BE FREE FROM OBJECTIONABLE POCKETS OF SMALL STONES AND / OR CLUSTERS OF LARGER STONES



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. UNITS SHOWN WITH ASTERISK (*) ARE DIMENSIONS REQUIREMENT FOR HEAVY RIPRAP DESIGN

TYPICAL SECTION

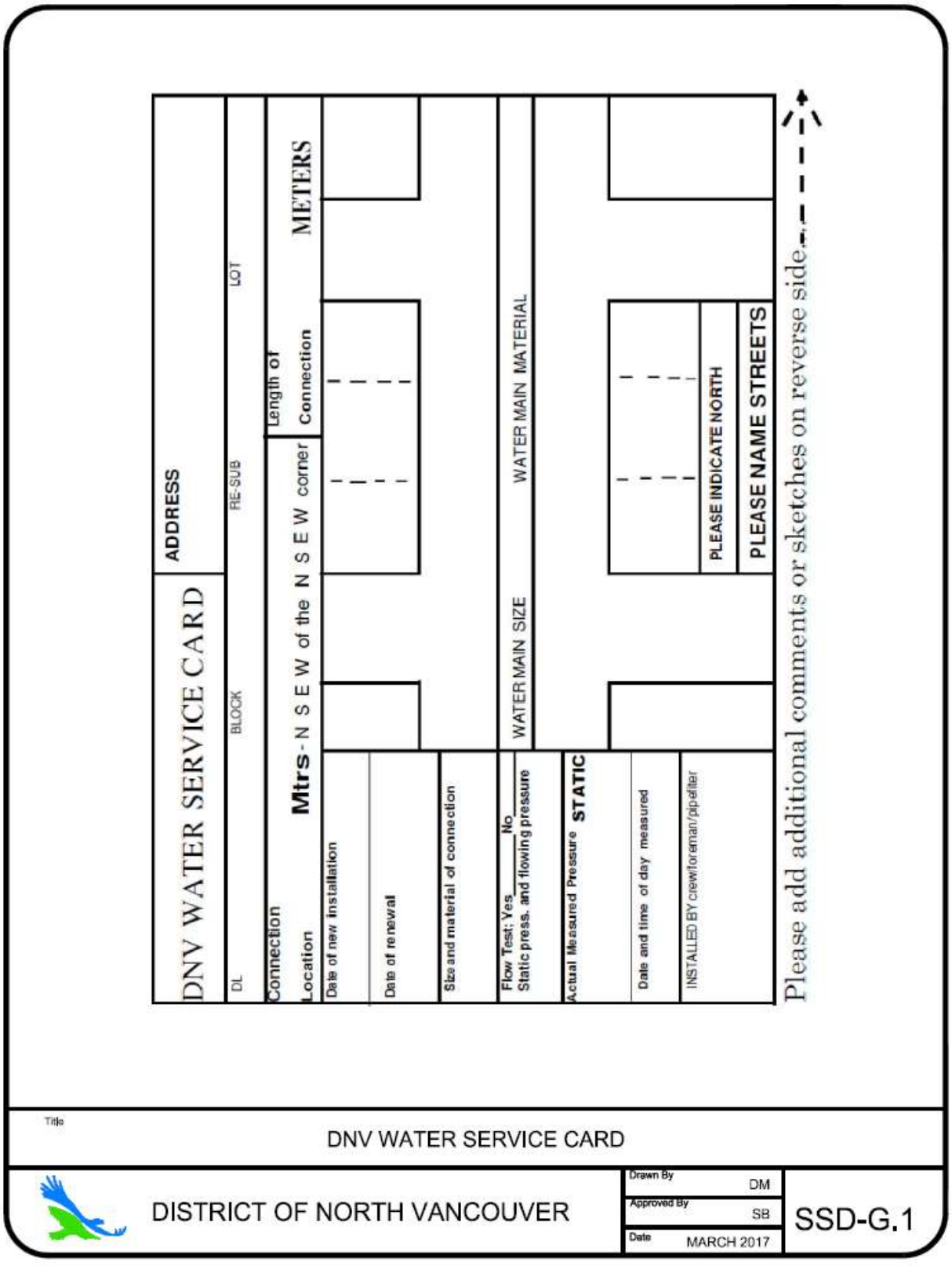
Title

TYPICAL BANK PROTECTION (LIGHT RIPRAP AND HEAVY RIPRAP)

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-D.9


DNV WATER SERVICE CARD
ADDRESS
DL
BLOCK
RE-SUB
LOT
Connection
Location
Mtrs - N S E W of the N S E W corner
Length of Connection
METERS
Date of new installation
Date of renewal
Size and material of connection
Flow Test: Yes No
Static press. and flowing pressure
WATER MAIN SIZE
WATER MAIN MATERIAL
Actual Measured Pressure STATIC
Date and time of day measured
INSTALLED BY crew/foreman/pipefitter
PLEASE INDICATE NORTH
PLEASE NAME STREETS
Please add additional comments or sketches on reverse side.
Title
DNV WATER SERVICE CARD
DISTRICT OF NORTH VANCOUVER
Drawn By DM
Approved By SB
Date MARCH 2017
SSD-G.1

DNV Ductile Iron Water Service Connection As-Built

100mm and larger connections

Address:	
Date work started:	Date work completed:
Size and material of connection:	
Connection Location: _____ Meters N S E W from the N S E W Corner	
Length of run from Water Main to property line: _____Meters	
Size and material of Water Main:	
Method used to connect to main List fittings	
Size and configuration of valve used at Main i.e. 150mm Flg x Tyt	Size and configuration of valve used at P.L.
Type of restraints used and where:	

Overhead view drawing of configuration at water main showing and listing all parts , thrust block etc. Indicate North.	Parts list:

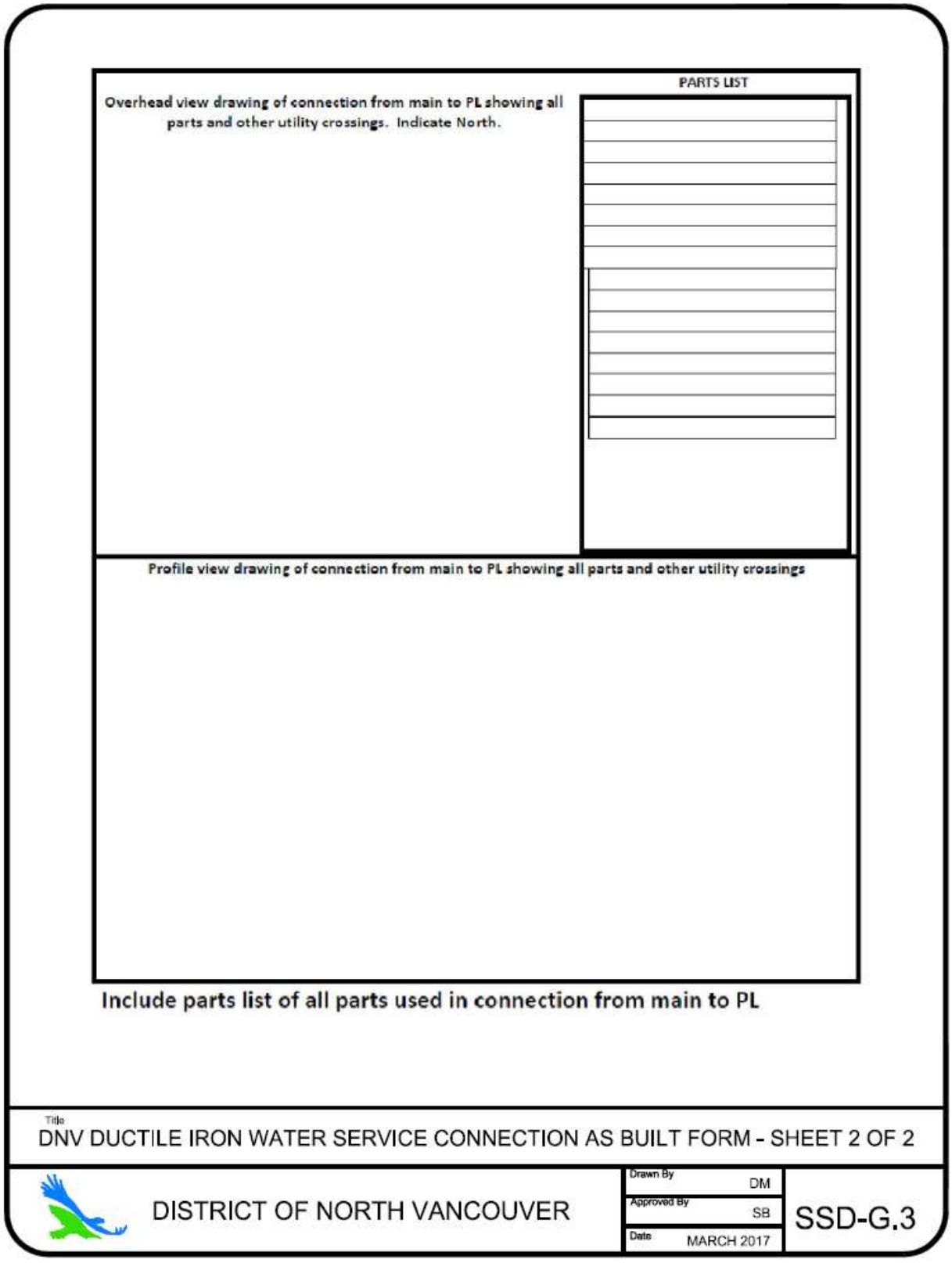
Please complete drawings on other side

Title
DNV DUCTILE IRON WATER SERVICE CONNECTION AS BUILT FORM - SHEET 1 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	DM
Approved By	SB
Date	MARCH 2017

SSD-G.2


PARTS LIST
Overhead view drawing of connection from main to PL showing all parts and other utility crossings. Indicate North.
Profile view drawing of connection from main to PL showing all parts and other utility crossings
Include parts list of all parts used in connection from main to PL
Title
DNV DUCTILE IRON WATER SERVICE CONNECTION AS BUILT FORM - SHEET 2 OF 2
DISTRICT OF NORTH VANCOUVER
Drawn By DM
Approved By SB
Date MARCH 2017
SSD-G.3

District of North Vancouver
Utilities Department
Connection As-Built Worksheet

Street Address _____

Date work started _____ Date work finished _____

Circle type of connection installation; Sanitary Storm

Size of connection _____ MM Pipe Material _____

Location of Conn. _____ M - N S E W from the N S E W corner

L.O.R. from Main to P.L. _____ Mtr. Size and Material of Main _____

Chainage distance; _____ Meters from downstream MH number _____

If downstream MH not accessible, dist. from upstream MH; _____ M up from MH# _____

Type of connection made into Main _____

Riser off Main ? _____ Angle of Riser off Main in DEG. _____

Height of riser off Main from CL of Main to CL of connection _____ M

Connection Grade _____ % Type and # of bends _____

Depth of cut or fill achieved from invert of IC to IP, HUB, LP, GL _____ M

Installed by Crew Foreman Pipefitter

Sketch Plan View / Overhead view	Sketch Profile / side view

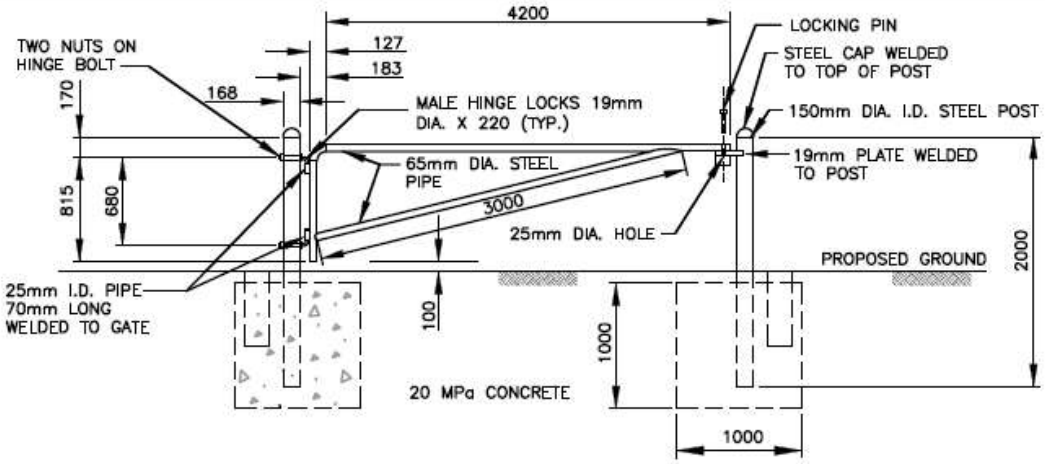
Title

DNV UTILITIES DEPARTMENT CONNECTION AS-BUILT FORM

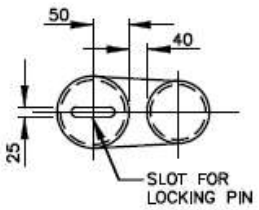
DISTRICT OF NORTH VANCOUVER

Drawn By	DM
Approved By	SB
Date	MARCH 2017

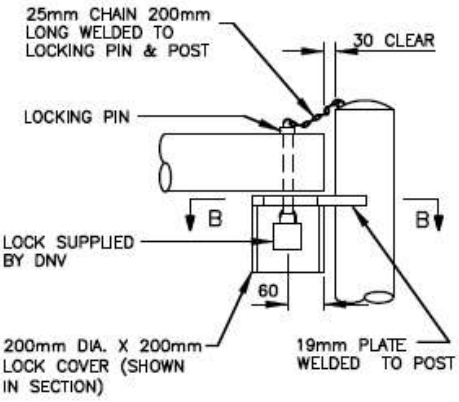
SSD-G.4

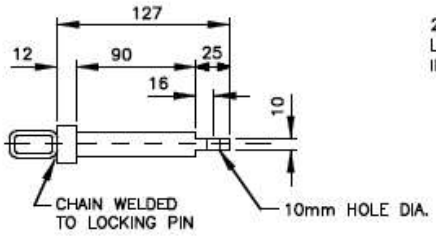


GATE DETAILS

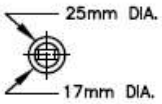


SECTION B–B





SIDE VIEW



END VIEW

GATE LOCKING PIN DETAIL

NOTES:

1. ALL GATE COMPONENTS TO HAVE PRIME COAT AND TWO COATS OF WHITE ENAMEL PAINT. ALL STEEL TO BE A MINIMUM OF A36 GRADE.
2. ALL DIMENSIONS SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED.

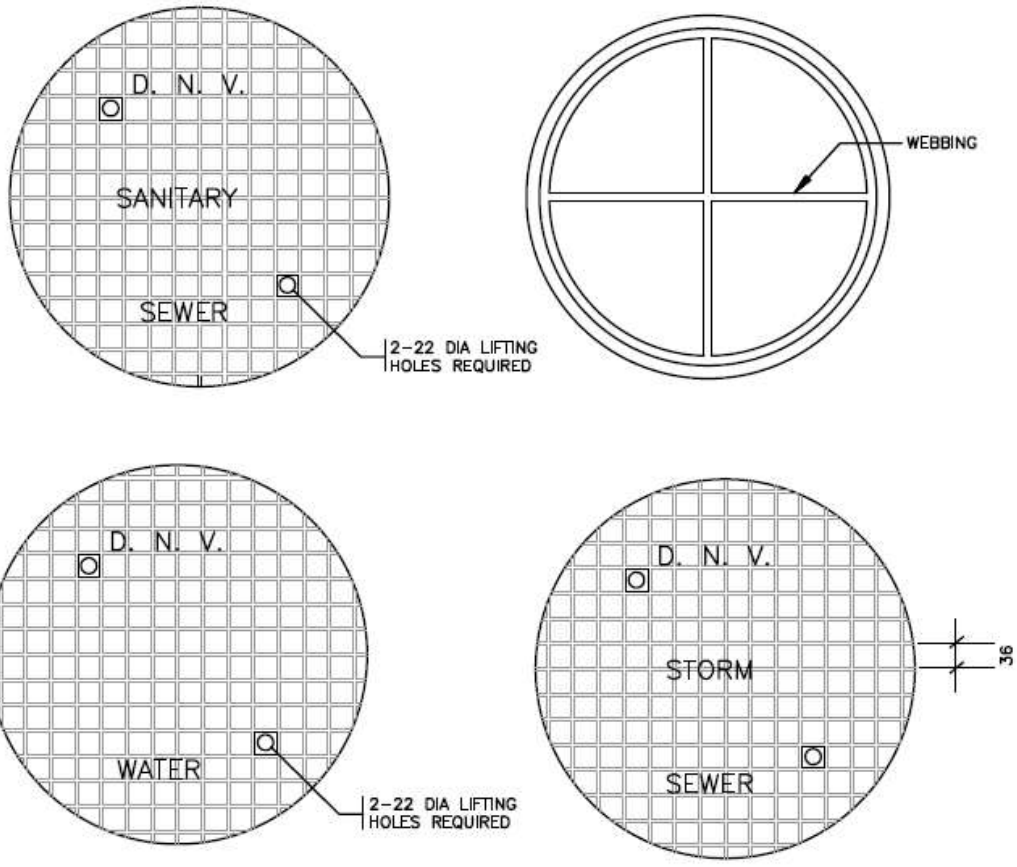
Title

TYPICAL GATE DETAILS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-G.5



NOTES:

1. DNV COVER AND FRAME FOR SANITARY AND STORM TO BE TR18 OR DOBNEY C-18 OR APPROVED EQUAL. DNV COVER AND FRAME FOR WATER TO BE DOBNEY C-44A OR APPROVED EQUAL.
2. LIMITS OF TOLERANCE +/- 2mm
3. COVER SHALL BE MARKED DNV WATER, DNV STORM OR DNV SANITARY AS REQUIRED
4. CASING SHALL BE FINISHED BY COATING WITH HOT ASPHALT AND BLACK PAINT EMULSION.
5. WHERE UNDERSIDE OF COVER AND FRAME MAKE CONTACT, SURFACES TO BE MACHINED.
6. THE FRAME AND COVER SHALL BE ASTM A48 CLASS 30B CAST IRON AND MUST BE H-20 LOADING.
7. LETTERING ON COVER TO BE THE SAME HEIGHT AS THE RAISED SQUARES.
8. THE DISTRICT OF NORTH VANCOUVER DOES NOT ALLOW LOW PROFILE FRAME AND LIDS.
9. ALL DIMENSIONS SHOWN IN MILLIMETRES, UNLESS OTHERWISE NOTED.

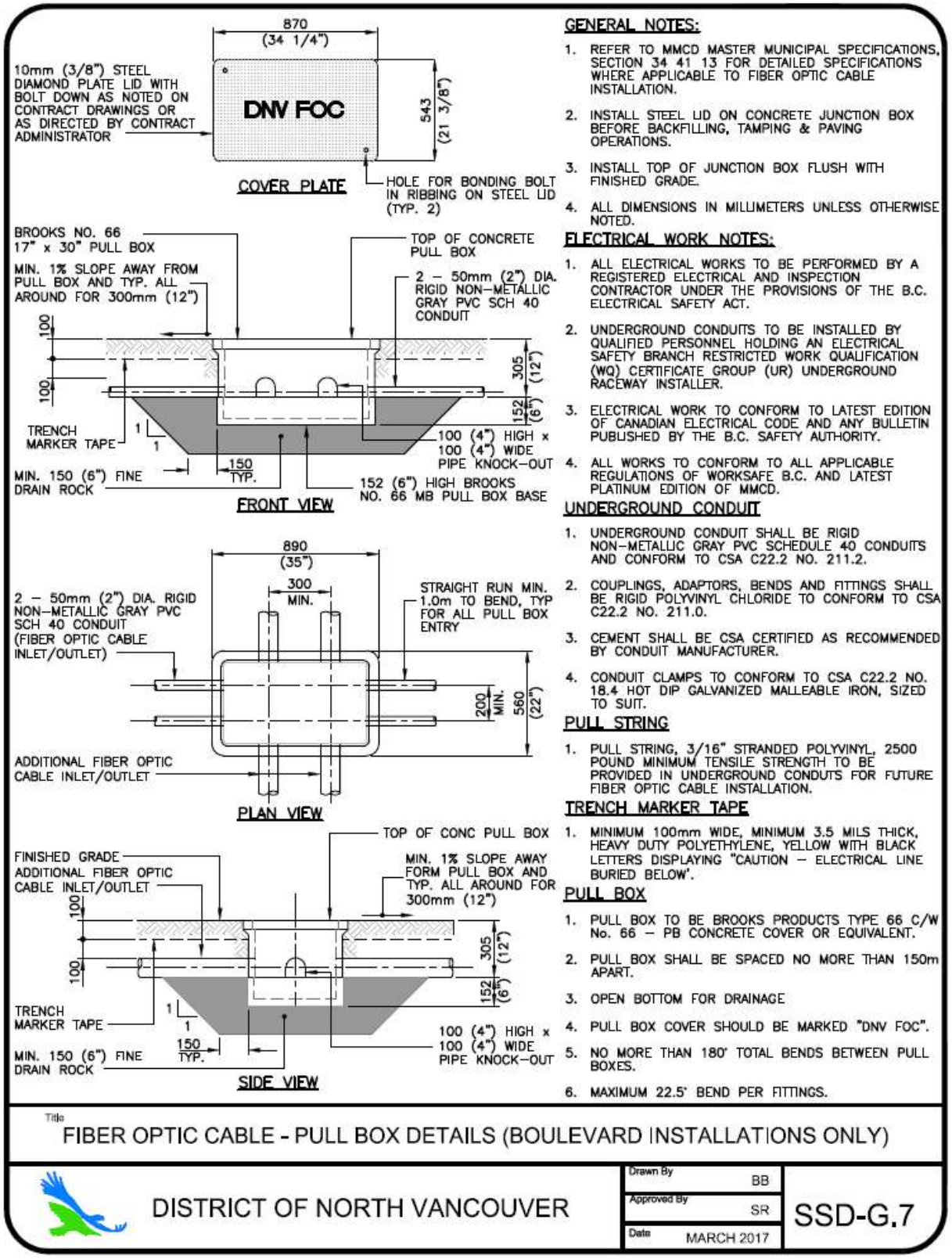
Title

STANDARD MANHOLE / CHAMBER

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-G.6



GENERAL NOTES:

1. REFER TO MMCD MASTER MUNICIPAL SPECIFICATIONS, SECTION 34 41 13 FOR DETAILED SPECIFICATIONS WHERE APPLICABLE TO FIBER OPTIC CABLE INSTALLATION.
2. INSTALL STEEL LID ON CONCRETE JUNCTION BOX BEFORE BACKFILLING, TAMPING & PAVING OPERATIONS.
3. INSTALL TOP OF JUNCTION BOX FLUSH WITH FINISHED GRADE.
4. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

ELECTRICAL WORK NOTES:

1. ALL ELECTRICAL WORKS TO BE PERFORMED BY A REGISTERED ELECTRICAL AND INSPECTION CONTRACTOR UNDER THE PROVISIONS OF THE B.C. ELECTRICAL SAFETY ACT.
2. UNDERGROUND CONDUITS TO BE INSTALLED BY QUALIFIED PERSONNEL HOLDING AN ELECTRICAL SAFETY BRANCH RESTRICTED WORK QUALIFICATION (WQ) CERTIFICATE GROUP (UR) UNDERGROUND RACEWAY INSTALLER.
3. ELECTRICAL WORK TO CONFORM TO LATEST EDITION OF CANADIAN ELECTRICAL CODE AND ANY BULLETIN PUBLISHED BY THE B.C. SAFETY AUTHORITY.
4. ALL WORKS TO CONFORM TO ALL APPLICABLE REGULATIONS OF WORKSAFE B.C. AND LATEST PLATINUM EDITION OF MMCD.

UNDERGROUND CONDUIT

1. UNDERGROUND CONDUIT SHALL BE RIGID NON–METALLIC GRAY PVC SCHEDULE 40 CONDUITS AND CONFORM TO CSA C22.2 NO. 211.2.
2. COUPLINGS, ADAPTORS, BENDS AND FITTINGS SHALL BE RIGID POLYVINYL CHLORIDE TO CONFORM TO CSA C22.2 NO. 211.0.
3. CEMENT SHALL BE CSA CERTIFIED AS RECOMMENDED BY CONDUIT MANUFACTURER.
4. CONDUIT CLAMPS TO CONFORM TO CSA C22.2 NO. 18.4 HOT DIP GALVANIZED MALLEABLE IRON, SIZED TO SUIT.

PULL STRING

1. PULL STRING, 3/16" STRANDED POLYVINYL, 2500 POUND MINIMUM TENSILE STRENGTH TO BE PROVIDED IN UNDERGROUND CONDUITS FOR FUTURE FIBER OPTIC CABLE INSTALLATION.

TRENCH MARKER TAPE

1. MINIMUM 100mm WIDE, MINIMUM 3.5 MILS THICK, HEAVY DUTY POLYETHYLENE, YELLOW WITH BLACK LETTERS DISPLAYING "CAUTION – ELECTRICAL LINE BURIED BELOW".

PULL BOX

1. PULL BOX TO BE BROOKS PRODUCTS TYPE 66 C/W No. 66 – PB CONCRETE COVER OR EQUIVALENT.
2. PULL BOX SHALL BE SPACED NO MORE THAN 150m APART.
3. OPEN BOTTOM FOR DRAINAGE
4. PULL BOX COVER SHOULD BE MARKED "DNV FOC".
5. NO MORE THAN 180° TOTAL BENDS BETWEEN PULL BOXES.
6. MAXIMUM 22.5° BEND PER FITTINGS.

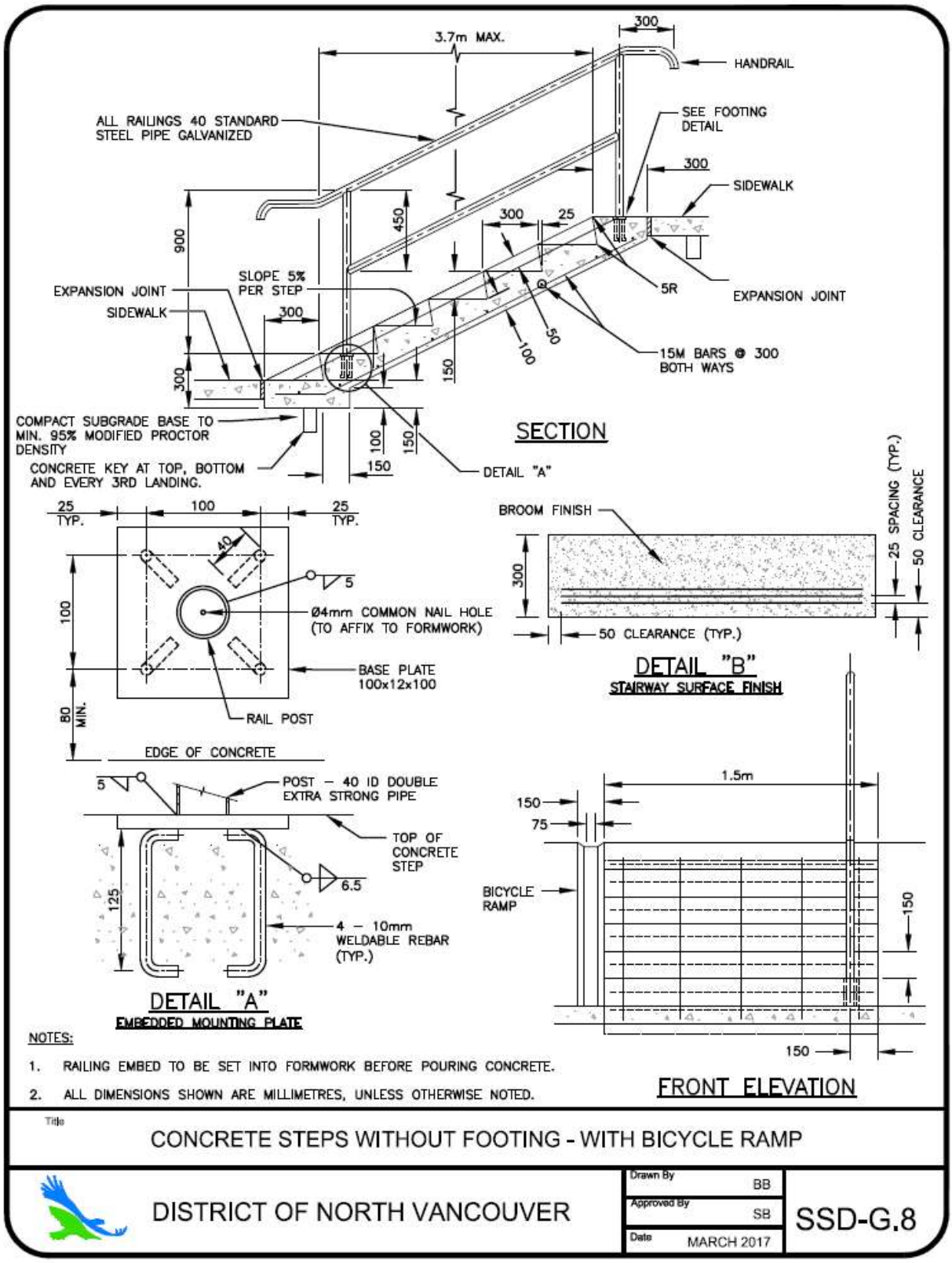
Title

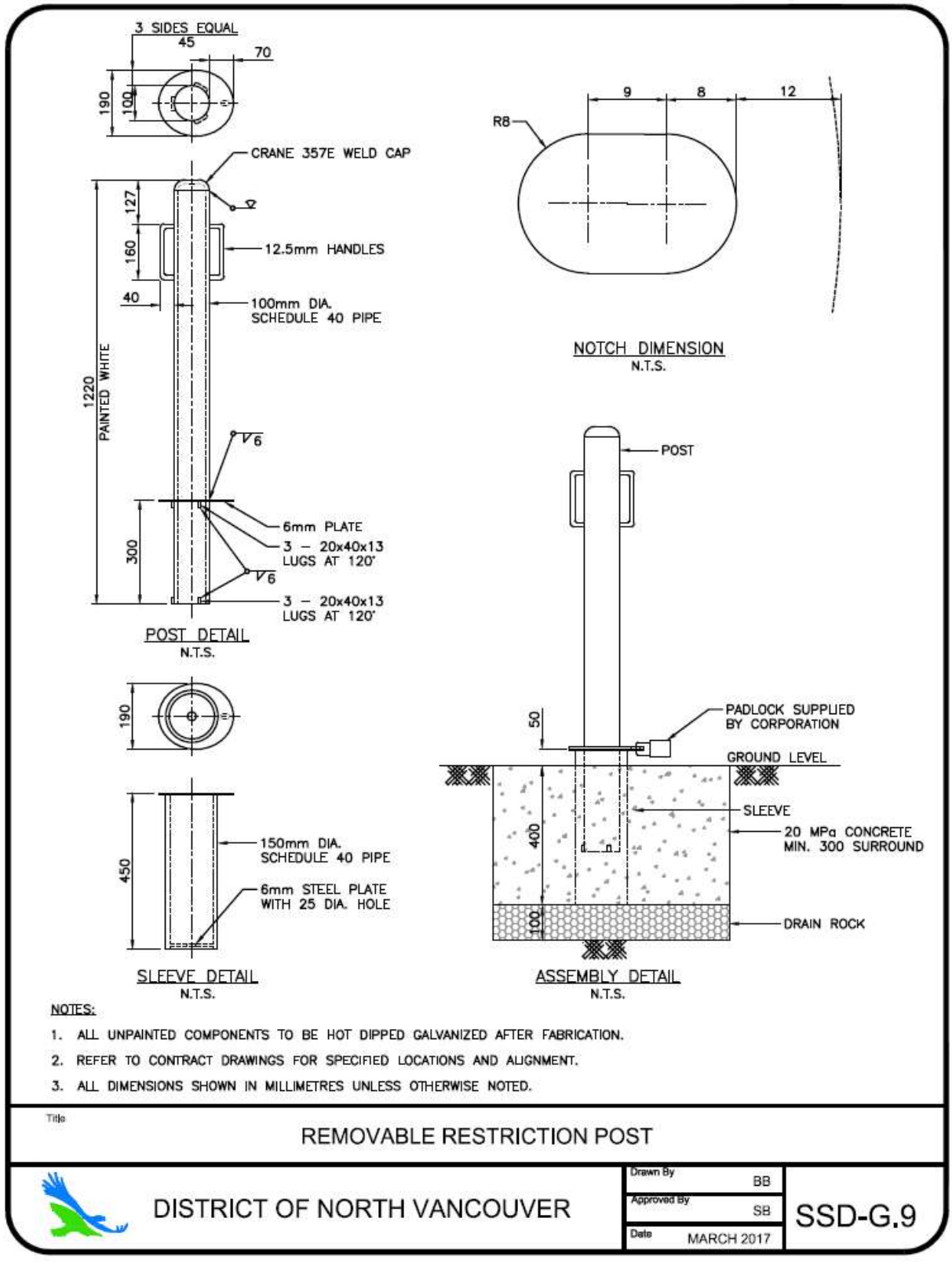
FIBER OPTIC CABLE - PULL BOX DETAILS (BOULEVARD INSTALLATIONS ONLY)

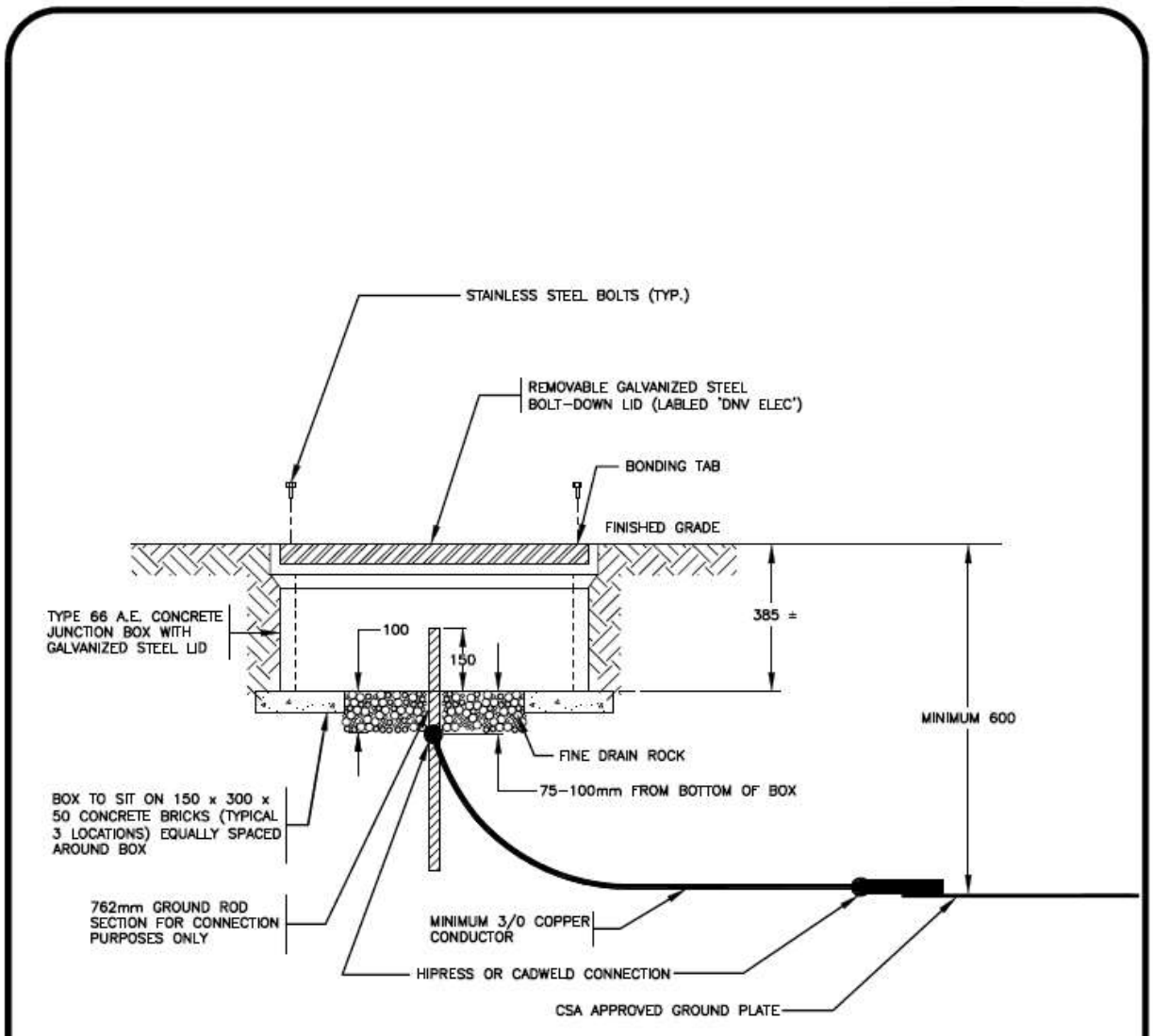
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SR
Date	MARCH 2017

SSD-G.7


3.7m MAX.
300
HANDRAIL
ALL RAILINGS 40 STANDARD STEEL PIPE GALVANIZED
SEE FOOTING DETAIL
300
SIDEWALK
900
450
300
25
SLOPE 5% PER STEP
EXPANSION JOINT
SIDEWALK
300
5R
EXPANSION JOINT
50
100
15M BARS @ 300 BOTH WAYS
300
150
COMPACT SUBGRADE BASE TO MIN. 95% MODIFIED PROCTOR DENSITY
CONCRETE KEY AT TOP, BOTTOM AND EVERY 3RD LANDING.
100
150
150
DETAIL "A"
SECTION
25 TYP.
100
25 TYP.
40
5
100
Ø4mm COMMON NAIL HOLE (TO AFFIX TO FORMWORK)
BASE PLATE 100x12x100
RAIL POST
80 MIN.
EDGE OF CONCRETE
5
POST – 40 ID DOUBLE EXTRA STRONG PIPE
TOP OF CONCRETE STEP
6.5
125
4 – 10mm WELDABLE REBAR (TYP.)
DETAIL "A"
EMBEDDED MOUNTING PLATE
BROOM FINISH
300
25 SPACING (TYP.)
50 CLEARANCE
50 CLEARANCE (TYP.)
DETAIL "B"
STAIRWAY SURFACE FINISH
1.5m
150
75
BICYCLE RAMP
150
150
FRONT ELEVATION
NOTES:
1. RAILING EMBED TO BE SET INTO FORMWORK BEFORE POURING CONCRETE.
2. ALL DIMENSIONS SHOWN ARE MILLIMETRES, UNLESS OTHERWISE NOTED.
Title
CONCRETE STEPS WITHOUT FOOTING - WITH BICYCLE RAMP
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-G.8


3 SIDES EQUAL
45
70
190
100
CRANE 357E WELD CAP
127
160
12.5mm HANDLES
40
100mm DIA.
SCHEDULE 40 PIPE
1220
PAINTED WHITE
6
6mm PLATE
3 – 20x40x13
LUGS AT 120°
300
6
3 – 20x40x13
LUGS AT 120°
POST DETAIL
N.T.S.
190
150mm DIA.
SCHEDULE 40 PIPE
450
6mm STEEL PLATE
WITH 25 DIA. HOLE
SLEEVE DETAIL
N.T.S.
9
8
12
R8
NOTCH DIMENSION
N.T.S.
POST
50
PADLOCK SUPPLIED
BY CORPORATION
GROUND LEVEL
SLEEVE
400
20 MPa CONCRETE
MIN. 300 SURROUND
100
DRAIN ROCK
ASSEMBLY DETAIL
N.T.S.
NOTES:
1. ALL UNPAINTED COMPONENTS TO BE HOT DIPPED GALVANIZED AFTER FABRICATION.
2. REFER TO CONTRACT DRAWINGS FOR SPECIFIED LOCATIONS AND ALIGNMENT.
3. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS OTHERWISE NOTED.
Title
REMOVABLE RESTRICTION POST
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-G.9



SECTION

N.T.S.

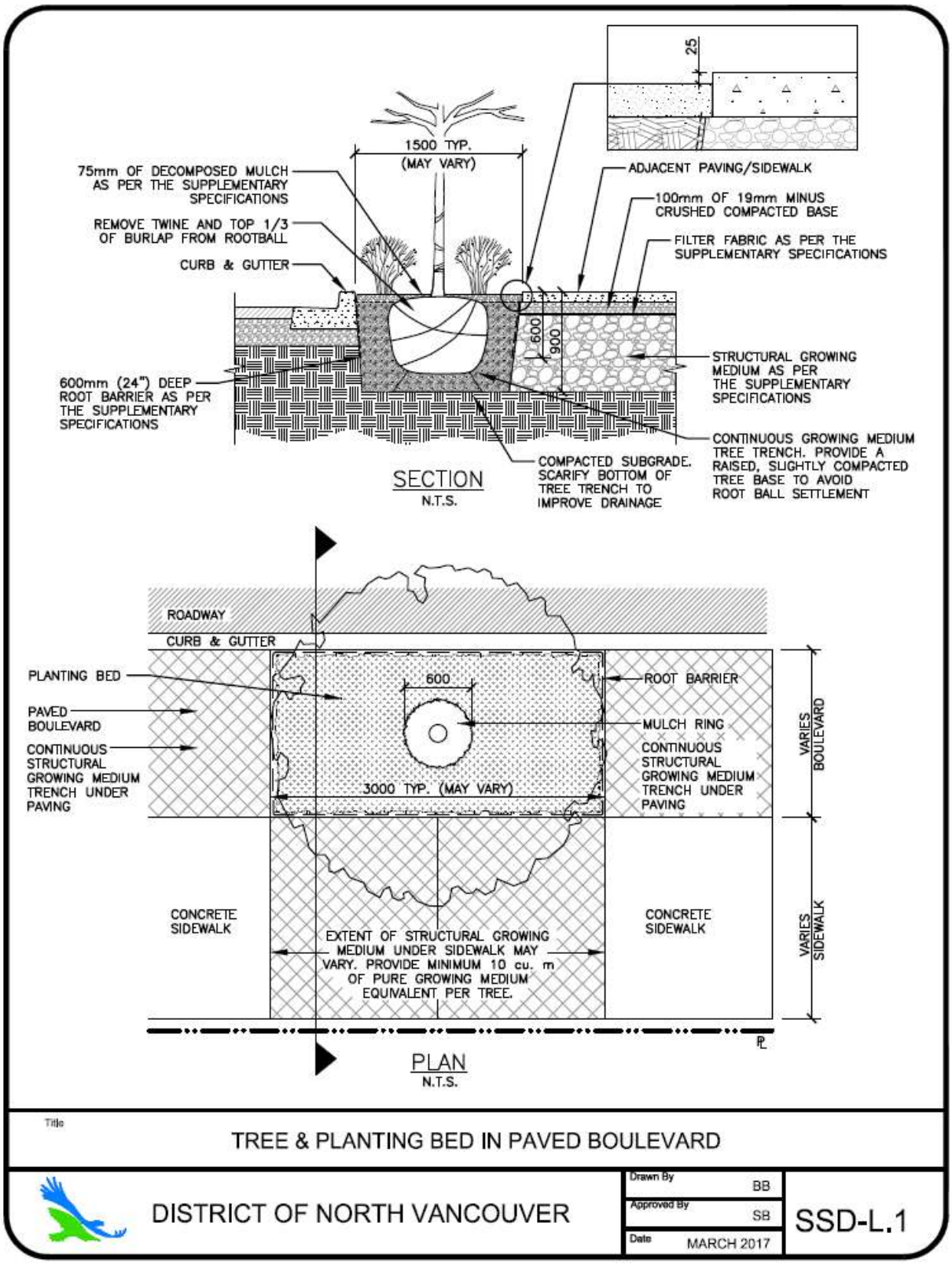
Title

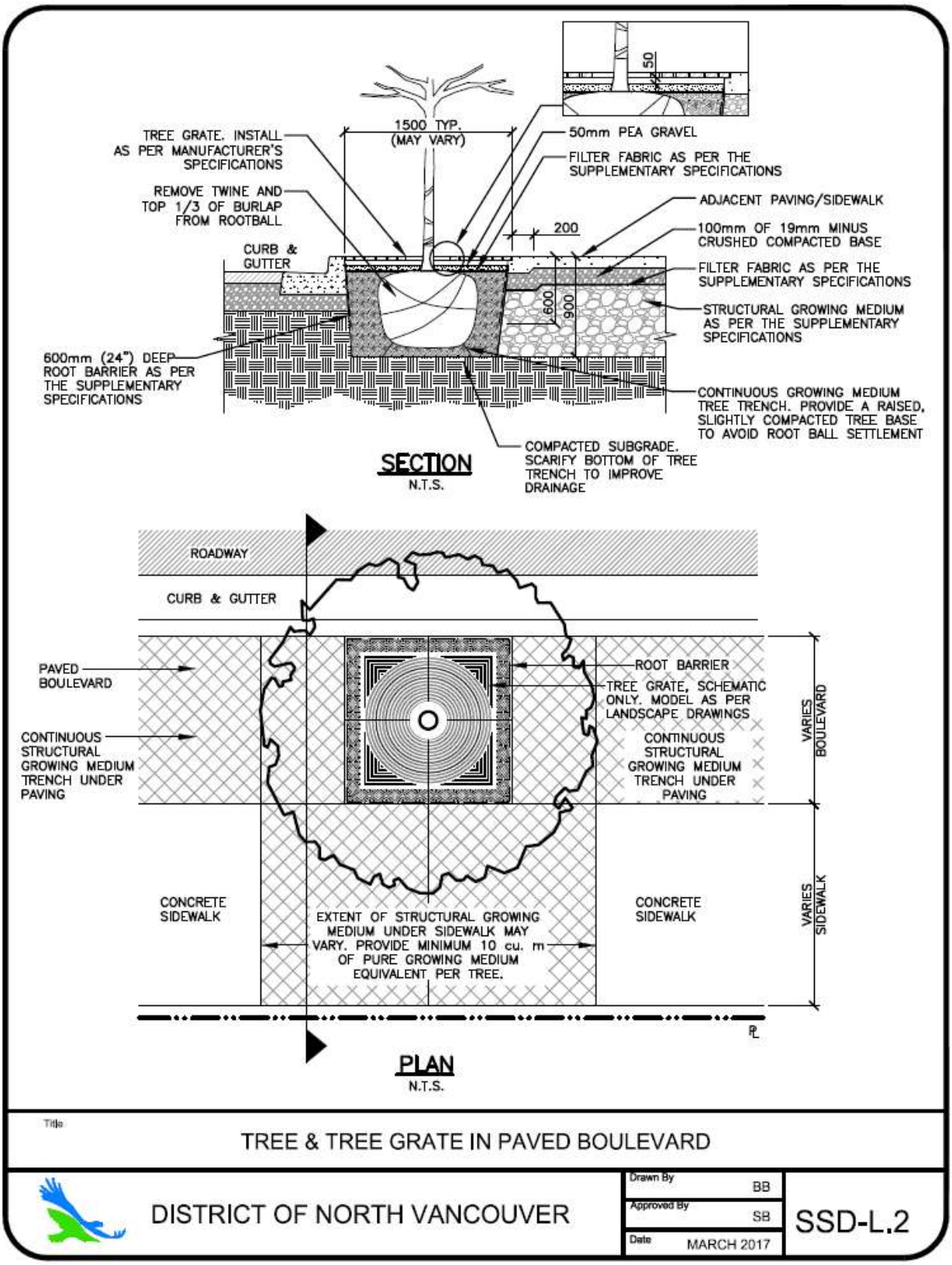
GROUND PLATE INSTALLATION DETAIL (FOR TEMPORARY USE ONLY)

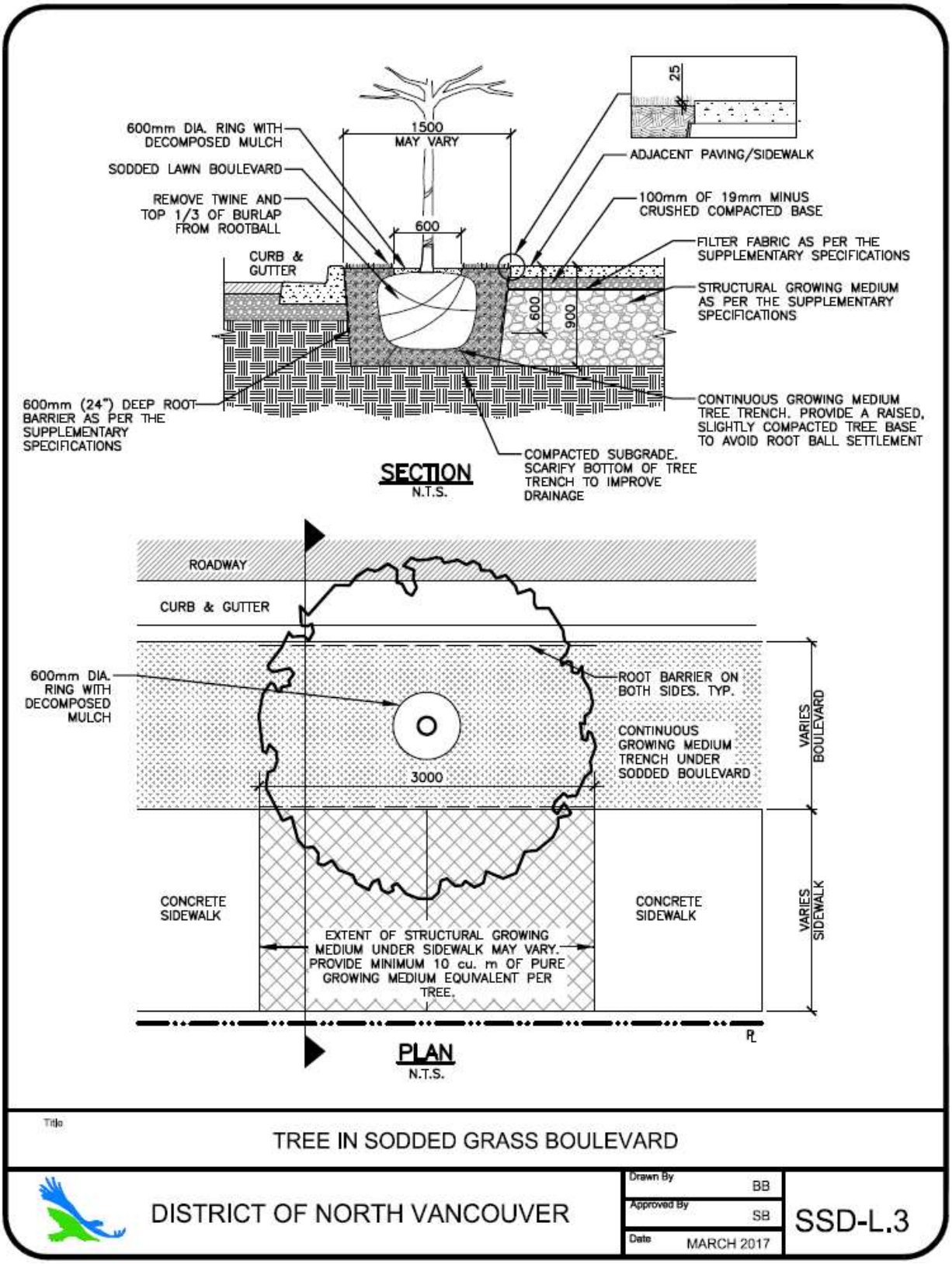
DISTRICT OF NORTH VANCOUVER

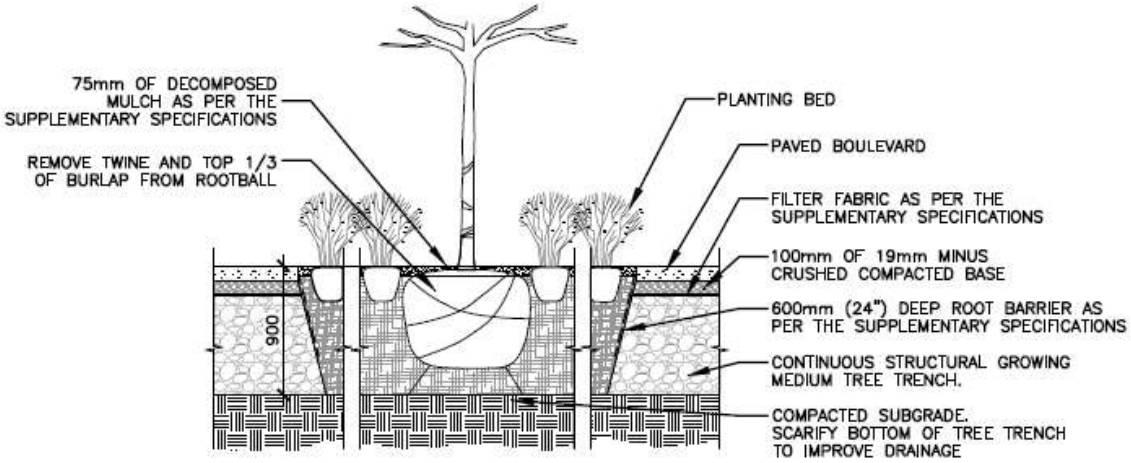
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-G.10

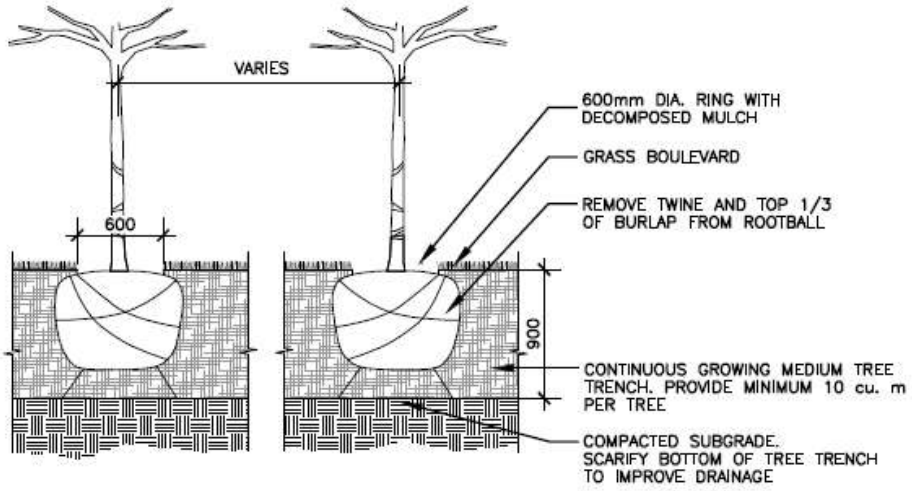

25
1500 TYP.
(MAY VARY)
75mm OF DECOMPOSED MULCH AS PER THE SUPPLEMENTARY SPECIFICATIONS
REMOVE TWINE AND TOP 1/3 OF BURLAP FROM ROOTBALL
CURB & GUTTER
ADJACENT PAVING/SIDEWALK
100mm OF 19mm MINUS CRUSHED COMPACTED BASE
FILTER FABRIC AS PER THE SUPPLEMENTARY SPECIFICATIONS
600
900
STRUCTURAL GROWING MEDIUM AS PER THE SUPPLEMENTARY SPECIFICATIONS
600mm (24") DEEP ROOT BARRIER AS PER THE SUPPLEMENTARY SPECIFICATIONS
CONTINUOUS GROWING MEDIUM TREE TRENCH. PROVIDE A RAISED, SLIGHTLY COMPACTED TREE BASE TO AVOID ROOT BALL SETTLEMENT
COMPACTED SUBGRADE. SCARIFY BOTTOM OF TREE TRENCH TO IMPROVE DRAINAGE
SECTION
N.T.S.
ROADWAY
CURB & GUTTER
PLANTING BED
PAVED BOULEVARD
CONTINUOUS STRUCTURAL GROWING MEDIUM TRENCH UNDER PAVING
600
ROOT BARRIER
MULCH RING
CONTINUOUS STRUCTURAL GROWING MEDIUM TRENCH UNDER PAVING
3000 TYP. (MAY VARY)
VARIES BOULEVARD
CONCRETE SIDEWALK
EXTENT OF STRUCTURAL GROWING MEDIUM UNDER SIDEWALK MAY VARY. PROVIDE MINIMUM 10 cu. m OF PURE GROWING MEDIUM EQUIVALENT PER TREE.
CONCRETE SIDEWALK
VARIES SIDEWALK
℄
PLAN
N.T.S.
Title
TREE & PLANTING BED IN PAVED BOULEVARD
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-L.1


50
1500 TYP.
(MAY VARY)
TREE GRATE. INSTALL AS PER MANUFACTURER'S SPECIFICATIONS
REMOVE TWINE AND TOP 1/3 OF BURLAP FROM ROOTBALL
50mm PEA GRAVEL
FILTER FABRIC AS PER THE SUPPLEMENTARY SPECIFICATIONS
ADJACENT PAVING/SIDEWALK
200
100mm OF 19mm MINUS CRUSHED COMPACTED BASE
CURB & GUTTER
FILTER FABRIC AS PER THE SUPPLEMENTARY SPECIFICATIONS
600
900
STRUCTURAL GROWING MEDIUM AS PER THE SUPPLEMENTARY SPECIFICATIONS
600mm (24") DEEP ROOT BARRIER AS PER THE SUPPLEMENTARY SPECIFICATIONS
CONTINUOUS GROWING MEDIUM TREE TRENCH. PROVIDE A RAISED, SLIGHTLY COMPACTED TREE BASE TO AVOID ROOT BALL SETTLEMENT
COMPACTED SUBGRADE. SCARIFY BOTTOM OF TREE TRENCH TO IMPROVE DRAINAGE
SECTION
N.T.S.
ROADWAY
CURB & GUTTER
PAVED BOULEVARD
CONTINUOUS STRUCTURAL GROWING MEDIUM TRENCH UNDER PAVING
ROOT BARRIER
TREE GRATE, SCHEMATIC ONLY. MODEL AS PER LANDSCAPE DRAWINGS
CONTINUOUS STRUCTURAL GROWING MEDIUM TRENCH UNDER PAVING
VARIES BOULEVARD
CONCRETE SIDEWALK
EXTENT OF STRUCTURAL GROWING MEDIUM UNDER SIDEWALK MAY VARY. PROVIDE MINIMUM 10 cu. m OF PURE GROWING MEDIUM EQUIVALENT PER TREE.
CONCRETE SIDEWALK
VARIES SIDEWALK
℄
PLAN
N.T.S.
Title
TREE & TREE GRATE IN PAVED BOULEVARD
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-L.2


600mm DIA. RING WITH DECOMPOSED MULCH
SODDED LAWN BOULEVARD
REMOVE TWINE AND TOP 1/3 OF BURLAP FROM ROOTBALL
1500 MAY VARY
600
CURB & GUTTER
25
ADJACENT PAVING/SIDEWALK
100mm OF 19mm MINUS CRUSHED COMPACTED BASE
FILTER FABRIC AS PER THE SUPPLEMENTARY SPECIFICATIONS
STRUCTURAL GROWING MEDIUM AS PER THE SUPPLEMENTARY SPECIFICATIONS
600
900
600mm (24") DEEP ROOT BARRIER AS PER THE SUPPLEMENTARY SPECIFICATIONS
CONTINUOUS GROWING MEDIUM TREE TRENCH. PROVIDE A RAISED, SLIGHTLY COMPACTED TREE BASE TO AVOID ROOT BALL SETTLEMENT
COMPACTED SUBGRADE. SCARIFY BOTTOM OF TREE TRENCH TO IMPROVE DRAINAGE
SECTION
N.T.S.
ROADWAY
CURB & GUTTER
600mm DIA. RING WITH DECOMPOSED MULCH
ROOT BARRIER ON BOTH SIDES. TYP.
CONTINUOUS GROWING MEDIUM TRENCH UNDER SODDED BOULEVARD
3000
VARIES BOULEVARD
CONCRETE SIDEWALK
CONCRETE SIDEWALK
EXTENT OF STRUCTURAL GROWING MEDIUM UNDER SIDEWALK MAY VARY. PROVIDE MINIMUM 10 cu. m OF PURE GROWING MEDIUM EQUIVALENT PER TREE.
VARIES SIDEWALK
PL
PLAN
N.T.S.
Title
TREE IN SODDED GRASS BOULEVARD
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-L.3



PAVED BOULEVARD – LONGITUDINAL SECTION



GRASS BOULEVARD – LONGITUDINAL SECTION

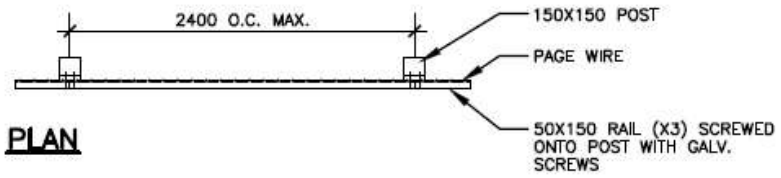
Title

CONTINUOUS TREE TRENCH DETAIL

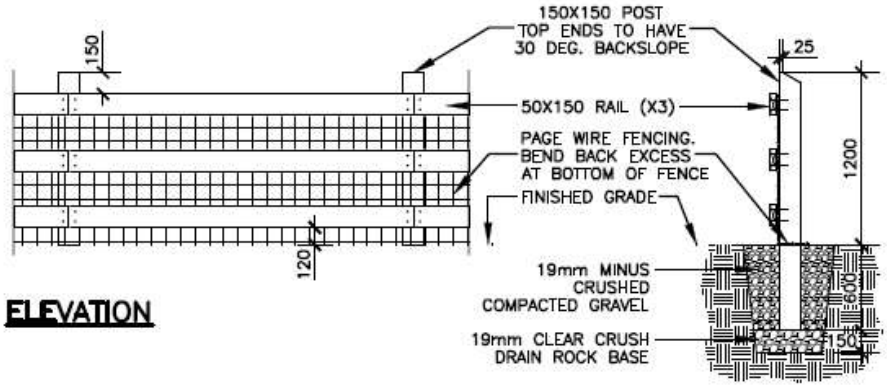
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.4



PLAN



ELEVATION

SECTION

NOTES:

1. ALL WOOD TO BE DIMENSIONAL ROUGH TEXTURED STANDARD GRADE CEDAR.
2. ALL WOOD TO BE STAINED WITH BRODA PRO–TEK–TOR DECK–RAIL WATER–BORNE NATURAL OIL FINISH.
3. COLOUR TO BE 011A NATURAL CLEAR LITE, AS SUPPLIED BY CBR PRODUCTS (604–254–3325), OR APPROVED EQUAL.
4. CONFIRM LAYOUT ON SITE WITH DNV REPRESENTATIVE PRIOR TO INSTALLATION.
5. ALL FENCE POSTS TO BE INSTALLED PLUMB AND TRUE.
6. RESTORE ANY DISTURBED AREAS TO THE SATISFACTION OF THE DNV REPRESENTATIVE.
7. CONTRACTOR TO PROVIDE SAMPLE OF MATERIALS FOR DNV REPRESENTATIVE'S APPROVAL PRIOR TO INSTALLATION.
8. ENSURE ALL PAGE WIRE IS TAUT AND ALIGNED AT RIGHT ANGLES WITH POSTS AND RAILS.
9. PAGE WIRE TO BE LOW CARBON FIELD FENCE, PRODUCT #118233, BY BEKAERT. SUPPLIED BY OTTER CO–OP (604–607–6909), OR FRASER VALLEY STEEL (604–856–3391), OR APPROVED EQUAL.

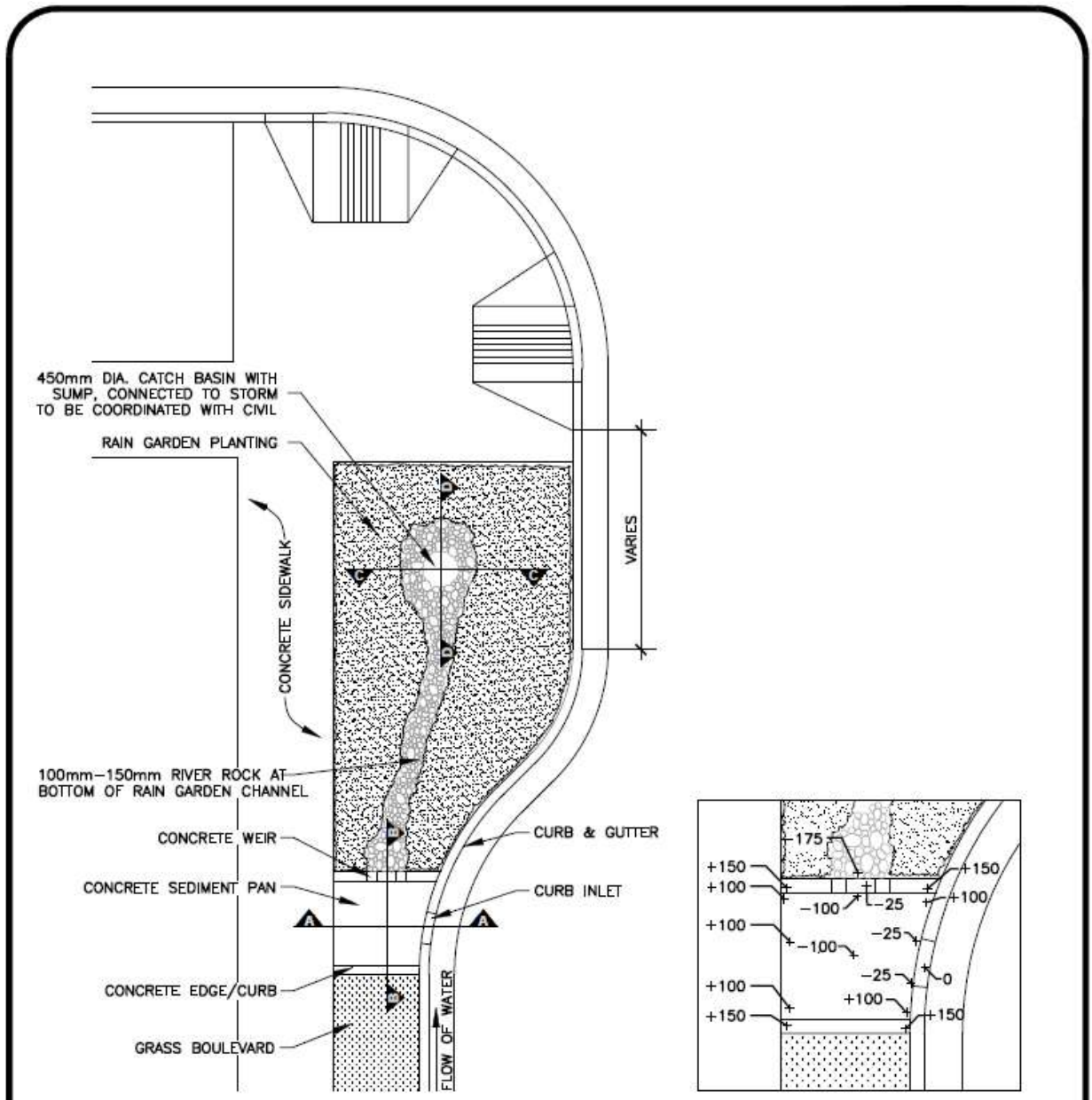
Title

ENVIRONMENTAL FENCE DETAIL

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.5



TYPICAL GRADING OF SEDIMENT PAN

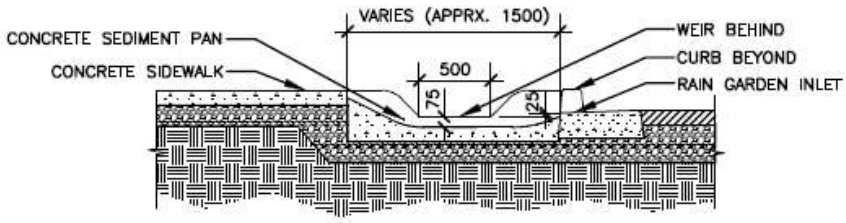
Title

CORNER BULGE RAIN GARDEN - TYPICAL LAYOUT PLAN - SHEET 1 OF 3

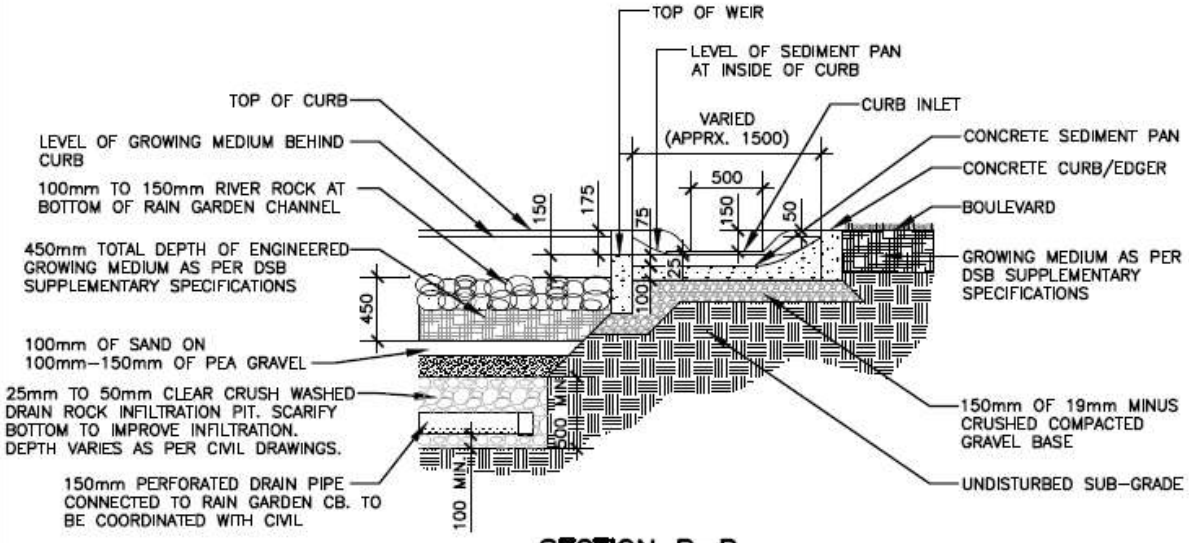
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.6



SECTION A–A
N.T.S.



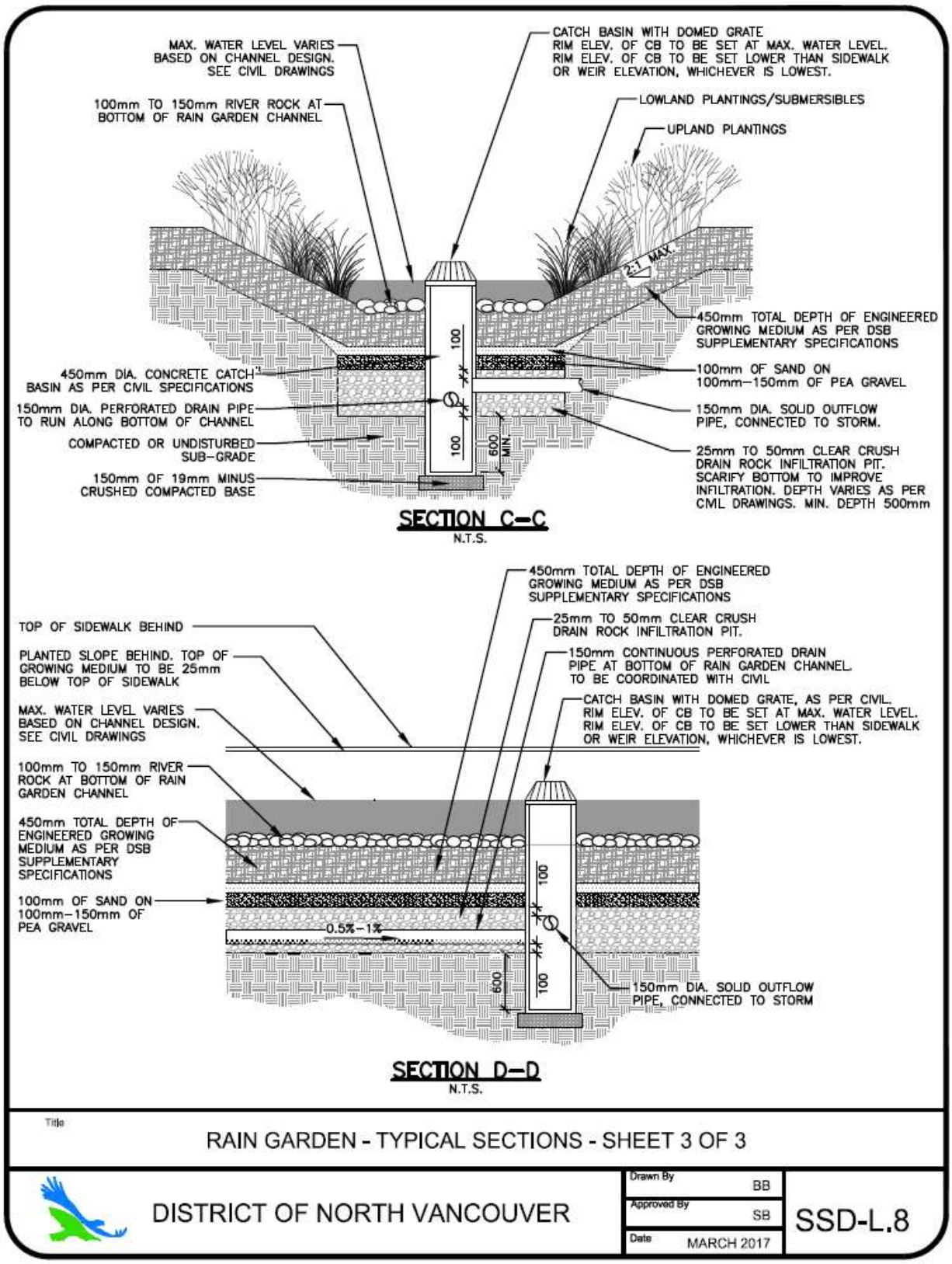
SECTION B–B
N.T.S.

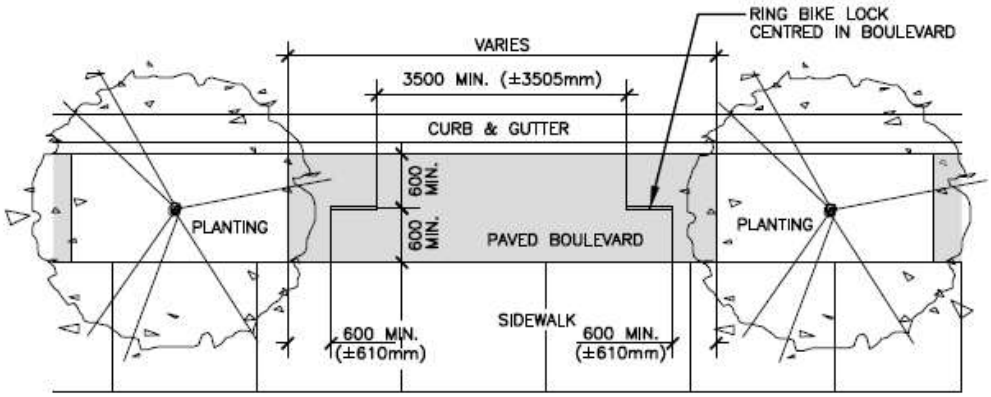
Title
RAIN GARDEN CONCRETE SEDIMENT PAN - TYPICAL DETAIL - SHEET 2 OF 3

DISTRICT OF NORTH VANCOUVER

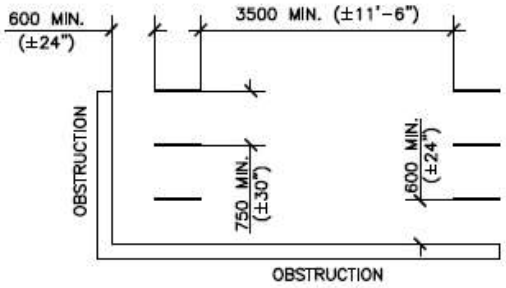
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.7

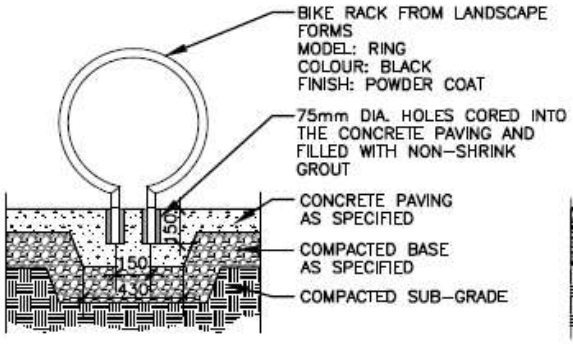

MAX. WATER LEVEL VARIES BASED ON CHANNEL DESIGN. SEE CIVIL DRAWINGS
CATCH BASIN WITH DOMED GRATE RIM ELEV. OF CB TO BE SET AT MAX. WATER LEVEL. RIM ELEV. OF CB TO BE SET LOWER THAN SIDEWALK OR WEIR ELEVATION, WHICHEVER IS LOWEST.
100mm TO 150mm RIVER ROCK AT BOTTOM OF RAIN GARDEN CHANNEL
LOWLAND PLANTINGS/SUBMERSIBLES
UPLAND PLANTINGS
2:1 MAX.
450mm TOTAL DEPTH OF ENGINEERED GROWING MEDIUM AS PER DSB SUPPLEMENTARY SPECIFICATIONS
100mm OF SAND ON 100mm–150mm OF PEA GRAVEL
450mm DIA. CONCRETE CATCH BASIN AS PER CIVIL SPECIFICATIONS
150mm DIA. PERFORATED DRAIN PIPE TO RUN ALONG BOTTOM OF CHANNEL
150mm DIA. SOLID OUTFLOW PIPE, CONNECTED TO STORM.
COMPACTED OR UNDISTURBED SUB–GRADE
25mm TO 50mm CLEAR CRUSH DRAIN ROCK INFILTRATION PIT. SCARIFY BOTTOM TO IMPROVE INFILTRATION. DEPTH VARIES AS PER CML DRAWINGS. MIN. DEPTH 500mm
150mm OF 19mm MINUS CRUSHED COMPACTED BASE
100
100
600 MIN.
SECTION C–C
N.T.S.
450mm TOTAL DEPTH OF ENGINEERED GROWING MEDIUM AS PER DSB SUPPLEMENTARY SPECIFICATIONS
25mm TO 50mm CLEAR CRUSH DRAIN ROCK INFILTRATION PIT.
TOP OF SIDEWALK BEHIND
PLANTED SLOPE BEHIND. TOP OF GROWING MEDIUM TO BE 25mm BELOW TOP OF SIDEWALK
150mm CONTINUOUS PERFORATED DRAIN PIPE AT BOTTOM OF RAIN GARDEN CHANNEL. TO BE COORDINATED WITH CIVIL
CATCH BASIN WITH DOMED GRATE, AS PER CIVIL. RIM ELEV. OF CB TO BE SET AT MAX. WATER LEVEL. RIM ELEV. OF CB TO BE SET LOWER THAN SIDEWALK OR WEIR ELEVATION, WHICHEVER IS LOWEST.
MAX. WATER LEVEL VARIES BASED ON CHANNEL DESIGN. SEE CIVIL DRAWINGS
100mm TO 150mm RIVER ROCK AT BOTTOM OF RAIN GARDEN CHANNEL
450mm TOTAL DEPTH OF ENGINEERED GROWING MEDIUM AS PER DSB SUPPLEMENTARY SPECIFICATIONS
100mm OF SAND ON 100mm–150mm OF PEA GRAVEL
0.5%–1%
100
100
600
150mm DIA. SOLID OUTFLOW PIPE, CONNECTED TO STORM
SECTION D–D
N.T.S.
Title
RAIN GARDEN - TYPICAL SECTIONS - SHEET 3 OF 3
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-L.8



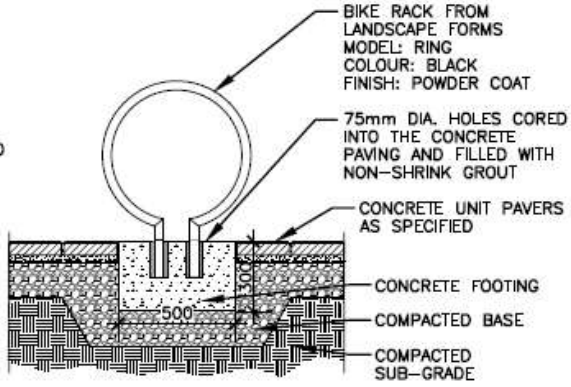
BIKE LOCK – BOULEVARD PLACEMENT
N.T.S.



BIKE LOCK – GENERAL PLACEMENT
N.T.S.



INSTALLATION ON CIP CONCRETE PAVEMENT
N.T.S.



INSTALLATION ON CONCRETE UNIT PAVEMENT
N.T.S.

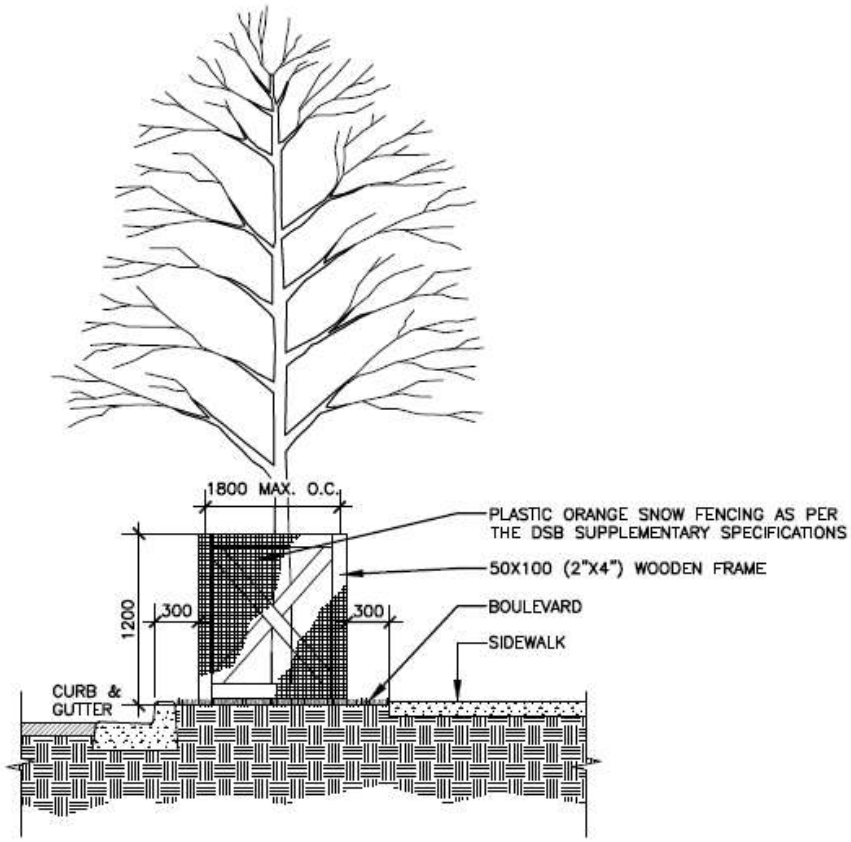
Title

BIKE LOCK - TYPICAL DETAILS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.9



TRUNK DIAMETER		MINIMUM PROTECTION REQUIRED
(cm)	(in)	(DISTANCE FROM TRUNK)
20	8	1.2 METRES
25	10	1.5 METRES
30	12	1.8 METRES
35	14	2.1 METRES
40	16	2.4 METRES
45	18	2.7 METRES
50	20	3.0 METRES
55	22	3.3 METRES
60	24	3.6 METRES
75	30	4.5 METRES
90	36	5.0 METRES
100	40	6.0 METRES

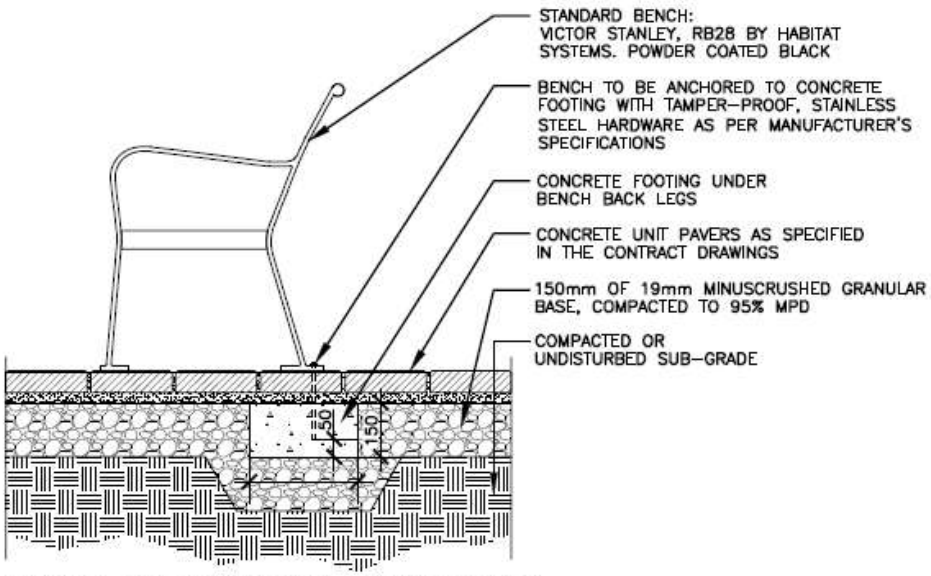
Title

TREE PROTECTION FENCE - TYPICAL SECTIONS

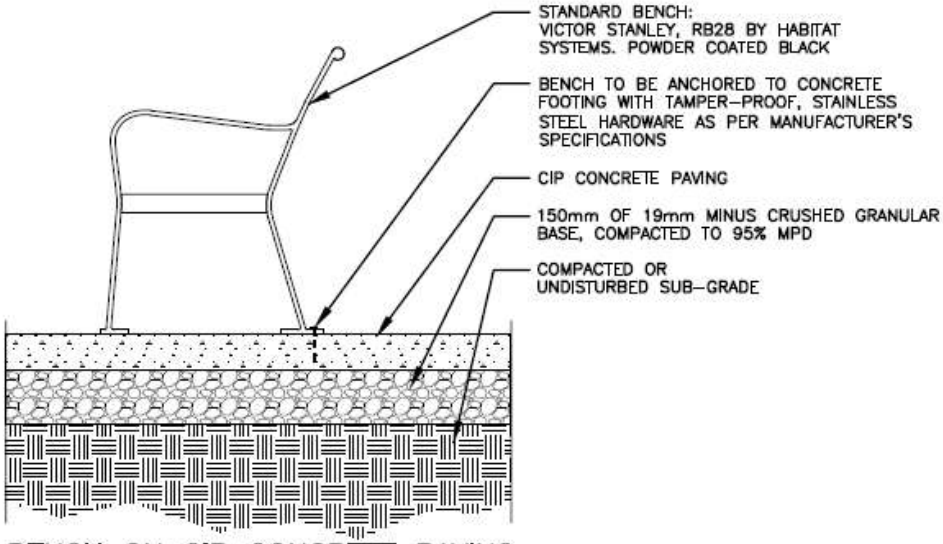
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.10



BENCH ON CONCRETE UNIT PAVERS



BENCH ON CIP CONCRETE PAVING

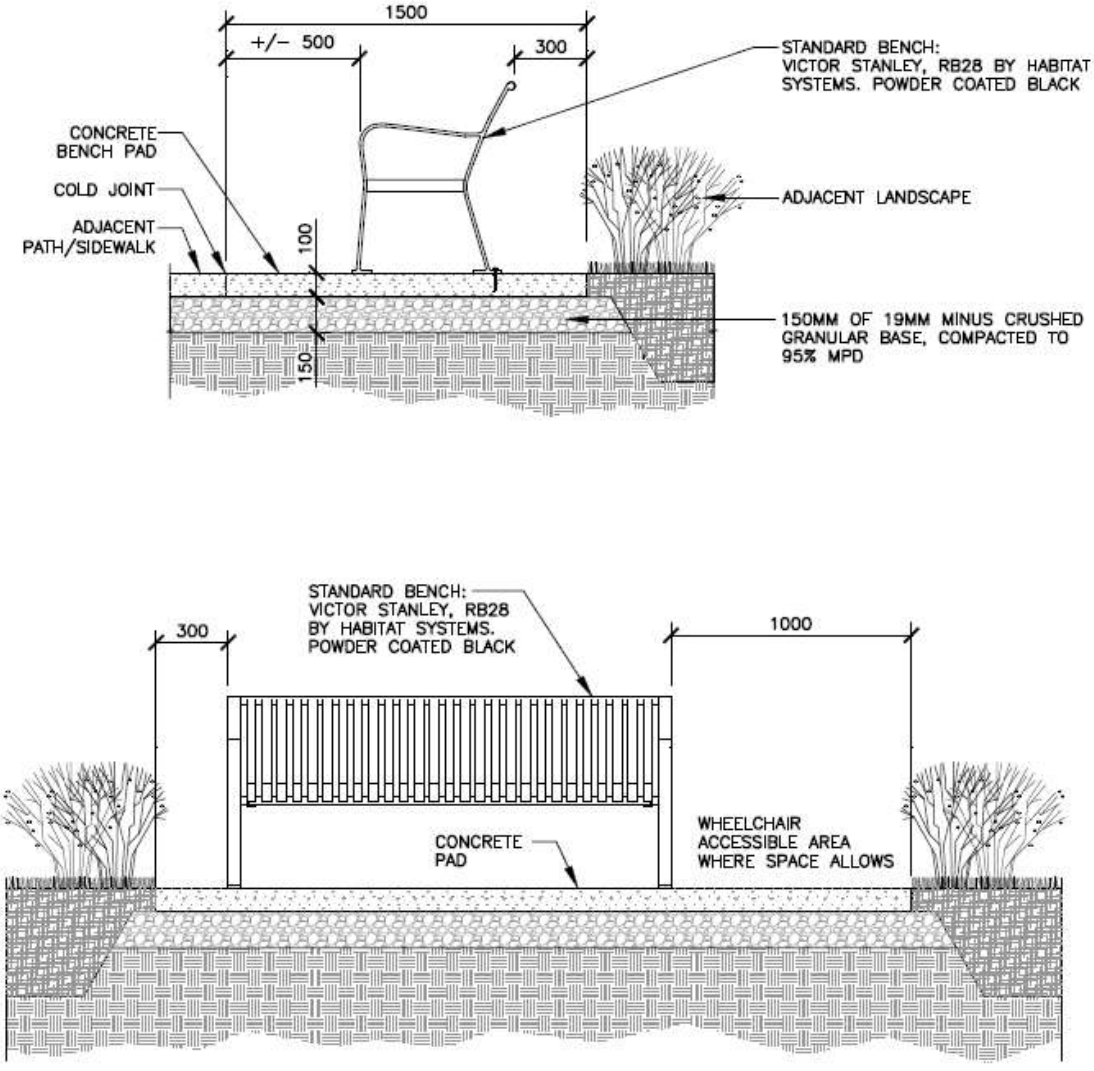
Title

BENCH INSTALLATION ON CONCRETE AND CONCRETE UNIT PAVERS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.11



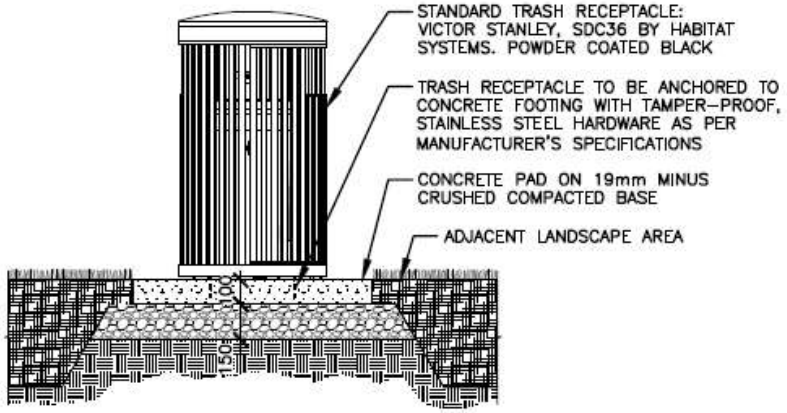
Title

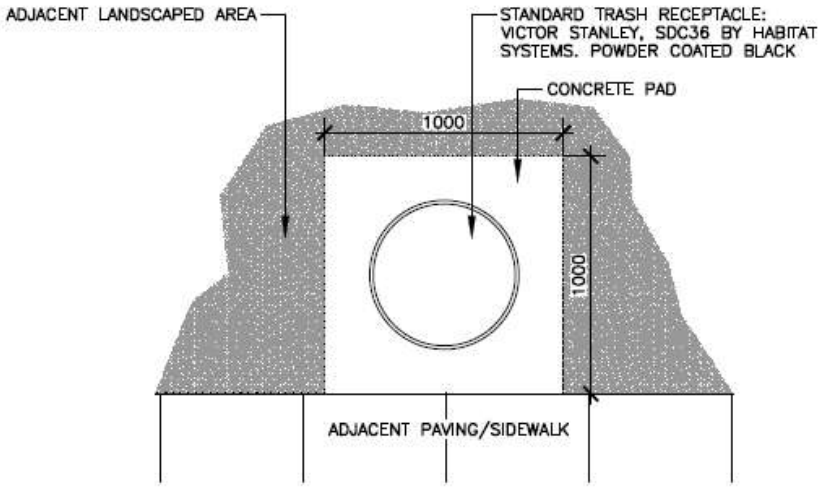
CONCRETE BENCH PAD IN LANDSCAPE AREAS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.12





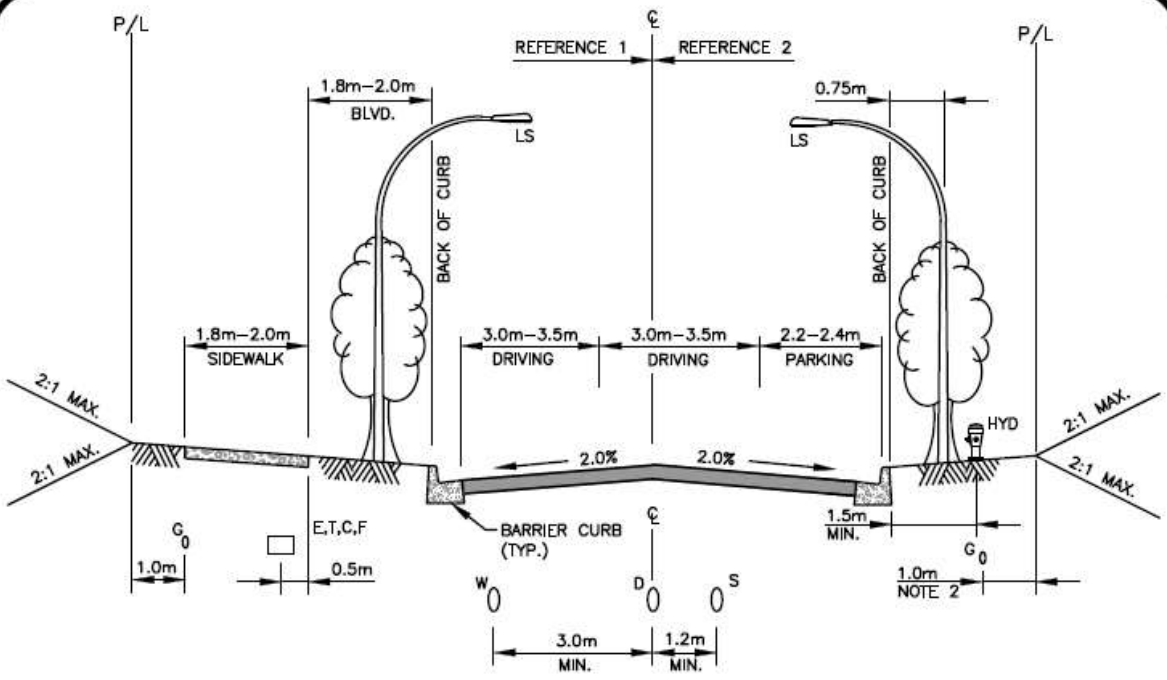
Title

TRASH RECEPTACLE INSTALLATION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-L.13



LEGEND

T	–	TELEPHONE	D	–	STORM SEWER
G	–	GAS	HYD	–	HYDRANT
E	–	ELECTRICAL	P/L	–	PROPERTY LINE
C	–	CABLE T.V.	SW	–	SIDEWALK
W	–	WATER	LS	–	LAMP STANDARD
F	–	FIBRE OPTIC	S	–	SANITARY SEWER

NOTES:

1. REFER TO SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES.
2. DISTANCE BETWEEN UTILITIES TO MEET HEALTH STANDARDS AND OTHER UTILITY COMPANIES' REQUIREMENTS.
   - MIN. 3.0m BETWEEN WATER AND OTHER UTILITIES.
   - MIN. 1.2m BETWEEN STORM AND SANITARY SEWER.
   - MIN. 0.3m BETWEEN POWER AND COMMUNICATION CORRIDORS
   - MIN. 1.0m SEPARATION BETWEEN GAS AND ANY UTILITIES.
   - TELUS LINE TO BE CLOSEST TO PROPERTY LINE.
3. POWER, COMMUNICATION OR GAS MAY BE PLACED IN EASEMENT AREAS IF THE NECESSARY APPROVALS ARE OBTAINED.
4. FOR TREE CLEARANCES REFER TO "SECTION 12.5: TABLE 12a – MINIMUM PLANTING CLEARANCES FOR ROAD TREES".
5. SURROUNDING TOPOGRAPHY MAY REQUIRE RETAINING STRUCTURES, SUB-DRAINS AND STORM DRAINAGE INTERCEPTION MEASURES.
6. MIN. PREFERRED CLEAR DISTANCE BETWEEN ABOVE GROUND UTILITIES/OBSTRUCTIONS AND SIDEWALK OR FACE OF CURB TO BE 1.0m.
7. ROAD SECTIONS VARIES AND ARE DEPENDANT ON ROAD WIDTH AND LOCATION.
8. REFER TO TABLE 5.B (SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES – SECTION 5.3) – FOR ROAD CROSS SECTION DIMENSIONS
9. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE INDICATED.

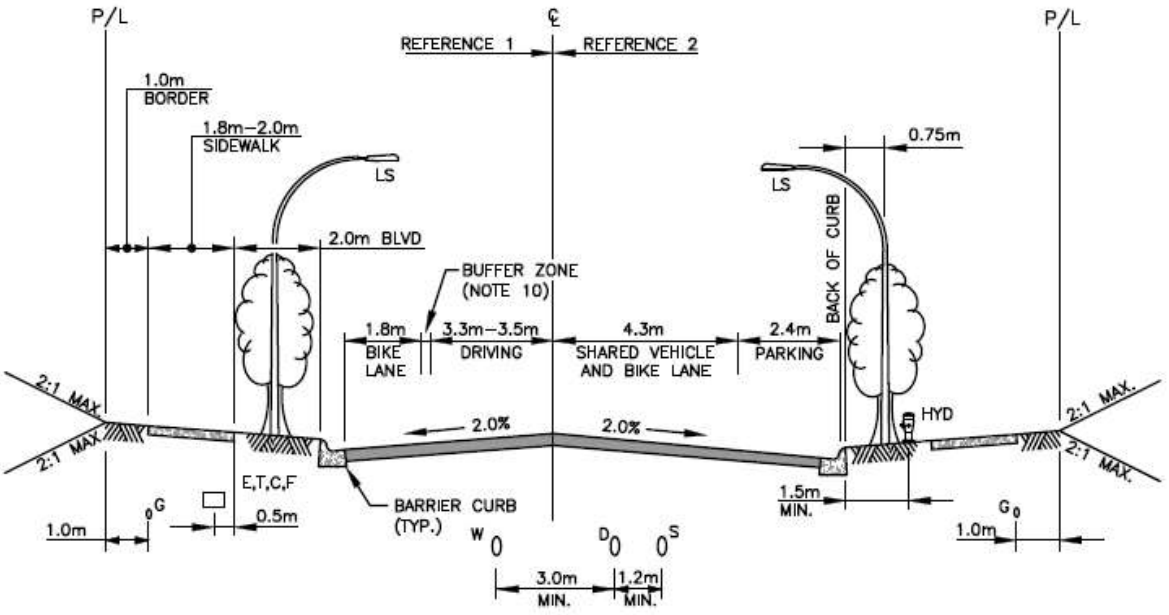
Title

TYPICAL LOCAL ROAD SECTION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.1



LEGEND

T	–	TELEPHONE	D	–	STORM SEWER
G	–	GAS	HYD	–	HYDRANT
E	–	ELECTRICAL	P/L	–	PROPERTY LINE
C	–	CABLE T.V.	SW	–	SIDEWALK
W	–	WATER	LS	–	LAMP STANDARD
F	–	FIBRE OPTIC	S	–	SANITARY SEWER

NOTES:

1. REFER TO SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES.
2. DISTANCE BETWEEN UTILITIES TO MEET HEALTH STANDARDS AND OTHER UTILITY COMPANIES' REQUIREMENTS.
   - MIN. 3.0m BETWEEN WATER AND OTHER UTILITIES.
   - MIN. 1.2m BETWEEN STORM AND SANITARY SEWER.
   - MIN. 0.3m BETWEEN POWER AND COMMUNICATION CORRIDORS
   - MIN. 1.0m SEPARATION BETWEEN GAS AND ANY UTILITIES.
   - TELUS LINE TO BE CLOSEST TO PROPERTY LINE.
3. POWER, COMMUNICATION OR GAS MAY BE PLACED IN EASEMENT AREAS IF THE NECESSARY APPROVALS ARE OBTAINED.
4. FOR TREE CLEARANCES REFER TO "SECTION 12.5: TABLE 12a – MINIMUM PLANTING CLEARANCES FOR ROAD TREES".
5. SURROUNDING TOPOGRAPHY MAY REQUIRE RETAINING STRUCTURES, SUB–DRAINS AND STORM DRAINAGE INTERCEPTION MEASURES.
6. MIN. PREFERRED CLEAR DISTANCE BETWEEN ABOVE GROUND UTILITIES/OBSTRUCTIONS AND SIDEWALK OR FACE OF CURB TO BE 1.0m.
7. REFER TO TABLE 5.B (SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES – SECTION 5.3) – FOR ROAD CROSS SECTION DIMENSIONS
8. ROAD SECTIONS VARIES AND ARE DEPENDANT ON ROAD WIDTH AND LOCATION.
9. BIKE FACILITY VARIES AND ARE DEPENDANT ON ROAD WIDTH AND LOCATION. (SEE MMCD 9.11)
10. BIKE LANE BUFFER ZONE DETAILS TO BE DISCUSS WITH DNV.
11. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE INDICATED.

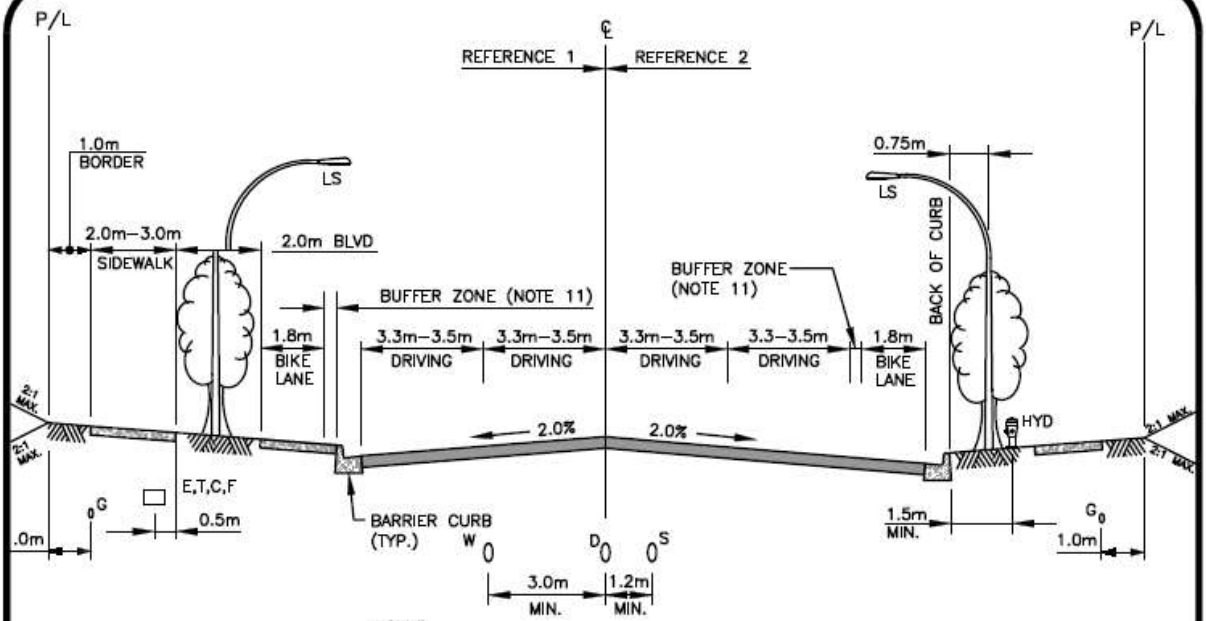
Title

TYPICAL COLLECTOR ROAD SECTION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.2



LEGEND

T	–	TELEPHONE	D	–	STORM SEWER
G	–	GAS	HYD	–	HYDRANT
E	–	ELECTRICAL	P/L	–	PROPERTY LINE
C	–	CABLE T.V.	SW	–	SIDEWALK
W	–	WATER	LS	–	LAMP STANDARD
F	–	FIBRE OPTIC	S	–	SANITARY SEWER

NOTES:

1. REFER TO SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES.
2. DISTANCE BETWEEN UTILITIES TO MEET HEALTH STANDARDS AND OTHER UTILITY COMPANIES' REQUIREMENTS.
   - MIN. 3.0m BETWEEN WATER AND OTHER UTILITIES.
   - MIN. 1.2m BETWEEN STORM AND SANITARY SEWER.
   - MIN. 0.3m BETWEEN POWER AND COMMUNICATION CORRIDORS
   - MIN. 1.0m SEPARATION BETWEEN GAS AND ANY UTILITIES.
   - TELUS LINE TO BE CLOSEST TO PROPERTY LINE.
3. POWER, COMMUNICATION OR GAS MAY BE PLACED IN EASEMENT AREAS IF THE NECESSARY APPROVALS ARE OBTAINED.
4. FOR TREE CLEARANCES REFER TO "SECTION 12.5: TABLE 12a – MINIMUM PLANTING CLEARANCES FOR ROAD TREES".
5. SURROUNDING TOPOGRAPHY MAY REQUIRE RETAINING STRUCTURES, SUB–DRAINS AND STORM DRAINAGE INTERCEPTION MEASURES.
6. MIN. PREFERRED CLEAR DISTANCE BETWEEN ABOVE GROUND UTILITIES/OBSTRUCTIONS AND SIDEWALK OR FACE OF CURB TO BE 1.0m.
7. BIKE LANE TO BE THE SAME ON BOTH SIDES.
8. REFER TO TABLE 5.B (SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES – SECTION 5.3) – FOR ROAD CROSS SECTION DIMENSIONS.
9. ROAD SECTIONS VARIES AND ARE DEPENDANT ON ROAD WIDTH AND LOCATION.
10. BIKE FACILITY VARIES AND ARE DEPENDANT ON ROAD WIDTH AND LOCATION. (SEE MMCD 9.11)
11. BIKE LANE BUFFER ZONE DETAILS TO BE DISCUSS WITH DNV.
12. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE INDICATED.

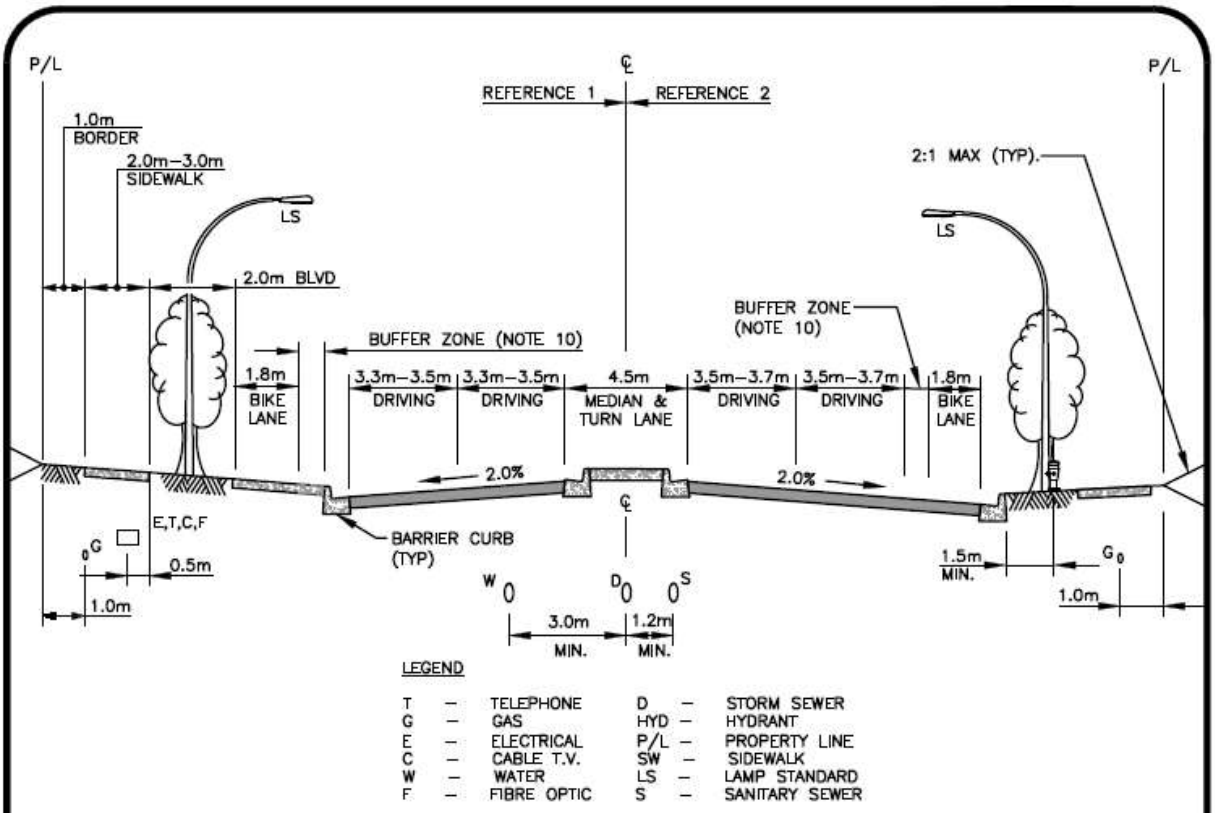
Title

TYPICAL ARTERIAL UNDIVIDED ROAD SECTION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.3



LEGEND

T	–	TELEPHONE	D	–	STORM SEWER
G	–	GAS	HYD	–	HYDRANT
E	–	ELECTRICAL	P/L	–	PROPERTY LINE
C	–	CABLE T.V.	SW	–	SIDEWALK
W	–	WATER	LS	–	LAMP STANDARD
F	–	FIBRE OPTIC	S	–	SANITARY SEWER

NOTES:

1. REFER TO SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES.
2. DISTANCE BETWEEN UTILITIES TO MEET HEALTH STANDARDS AND OTHER UTILITY COMPANIES' REQUIREMENTS.
   - MIN. 3.0m BETWEEN WATER AND OTHER UTILITIES.
   - MIN. 1.2m BETWEEN STORM AND SANITARY SEWER.
   - MIN. 0.3m BETWEEN POWER AND COMMUNICATION CORRIDORS
   - MIN. 1.0m SEPARATION BETWEEN GAS AND ANY UTILITIES.
   - TELUS LINE TO BE CLOSEST TO PROPERTY LINE.
3. POWER, COMMUNICATION OR GAS MAY BE PLACED IN EASEMENT AREAS IF THE NECESSARY APPROVALS ARE OBTAINED.
4. FOR TREE CLEARANCES REFER TO "SECTION 12.5: TABLE 12a – MINIMUM PLANTING CLEARANCES FOR ROAD TREES".
5. SURROUNDING TOPOGRAPHY MAY REQUIRE RETAINING STRUCTURES, SUB–DRAINS AND STORM DRAINAGE INTERCEPTION MEASURES.
6. MIN. PREFERRED CLEAR DISTANCE BETWEEN ABOVE GROUND UTILITIES/OBSTRUCTIONS AND SIDEWALK OR FACE OF CURB TO BE 1.0m.
7. REFER TO TABLE 5.B (SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES – SECTION 5.3) – FOR ROAD CROSS SECTION DIMENSIONS
8. ROAD SECTIONS VARIES AND ARE DEPENDANT ON ROAD WIDTH AND LOCATION.
9. BIKE FACILITY VARIES AND ARE DEPENDANT ON ROAD WIDTH AND LOCATION. (SEE MMCD 9.11)
10. BIKE LANE BUFFER ZONE DETAILS TO BE DISCUSS WITH DNV.
11. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE INDICATED.

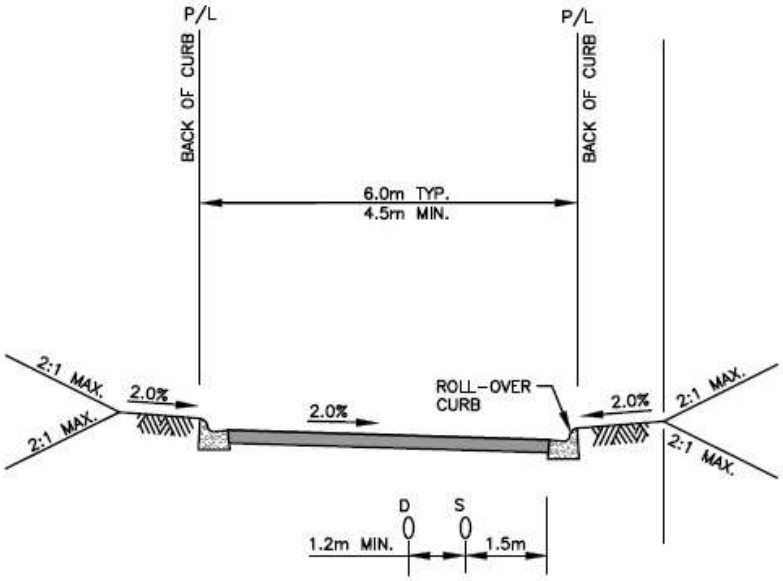
Title

TYPICAL ARTERIAL DIVIDED ROAD SECTION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.4



LEGEND

D – STORM SEWER
P/L – PROPERTY LINE
SW – SIDEWALK
LS – LAMP STANDARD
S – SANITARY SEWER

NOTES:

1. REFER TO SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES.
2. DISTANCE BETWEEN UTILITIES TO MEET HEALTH STANDARDS AND OTHER UTILITY COMPANIES' REQUIREMENTS.
   - MIN. 3.0m BETWEEN WATER AND OTHER UTILITIES.
   - MIN. 1.2m BETWEEN STORM AND SANITARY SEWER.
   - MIN. 0.3m BETWEEN POWER AND COMMUNICATION CORRIDORS
   - MIN. 1.0m SEPARATION BETWEEN GAS AND ANY UTILITIES.
   - TELUS LINE TO BE CLOSEST TO PROPERTY LINE.
3. POWER, COMMUNICATION OR GAS MAY BE PLACED IN EASEMENT AREAS IF THE NECESSARY APPROVALS ARE OBTAINED.
4. SURROUNDING TOPOGRAPHY MAY REQUIRE RETAINING STRUCTURES, SUB-DRAINS AND STORM DRAINAGE INTERCEPTION MEASURES.
6. MIN. PREFERRED CLEAR DISTANCE BETWEEN ABOVE GROUND UTILITIES/OBSTRUCTIONS AND SIDEWALK OR FACE OF CURB TO BE 1.0m.
7. REFER TO TABLE 5.8 (SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES – SECTION 5.3) – FOR ROAD CROSS SECTION DIMENSIONS.
8. NO THROUGH ROADS WITH A LOW NUMBER OF VEHICLE MOVEMENTS MAY BE PERMITTED TO REDUCE ASPHALT WIDTH TO 4.5m AND ELIMINATE CURBS.
9. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE INDICATED.

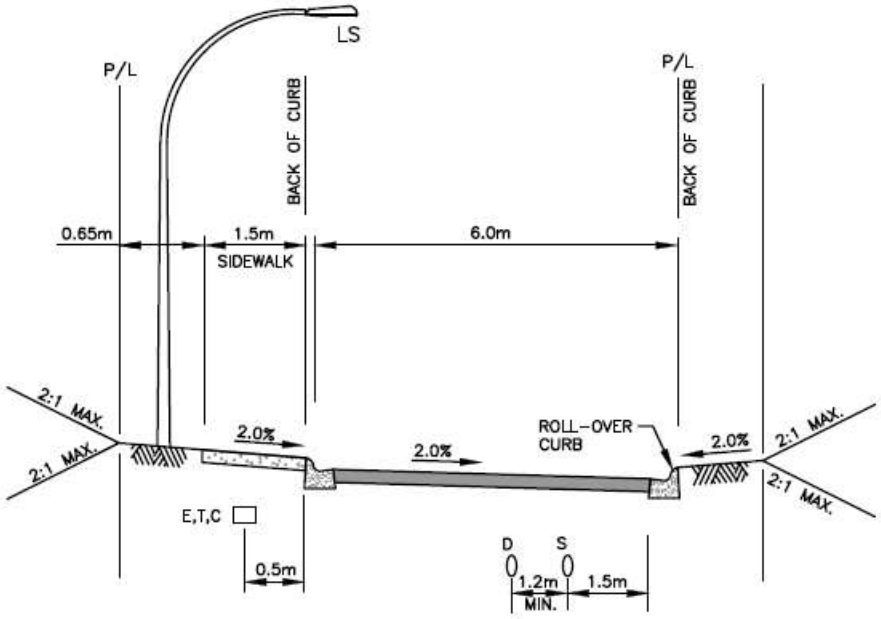
Title

TYPICAL LANE - RESIDENTIAL

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.5



LEGEND

T	–	TELEPHONE	D	–	STORM SEWER
E	–	ELECTRICAL	P/L	–	PROPERTY LINE
C	–	CABLE T.V.	SW	–	SIDEWALK
S	–	SANITARY SEWER	LS	–	LAMP STANDARD

NOTES:

1. REFER TO SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES.
2. DISTANCE BETWEEN UTILITIES TO MEET HEALTH STANDARDS AND OTHER UTILITY COMPANIES' REQUIREMENTS.
   - MIN. 3.0m BETWEEN WATER AND OTHER UTILITIES.
   - MIN. 1.2m BETWEEN STORM AND SANITARY SEWER.
   - MIN. 0.3m BETWEEN POWER AND COMMUNICATION CORRIDORS
   - MIN. 1.0m SEPARATION BETWEEN GAS AND ANY UTILITIES.
   - TELUS LINE TO BE CLOSEST TO PROPERTY LINE.
3. POWER, COMMUNICATION OR GAS MAY BE PLACED IN EASEMENT AREAS IF THE NECESSARY APPROVALS ARE OBTAINED.
4. SURROUNDING TOPOGRAPHY MAY REQUIRE RETAINING STRUCTURES, SUB-DRAINS AND STORM DRAINAGE INTERCEPTION MEASURES.
5. MIN. PREFERRED CLEAR DISTANCE BETWEEN ABOVE GROUND UTILITIES/OBSTRUCTIONS AND SIDEWALK OR FACE OF CURB TO BE 1.0m.
6. REFER TO TABLE 5.B (SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES – SECTION 5.3) – FOR ROAD CROSS SECTION DIMENSIONS
7. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE INDICATED.

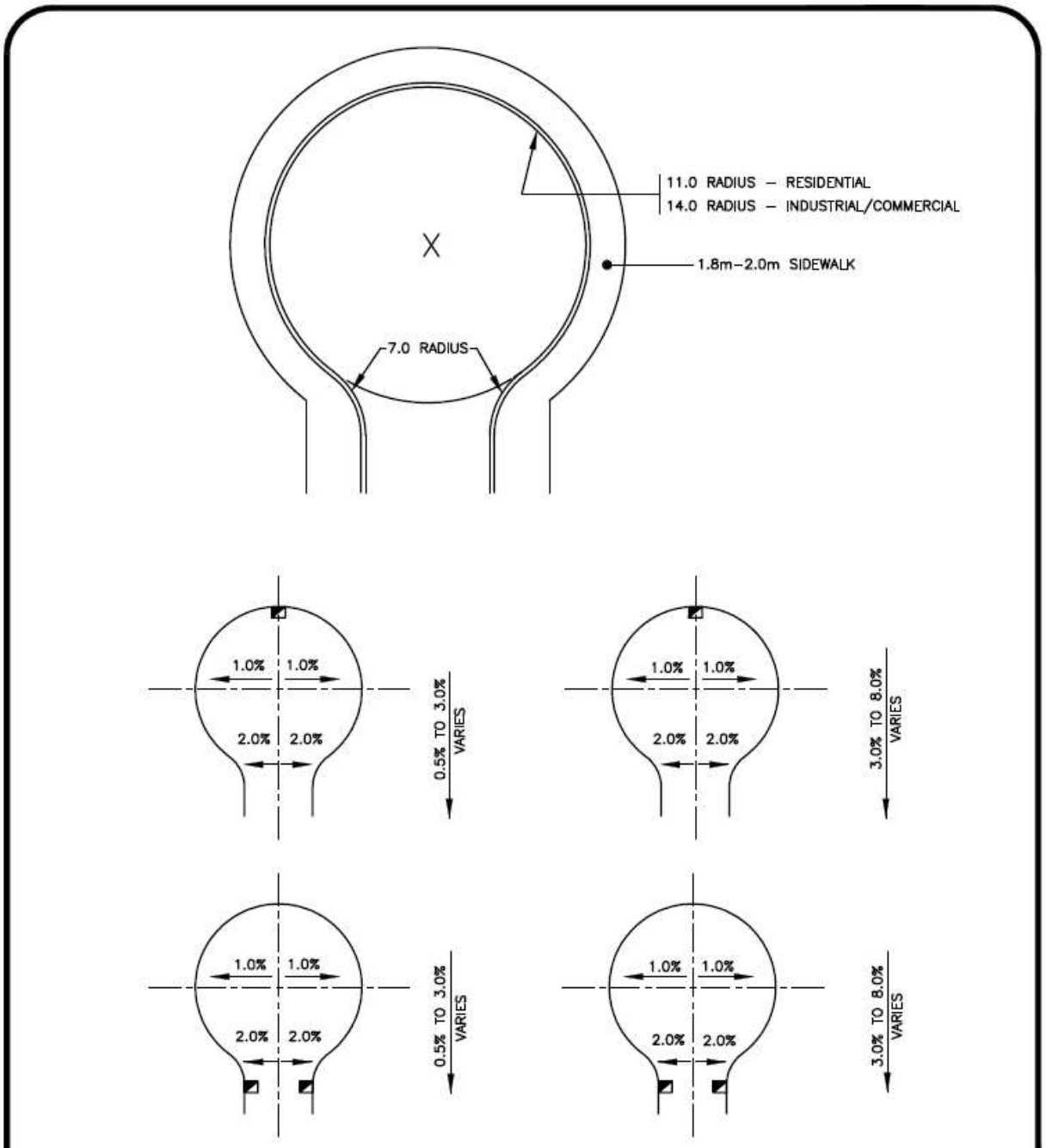
Title

TYPICAL LANE - COMMERCIAL / TOWN CENTRE

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.6



CUL–DE–SAC GRADING DETAILS

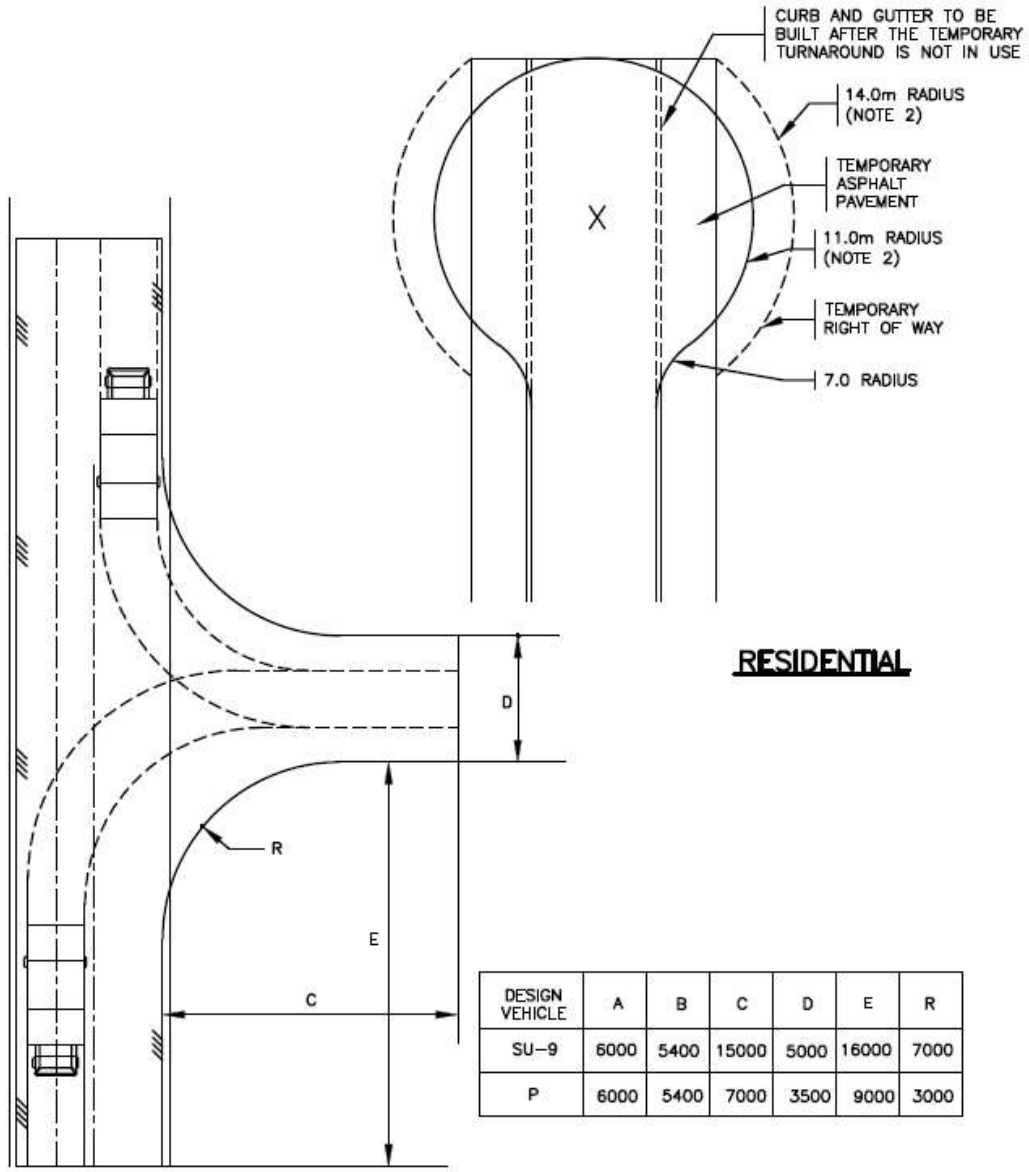
Title

TYPICAL CUL-DE-SAC DETAILS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.7



RESIDENTIAL

DESIGN VEHICLE	A	B	C	D	E	R
SU–9	6000	5400	15000	5000	16000	7000
P	6000	5400	7000	3500	9000	3000

NOTES:

1. DESIGN VEHICLE AS DIRECTED BY THE MUNICIPAL ENGINEER.
2. RADII SHALL BE RADIUS 14.0m AND RADIUS 17.0m RESPECTIVELY FOR COMMERCIAL AND INDUSTRIAL ZONES.
3. ALL DIMENSIONS SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED.

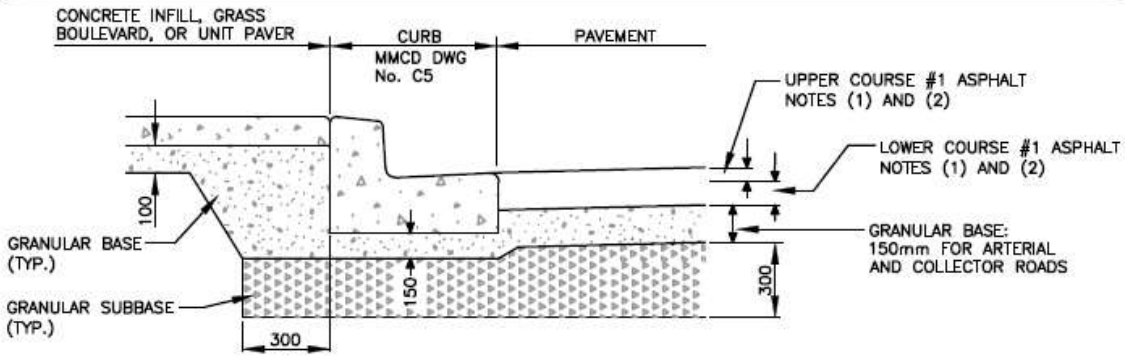
Title

TYPICAL TEMPORARY TURNAROUND & CUL-DE-SAC DETAILS

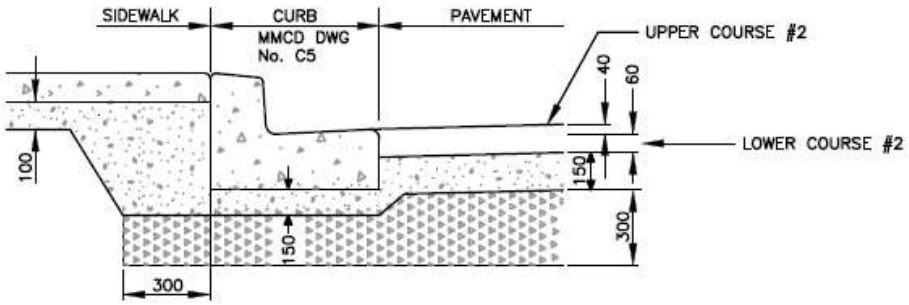
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

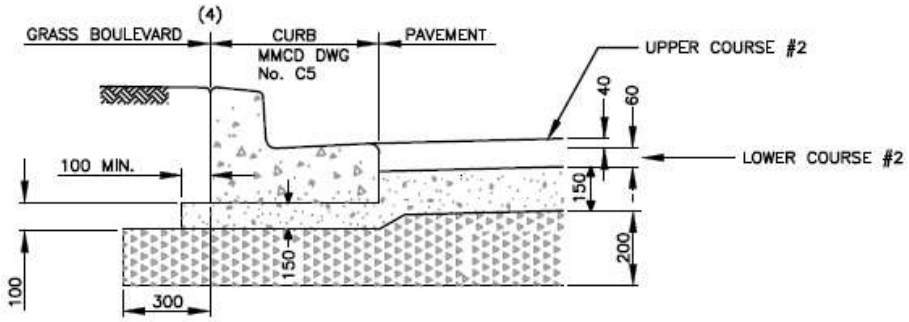
SSD-R.8



TYPICAL SECTION "1" – ARTERIAL AND COLLECTOR ROADS



TYPICAL SECTION "2" – LOCAL ROAD OR LANE – COMMERCIAL



TYPICAL SECTION "3" – LOCAL ROAD OR LANE – RESIDENTIAL

NOTES:

1. FOR ARTERIAL ROADS, THE MINIMUM ASPHALT THICKNESS WILL BE 65mm AND 85mm FOR SURFACE AND BASE LAYERS RESPECTIVELY.
2. FOR COLLECTOR ROADS, THE MINIMUM ASPHALT THICKNESS SHALL BE 50mm AND 80mm FOR SURFACE AND BASE LAYERS RESPECTIVELY.
3. FOR ARTERIAL AND COLLECTOR ROADS, USE LOWER COURSE #1 AND UPPER COURSE #1 RESPECTIVELY.
4. ROADS WITHOUT CURB AND GUTTER SHALL HAVE A MINIMUM PAVEMENT SECTION:
   - 100mm THICKNESS GRANULAR BASE
   - 200mm THICKNESS GRANULAR SUB–BASE
5. FOR MINIMUM GRANULAR AND ASPHALT PAVEMENT SECTIONS, REFER TO SECTION 5.17.3 – TABLE 5D: MINIMUM PAVEMENT STRUCTURE FOR ASPHALTIC CONCRETE PAVEMENT (SCHEDULE A – PART 2: SUPPLEMENTAL DESIGN GUIDELINES)

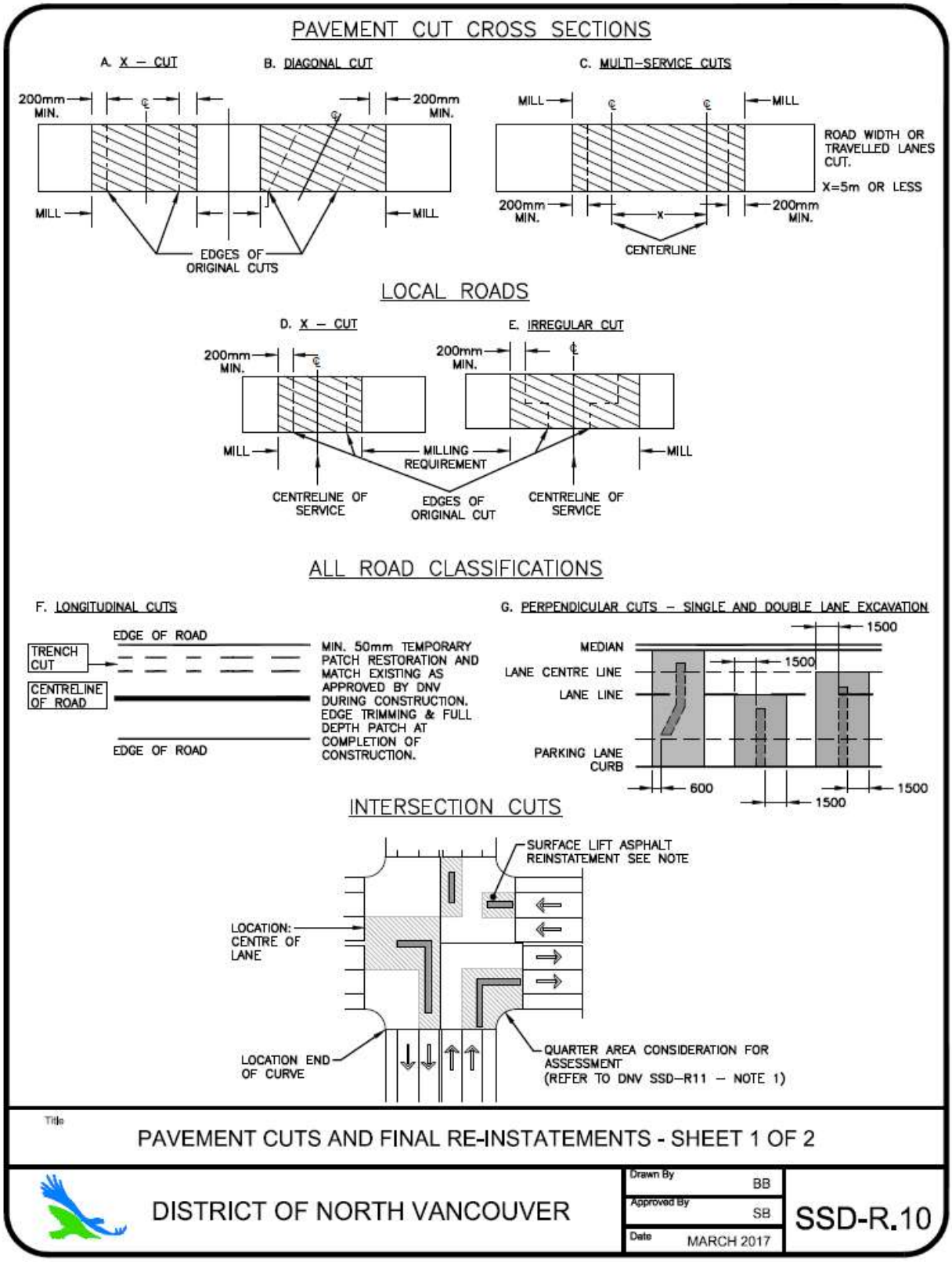
Title

ASPHALT ROAD CONSTRUCTION WITH MINIMUM PAVEMENT SECTIONS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.9


PAVEMENT CUT CROSS SECTIONS
A. X – CUT
B. DIAGONAL CUT
C. MULTI–SERVICE CUTS
200mm MIN.
MILL
EDGES OF ORIGINAL CUTS
ROAD WIDTH OR TRAVELLED LANES CUT.
X=5m OR LESS
CENTERLINE
LOCAL ROADS
D. X – CUT
E. IRREGULAR CUT
MILLING REQUIREMENT
CENTRELINE OF SERVICE
EDGES OF ORIGINAL CUT
ALL ROAD CLASSIFICATIONS
F. LONGITUDINAL CUTS
EDGE OF ROAD
TRENCH CUT
CENTRELINE OF ROAD
MIN. 50mm TEMPORARY PATCH RESTORATION AND MATCH EXISTING AS APPROVED BY DNV DURING CONSTRUCTION. EDGE TRIMMING & FULL DEPTH PATCH AT COMPLETION OF CONSTRUCTION.
G. PERPENDICULAR CUTS – SINGLE AND DOUBLE LANE EXCAVATION
MEDIAN
LANE CENTRE LINE
LANE LINE
PARKING LANE CURB
1500
600
INTERSECTION CUTS
SURFACE LIFT ASPHALT REINSTATEMENT SEE NOTE
LOCATION: CENTRE OF LANE
LOCATION END OF CURVE
QUARTER AREA CONSIDERATION FOR ASSESSMENT (REFER TO DNV SSD–R11 – NOTE 1)
Title
PAVEMENT CUTS AND FINAL RE-INSTATEMENTS - SHEET 1 OF 2
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SB
Date MARCH 2017
SSD-R.10

CRITERIA FOR APPROVAL OF PAVEMENT CUT AND FINAL REINSTATEMENT

1. BASE LIFT PAVEMENTS
TO BE SURFACE OVERLAID WITHIN 6 MONTHS, WEATHER PERMITTED. A "ONE STAGE" REINSTATEMENT WILL BE UNDERTAKEN BY THE PERMITTEE WHICH WILL GENERALLY BE LIMITED TO THE CUT AREA, TOGETHER WITH ANY EDGE TRIMMING TO GIVE A REGULAR EDGE TO THE PATCH READY FOR FINAL SURFACE LIFT (MINIMUM REQUIREMENTS AS PER DETAIL). BASE LIFT PAVEMENTS – SURFACE OVERLAY NOT SCHEDULED IN NEAR FUTURE. SAME AS ABOVE, HOWEVER THE MMCD G5 WILL APPLY.

2. FINAL LIFT PAVEMENTS LESS THAN ONE YEAR OLD
CUTTINGS ARE NOT ALLOWED. IT SHALL BE INCUMBENT ON THE PERMITTEE TO SATISFY THE MANAGER, DESIGN & CONSTRUCTION THAT SUCH CUTS COULD NOT BE FORESEEN, COULD NOT BE UNDERTAKEN PRIOR TO PAVING AND THAT THERE IS NO PRACTICAL ALTERNATIVE. TERMS FOR APPROPRIATE REINSTATEMENT WILL BE AT THE DISCRETION OF THE DNV.

3. FINAL LIFT PAVEMENTS BETWEEN ONE YEAR AND FIVE YEARS OLD
THE PERMITTEE SHOULD BE ENCOURAGED TO TAKE ALTERNATE ROUTES, PUSHING OR AUGURING FOR SERVICES TO AVOID CUTTING THE PAVEMENTS.

4. FINAL LIFT PAVEMENTS MORE THAN FIVE YEARS OLD
THE PERMITTEE MUST KEEP THE NUMBER AND EXTENT OF THE PAVEMENT CUTS DOWN TO A PRACTICAL MINIMUM.

5. PAVEMENT CUTS IN TRAVELLED ROAD AREA – LONGITUDINAL CUTS
5.1. APPLY THE MMCD–G5.

5.2. EXISTING ROADS WITH FINISHED ASPHALT SURFACE WILL BE MILLED TO CENTERLINE OR FULL WIDTH OF TRAVELLED LANE. (REFER TO SKETCH F)

5.3. EXISTING ROADS OVER FIVE YEARS OLD WILL BE REVIEWED FOR REINSTATEMENT REQUIREMENT BY THE DESIGN & CONSTRUCTION DEPARTMENT. A FINAL REINSTATEMENT MAY BE DEFERRED AND THE CHARGES KEPT IN AN ACCOUNT FOR FUTURE RE–PAVING OF THE ENTIRE STREET IF EXISTING PAVEMENT CONDITIONS DO NOT WARRANT SUCH LOCALIZED FINAL REINSTATEMENT TO BE CARRIED OUT.

5.4. FULL OVERLAYS AS A FINAL REINSTATEMENT MAY BE REQUIRED WHERE PAVEMENT CUTS ARE NUMEROUS AND WITHIN CLOSE PROXIMITY OR OTHERWISE EXTENSIVE. ANY UNDERMINING WITHIN A TRENCH MUST BE COMPLETED CUT OUT AND REMOVED. NO CRACKED, FAILED OR UNDERMINED ASPHALT WILL BE PERMITTED ON ANY PATCH.

6. ARTERIALS AND MAJOR COLLECTORS
NEW UTILITY SERVICES PROPOSED WITHIN ARTERIAL OR MAJOR COLLECTOR ROADS SHALL BE INSTALLED BY THE USE OF A PIPE–PUSHER, AUGER/JACKING OR SIMILAR EQUIPMENT. THE MANAGER, DESIGN & CONSTRUCTION WILL BE RESPONSIBLE TO APPROVE ANY ALTERNATIVE REQUEST. SHOULD AN OPEN CUT BE PERMITTED, THE FOLLOWING REINSTATEMENT IS REQUIRED (CROSS, DIAGONAL CUTS AND MULTI–SERVICE CUTS).

6.1. INTERIM REINSTATEMENT
AS PER STANDARD MMCD G5

6.2. FINAL REINSTATEMENT

6.2.1. ARTERIAL & MAJOR COLLECTOR ROADS X–CUT (PERPENDICULAR TO ROAD):
MEASURE 0.2M EACH SIDE OF EDGE OF PAVEMENT CUT (REFER TO SKETCH A).

6.2.3. LONGITUDINAL TRENCHES:
WHETHER IN THE WHEEL PATH OR OTHERWISE, THE AFFECTED LANE WILL BE MILLED AND PAVED FOR THE LENGTH OF THE TRENCH PLUS AN ADDITIONAL 5.0m AT EITHER END OF THE TRENCH.

6.2.4. DIAGONAL CUT:
MEASURE 0.2M BEYOND THE OUTER MOST EDGE OF THE TRENCH CUT (REFER TO SKETCH B).

6.2.5. MULTI–SERVICE CUTS:
MORE THAN ONE SERVICE CUT OVER 5 METERS: MEASUREMENTS TO COVER ALL AREAS BETWEEN CUTS AND EXTEND 0.2M BEYOND THE OUTER MOST EDGE OF THE OUTERMOST CUTS, EXTENDING PERPENDICULAR FROM THE LONGITUDINAL EDGE OF PAVEMENT AND CONTINUING OVER THE FULL WIDTH OF THE AFFECTED TRAVELED LANES (REFER TO SKETCH C).

6.2.6. THE COST OF COMPLETING ASPHALT PAVING SHALL BE BORNE BY THE PERMITTEE.

6.3. LOCAL ROADS X–CUT (PERPENDICULAR TO ROAD):
MEASURE 0.2M EACH SIDE OF EDGE OF PAVEMENT CUT (REFER TO SKETCH D). IRREGULAR CUTS: MEASURE 0.2M BEYOND THE OUTERMOST EDGE OF THE TRENCH CUT (REFER TO SKETCH E). DIAGONAL & MULTI–SERVICE CUTS: TO BE REVIEWED FOR REINSTATEMENT BY THE DNV DESIGN & CONSTRUCTION DEPARTMENT.

6.4. INTERSECTION CUTS:
IF THE CUT AREA (EXISTING AND NEW) ON A QUARTER OF THE INTERSECTION IS 50% PERMANENT RESTORATION OR MORE BY AREA, THEN THE ENTIRE AFFECTED QUARTER MUST BE PAVED, OTHERWISE PAVE FULL LANE ENTIRE WIDTH. SURFACE ASPHALT RESTORATION INVOLVES MILL/OVERLAY TO DEPTH OF UPPER COURSE ASPHALT AS NOTED ON MMCD G5 AND AS DETERMINED IN FIELD BY DNV INSPECTORS.

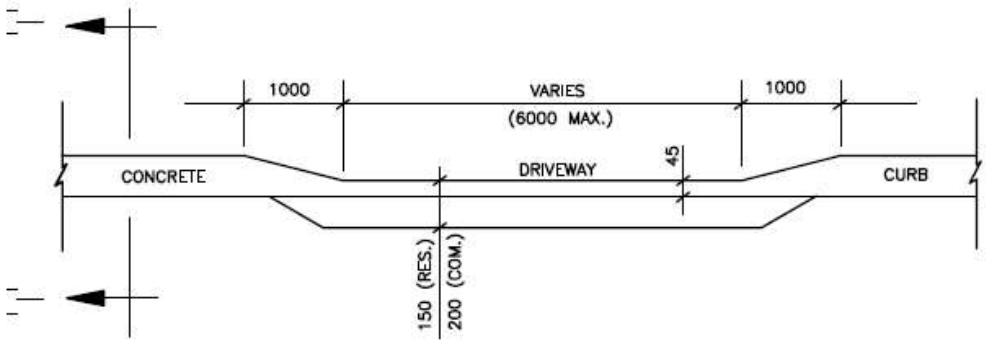
Title

PAVEMENT CUT AND FINAL RE-INSTATEMENTS - SHEET 2 OF 2

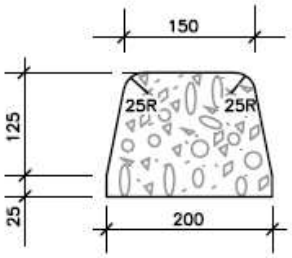
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

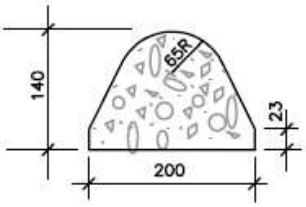
SSD-R.11



ELEVATION – TYPE 'A' AND TYPE 'B'



TYPE 'A'
SECTION 'I'



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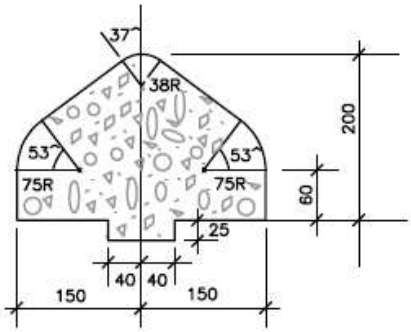
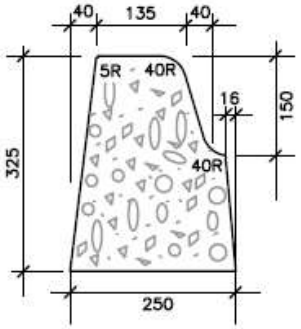
SECTION 'I'



TYPE 'C'
SECTION OF CONCRETE CURB
CENTER DIVIDER



TYPE 'D'
SECTION OF CONCRETE CURB
FOR ISLANDS AND MEDIANS

NOTES:

1. ALL DIMENSIONS SHOWN IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. USE 32MPa CONCRETE (MMCD SECTION 03 30 20)
3. A DRIVEWAY WILL BE PROVIDED AT EACH LOT AT THE LOCATION SHOWN ON THE CONTRACT DRAWINGS. IF NOT SHOWN, LOCATION WILL BE CHOSEN BY THE CONTRACT ADMINISTRATOR.

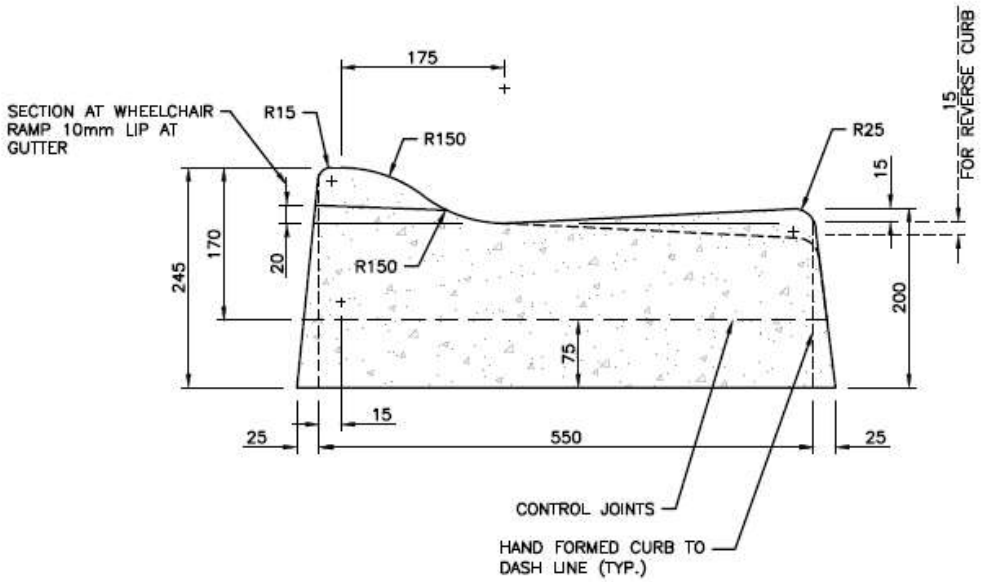
Title

CONCRETE CURBS - TYPE A, B, C, AND D

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.12



NOTES:

1. SECTIONS SHOWN ARE FOR MACHINE EXTRUDED CURBS.
2. REFER TO CONTRACT DRAWINGS, SECTIONS 03 30 20 FOR DETAILED SPECIFICATIONS.
3. REFER TO MMCD DRAWING No. C1, C2 AND C3 FOR INSTALLATION DETAILS.
4. REFER TO MMCD DRAWING No. C5 FOR DIMENSION OF WIDE BASE CURB AND GUTTER.
5. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS OTHERWISE NOTED.

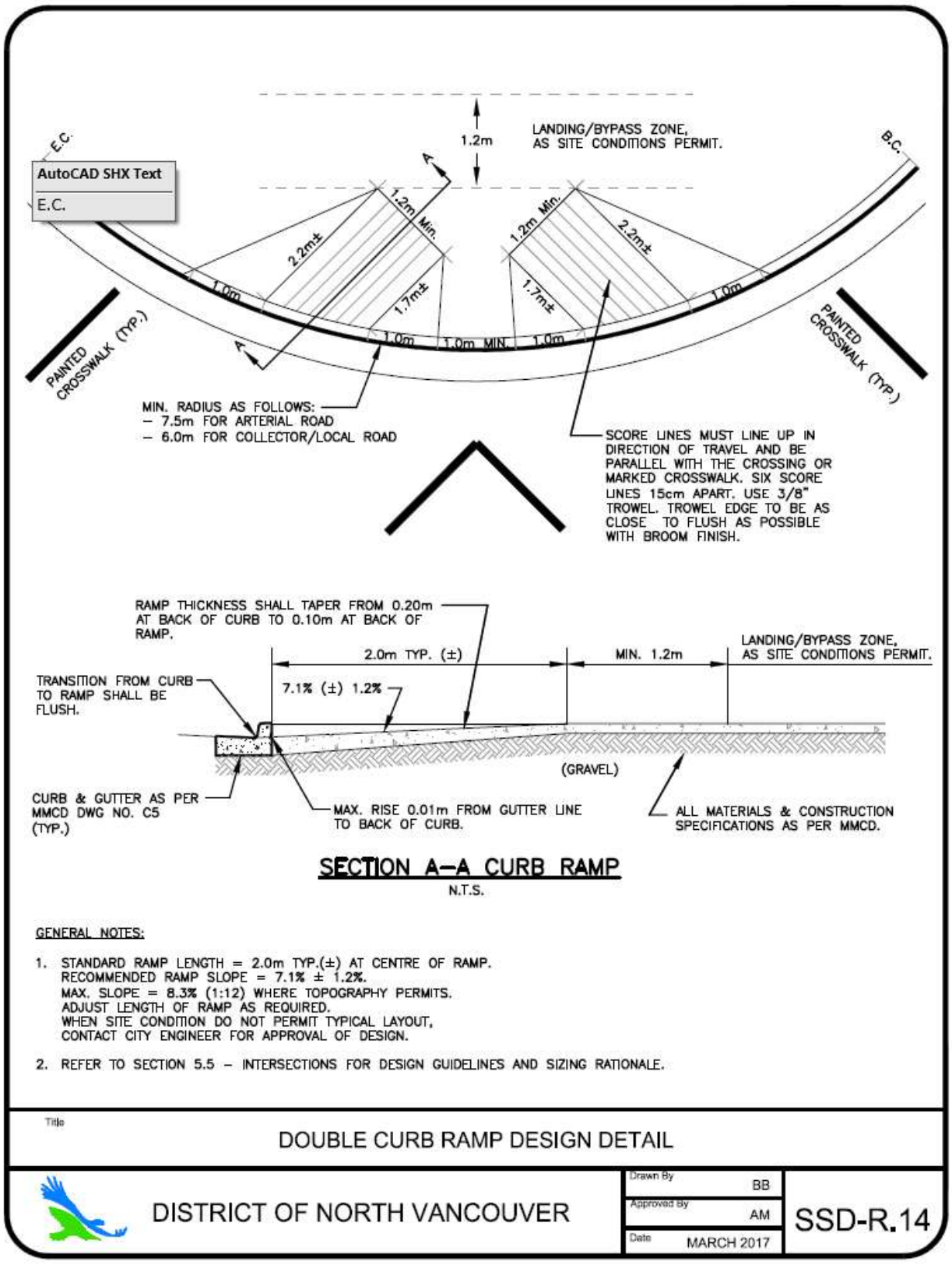
Title

ROLLOVER CURB

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.13



SECTION A–A CURB RAMP

N.T.S.

GENERAL NOTES:

1. STANDARD RAMP LENGTH = 2.0m TYP.(±) AT CENTRE OF RAMP.
   RECOMMENDED RAMP SLOPE = 7.1% ± 1.2%.
   MAX. SLOPE = 8.3% (1:12) WHERE TOPOGRAPHY PERMITS.
   ADJUST LENGTH OF RAMP AS REQUIRED.
   WHEN SITE CONDITION DO NOT PERMIT TYPICAL LAYOUT,
   CONTACT CITY ENGINEER FOR APPROVAL OF DESIGN.
2. REFER TO SECTION 5.5 – INTERSECTIONS FOR DESIGN GUIDELINES AND SIZING RATIONALE.

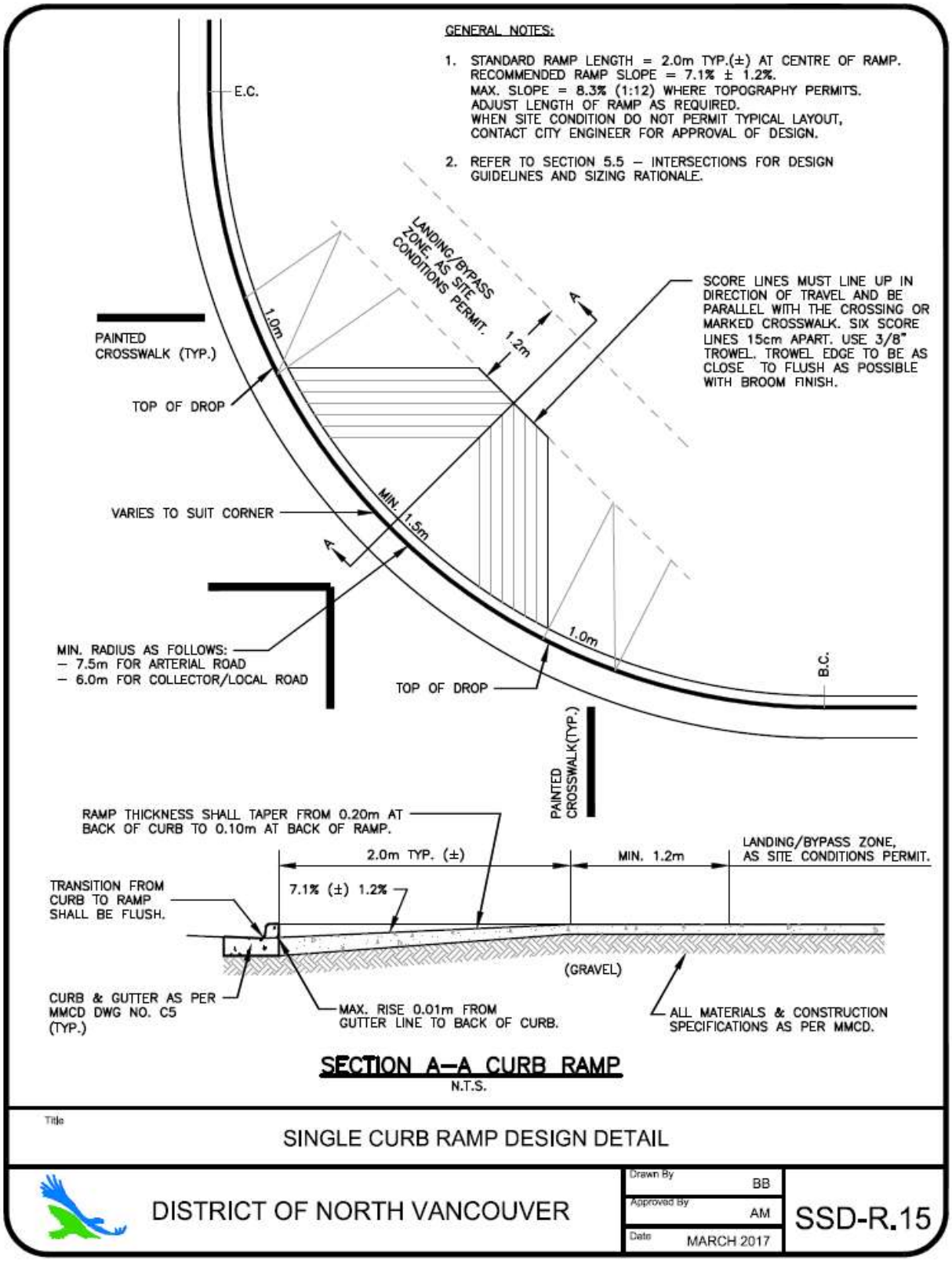
Title

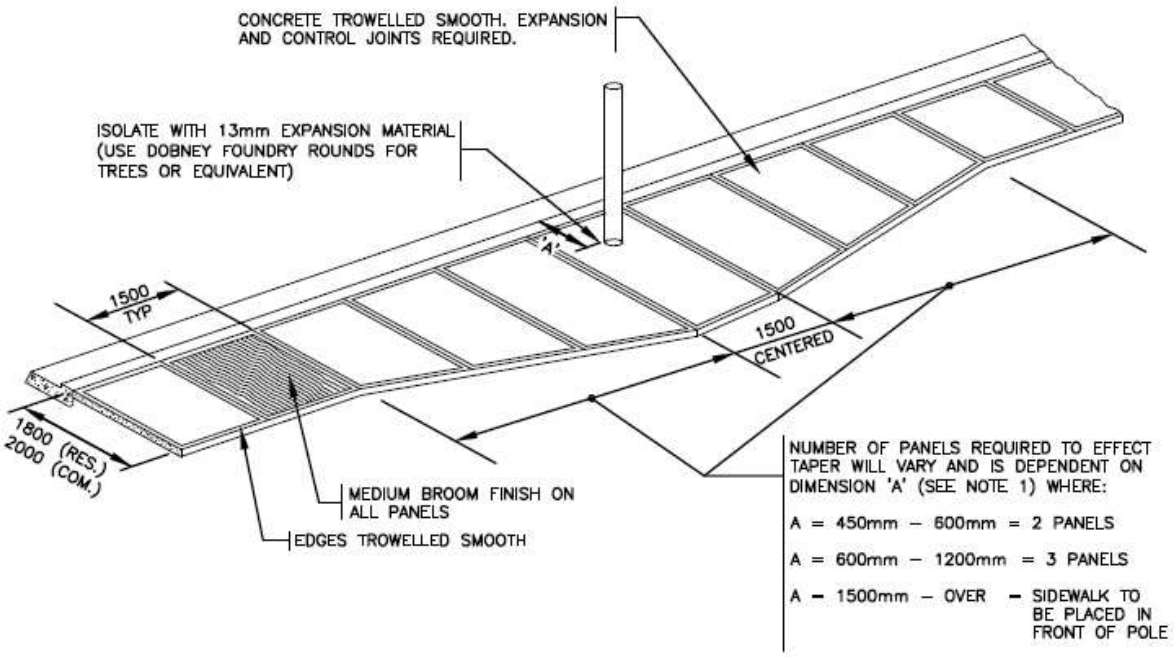
DOUBLE CURB RAMP DESIGN DETAIL

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	AM
Date	MARCH 2017

SSD-R.14


GENERAL NOTES:
1. STANDARD RAMP LENGTH = 2.0m TYP.(±) AT CENTRE OF RAMP. RECOMMENDED RAMP SLOPE = 7.1% ± 1.2%. MAX. SLOPE = 8.3% (1:12) WHERE TOPOGRAPHY PERMITS. ADJUST LENGTH OF RAMP AS REQUIRED. WHEN SITE CONDITION DO NOT PERMIT TYPICAL LAYOUT, CONTACT CITY ENGINEER FOR APPROVAL OF DESIGN.
2. REFER TO SECTION 5.5 – INTERSECTIONS FOR DESIGN GUIDELINES AND SIZING RATIONALE.
E.C.
LANDING/BYPASS ZONE AS SITE CONDITIONS PERMIT.
1.0m
1.2m
4
SCORE LINES MUST LINE UP IN DIRECTION OF TRAVEL AND BE PARALLEL WITH THE CROSSING OR MARKED CROSSWALK. SIX SCORE LINES 15cm APART. USE 3/8" TROWEL. TROWEL EDGE TO BE AS CLOSE TO FLUSH AS POSSIBLE WITH BROOM FINISH.
PAINTED CROSSWALK (TYP.)
TOP OF DROP
VARIES TO SUIT CORNER
MIN. 1.5m
4
MIN. RADIUS AS FOLLOWS:
– 7.5m FOR ARTERIAL ROAD
– 6.0m FOR COLLECTOR/LOCAL ROAD
TOP OF DROP
1.0m
B.C.
PAINTED CROSSWALK(TYP.)
RAMP THICKNESS SHALL TAPER FROM 0.20m AT BACK OF CURB TO 0.10m AT BACK OF RAMP.
2.0m TYP. (±)
MIN. 1.2m
LANDING/BYPASS ZONE, AS SITE CONDITIONS PERMIT.
TRANSITION FROM CURB TO RAMP SHALL BE FLUSH.
7.1% (±) 1.2%
(GRAVEL)
CURB & GUTTER AS PER MMCD DWG NO. C5 (TYP.)
MAX. RISE 0.01m FROM GUTTER LINE TO BACK OF CURB.
ALL MATERIALS & CONSTRUCTION SPECIFICATIONS AS PER MMCD.
SECTION A–A CURB RAMP
N.T.S.
Title
SINGLE CURB RAMP DESIGN DETAIL
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By AM
Date MARCH 2017
SSD-R.15



NOTES:

1. WHERE ACHIEVABLE, DIMENSION 'A' SHALL BE 1.0m FROM CURB FACE TO POLE EDGE, WITH A MINIMUM DIMENSION OF 450mm.
2. 100mm CONCRETE SIDEWALK THICKNESS FOR RESIDENTIAL BARRIER CURB AND 150mm FOR RESIDENTIAL ROLL–OVER CURB INSTALLATIONS.
3. USE 32MPA CONCRETE (MMCD SECTION 03 30 20)
4. FOR SIDEWALK EXPANSION AND CONTROL JOINTS SPACING DETAILS, REFER TO MMCD STANDARD DRAWINGS C2 AND C3.
5. MAINTAIN CONTINUOUS SIDEWALK WIDTH. MINIMUM SIDEWALK WIDTH AT CONFLICT POINT IS 1.5m.
6. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED.

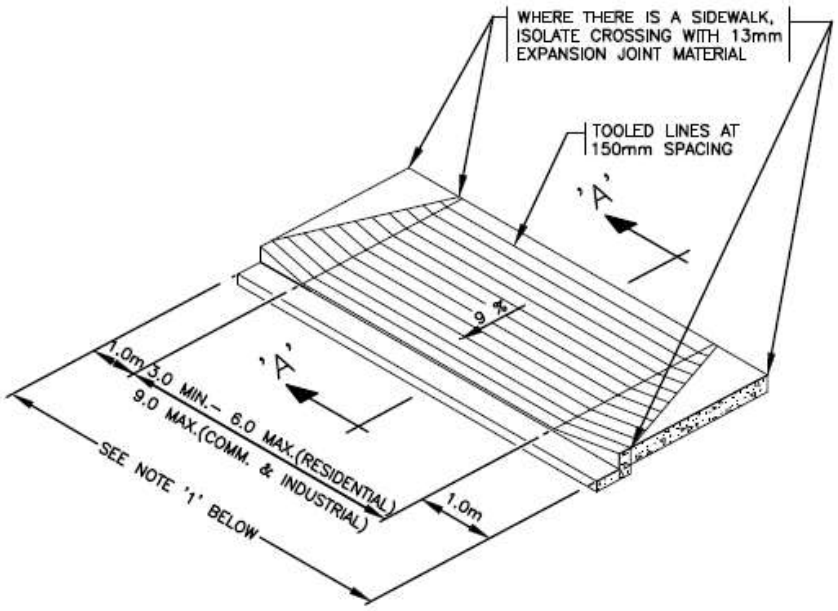
Title

TYPICAL SIDEWALK DETAILS AT UTILITY POLE LOCATIONS

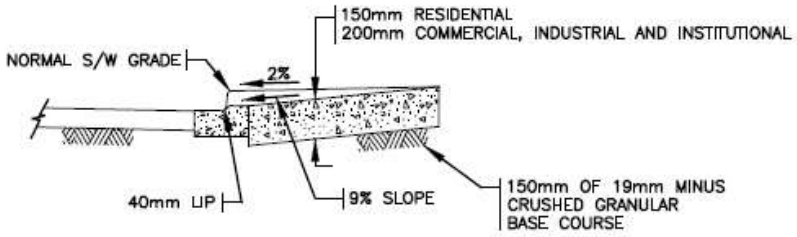
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.16



DRIVEWAY CROSSING



SECTION A–A THROUGH CROSSING

NOTES:

1. MINIMUM 150mm CONCRETE THICKNESS FOR RESIDENTIAL DRIVEWAY CROSSING AND 200mm CONCRETE THICKNESS FOR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL.
2. USE 32MPa CONCRETE (MMCD SECTION 03 30 20).
3. FOR A TIE–IN ON BARRIER CURB AND GUTTER THERE IS A 200mm KEY, SAME AS C5. FOR EXTRUDED OR MONO CURB TIE–IN THE KEY IS 150mm FOR RESIDENTIAL AND 200mm FOR COMMERCIAL
4. ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE NOTED.

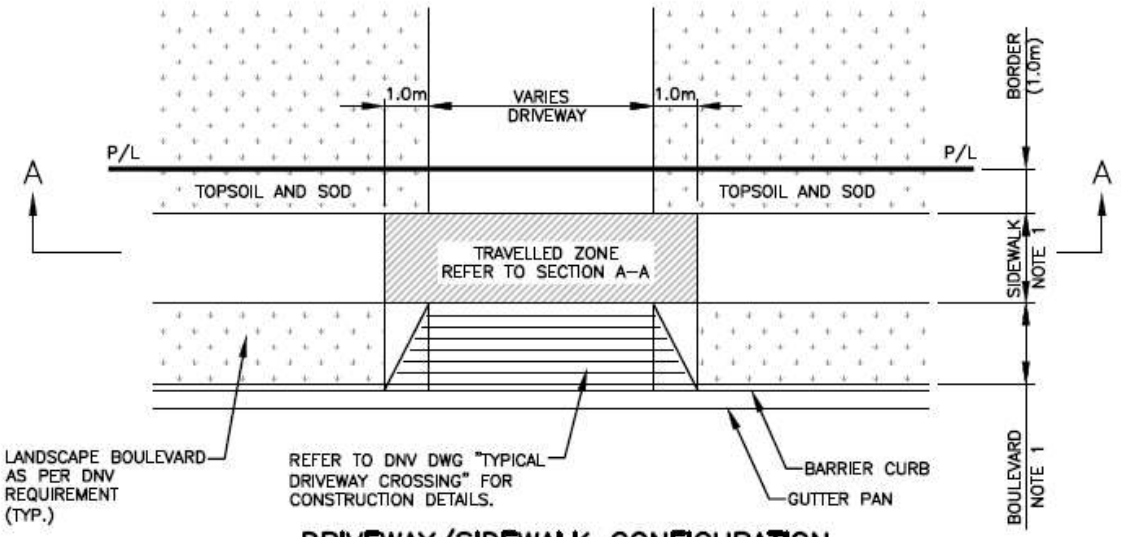
Title

TYPICAL DRIVEWAY CROSSING

DISTRICT OF NORTH VANCOUVER

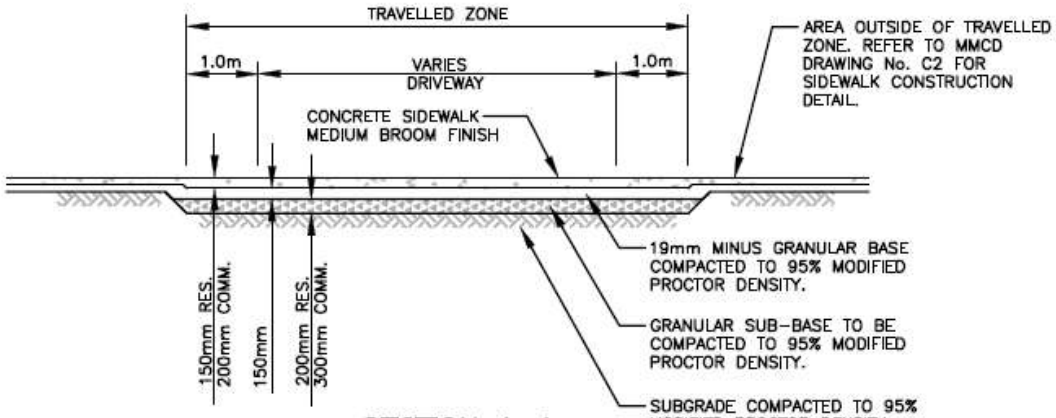
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.17



DRIVEWAY/SIDEWALK CONFIGURATION

N.T.S.



SECTION A–A

N.T.S.

NOTES:

1. REFER TO SECTION 5.3 – TABLE 5B: ROAD CROSS SECTION DERIVATION (SCHEDULE A – PART 1: SUPPLEMENTAL DESIGN GUIDELINES) – FOR SIDEWALK AND BOULEVARD DIMENSIONS
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE INDICATED.

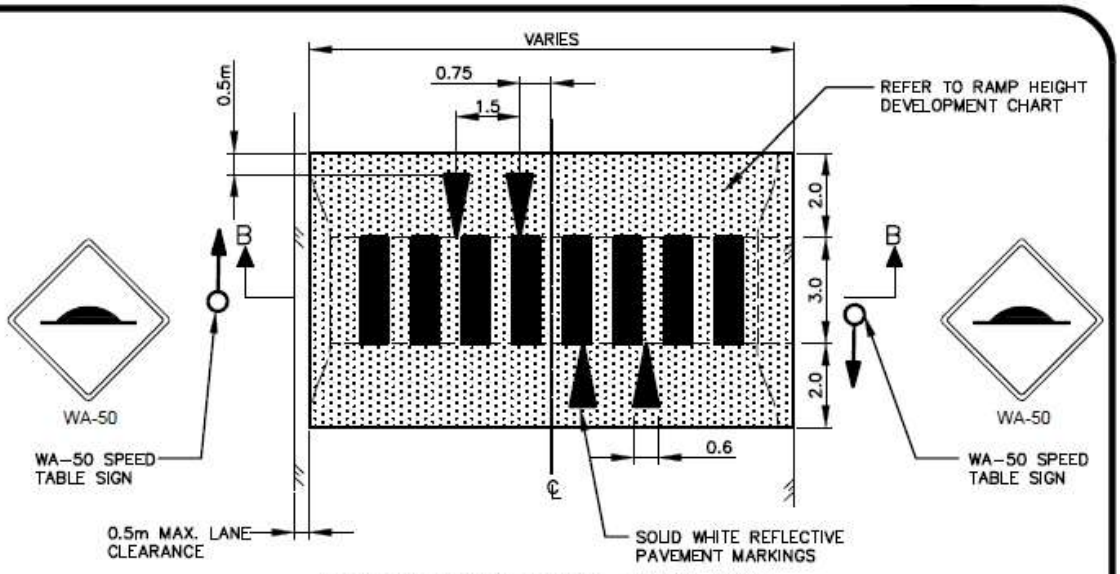
Title

DRIVEWAY AND SIDEWALK CONFIGURATION

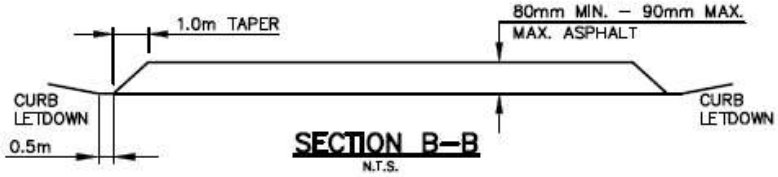
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

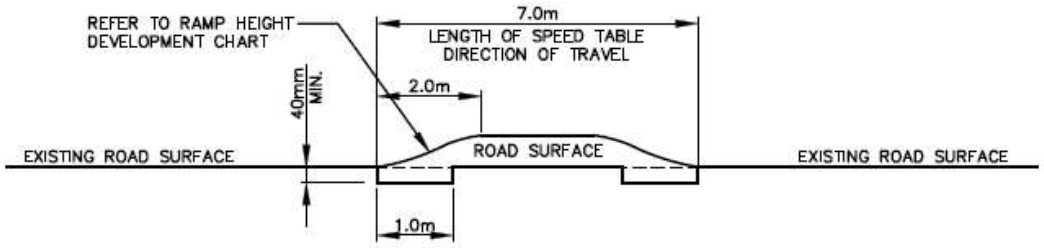
SSD-R.18



RAISED CROSSWALK PLAN VIEW
N.T.S.



SECTION B–B
N.T.S.



METHOD OF KEYING IN RAISED CROSSWALK
N.T.S.

RAMP HEIGHT DEVELOPMENT

CROSSWALK PROFILE PARALLEL TO ROADWAY SURFACE.

DISTANCE (m)	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000
FINISHED HEIGHT (mm)	0	1	3	7	12	18	25	32	40	48	55	62	68	73	77	79	80

* DIMENSION FOR 80mm HEIGHT RAMP

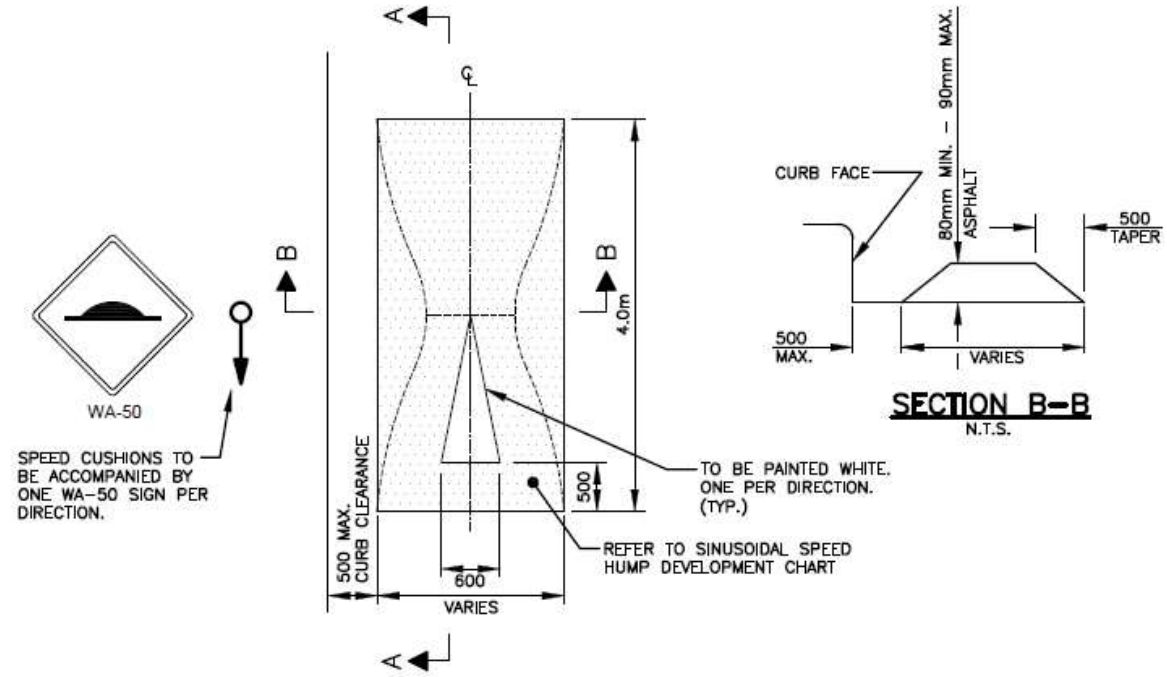
Title

RAISED CROSSWALK DETAIL

DISTRICT OF NORTH VANCOUVER

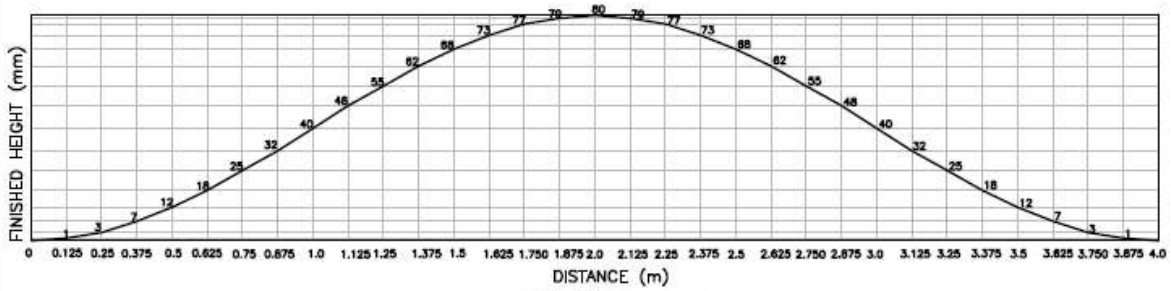
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.19



PLAN VIEW
N.T.S.

SECTION B–B
N.T.S.



SECTION A–A
N.T.S.

SINUSOIDAL SPEED HUMP DEVELOPMENT

SPEED HUMP PROFILE PARALLEL TO ROADWAY SURFACE.

DISTANCE (m)	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875	1.000	1.125	1.250	1.375	1.500	1.625	1.750	1.875	2.000
FINISHED HEIGHT (mm)	0	1	3	7	12	18	25	32	40	48	55	62	68	73	77	79	80

* DIMENSION BASED ON 80mm RAMP HEIGHT

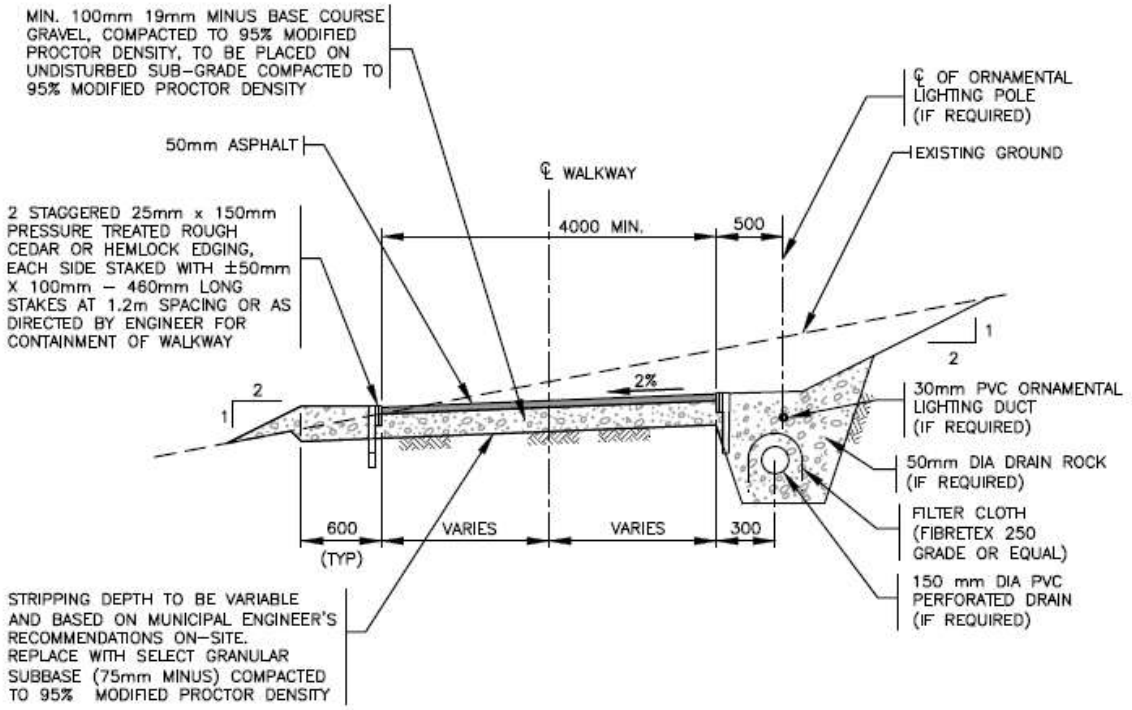
Title

SPEED HUMP DETAIL

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.20



NOTE:

1. ALL DIMENSIONS SHOWN IN MILLIMETRES, UNLESS OTHERWISE NOTED.
2. ASPHALT MIX FOR 50mm LAYER SHALL BE UPPER COURSE #2 (MMCD SECTION 32 12 16).

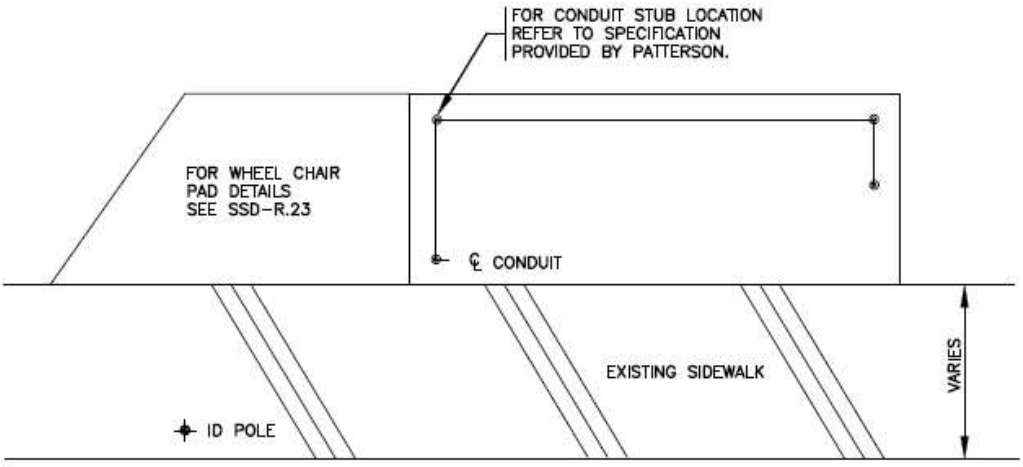
Title

TYPICAL PAVED MULTI-USE PATHWAY DETAIL

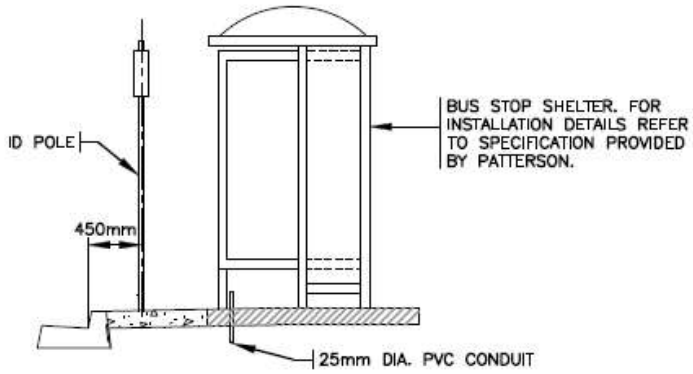
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

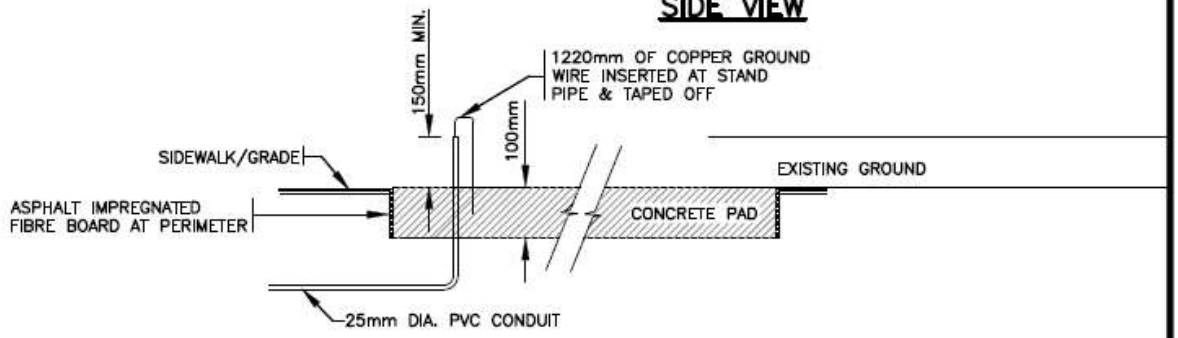
SSD-R.21



PLAN VIEW – CONDUIT LOCATION



SIDE VIEW



TYPICAL SECTION & CONDUIT

NOTES:
ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE SHOWN.

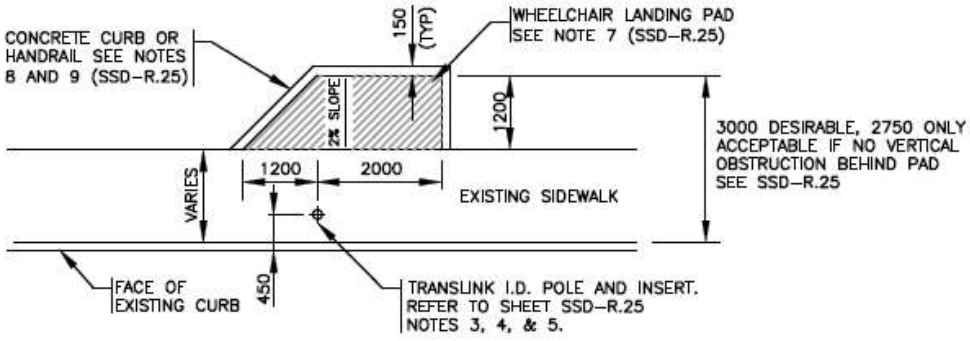
Title

BUS STOP SHELTER LAYOUT

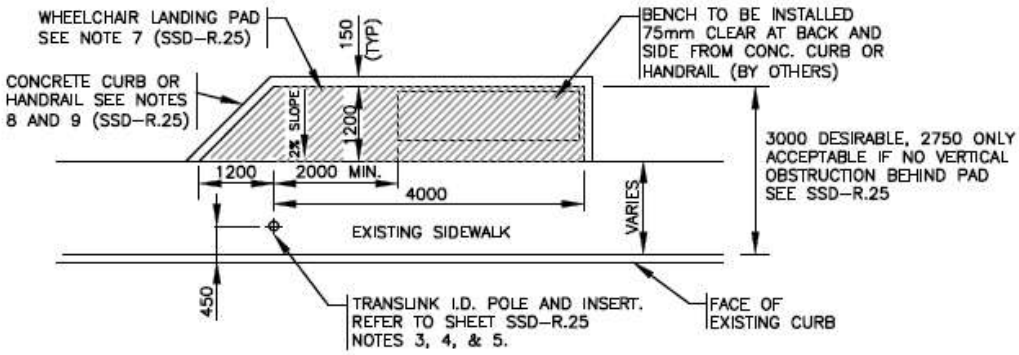
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

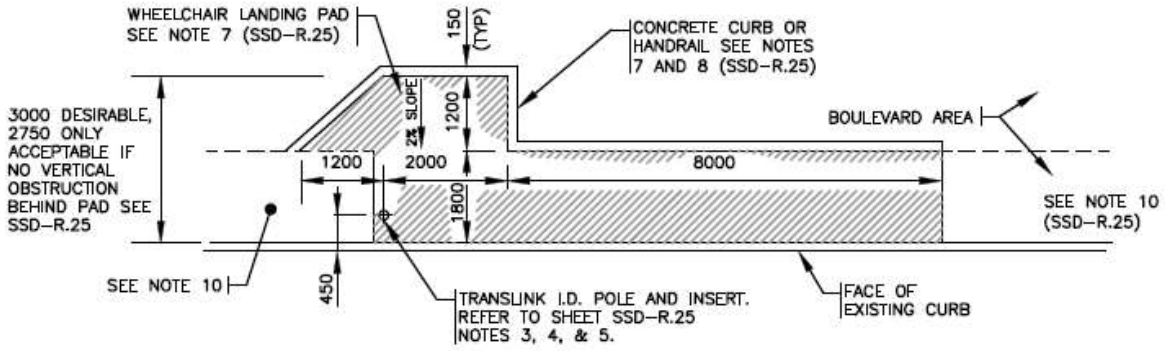
SSD-R.22



TYPE 1



TYPE 2 (BENCH 2.6m LONG)



TYPE 3

NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES, UNLESS OTHERWISE SHOWN.
2. FOR BUS STOP NOTES, SEE DWG. SSD–R.25

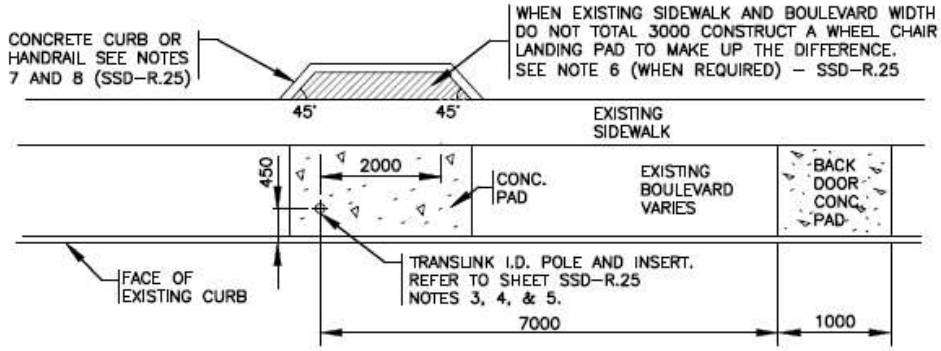
Title

LANDING AREA FOR WHEELCHAIR ACCESSIBLE BUS STOP - TYPES 1, 2 & 3

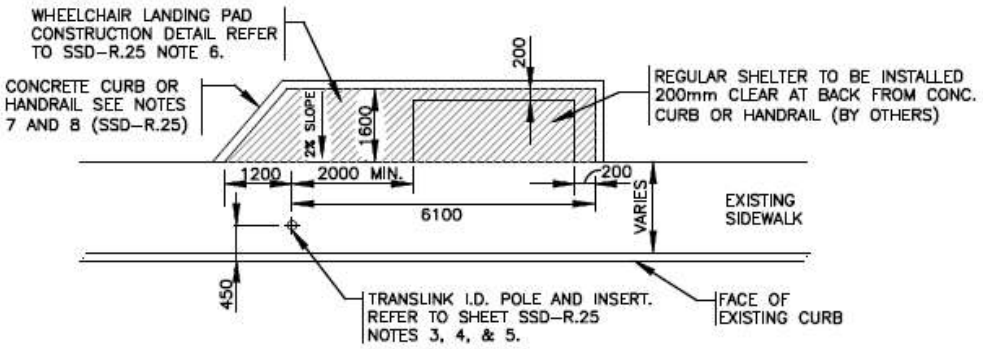
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

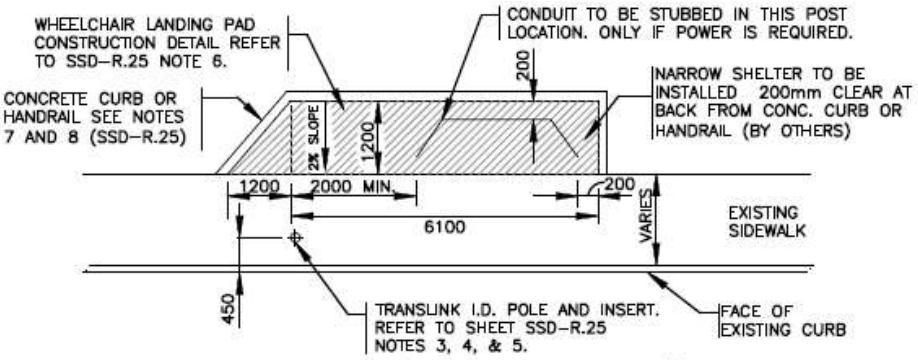
SSD-R.23



TYPE 4 (BOULEVARD BUS STOP)



TYPE 5 (STANDARD SHELTER)



TYPE 6 (NARROW SHELTER)

NOTES:

1. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES, UNLESS OTHERWISE SHOWN.
2. FOR LIGHTING CONDUIT LOCATIONS (TYPE 5&6 SHELTERS) REFER TO SSD–R.22 AND PATTERSON SPECIFIED DRAWING FOR DETAILS.
3. FOR BUS STOP NOTES, SEE DWG. SSD–R.25

Title

LANDING AREA FOR WHEELCHAIR ACCESSIBLE BUS STOP - TYPES 4, 5 & 6

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-R.24

NOTES:

1. WHEELCHAIR LANDING PAD NOT TO BE INSTALLED IF ROAD GRADE IS OVER 10%.
2. ALL PADS TO HAVE MAX. 2% SLOPE.
3. TRANSLINK TO SUPPLY I.D. POLE AND INSERTS. CONTRACTOR TO CO-ORDINATED I.D. POLE INSTALLATION WITH CMBC AND INSTALL I.D. POLE TO TRANSLINK'S RECOMMENDATIONS AND SATISFACTION.
4. INSTALL INSERTS 450mm BEHIND FACE OF CURB AND ALIGN WITH INSIDE FACE OF HANDRAIL OR PAD CURB.
5. I.D. POLE INSERTS TO BE INSTALLED PLUMB AND POLE INSERT LOCK BOLT TO FACE ROAD.
6. WHEELCHAIR LANDING PAD AND CURB TO BE 100mm OF 32MPa CONCRETE (MMCD Section 03 30 20) C/W BROOM FINISH. BASE MATERIAL UNDER PAD TO BE 100mm OF COMPACTED 19mm MINUS CRUSHED GRANULAR BASE COURSE.
7. WHEN ELEVATION CHANGE IS MORE THAN 600mm AT BACK OR SIDES OF WHEELCHAIR PAD, HANDRAILS WILL BE REQUIRED AS PER MMCD STD. DWG. C14.
8. AT THE DISCRETION OF THE MUNICIPAL ENGINEER, 150mm x 150mm CONCRETE CURB TO BE INSTALLED AT BACK AND SIDES OF ALL WHEELCHAIR LANDING PADS EXCEPT WHERE HANDRAILS ARE REQUIRED. CURB TO BE TIED INTO CONCRETE PAD WITH 10M REBAR SPACED 300mm APART AND EMBEDDED 100mm INTO PAD AND CURB AND 1-10m REBAR RUNNING HORIZONTALLY IN THE MIDDLE OF CURB.
9. WHEN RETAINING WALLS ARE REQUIRED REFER TO CONSTRUCTION DRAWINGS FOR DETAILS.
10. WHENEVER POSSIBLE, WHEELCHAIR LANDING PAD TO TIE INTO EXISTING SIDEWALK.

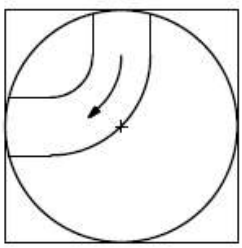
Title

LANDING AREA FOR WHEELCHAIR ACCESSIBLE BUS STOP - NOTES

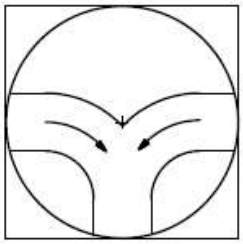
DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

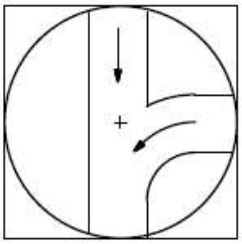
SSD-R.25



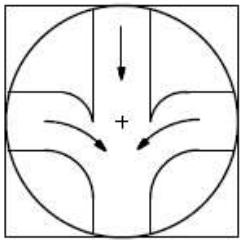
1. RIGHT ANGLE BEND



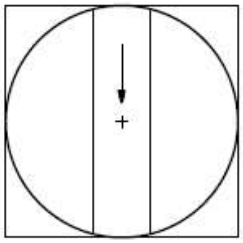
2. TEE CONNECTION



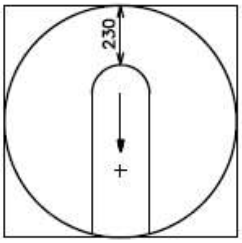
3. THREE WAY JUNCTION



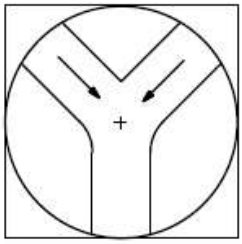
4. FOUR WAY JUNCTION



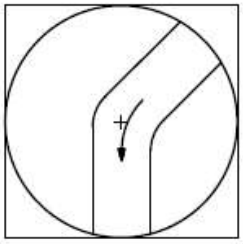
5. STRAIGHT THROUGH



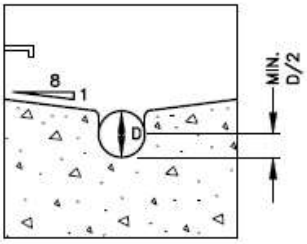
6. DEAD END



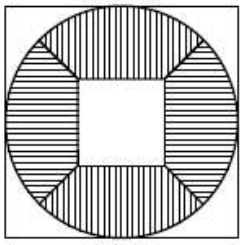
7. WYE CONNECTION



8. 45° BEND

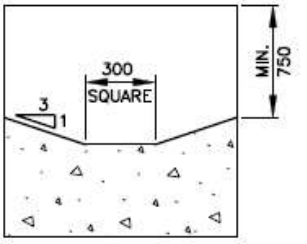


SECTION



SUMP

SUMP DETAIL



SECTION

NOTES:

1. BENCHING DETAILS ARE CONCEPTUAL ONLY. BENCHING CONFIGURATION AND INVERTS SHALL BE CHECKED FOR HYDRAULIC ADEQUACY.
2. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

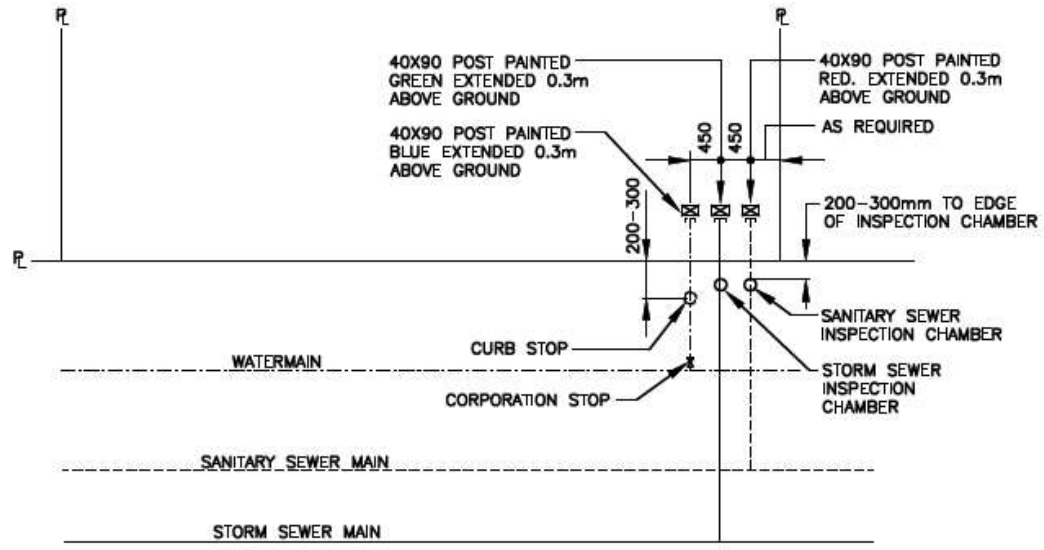
Title

TYPICAL MANHOLE BENCHING DETAILS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-S.1



TYPICAL SERVICE CONNECTION LAYOUT – PLAN VIEW

N.T.S.

NOTES:

1. ALL NEW SEWER MAINS AND LATERALS TO BE CCTV INSPECTED PER MMCD.
2. TESTING OF NEW SEWER MAINS AND LATERALS TO BE PERFORMED IN THE PRESENCE OF THE ENGINEER OF RECORD AND DNV INSPECTORS. CONTRACTOR TO PROVIDE 48 HRS NOTICE. TESTING OF ALL SERVICES/MAINS PER MMCD WITH THE RESULTS FORWARDED TO DNV.
3. PIPE BEDDING TO CONFORM WITH MMCD STANDARDS AND BE COMPACTED TO 95% MODIFIED PROCTOR DENSITY FOR IMPORTED GRANULAR BACKFILL OR 90% FOR APPROVED NATIVE BACKFILL PRIOR TO BACKFILLING. SEE MMCD STANDARD DRAWING G4. TEST RESULTS TO BE FORWARDED TO DNV.
4. NEW AND/OR REINSTATED SERVICE CONNECTIONS TO BE FREE OF BENDS ASIDE FROM ONE VERTICAL SWEEP BEND AS SHOWN ON DNV STANDARD DWG. SSD-S.7 IF CONNECTION AT MAIN IS GREATER THAN 1.8m DEEP. ANY VARIATION WILL REQUIRE CDNV APPROVAL.
5. TIE-INS TO EXISTING MAINS 200mm (8") AND LARGER TO USE A QWIKSEAL INSERT CONNECTION.
6. TIE-INS TO EXISTING 150mm (6") MAINS TO USE A ROBAR 3406/3506 SEWER SADDLE OR A ROMAC STYLE "CB" SEWER SADDLE.
7. CUT-IN WYES COMPLETE WITH FLEX SEAL ADJUSTABLE SHIELDED COUPLINGS MAY ONLY BE USED AT THE DISCRETION OF THE CDNV.
8. NEW MAINS THAT REINSTATE OR HAVE NEW SERVICE CONNECTIONS ARE TO INSTALL A MANUFACTURED WYE AT THE SERVICE CONNECTION.
9. CONTRACTOR TO PROVIDE TEMPORARY BYPASS AND RECONNECTION OF SERVICES DISRUPTED BY CONSTRUCTION ACTIVITIES.
10. ALL CONNECTIONS TO EXISTING PIPES OR TO PIPES OF DIFFERENT MATERIAL TO USE FLEX SEAL ADJUSTABLE SHIELDED COUPLINGS.
11. MMCD SECTION 33 30 01 CLAUSE 3.19.5 TO BE DELETED AND INSTEAD READ "NO PONDING IS ACCEPTABLE".
12. MMCD SECTION 33 40 01 CLAUSE 3.13.5 TO BE DELETED AND INSTEAD READ "NO PONDING IS ACCEPTABLE".

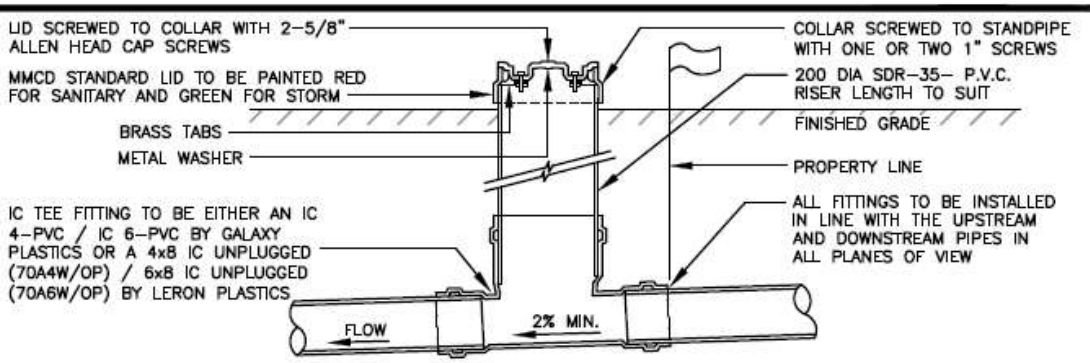
Title

SERVICE CONNECTION LAYOUT

DISTRICT OF NORTH VANCOUVER

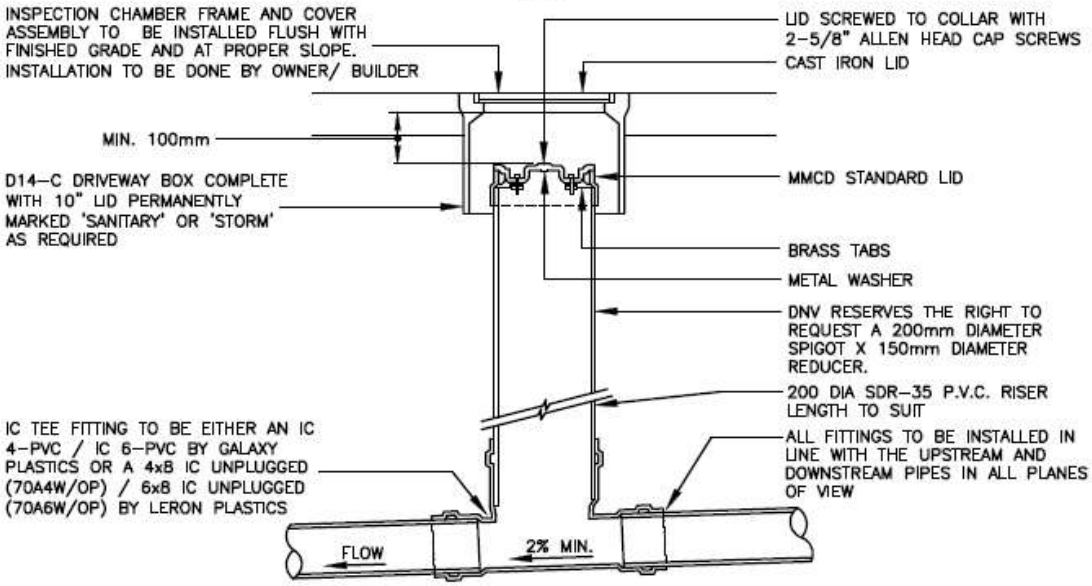
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-S.2



INSTALLATION OF INSPECTION CHAMBER IN NON-TRAVELLED AREAS

N.T.S.



INSTALLATION OF INSPECTION CHAMBER IN TRAVELLED AREAS

N.T.S.

NOTES:

1. MINIMUM COVER 1.2m UNLESS OTHERWISE SPECIFIED BY THE MUNICIPAL ENGINEER.
2A. STREET RECONSTRUCTION PROJECTS: CONTRACTOR/DEVELOPER TO LEAVE TOP OF INSPECTION CHAMBER AT 150mm ABOVE FINISHED GRADE OR AS OTHERWISE DIRECTED BY THE MUNICIPAL ENGINEER.
2B. LAND DEVELOPMENT PROJECTS: CONTRACTOR TO LEAVE TOP OF INSPECTION CHAMBER A MINIMUM OF 600mm ABOVE EXISTING GRADE OR AS OTHERWISE DIRECTED BY THE MUNICIPAL ENGINEER.
3. A FACTORY INSTALLED PLUG MUST BE USED ON ALL STORM AND SANITARY UNTIL FINAL CONNECTION IS MADE.
4. MAXIMUM OF ONE JOINT IN THE STAND-PIPE AND IT MUST INCLUDE A FACTORY BELL COMPLETE WITH GASKET.
5. UNITS SHOWN IN MILLIMETERS UNLESS OTHERWISE STATED.

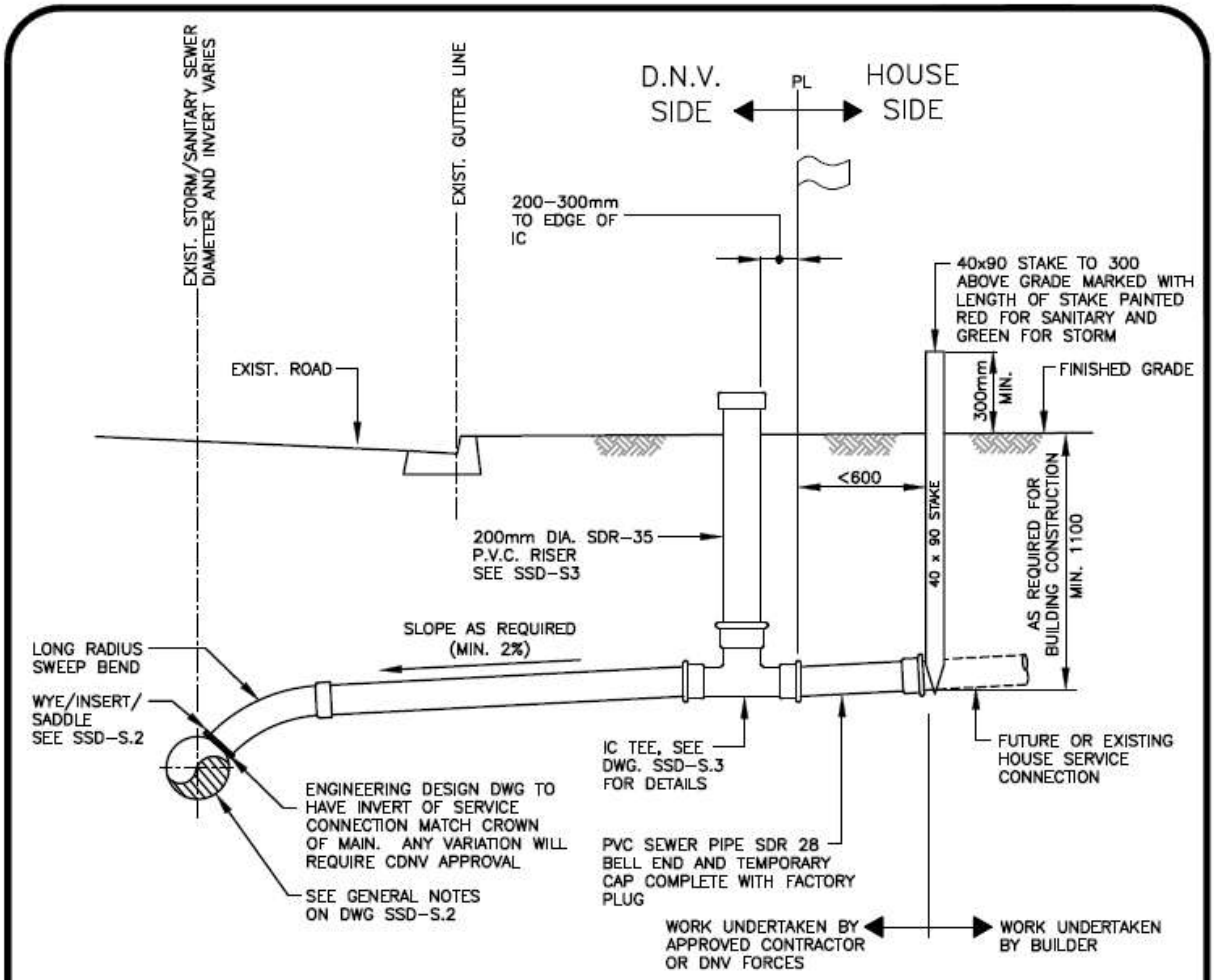
Title

INSPECTION CHAMBER DETAIL

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-S.3



NOTES:

1. FOR INSPECTION CHAMBER DETAILS SEE DNV STANDARD DWG SSD–S.3
2. TYPICAL SERVICE CONNECTION SIZES ON DNV SIDE 150mm DIA FOR STORM AND 100mm DIA FOR SANITARY SDR–28 PVC.
3. ALL SERVICE CONNECTIONS REQUIRE LONG RADIUS SWEEPS.
4. ALL NON–FACTORY JOINTS MUST USE FLEX SEAL ADJUSTABLE SHIELDED COUPLERS.
5. ALL JOINTS MUST BE SEALED.
6. UNITS SHOWN IN MILLIMETERS UNLESS OTHERWISE STATED.

TYPICAL SAN/STORM SERVICE CONNECTION < OR = 1.8m DEEP @ MAIN CONSTRUCTION

N.T.S.

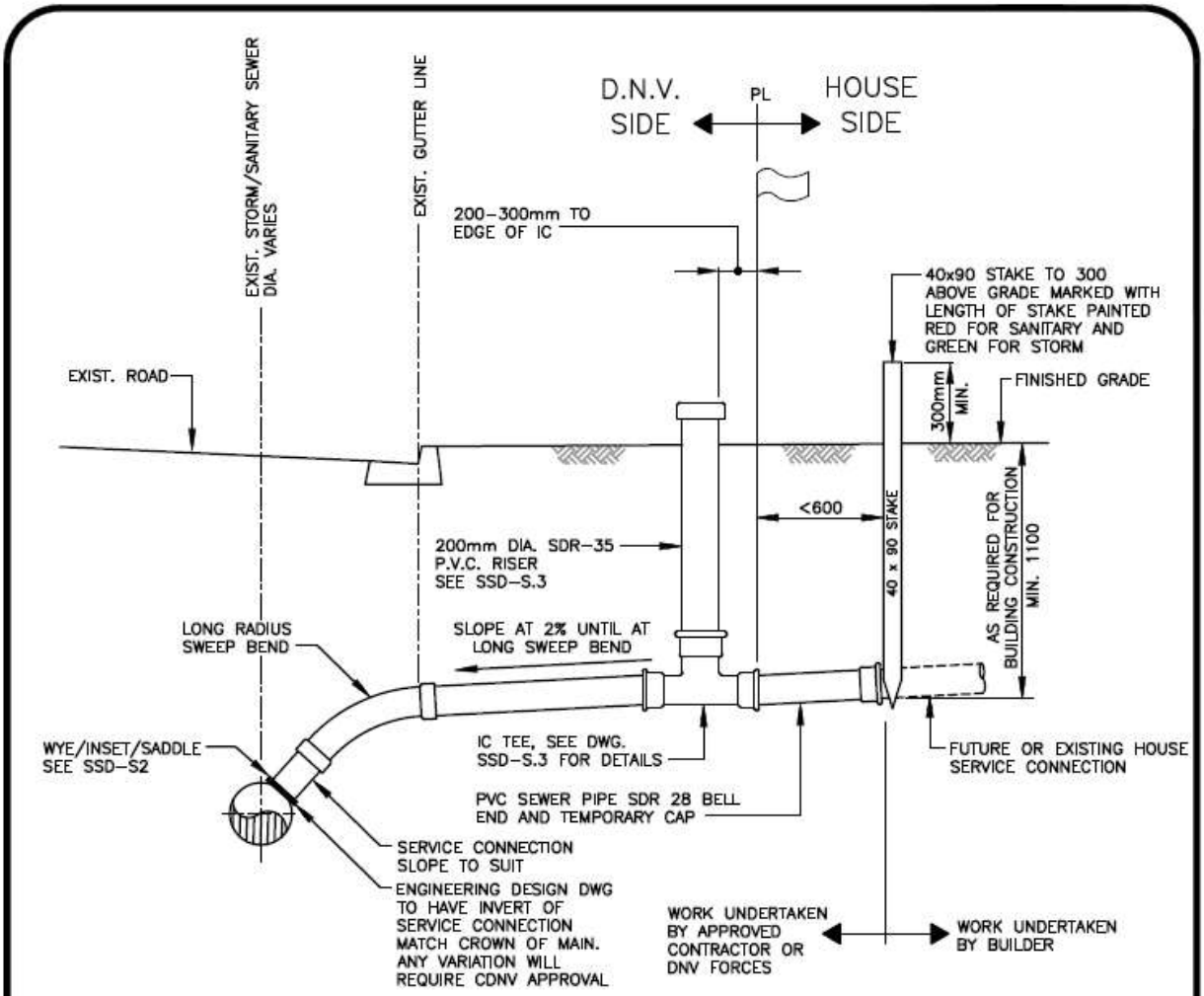
Title

SEWER SERVICE CONNECTION DETAILS - SHEET 1 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-S.4



NOTES:

1. FOR INSPECTION CHAMBER DETAILS SEE DNV STANDARD DWG SSD–S.3
2. TYPICAL SERVICE CONNECTION SIZES ON DNV SIDE 150mm DIA FOR STORM AND 100mm DIA FOR SANITARY SDR–28 PVC.
3. ALL SERVICE CONNECTIONS REQUIRE LONG RADIUS SWEEPS.
4. ALL NON–FACTORY JOINTS MUST USE FLEX SEAL ADJUSTABLE SHIELDED COUPLERS.
5. ALL JOINTS MUST BE SEALED.
6. UNITS SHOWN IN MILLIMETERS UNLESS OTHERWISE STATED.

TYPICAL SAN/STORM SERVICE CONNECTION > 1.8m DEEP @ MAIN CONSTRUCTION

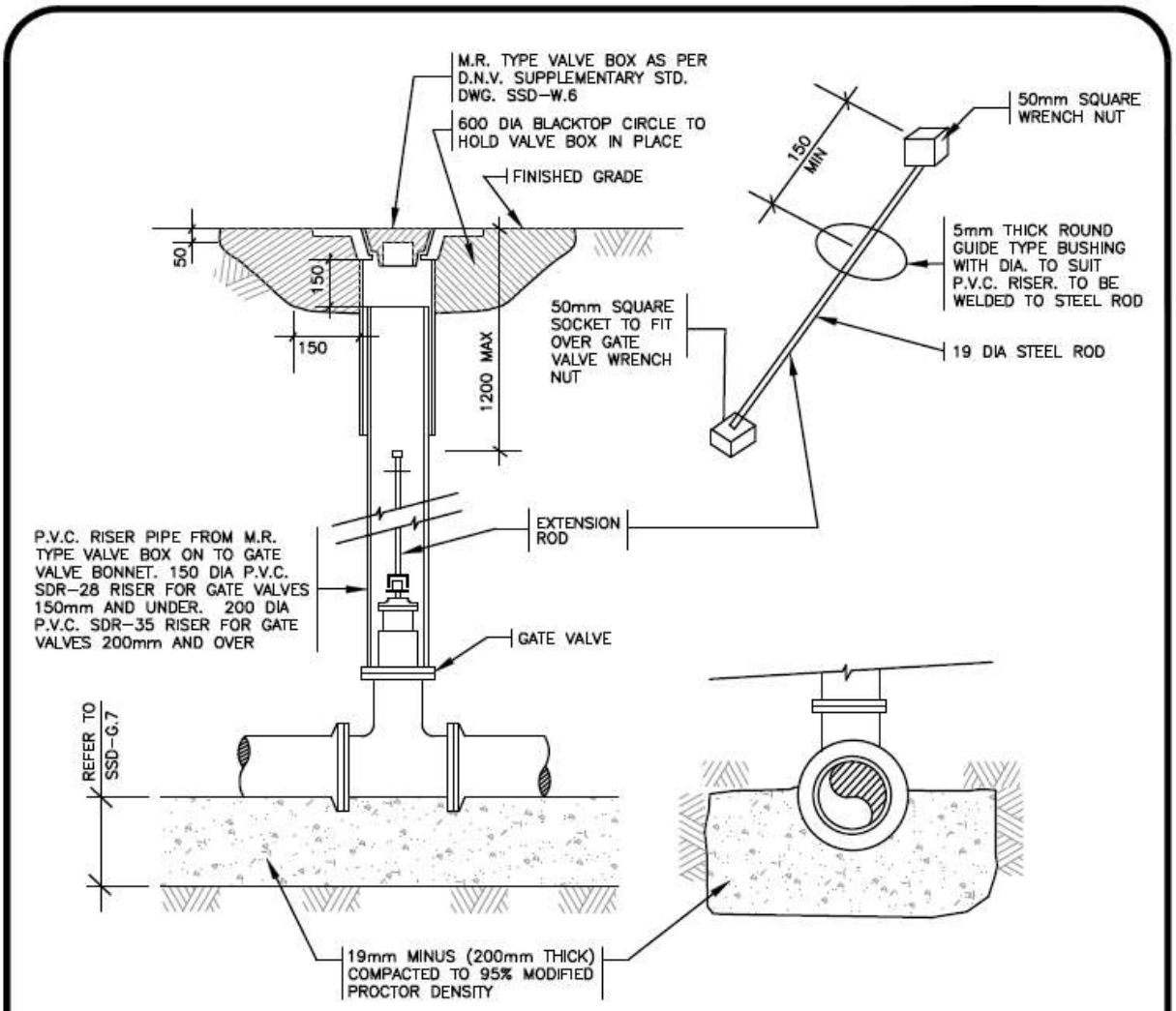
N.T.S.

Title: SEWER SERVICE CONNECTION DETAILS - SHEET 2 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-S.5



NOTES:

1. EXTENSION RODS ARE REQUIRED TO MAINTAIN THE DEPTH OF THE OPERATING NUT FOR THE GATE VALVE AT 1200mm.
2. POLYETHYLENE (6 MIL) ON THE INTERFACE OF CONCRETE AND FITTINGS.
3. IN GRAVELED AREAS THE M.R. TYPE VALVE BOX IS TO BE IN PAVED 600mm CIRCULAR AREA TO SUIT GRADE.
4. PAINT REBAR WITH ROCO TAR.
5. WHEREVER POSSIBLE, GATE VALVES ARE TO BE FLANGED TO FITTINGS.
6. ALL THRUST BLOCK MUST BE ENGINEERED.
7. ALL DIMENSIONS SHOWN IN MILLIMETRES, UNLESS OTHERWISE NOTED.

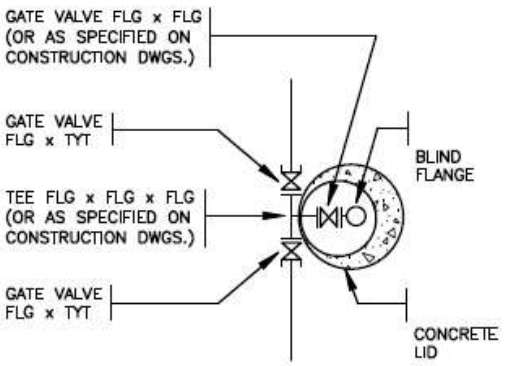
Title

GATE VALVE INSTALLATION DETAILS

DISTRICT OF NORTH VANCOUVER

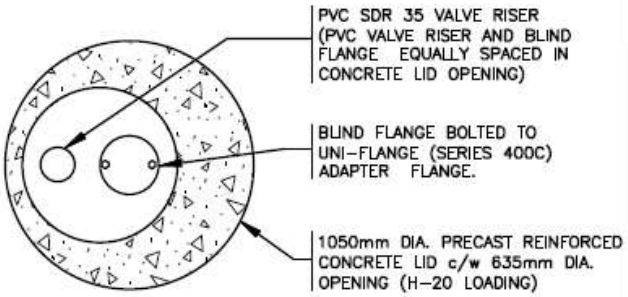
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.1



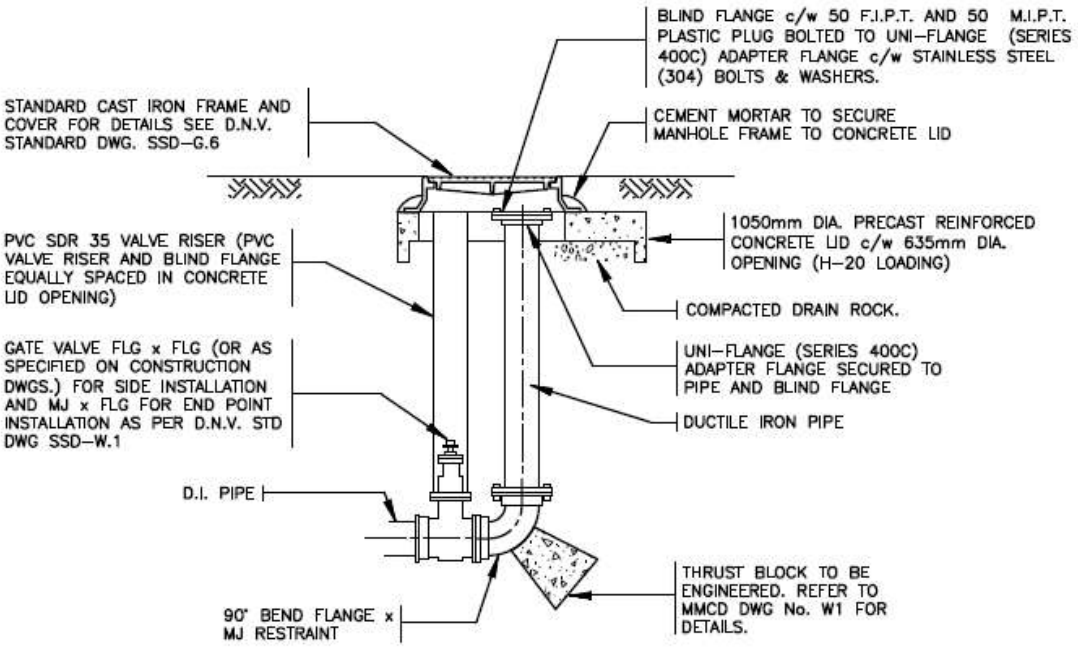
TYPICAL BLOW-OFF VALVE CONFIGURATION

WHEN REQUIRED AT SIDE INSTALLATION ON WATERMAIN



PLAN

WITHOUT MANHOLE FRAME & COVER



SECTION OF SIDE AND END POINT INSTALLATIONS

N.T.S.

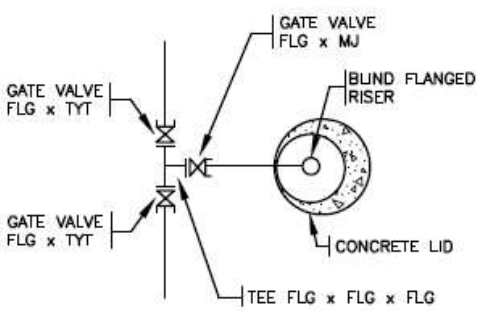
Title

100mm BLOW-OFF DETAIL

DISTRICT OF NORTH VANCOUVER

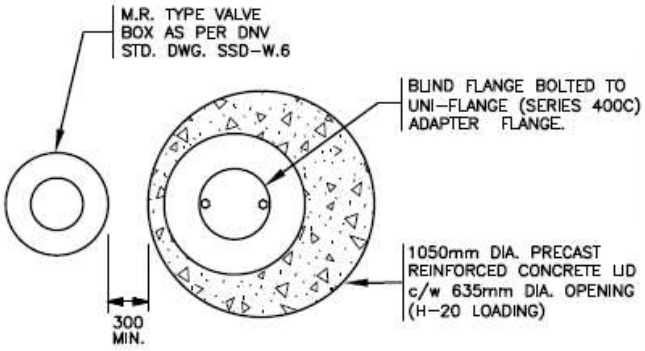
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.2



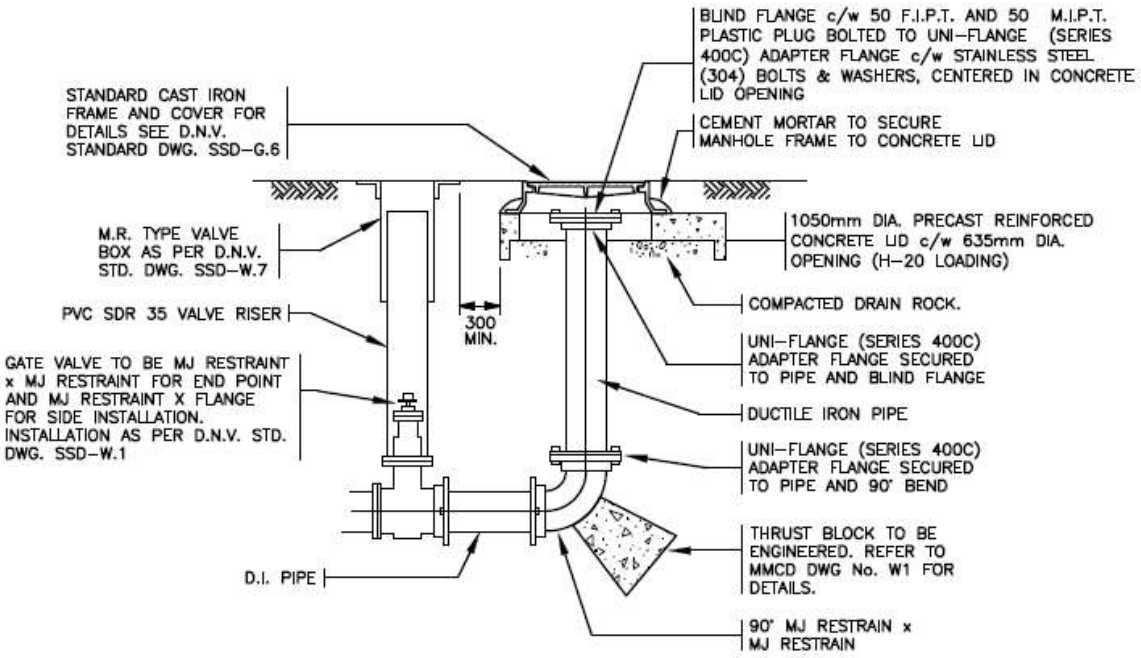
TYPICAL BLOW-OFF VALVE CONFIGURATION

WHEN REQUIRED AT SIDE INSTALLATION ON WATERMAIN



PLAN

WITHOUT MANHOLE FRAME & COVER



SECTION OF SIDE AND END POINT INSTALLATIONS

N.T.S.

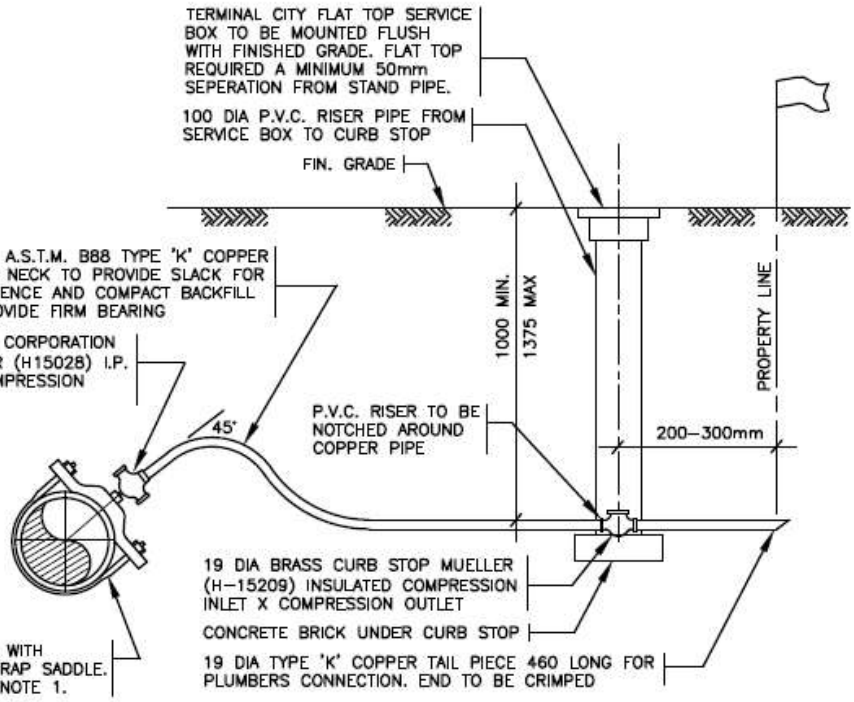
Title

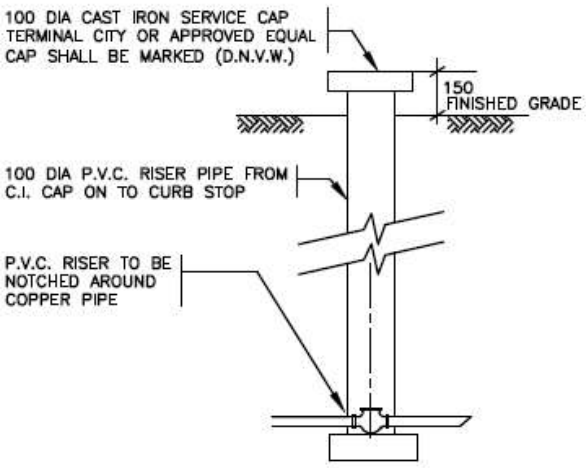
150mm AND LARGER BLOW-OFF DETAIL

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.3





TYPICAL RISER INSTALLATION IN NON TRAVELLED AREAS

NOTES:

1. USE ROBAR 2506 FOR DUCTILE IRON, STEEL OR CAST IRON PIPE. USE ROBAR 2616 SERVICE STRADDLE FOR A/C PIPE.
2. DUCTILE IRON MAINS 150mm TO 300mm MAY BE DIRECT TAPPED ONLY WITH THE MUNICIPAL ENGINEER'S APPROVAL AND UNDER DIRECT SUPERVISION OF D.N.V. INSPECTOR.
3. MAXIMUM 4 SERVICES PER PIPE LENGTH. MINIMUM 1000mm SEPARATION BETWEEN TAPS.
4. ALL SERVICES MINIMUM 450mm FROM END OF PIPE.
5. ALL DIMENSIONS SHOWN IN MILLIMETRES, UNLESS OTHERWISE NOTED

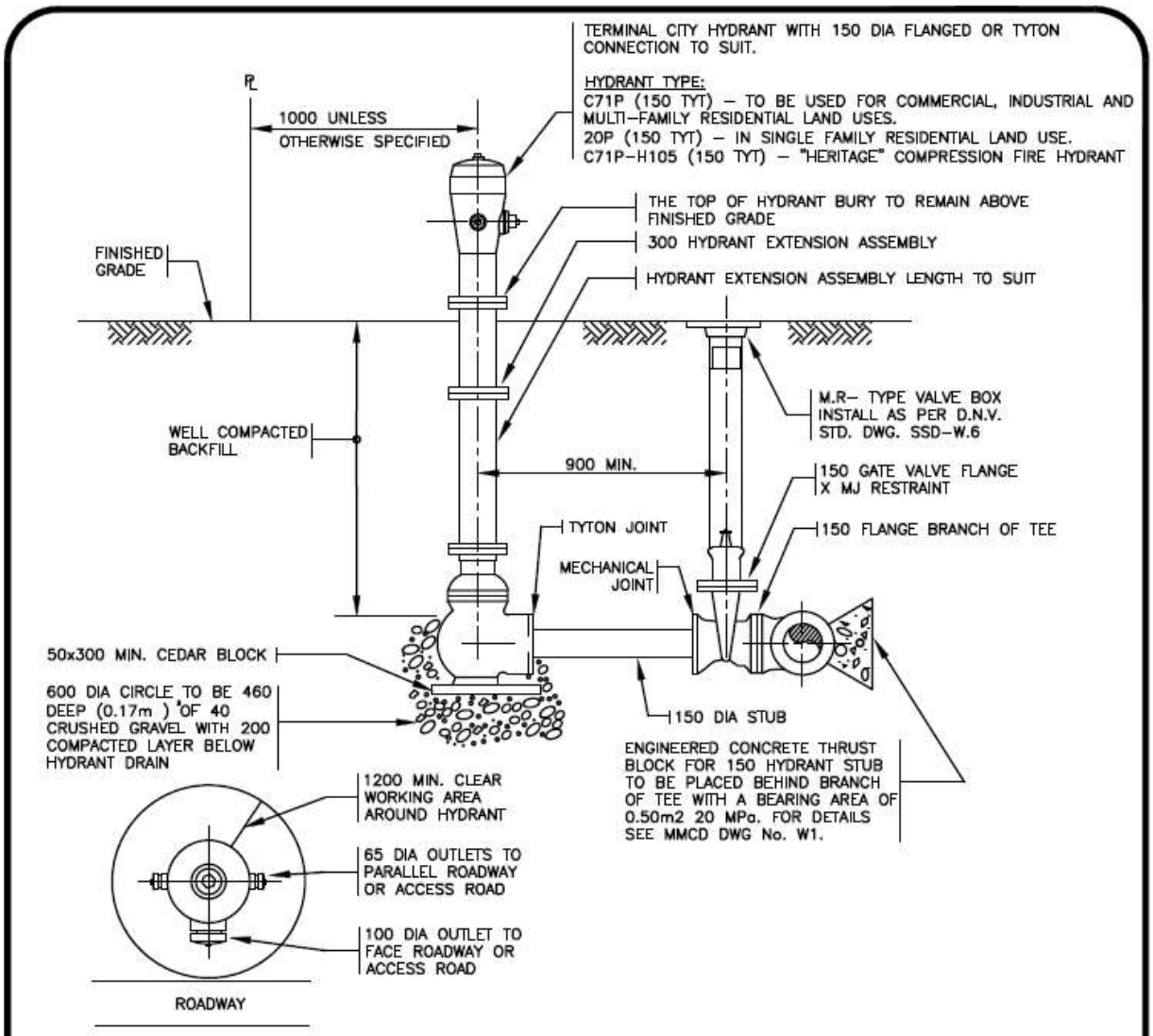
Title

TYPICAL WATER SERVICE CONNECTION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.4



NOTES:

1. PRIOR TO PAINTING ALL METAL PARTS SHALL BE CLEANED OF ALL SCALE, RUST, OIL AND DIRT, SHOP APPLY 1 COAT @ 3 MILS DRY THICKNESS OF INTERNATIONAL PAINTS PRIMER (INTERGUARD ANTI–CORROSIVE PRIMER RED EGA 088/089 AND FINISH WITH 1 COAT @ 3 MILS DRY THICKNESS OF INTERNATIONAL PAINTS (INTERTHAIN HIGH GLOSS FINISH PE SERIES). HYDRANT BARREL, OUTLET CAPS AND BONNET TO BE RED.
2. ALL PIPE JOINTS BETWEEN THE GATE VALVE AND THE HYDRANT SHALL BE RESTRAINED WITH 1700 SERIES MEGALUG HARNESS OR APPROVED EQUIVALENT.
3. HYDRANT SHALL BE TYT. X MJ RESTRAINED WITH TRU–DUAL SERIES 15PF00TD.
4. ALL DIMENSIONS SHOWN IN MILLIMETRES, UNLESS OTHERWISE NOTED.
5. DRAIN PORTS SHALL BE PLUGGED BELOW THE WATER TABLE.
6. D.N.V. FIRE BYLAW SCHEDULE E.

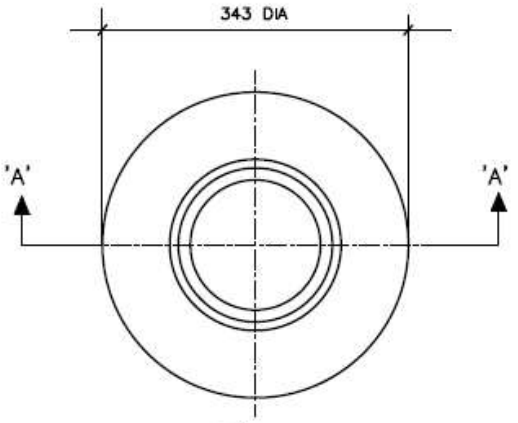
Title

TYPICAL HYDRANT ASSEMBLY

DISTRICT OF NORTH VANCOUVER

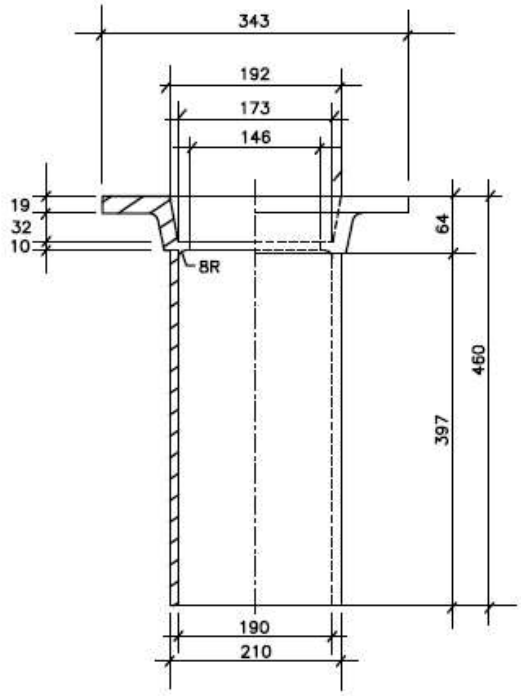
Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.5

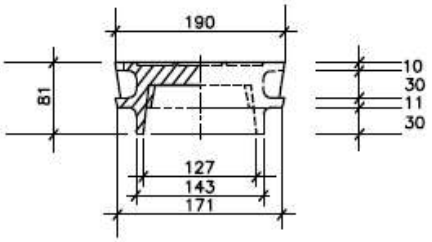


PLAN

PLAN



SECTION 'A–A'
VALVE BOX



SECTION 'B–B'
LID

NOTES:

1. FOR DETAILS OF M.R. – TYPE VALVE BOX AND LID SEE TERMINAL CITY DWG. C713 OR EQUIVALENT.
2. COVER SHALL BE MARKED 'D.N.V. WATER'
3. FOR INSTALLATION DETAILS, SEE SSD–W.1
4. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS OTHERWISE NOTED.

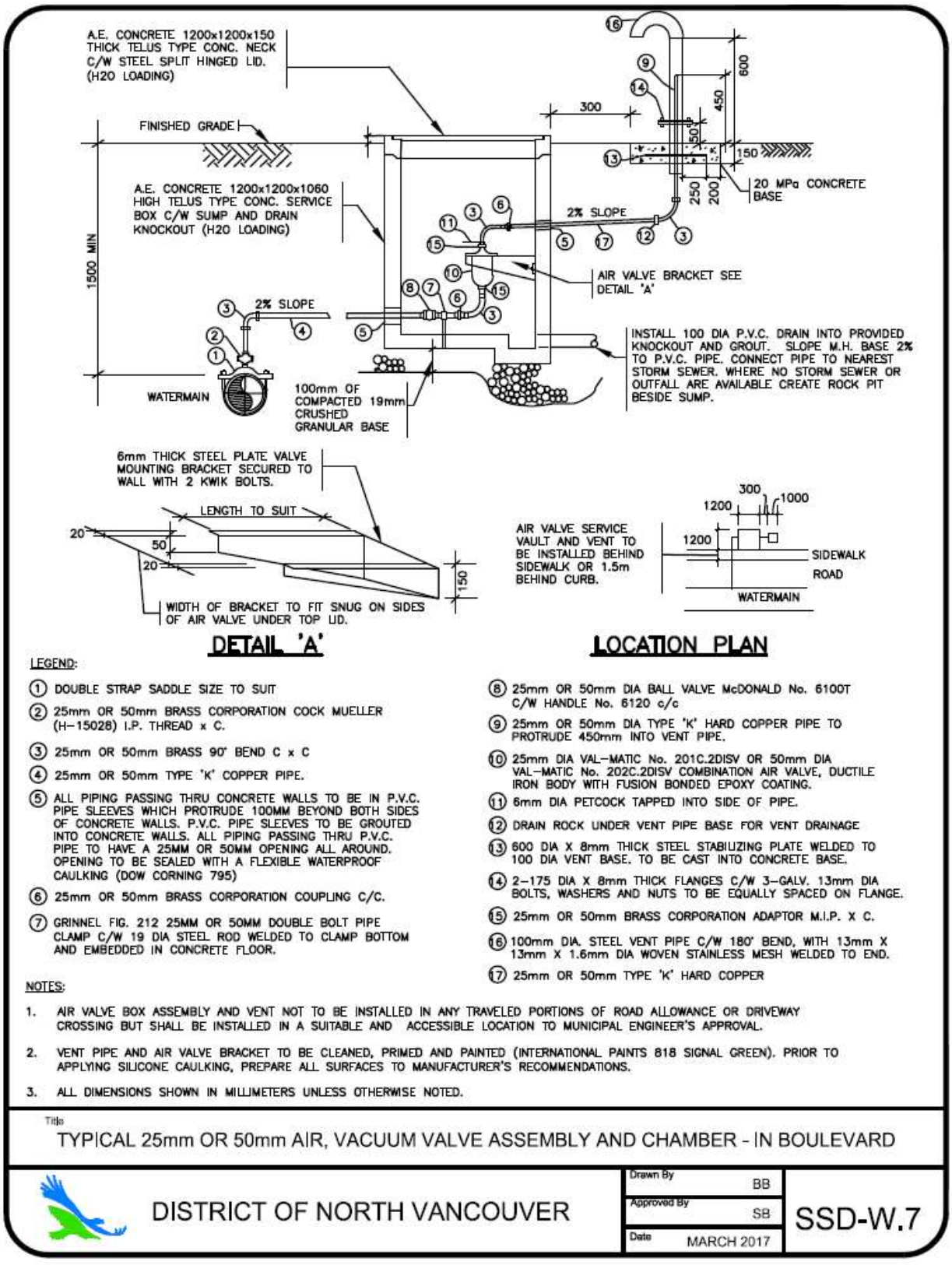
Title

TYPICAL M.R. - TYPE VALVE BOX ASSEMBLY

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.6



DETAIL 'A'

LOCATION PLAN

LEGEND:

1. DOUBLE STRAP SADDLE SIZE TO SUIT
2. 25mm OR 50mm BRASS CORPORATION COCK MUELLER (H-15028) I.P. THREAD x C.
3. 25mm OR 50mm BRASS 90° BEND C x C
4. 25mm OR 50mm TYPE 'K' COPPER PIPE.
5. ALL PIPING PASSING THRU CONCRETE WALLS TO BE IN P.V.C. PIPE SLEEVES WHICH PROTRUDE 100MM BEYOND BOTH SIDES OF CONCRETE WALLS. P.V.C. PIPE SLEEVES TO BE GROUTED INTO CONCRETE WALLS. ALL PIPING PASSING THRU P.V.C. PIPE TO HAVE A 25MM OR 50MM OPENING ALL AROUND. OPENING TO BE SEALED WITH A FLEXIBLE WATERPROOF CAULKING (DOW CORNING 795)
6. 25mm OR 50mm BRASS CORPORATION COUPLING C/C.
7. GRINNEL FIG. 212 25MM OR 50MM DOUBLE BOLT PIPE CLAMP C/W 19 DIA STEEL ROD WELDED TO CLAMP BOTTOM AND EMBEDDED IN CONCRETE FLOOR.
8. 25mm OR 50mm DIA BALL VALVE McDONALD No. 6100T C/W HANDLE No. 6120 c/c
9. 25mm OR 50mm DIA TYPE 'K' HARD COPPER PIPE TO PROTRUDE 450mm INTO VENT PIPE.
10. 25mm DIA VAL-MATIC No. 201C.2DISV OR 50mm DIA VAL-MATIC No. 202C.2DISV COMBINATION AIR VALVE, DUCTILE IRON BODY WITH FUSION BONDED EPOXY COATING.
11. 6mm DIA PETCOCK TAPPED INTO SIDE OF PIPE.
12. DRAIN ROCK UNDER VENT PIPE BASE FOR VENT DRAINAGE
13. 600 DIA X 8mm THICK STEEL STABILIZING PLATE WELDED TO 100 DIA VENT BASE. TO BE CAST INTO CONCRETE BASE.
14. 2-175 DIA X 8mm THICK FLANGES C/W 3-GALV. 13mm DIA BOLTS, WASHERS AND NUTS TO BE EQUALLY SPACED ON FLANGE.
15. 25mm OR 50mm BRASS CORPORATION ADAPTOR M.I.P. X C.
16. 100mm DIA. STEEL VENT PIPE C/W 180° BEND, WITH 13mm X 13mm X 1.6mm DIA WOVEN STAINLESS MESH WELDED TO END.
17. 25mm OR 50mm TYPE 'K' HARD COPPER

NOTES:

1. AIR VALVE BOX ASSEMBLY AND VENT NOT TO BE INSTALLED IN ANY TRAVELED PORTIONS OF ROAD ALLOWANCE OR DRIVEWAY CROSSING BUT SHALL BE INSTALLED IN A SUITABLE AND ACCESSIBLE LOCATION TO MUNICIPAL ENGINEER'S APPROVAL.
2. VENT PIPE AND AIR VALVE BRACKET TO BE CLEANED, PRIMED AND PAINTED (INTERNATIONAL PAINTS 818 SIGNAL GREEN). PRIOR TO APPLYING SILICONE CAULKING, PREPARE ALL SURFACES TO MANUFACTURER'S RECOMMENDATIONS.
3. ALL DIMENSIONS SHOWN IN MILLIMETERS UNLESS OTHERWISE NOTED.

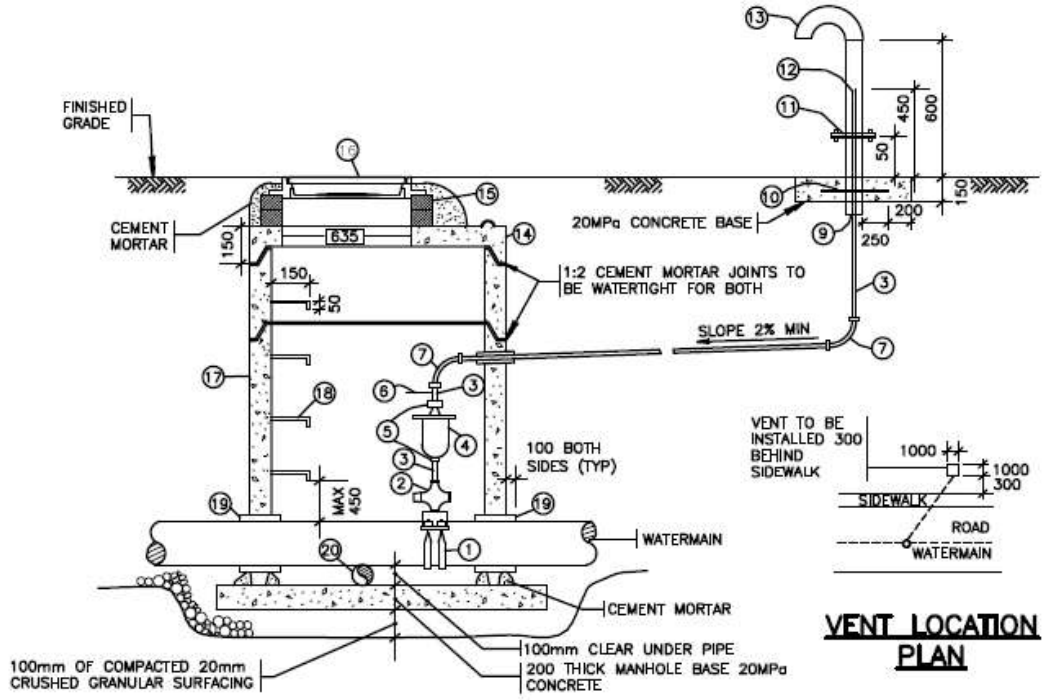
Title

TYPICAL 25mm OR 50mm AIR, VACUUM VALVE ASSEMBLY AND CHAMBER - IN BOULEVARD

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.7



VENT LOCATION PLAN

LEGEND:

1. DOUBLE STRAP SADDLE SIZE TO SUIT
2. 25mm OR 50mm BRASS CORPORATION COCK MUELLER (H–15028) M.I.P. THREAD x C
3. 25mm OR 50mm DIA TYPE 'K' HARD COPPER PIPE
4. 25mm DIA VAL–MATIC NO. 201C.2DISV OR 50mm DIA VAL–MATIC NO. 202C.2DISV COMBINATION AIR VALVE, DUCTILE IRON BODY WITH FUSION BONDED EPOXY COATING.
5. 25mm OR 50 DIA BRASS CORPORATION ADAPTOR M.L.P. THREAD x C
6. 6mm DIA PETCOCK TAPPED INTO SIDE OF PIPE
7. 25mm OR 50mm BRASS 90° BEND CxC
8. 25mm OR 50mm DIA TYPE 'K' COPPER PIPE
9. DRAIN ROCK UNDER VENT PIPE BASE FOR VENT DRAINAGE
10. 600mm DIA x 8mm THICK STEEL STABILIZING PLATE WELDED TO 100 DIA VENT PIPE BASE. TO BE CAST INTO CONCRETE BASE
11. 2–175mm DIA x 8mm THICK FLANGES c/w 3 GALV. 13mm DIA BOLTS, WASHERS AND NUTS TO BE EQUALLY SPACED ON FLANGE.
12. 25mm OR 50mm DIA TYPE 'K' HARD COPPER PIPE TO PROTRUDE 450mm INTO 100mm DIA VENT PIPE
13. 100mm DIA STEEL VENT PIPE c/w 180° BEND WITH 13mm x 13mm x 1.6mm DIA WOVEN STAINLESS STEEL MESH WELDED TO END. LOCATE APPROX. 2.0mm MIN. FROM FACE OF CURB TO ℄ OF VENT PIPE. FINAL LOCATION TO MUNICIPAL ENGINEER'S APPROVAL.
14. PRECAST REINFORCED CONCRETE LID (H–20 LOADING) c/w LIFTING LUGS.
15. 1 TO 3 COURSES OF CONCRETE BRICKS 1:2 CEMENT MORTAR JOINTS OR APPROVED CONCRETE RINGS.
16. DOBNEY MANHOLE FRAME AND COVER (C–18) H–20 LOADING
17. 1050mm DIA PRECAST R.C. MANHOLE SECTIONS (ASTM C478)
18. 19mm DIA GALV. STEEL RUNGS AT 300mm c/c CAST INTO WALL OF BARREL SECTION
19. ALL PIPING PASSING THRU CONCRETE M.H. WALLS TO BE IN P.V.C. PIPE SLEEVES WHICH PROTRUDE 100mm BEYOND BOTH SIDES OF CONCRETE M.H. WALLS. P.V.C. PIPE SLEEVES TO BE GROUTED INTO CONCRETE M.H. WALLS. ALL PIPING PASSING THRU P.V.C. PIPE SLEEVE TO HAVE A 25mm OR 50mm CLEAR OPENING ALL AROUND. OPENING TO BE SEALED WITH A FLEXIBLE WATERPROOF CAULKING (DOW CORNING 795)
20. BREAK OUT M.H. SECTION AROUND 100mm DIA P.V.C. DRAIN AND GROUT. SET INVERT OF 100mm DIA P.V.C. DRAIN FLUSH WITH M.H. BASE AND SLOPE M.H. BASE 2% TO P.V.C. PIPE. 100mm DIA P.V.C. DRAIN MUST BE CONNECTED TO NEAREST STORM SEWER WHEN AVAILABLE. ROCK PITS MAY BE PERMITTED WITH D.N.V. APPROVAL.

NOTES:

1. VENT PIPE TO BE CLEANED, PRIMED AND PAINTED (INTERNATIONAL PAINTS 818 SIGNAL GREEN)
2. PRIOR TO APPLYING SILICONE CAULKING, PREPARE ALL SURFACES TO MANUFACTURER'S RECOMMENDATIONS.
3. VENT ASSEMBLY NOT TO BE INSTALLED IN ANY TRAVELED PORTION OF ROAD ALLOWANCE OF DRIVEWAY CROSSINGS. TO BE INSTALLED IN A SUITABLE AND ACCESSIBLE LOCATION TO MUNICIPAL ENGINEER'S APPROVAL.
4. ALL DIMENSIONS SHOWN IN MILLIMETRES UNLESS OTHERWISE NOTED.

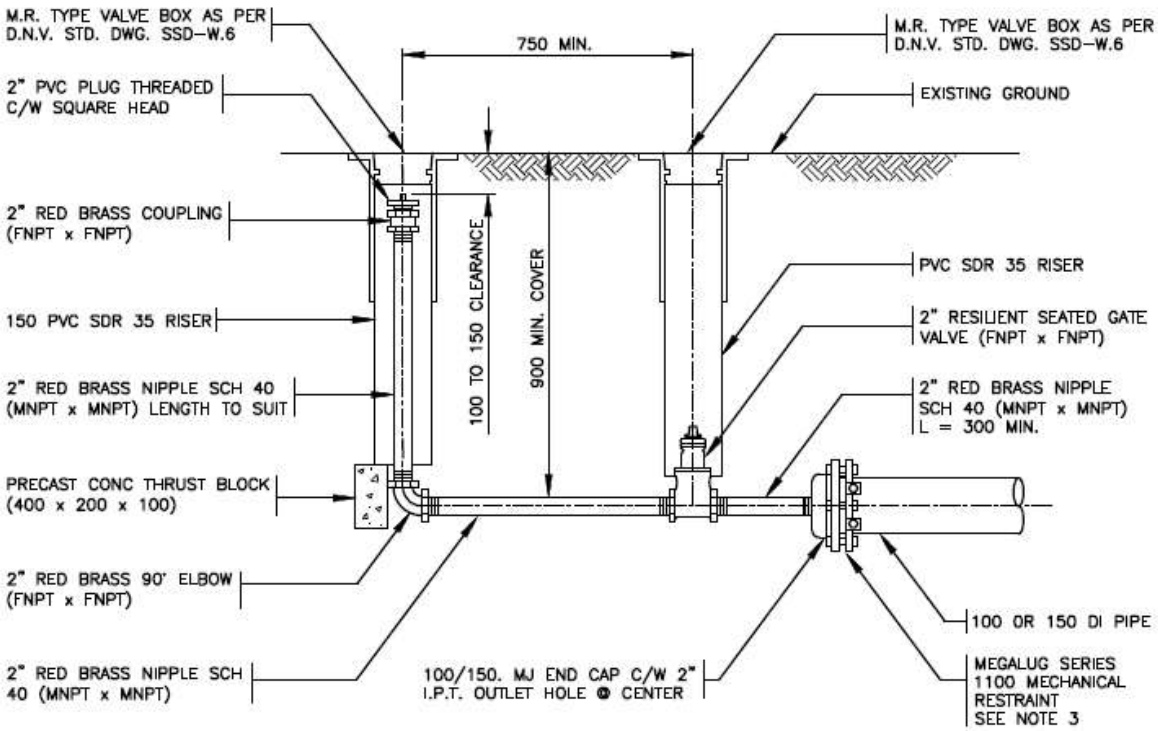
Title

TYPICAL 25mm OR 50mm AIR, VACUUM VALVE ASSEMBLY AND CHAMBER - IN ROADWAY

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.8



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED IN INCHES.
2. BLOW–OFF UNIT SHALL BE BACKFILLED WITH APPROVED NATIVE MATERIALS COMPACTED TO 90% MODIFIED PROCTOR DENSITY WITH MINIMUM 100mm BEDDING GRAVEL TO 95% MODIFIED PROCTOR DENSITY DIRECTLY UNDER PIPING.
3. USE MEGALUG MECHANICAL JOINT RESTRAINT SERIES 1104 TO RESTRAIN 100 DIA. DI PIPING AND SERIES 1106 TO RESTRAIN 150 DI PIPING.

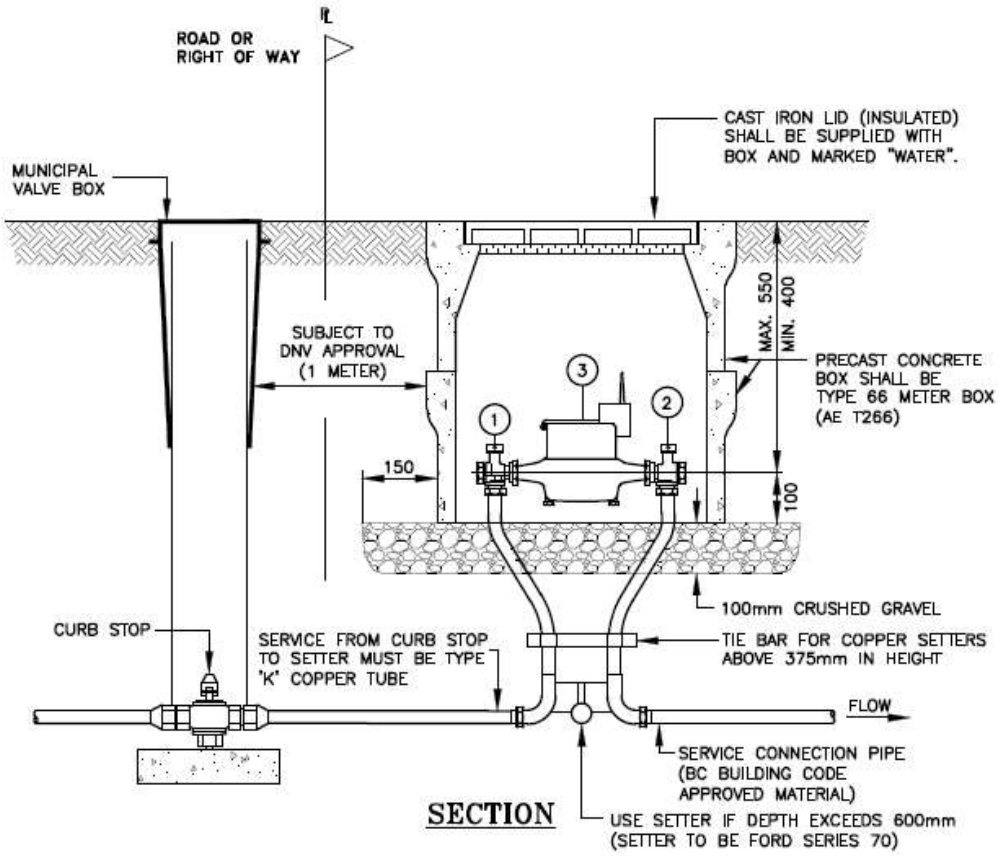
Title

50mm DIAMETER END OF LINE BLOW OFF ASSEMBLY DETAILS

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SB
Date	MARCH 2017

SSD-W.9



No.	DESCRIPTION
1	KEY VALVE WITH PADLOCK WING
2	KEY VALVE
3	NEPTUNE METER T10 C/W RF MIU E-CODER 900i PIT VERSION

	SETTERS	HEIGHT	SERVICE LINE CONNECTION
16mm	VV71	VARIES	INLET/OUTLET – COMPRESSION (PACKED JOINT) – SIZE VARIES
16x19mm	VV72	VARIES	
19mm	VV73	VARIES	
25mm	VV74	VARIES	

NOTES:

1. METER AND PIT VERSION E-CODER)900i SHALL BE PURCHASED FROM DNV.
2. METER AND MIU SHALL BE INSTALLED BY CONTRACTOR.
3. WARNING: FOR WATER PRESSURES EXCEEDING 150 PSI, PRESSURE REGULATING VALVE SHALL BE INSTALLED BETWEEN MUNICIPAL ISOLATION VALVE AND WATER METER.

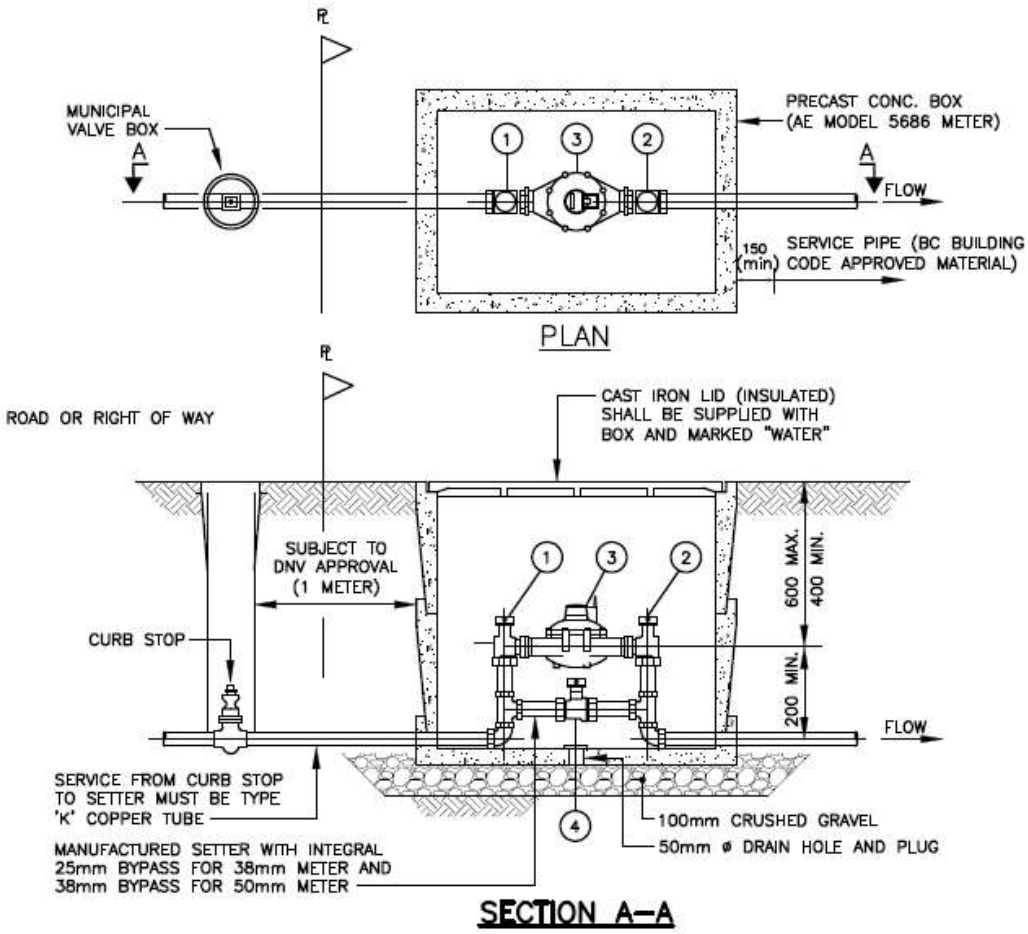
Title

Ø16mm - Ø25mm DISPLACEMENT METER INSTALLATION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SR
Date	MARCH 2017

SSD-W.10



No.	DESCRIPTION
1	STOP WITH LOCKWING
2	DOWNSTREAM STOP
3	NEPTUNE METER T–10 C/W RF MIU E–CODER)900i PIT VERSION
4	BYPASS STOP WITH LOCKWING

	SETTERS	HEIGHT	SERVICE LINE CONNECTION
38mm	VB876–HB	VARIES	INLET/OUTLET – COMPRESSION
50mm	VB877–HB	VARIES	(PACKED JOINT) – SIZE VARIES

NOTES:

1. METER AND PIT VERSION E–CODER)900i SHALL BE PURCHASED FROM DNV AND INSTALLED BY CONTRACTOR.
2. ALL FIELD JOINTS TO BE THREADED OR COMPRESSION. ALL PIPE TO BE COPPER TUBE. MANUFACTURED SETTERS MAY HAVE SOLDERED JOINTS.
3. WARNING: FOR WATER PRESSURES EXCEEDING 150 PSI, PRESSURE REGULATING VALVE SHALL BE INSTALLED BETWEEN MUNICIPAL ISOLATION VALVE AND WATER METER.

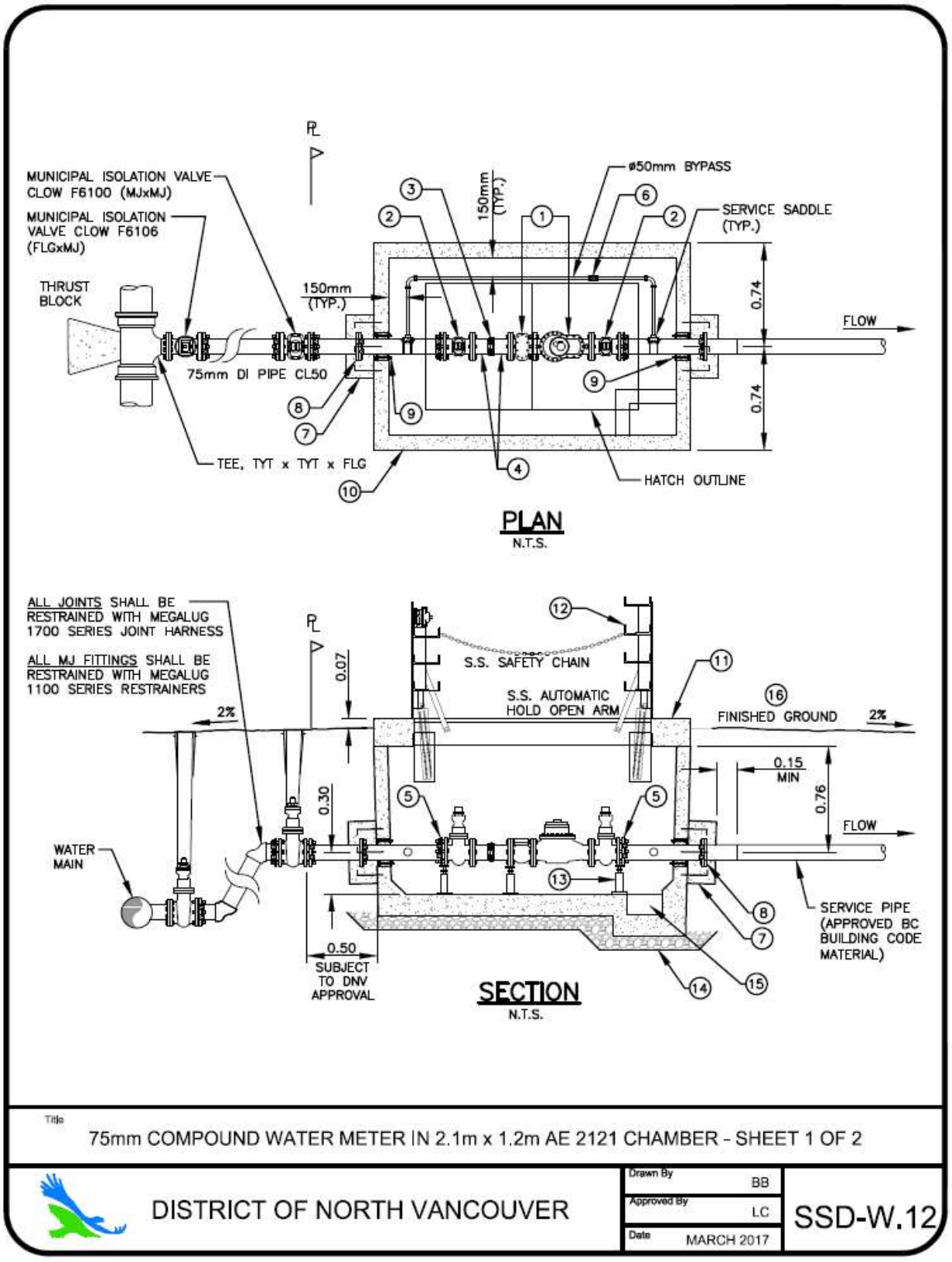
Title

Ø38mm - Ø50mm DISPLACEMENT METER INSTALLATION

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SR
Date	MARCH 2017

SSD-W.11



Title

75mm COMPOUND WATER METER IN 2.1m x 1.2m AE 2121 CHAMBER - SHEET 1 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	LC
Date	MARCH 2017

SSD-W.12

WATERWORKS NOTES:

1. 75mm NEPTUNE TRU/ FLOW COMPOUND WATER METER C/W NEPTUNE STRAINER. WATER METER SHALL BE EQUIPPED WITH RADIO FREQUENCY METER INTERFACE UNIT E-CODER) R900i PIT VERSION AND INTEGRATED WHIP ANTENNA. QUANTITY: 1.
2. 75mm ISOLATION VALVE SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH MJxFLG ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, EPOXY COATED. THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6106 (MJxFLG) OR APPROVED EQUAL. QUANTITY: 2.
3. 75mm VICTAULIC COUPLING STYLE 77 WITH GRADE "E" GASKET (GREEN COLOR CODE). QUANTITY: 1.
4. 75mm VICTAULIC FLANGE ADAPTER NIPPLE No.45F. EPOXY COATED AND LINED TO AWWA C210-07. QUANTITY: 2.
5. 75mm MEGALUG MJ RESTRAINT SERIES 1100 FOR DI PIPE. QUANTITY: 2.
6. 50mm BY-PASS BALL VALVE WITH LOCK-WING. QUANTITY: 1.
7. CONCRETE THRUST BLOCK 0.45m x 0.45m x 0.2m (WxHxD) WITH 4-M15 CONCRETE "L" -REBAR ANCHORS EMBEDDED IN CHAMBER'S WALL USE HILTI HIT-RE 500 EPOXY ADHESIVE. QUANTITY: 2.
8. MID SPAN RESTRAINT MEGALUG SERIES 1100SDB AS AN ANCHOR IN CONCRETE THRUST BLOCK. QUANTITY: 2.
9. LINK-SEAL MODULAR SEAL LS-315-C-10 (OR APPROVED EQUAL). QUANTITY: 2. CAST-IN HOLE DIAMETER: 152mm.
10. AE CONCRETE METER CHAMBER MODEL 2121 (2.03mx1.21mx1.06m). QUANTITY: 1.
11. AE CONCRETE ROOF SLAB FOR CHAMBER MODEL 2121 WITH 1830 x 1220 ALUMINUM HATCH CAST-IN (SEE ITEM 11) C/W ELASTOMERIC GASKET. QUANTITY: 1.
12. 1830mm X 1220mm USF FABRICATION (OR APPROVED EQUAL) ALUMINUM HATCH TROUGH FRAME, 6.35mm THICK DIAMOND PLATE COVER REINFORCED FOR OCCASIONAL AASHTO H-20 WHEEL LOADS, 316 SS NUTS AND BOLTS, 38mm THREADED DRAIN COUPLING, SS HINGES AND AUTOMATIC HOLD-OPEN ARM, FLUSH LIFT HANDLE, TAMPERPROOF FASTENERS, SS SLAMLOCK WITH REMOVABLE KEY, BOLT ON SPRINGS (REMOVABLE), OVERSIZED RECESSED PADLOCK, BITUMINOUS PAINT AND SAFETY CHAIN. QUANTITY: 1.
13. PIPE SUPPORT. QUANTITY: 3.
14. 19mm MINUS CRUSHED ROCK SUB-BASE, 100mm THICK, COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY.
15. DRAINAGE SUMP PUMP REQUIRED WITH CONNECTION TO STORM SYSTEM.
16. FINISH GROUND FOR UNTRAVELED AREAS SHALL DRAIN AWAY FROM CHAMBER AT 2% SLOPE AND TOP OF CHAMBER SHALL BE 70mm CLEAR ABOVE SURROUNDING GRADE.
IN TRAVELED AREAS, CHAMBER SHALL BE FLUSH WITH GROUND AND FINISHED GROUND SHALL BE SLOPED AWAY FROM CHAMBER AT 0.5%.
17. WARNING: FOR WATER PRESSURES EXCEEDING 150 PSI, PRESSURE REGULATING VALVE SHALL BE INSTALLED BETWEEN MUNICIPAL ISOLATION VALVE AND WATER METER.

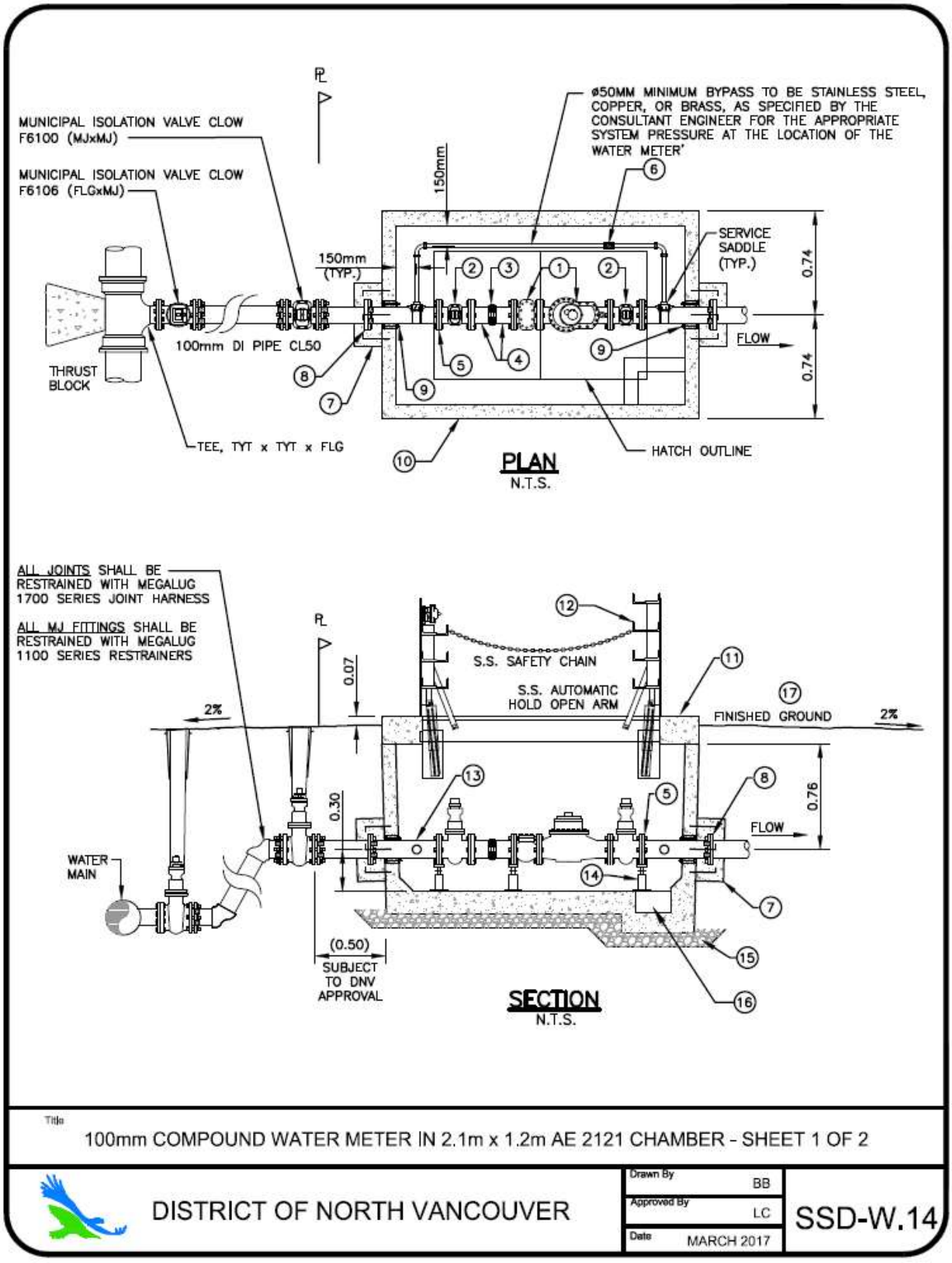
Title

75mm COMPOUND WATER METER IN 2.1m x 1.2m AE 2121 CHAMBER - SHEET 2 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	LC
Date	MARCH 2017

SSD-W.13



Title

100mm COMPOUND WATER METER IN 2.1m x 1.2m AE 2121 CHAMBER - SHEET 1 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	LC
Date	MARCH 2017

SSD-W.14

WATERWORKS NOTES:

1. 100mm NEPTUNE TRU/ FLOW COMPOUND WATER METER C/W NEPTUNE STRAINER. WATER METER SHALL BE EQUIPPED WITH RADIO FREQUENCY METER INTERFACE UNIT E-CODER) R900i PIT VERSION AND INTEGRATED WHIP ANTENNA. QUANTITY: 1.
2. 100mm ISOLATION VALVE SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH FLANGED ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, EPOXY COATED. THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6102 (FLGxFLG) OR APPROVED EQUAL. QUANTITY: 2.
3. 100mm VICTAULIC COUPLING STYLE 77 WITH GRADE "E" GASKET-GREEN COLOR CODE. QUANTITY: 1.
4. 100mm VICTAULIC FLANGE ADAPTER NIPPLE No.45F. EPOXY COATED AND LINED TO AWWA C210-07. QUANTITY: 2.
5. 100mm VICTAULIC FLANGE ADAPTER STYLE 341. EPOXY COATED TO AWWA C210-07. QUANTITY: 2.
6. 75mm BY-PASS BALL VALVE WITH LOCK-WING. QUANTITY: 1.
7. CONCRETE THRUST BLOCK 0.45m x 0.45m x 0.2m (WxHxD) WITH 4-M15 CONCRETE "L" -REBAR ANCHORS EMBEDDED IN CHAMBER'S WALL. USE HILTI HIT-RE 500 EPOXY ADHESIVE. QUANTITY: 2.
8. MID SPAN RESTRAINT MEGALUG SERIES 1100SDB AS AN ANCHOR IN CONCRETE THRUST BLOCK. QUANTITY: 2.
9. LINK-SEAL MODULAR SEAL LS-410-C-7 (OR APPROVED EQUAL). QUANTITY: 2. CAST-IN HOLE DIAMETER: 200mm.
10. AE CONCRETE METER CHAMBER MODEL 2121 (2.03mx1.21mx1.06m). QUANTITY: 1.
11. AE CONCRETE ROOF SLAB FOR CHAMBER MODEL 2121 WITH 1830 x 1220 ALUMINUM HATCH CAST-IN (SEE ITEM 11) C/W ELASTOMERIC GASKET. QUANTITY: 1.
12. 1524mm X 914mm (CONC. OPENING) USF FABRICATION (OR APPROVED EQUAL) ALUMINUM HATCH TROUGH FRAME, 6.35mm THICK DIAMOND PLATE COVER REINFORCED FOR OCCASIONAL AASHTO H-20 WHEEL LOADS, 316 SS NUTS AND BOLTS, 38mm THREADED DRAIN COUPLING, SS HINGES AND AUTOMATIC HOLD-OPEN ARM, FLUSH LIFT HANDLE, TAMPERPROOF FASTENERS, SS SLAMLOCK WITH REMOVABLE KEY, BOLT ON SPRINGS (REMOVABLE), OVERSIZED RECESSED PADLOCK, BITUMINOUS PAINT AND SAFETY CHAIN. QUANTITY: 1.
13. 100mm DI CL 53 SPOOL PIPING: PLAIN END x CUT-GROOVE (AWWA C-606) FOR VIC-FLANG ADAPTER STYLE 341. OVERALL LENGTH OF PIPE SPOOL: CUT TO SUIT IN THE FIELD. QUANTITY: 2.
14. PIPE SUPPORT. QUANTITY: 3.
15. 19mm MINUS CRUSHED ROCK SUB-BASE, 100mm THICK, COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY.
16. DRAINAGE SUMP PUMP REQUIRED WITH CONNECTION TO STORM SYSTEM.
17. FINISH GROUND FOR UNTRAVELED AREAS SHALL DRAIN AWAY FROM CHAMBER AT 2% SLOPE AND TOP OF CHAMBER SHALL BE 70mm CLEAR ABOVE SURROUNDING GRADE.
    IN TRAVELED AREAS, CHAMBER SHALL BE FLUSH WITH GROUND AND FINISHED GROUND SHALL BE SLOPED AWAY FROM CHAMBER AT 0.5%.
18. WARNING: FOR WATER PRESSURES EXCEEDING 150 PSI, PRESSURE REGULATING VALVE SHALL BE INSTALLED BETWEEN MUNICIPAL ISOLATION VALVE AND WATER METER.

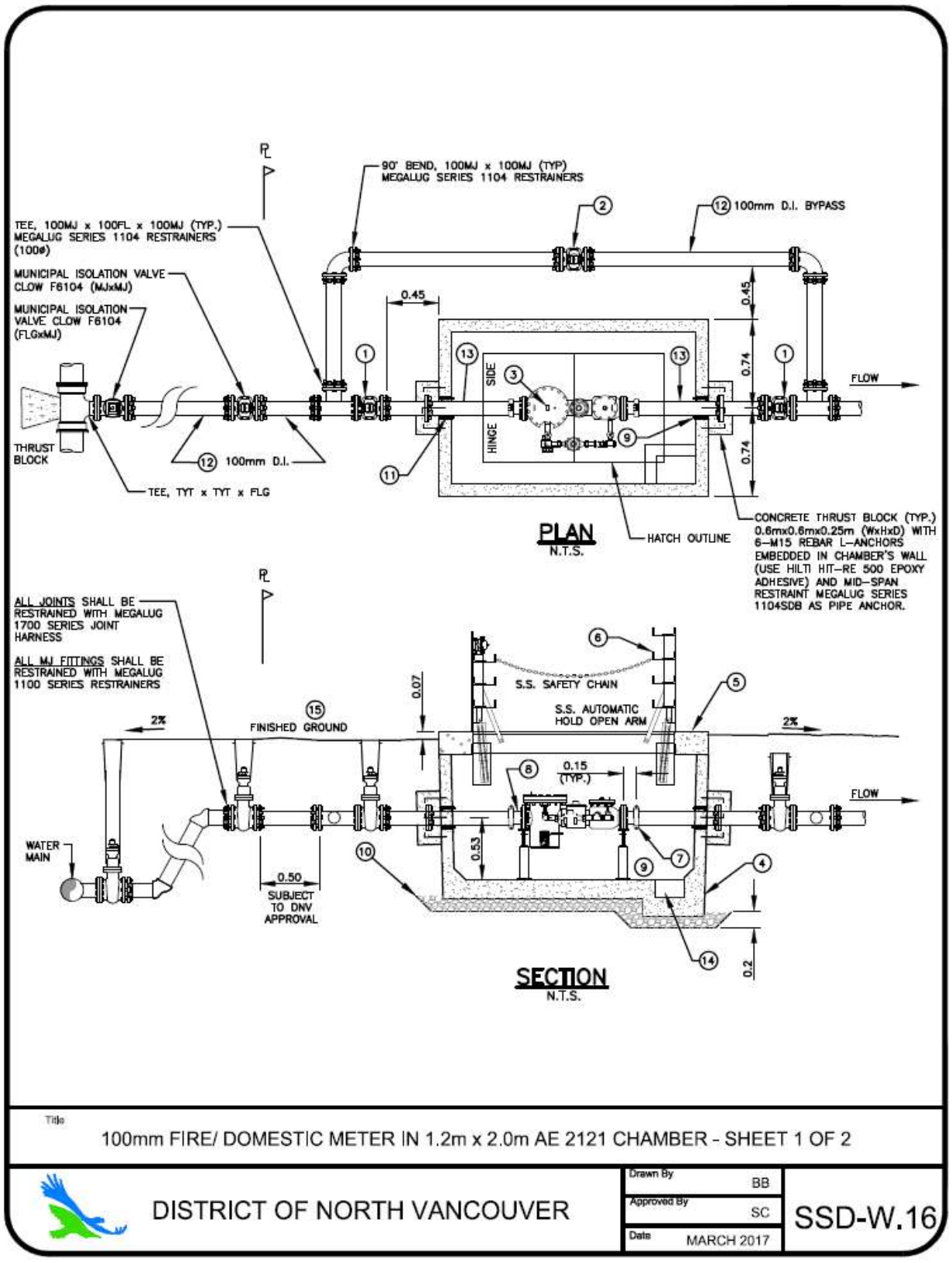
Title

100mm COMPOUND WATER METER IN 2.1m x 1.2m AE 2121 CHAMBER - SHEET 2 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	LC
Date	MARCH 2017

SSD-W.15



Title

100mm FIRE/ DOMESTIC METER IN 1.2m x 2.0m AE 2121 CHAMBER - SHEET 1 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SC
Date	MARCH 2017

SSD-W.16

WATERWORKS NOTES:

1. 100mm ISOLATION VALVES SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH FLGxMJ ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, SUITABLE FOR BURIED LOCATIONS (EPOXY COATED). THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6104 (FLGxMJ) OR APPROVED EQUAL. QUANTITY: 2.
2. 100mm ISOLATION VALVE SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH MJ ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, SUITABLE FOR BURIED LOCATIONS (EPOXY COATED). THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6104 (MJxMJ) OR APPROVED EQUAL. QUANTITY: 1.
3. 100mm NEPTUNE HP PROTECTUS III WATER METER EQUIPPED WITH RADIO FREQUENCY METER INTERFACE UNIT (RF MIU) E-CODER) R900I PIT VERSION AND INTEGRATED WHIP ANTENNA, EPOXY-COATED STEEL STRAINER BODY WITH SS BASKET AND 75mm S.S. BALL VALVE DRAIN, INTEGRAL DETECTOR CHECK VALVE, LOW FLOW BYPASS ASSEMBLY (TWO BALL VALVES, CHECK VALVE, NEPTUNE 38mm T-10 METER EQUIPPED WITH RF MIU E-CODER) R900I PIT VERSION AND INTEGRATED WHIP ANTENNA). QUANTITY: 1.
4. AE CONCRETE METER CHAMBER MODEL 2121 (BOTTOM ONLY) – 2030 L x 1220 W x 1060 D ID. QUANTITY: 1.
5. AE CONCRETE ROOF SLAB FOR 2121 BOTTOM WITH 1524 x 914 ALUMINUM HATCH CAST-IN (SEE ITEM 6) C/W ELASTOMERIC GASKET. QUANTITY: 1.
6. 1524mm X 914mm USF FABRICATION (OR APPROVED EQUAL) ALUMINUM HATCH TROUGH FRAME, 6.35mm THICK DIAMOND PLATE COVER REINFORCED FOR OCCASIONAL AASHTO H-20 WHEEL LOADS, 316 SS NUTS AND BOLTS, 38mm THREADED DRAIN COUPLING, SS HINGES AND AUTOMATIC HOLD-OPEN ARM, FLUSH LIFT HANDLE, TAMPERPROOF FASTENERS, SS SLAMLOCK WITH REMOVABLE KEY, BOLT ON SPRINGS (REMOVABLE), OVERSIZED RECESSED PADLOCK, BITUMINOUS PAINT AND SAFETY CHAIN. QUANTITY: 1.
7. 100mm VICTAULIC TRANSITION COUPLING – STYLE 307 WITH GRADE "M" GASKET (BROWN COLOR CODE). QUANTITY: 2.
8. VICTAULIC FLANGE ADAPTER NIPPLE No.45F. EPOXY COATED AND LINED TO AWWA C210-07.
9. PIPE SUPPORT. QUANTITY: 2.
10. 19mm MINUS CRUSHED ROCK SUB-BASE, 200mm THICK, COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY.
11. LINK-SEAL MODULAR SEAL LS-410-C-7 (OR APPROVED EQUAL). QUANTITY: 2.
12. PIPING SHALL BE AWWA C151 CLASS 50 DUCTILE IRON (CEMENT MORTAR LINED). ALL JOINTS SHALL BE MECHANICALLY RESTRAINED.
13. PIPING SHALL BE AWWA C151 CLASS 54 DUCTILE IRON (CEMENT MORTAR LINED), SUITABLE FOR GROOVED VICTAULIC CONNECTIONS.
14. DRAINAGE SUMP PUMP REQUIRED WITH CONNECTION TO STORM SYSTEM.
15. FINISH GROUND FOR UNTRAVELED AREAS SHALL DRAIN AWAY FROM CHAMBER AT 2% SLOPE AND TOP OF CHAMBER SHALL BE 70mm CLEAR ABOVE SURROUNDING GRADE.
IN TRAVELED AREAS, CHAMBER SHALL BE FLUSH WITH GROUND AND FINISHED GROUND SHALL BE SLOPED AWAY FROM CHAMBER AT 0.5%.

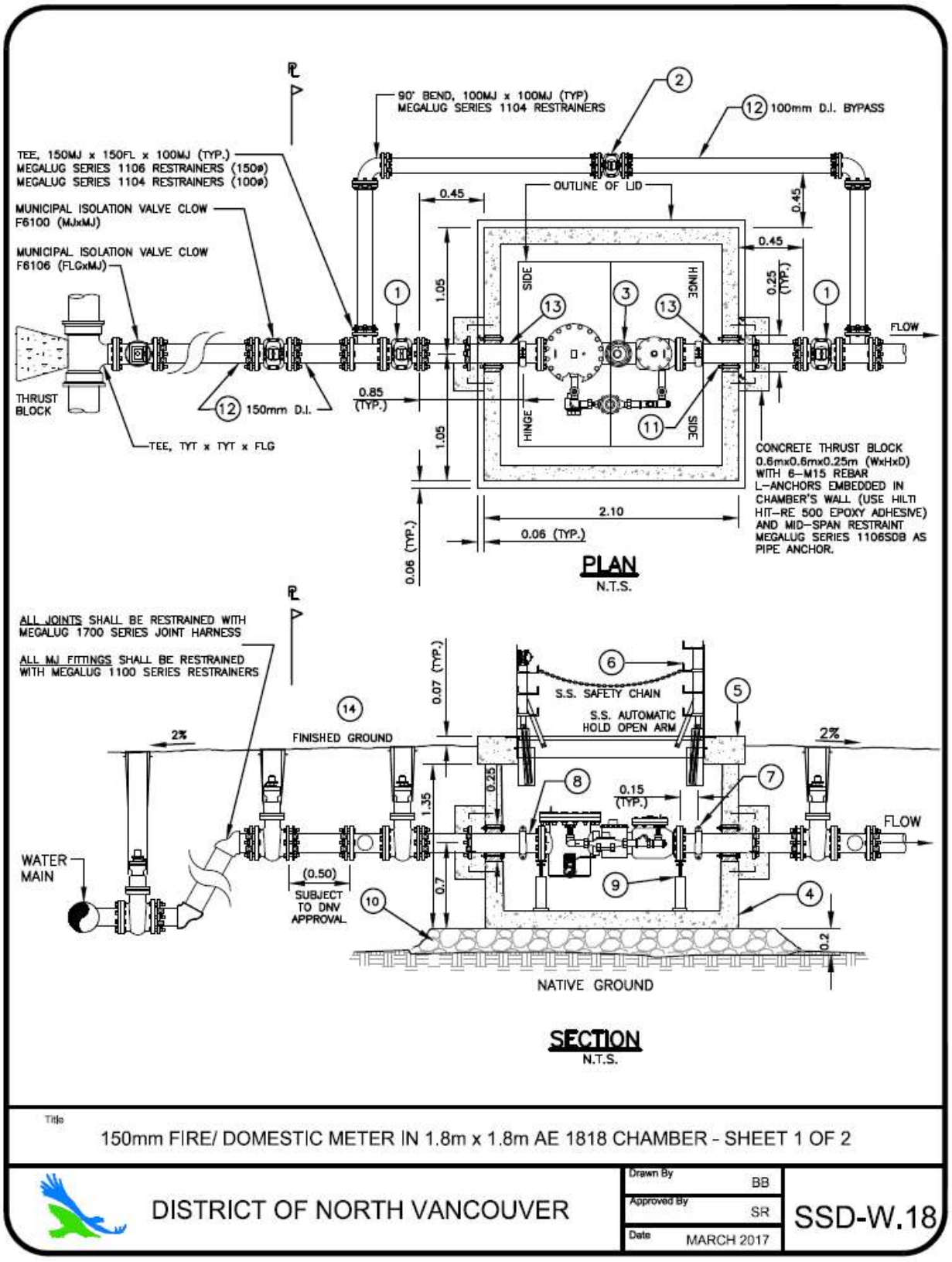
Title

100mm FIRE/ DOMESTIC METER IN 1.2m x 2.0m AE 2121 CHAMBER - SHEET 2 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	IP
Approved By	LC
Date	MARCH 2017

SSD-W.17


90° BEND, 100MJ x 100MJ (TYP)
MEGALUG SERIES 1104 RESTRAINERS
100mm D.I. BYPASS
TEE, 150MJ x 150FL x 100MJ (TYP.)
MEGALUG SERIES 1106 RESTRAINERS (150ø)
MEGALUG SERIES 1104 RESTRAINERS (100ø)
MUNICIPAL ISOLATION VALVE CLOW F6100 (MJxMJ)
MUNICIPAL ISOLATION VALVE CLOW F6106 (FLGxMJ)
THRUST BLOCK
150mm D.I.
TEE, TYT x TYT x FLG
OUTLINE OF LID
SIDE
HINGE
FLOW
0.85 (TYP.)
0.45
0.25 (TYP.)
1.05
2.10
0.06 (TYP.)
CONCRETE THRUST BLOCK 0.6mx0.6mx0.25m (WxHxD) WITH 6–M15 REBAR L–ANCHORS EMBEDDED IN CHAMBER'S WALL (USE HILTI HIT–RE 500 EPOXY ADHESIVE) AND MID–SPAN RESTRAINT MEGALUG SERIES 1106SDB AS PIPE ANCHOR.
PLAN
N.T.S.
ALL JOINTS SHALL BE RESTRAINED WITH MEGALUG 1700 SERIES JOINT HARNESS
ALL MJ FITTINGS SHALL BE RESTRAINED WITH MEGALUG 1100 SERIES RESTRAINERS
FINISHED GROUND
S.S. SAFETY CHAIN
S.S. AUTOMATIC HOLD OPEN ARM
2%
0.07 (TYP.)
0.15 (TYP.)
1.35
0.25
0.7
0.2
WATER MAIN
(0.50) SUBJECT TO DNV APPROVAL
NATIVE GROUND
SECTION
N.T.S.
Title
150mm FIRE/ DOMESTIC METER IN 1.8m x 1.8m AE 1818 CHAMBER - SHEET 1 OF 2
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By SR
Date MARCH 2017
SSD-W.18

NOTES:

1. 150mm ISOLATION VALVES SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH FLGxMJ ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, SUITABLE FOR BURIED LOCATIONS (EPOXY COATED). THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6106 (FLGxMJ) OR APPROVED EQUAL. QUANTITY: 2.
2. 100mm ISOLATION VALVE SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH MJ ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, SUITABLE FOR BURIED LOCATIONS (EPOXY COATED). THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6100 (MJxMJ) OR APPROVED EQUAL. QUANTITY: 1.
3. 150mm NEPTUNE HP PROTECTUS III WATER METER EQUIPPED WITH RADIO FREQUENCY METER INTERFACE UNIT (RF MIU) E-CODER) R900i PIT VERSION AND INTEGRATED WHIP ANTENNA, EPOXY-COATED STEEL STRAINER BODY WITH SS BASKET AND 75mm S.S. BALL VALVE DRAIN, INTEGRAL DETECTOR CHECK VALVE, LOW FLOW BYPASS ASSEMBLY (TWO BALL VALVES, CHECK VALVE, NEPTUNE 38mm T-10 METER EQUIPPED WITH RF MIU E-CODER) R900i PIT VERSION AND INTEGRATED WHIP ANTENNA). QUANTITY: 1.
4. AE CONCRETE METER CHAMBER MODEL 1818 (BOTTOM ONLY) – 1780 L x 1780 W x 1200 DEEP ID. USE AE CONCRETE DRAWING # VC18-20-ZZZZ. QUANTITY: 1.
5. AE CONCRETE ROOF SLAB FOR 1818 BOTTOM WITH 1524 x 1524 ALUMINUM HATCH CAST-IN (SEE ITEM 6) C/W ELASTOMERIC GASKET. USE AE CONCRETE DRAWING # 1818-10-004. QUANTITY: 1.
6. 1524mm X 1524mm USF FABRICATION (OR APPROVED EQUAL) ALUMINUM HATCH TROUGH FRAME, 6.35mm THICK DIAMOND PLATE COVER REINFORCED FOR OCCASIONAL AASHTO H-20 WHEEL LOADS, 316 SS NUTS AND BOLTS, 38mm THREADED DRAIN COUPLING, SS HINGES AND AUTOMATIC HOLD-OPEN ARM, FLUSH LIFT HANDLE, TAMPERPROOF FASTENERS, SS SLAMLOCK WITH REMOVABLE KEY, BOLT ON SPRINGS (REMOVABLE), OVERSIZED RECESSED PADLOCK, BITUMINOUS PAINT AND SAFETY CHAIN. QUANTITY: 1.
7. 150mm VICTAULIC TRANSITION COUPLING – STYLE 307 WITH GRADE "M" GASKET (BROWN COLOR CODE). QUANTITY: 2.
8. VICTAULIC FLANGE ADAPTER NIPPLE No.45F. EPOXY COATED AND LINED TO AWWA C210-07.
9. PIPE SUPPORT. QUANTITY: 2.
10. 19mm MINUS CRUSHED ROCK SUB-BASE, 200mm THICK, COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY.
11. LINK-SEAL MODULAR SEAL LS-410-C-10 (OR APPROVED EQUAL). QUANTITY: 2.
12. PIPING SHALL BE AWWA C151 CLASS 50 DUCTILE IRON (CEMENT MORTAR LINED). ALL JOINTS SHALL BE MECHANICALLY RESTRAINED.
13. PIPING SHALL BE AWWA C151 CLASS 54 DUCTILE IRON (CEMENT MORTAR LINED), SUITABLE FOR GROOVED VICTAULIC CONNECTIONS.
14. FINISH GROUND FOR UNTRAVELED AREAS SHALL DRAIN AWAY FROM CHAMBER AT 2% SLOPE AND TOP OF CHAMBER SHALL BE 70mm CLEAR ABOVE SURROUNDING GRADE.
    IN TRAVELED AREAS, CHAMBER SHALL BE FLUSH WITH GROUND AND FINISHED GROUND SHALL BE SLOPED AWAY FROM CHAMBER AT 0.5%.
15. DRAINAGE SUMP PUMP REQUIRED WITH CONNECTION TO STORM SYSTEM.

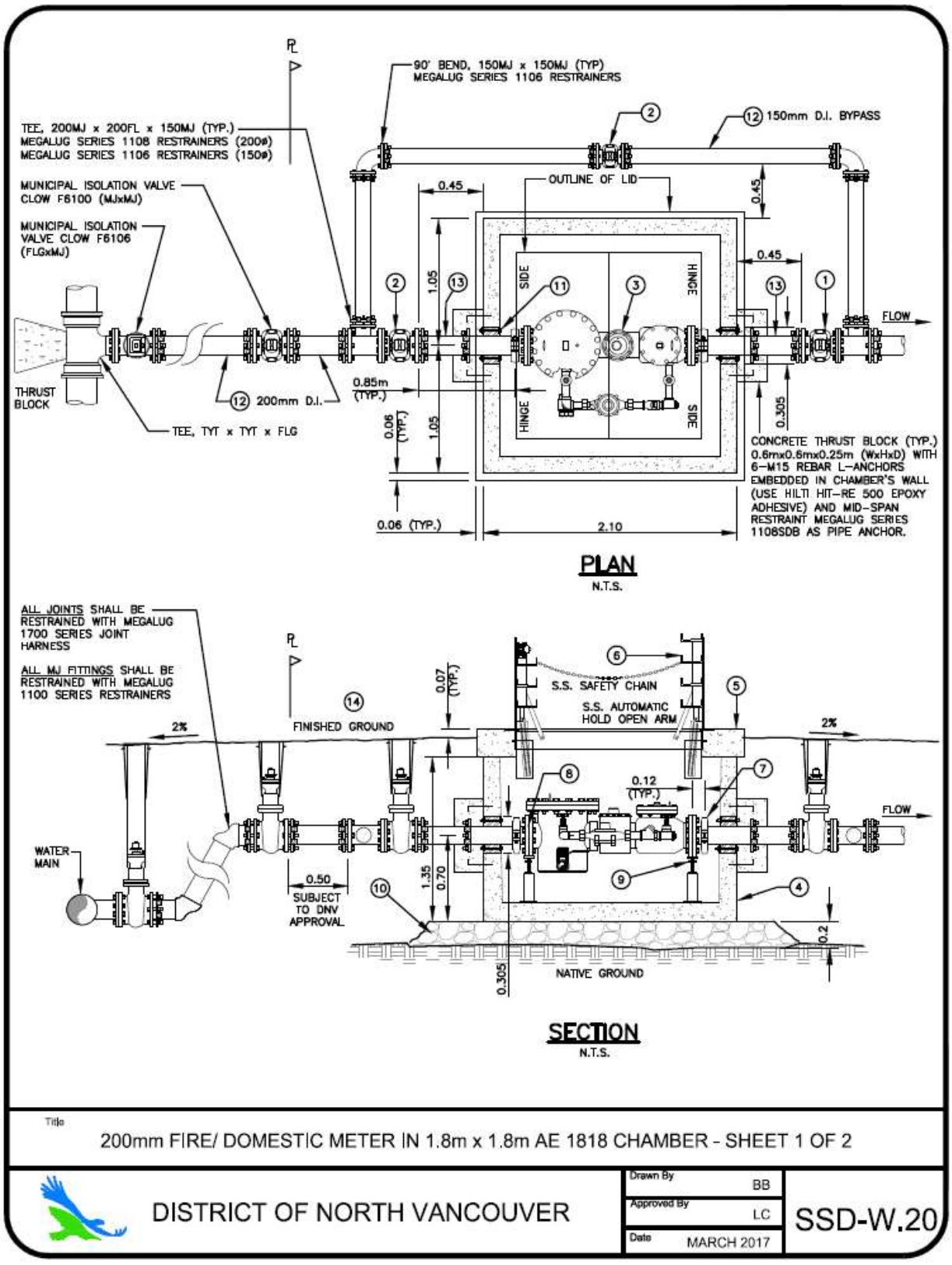
Title

150mm FIRE/ DOMESTIC METER IN 1.8m x 1.8m AE 1818 CHAMBER - SHEET 2 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	SR
Date	MARCH 2017

SSD-W.19


PL
90° BEND, 150MJ x 150MJ (TYP)
MEGALUG SERIES 1106 RESTRAINERS
TEE, 200MJ x 200FL x 150MJ (TYP.)
MEGALUG SERIES 1108 RESTRAINERS (200ø)
MEGALUG SERIES 1106 RESTRAINERS (150ø)
MUNICIPAL ISOLATION VALVE
CLOW F6100 (MJxMJ)
MUNICIPAL ISOLATION
VALVE CLOW F6106
(FLGxMJ)
THRUST
BLOCK
TEE, TYT x TYT x FLG
12 200mm D.I.
12 150mm D.I. BYPASS
OUTLINE OF LID
SIDE
HINGE
HINGE
SIDE
FLOW
0.85m
(TYP.)
0.06
(TYP.)
0.06 (TYP.)
2.10
0.45
0.45
0.45
1.05
1.05
0.305
CONCRETE THRUST BLOCK (TYP.)
0.6mx0.6mx0.25m (WxHxD) WITH
6-M15 REBAR L-ANCHORS
EMBEDDED IN CHAMBER'S WALL
(USE HILTI HIT-RE 500 EPOXY
ADHESIVE) AND MID-SPAN
RESTRAINT MEGALUG SERIES
1108SDB AS PIPE ANCHOR.
PLAN
N.T.S.
ALL JOINTS SHALL BE
RESTRAINED WITH MEGALUG
1700 SERIES JOINT
HARNESS
ALL MJ FITTINGS SHALL BE
RESTRAINED WITH MEGALUG
1100 SERIES RESTRAINERS
PL
14 FINISHED GROUND
2%
2%
0.07
(TYP.)
6 S.S. SAFETY CHAIN
S.S. AUTOMATIC
HOLD OPEN ARM
5
8
0.12
(TYP.)
7
FLOW
WATER
MAIN
0.50
SUBJECT
TO DNV
APPROVAL
10
1.35
0.70
9
4
0.2
0.305
NATIVE GROUND
SECTION
N.T.S.
Title
200mm FIRE/ DOMESTIC METER IN 1.8m x 1.8m AE 1818 CHAMBER - SHEET 1 OF 2
DISTRICT OF NORTH VANCOUVER
Drawn By BB
Approved By LC
Date MARCH 2017
SSD-W.20

WATERWORKS NOTES:

1. 200mm ISOLATION VALVES SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH FLGxMJ ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, SUITABLE FOR BURIED LOCATIONS (EPOXY COATED). THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6106 (FLGxMJ) OR APPROVED EQUAL. QUANTITY: 2.
2. 150mm ISOLATION VALVE SHALL BE RESILIENT SEAT GATE VALVE TYPE WITH MJ ENDS, NON-RISING STEM ("O" RING SEAL TYPE) OPENING LEFT AND PROVIDED WITH 50mm SQUARE OPERATING NUT, SUITABLE FOR BURIED LOCATIONS (EPOXY COATED). THE GATE VALVES SHALL BE MANUFACTURED IN ACCORDANCE WITH AWWA STANDARDS C-509 AND C-515. RECOMMENDED MODEL: CLOW F6100 (MJxMJ) OR APPROVED EQUAL. QUANTITY: 1.
3. 200mm NEPTUNE HP PROTECTUS III WATER METER EQUIPPED WITH RADIO FREQUENCY METER INTERFACE UNIT (RF MIU) E-CODER) R900i PIT VERSION AND INTEGRATED WHIP ANTENNA, EPOXY-COATED STEEL STRAINER BODY WITH SS BASKET AND 75mm S.S. BALL VALVE DRAIN, INTEGRAL DETECTOR CHECK VALVE, LOW FLOW BYPASS ASSEMBLY (TWO BALL VALVES, CHECK VALVE, NEPTUNE 50mm T-10 METER EQUIPPED WITH RF MIU E-CODER) R900i PIT VERSION AND INTEGRATED WHIP ANTENNA). QUANTITY: 1.
4. AE CONCRETE METER CHAMBER MODEL 1818 (BOTTOM ONLY) – 1780 L x 1780 W x 1200 DEEP ID. USE AE CONCRETE DRAWING # VC18-20-ZZZZ. QUANTITY: 1.
5. AE CONCRETE ROOF SLAB FOR 1818 BOTTOM WITH 1524 x 1524 ALUMINUM HATCH CAST-IN (SEE ITEM 6) C/W ELASTOMERIC GASKET. USE AE CONCRETE DRAWING # 1818-10-004. QUANTITY: 1.
6. 1524mm X 1524mm USF FABRICATION (OR APPROVED EQUAL) ALUMINUM HATCH TROUGH FRAME, 6.35mm THICK DIAMOND PLATE COVER REINFORCED FOR OCCASIONAL AASHTO H-20 WHEEL LOADS, 316 SS NUTS AND BOLTS, 38mm THREADED DRAIN COUPLING, SS HINGES AND AUTOMATIC HOLD-OPEN ARM, FLUSH LIFT HANDLE, TAMPERPROOF FASTENERS, SS SLAMLOCK WITH REMOVABLE KEY, BOLT ON SPRINGS (REMOVABLE), OVERSIZED RECESSED PADLOCK, BITUMINOUS PAINT AND SAFETY CHAIN. QUANTITY: 1.
7. 200mm VICTAULIC TRANSITION COUPLING – STYLE 307 WITH GRADE "M" GASKET (BROWN COLOR CODE). QUANTITY: 2.
8. FABRICATED STEEL SPOOL FLGxCUT-GROOVE PIPING (ASTM A106 GRB) AND WELDED SLIP-ON FLANGE (ASTM A105/ANSI B16.5). EPOXY COATED AND LINED TO AWWA C210-07. OVERALL LENGTH OF PIPE SPOOL: 100mm.
9. PIPE SUPPORT. QUANTITY: 2.
10. 19mm MINUS CRUSHED ROCK SUB-BASE, 200mm THICK, COMPACTED TO 95% OF MODIFIED PROCTOR DENSITY.
11. LINK-SEAL MODULAR SEAL LS-400-C-9 (OR APPROVED EQUAL). QUANTITY: 2.
12. PIPING SHALL BE AWWA C151 CLASS 50 DUCTILE IRON (CEMENT MORTAR LINED). ALL JOINTS SHALL BE MECHANICALLY RESTRAINED.
13. PIPING SHALL BE AWWA C151 CLASS 54 DUCTILE IRON (CEMENT MORTAR LINED), SUITABLE FOR GROOVED VICTAULIC CONNECTIONS.
14. FINISH GROUND FOR UNTRAVELED AREAS SHALL DRAIN AWAY FROM CHAMBER AT 2% SLOPE AND TOP OF CHAMBER SHALL BE 70mm CLEAR ABOVE SURROUNDING GRADE.
    IN TRAVELED AREAS, CHAMBER SHALL BE FLUSH WITH GROUND AND FINISHED GROUND SHALL BE SLOPED AWAY FROM CHAMBER AT 0.5%.
15. DRAINAGE SUMP PUMP REQUIRED WITH WITH CONNECTION TO STORM SYSTEM.

Title

200mm FIRE/ DOMESTIC METER IN 1.8m x 1.8m AE 1818 CHAMBER - SHEET 2 OF 2

DISTRICT OF NORTH VANCOUVER

Drawn By	BB
Approved By	LC
Date	MARCH 2017

SSD-W.21