

**LAND TITLE ACT
FORM C (Section 233) CHARGE**

GENERAL INSTRUMENT - PART 1 Province of British Columbia

PAGE OF PAGES

Your electronic signature is a representation that you are a designate authorized to certify this document under section 168.4 of the *Land Title Act*, RSBC 1996 c.250, that you certify this document under section 168.41(4) of the act, and that an execution copy, or a true copy of that execution copy, is in your possession.

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

Deduct LTSA Fees? Yes

2. PARCEL IDENTIFIER AND LEGAL DESCRIPTION OF LAND:
[PID] [LEGAL DESCRIPTION]

STC? YES

3. NATURE OF INTEREST

CHARGE NO.

ADDITIONAL INFORMATION

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

(a) Filed Standard Charge Terms D.F. No.

(b) Express Charge Terms Annexed as Part 2

A selection of (a) includes any additional or modified terms referred to in Item 7 or in a schedule annexed to this instrument.

5. TRANSFEROR(S):

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

7. ADDITIONAL OR MODIFIED TERMS:

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

Officer Signature(s)

Execution Date

Transferor(s) Signature(s)

Y	M	D

OFFICER CERTIFICATION:

Your signature constitutes a representation that you are a solicitor, notary public or other person authorized by the *Evidence Act*, R.S.B.C. 1996, c.124, to take affidavits for use in British Columbia and certifies the matters set out in Part 5 of the *Land Title Act* as they pertain to the execution of this instrument.

**LAND TITLE ACT
FORM D**

EXECUTIONS CONTINUED

PAGE _____ of _____ PAGES

Officer Signature(s)

Execution Date

Transferor / Borrower / Party Signature(s)

Y	M	D

OFFICER CERTIFICATION:

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**LAND TITLE ACT
FORM D**

EXECUTIONS CONTINUED

PAGE _____ of _____ PAGES

Officer Signature(s)

Execution Date

Transferor / Borrower / Party Signature(s)

Y	M	D

OFFICER CERTIFICATION:

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**LAND TITLE ACT
FORM E**

SCHEDULE

PAGE OF PAGES

2. PARCEL IDENTIFIER AND LEGAL DESCRIPTION OF LAND

STC for each PID listed below? YES

[PID] [LEGAL DESCRIPTION – must fit in a single text line]

**LAND TITLE ACT
FORM E**

SCHEDULE

PAGE OF PAGES

NATURE OF INTEREST	CHARGE NO.	ADDITIONAL INFORMATION
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NATURE OF INTEREST	CHARGE NO.	ADDITIONAL INFORMATION
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NATURE OF INTEREST	CHARGE NO.	ADDITIONAL INFORMATION
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TERMS OF INSTRUMENT - PART 2

RESTRICTIVE COVENANT

2017-306-RZ

(Stormwater Management System)

(Section 219 *Land Title Act*)

THIS AGREEMENT made this 21 day of January, 2021.

BETWEEN:

1127042 B.C. LTD.
201 - 12837 76th Avenue
Surrey, BC V3W 2V3

(the "Covenantor" or the "Owner")

AND:

CITY OF MAPLE RIDGE,
11995 Haney Place
Maple Ridge, BC V2X 6A9

(the "City")

WHEREAS:

- A. The Covenantor is the registered owner of or has an equity of redemption in certain lands in the City of Maple Ridge, in the Province of British Columbia, and more particularly known and described as:
Parcel Identifier: No PID
Legal Description:
Lot 1 District Lot 399 Group 1 New Westminster District Plan EPP107648
(collectively referred to as the "Lands");
- B. Section 219 of the *Land Title Act* R.S.B.C. 1996 c. 250, as amended (hereinafter called the "Land Title Act") provides, inter alia, that there may be registered as a charge against the title to land, a covenant, whether of a negative or positive nature in favour of a City that land is not to be subdivided or built upon except in

accordance with the covenant.

- C. It is the intention of the parties that the Covenantor shall construct and install on the said Lands, a stormwater management system, as described on the copy of H.Y. Engineering Ltd. plans, attached hereto as "Schedule A" – The Stormwater Management Plan and Stormwater Control Plan (the "Plan") and maintain same as per "Schedule B" – Guidelines for Operation and Maintenance of Stormwater System;
- D. The Plan is a three-tier stormwater management system, designed in accordance with the City's Watercourse Protection Bylaw 6410-2006 and incorporates the following three components:
1. Rainfall Capture (Source Control), for Tier A events (the small rainfall events that are less than half the size of a mean annual rainfall (MAR), 90% of all rainfall events are Tier A events);
 2. Runoff Control (Detention), for Tier B events (the large rainfall events that are greater than half the size of a MAR, but smaller than a MAR, about 10% of all rainfall events are Tier B events); and
 3. Flood Risk Management (Contain and Convey), for Tier C events (the extreme rainfall events exceeding a MAR, a Tier C event may or may not occur in any given year);

And that:

1. Rainfall Capture will be primarily achieved by using: 300 mm thick absorbent topsoil, oil/water separators, geotextiles and catchbasins;
 2. Runoff Control will be achieved by using bioswales and stormceptors; and
 3. Flood Risk Management will be achieved by using: oversized piping or detention tanks.
- E. The Covenantor and City both desire to ensure that the buildings and structures to be constructed on the said Lands comply with certain standards and guidelines agreed upon between the parties.

NOW THEREFORE, in consideration of the premises and the covenants herein contained, the payment of the sum of One Dollar (\$1.00) paid by the City to the Covenantor, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties covenant and agree, pursuant to section 219 of the *Land Title Act* (British Columbia), that the Lands shall not be used or built upon except in accordance with the following terms:

1. THE COVENANTOR COVENANTS AND AGREES WITH THE CITY:

- a) That the appropriate Absorbent Topsoil properties for the Lands are the responsibility of the qualified Landscape Architect or Engineer of Record, in accordance with British Columbia Landscaping and Nursery Association (BCLNA) standards. The BCLNA “Growing Medium” tables provide guidelines for ratios of sand, silt, and clay, along with organic content, acidity, and drainage. Mixing and handling of the Absorbent Topsoil shall be done to achieve minimum drainage characteristics, such that no standing water is visible 60 minutes after at least 10 minutes of moderate to heavy rains or irrigation. The growing medium should be virtually free of plants, building materials, chemical pollutants, or any other substances detracting from the desirable physical and chemical properties for landscaping purposes.
- b) For the City, the general makeup of Absorbent Topsoil and content ratios will be as follows:

Percent of Dry weight of Total Growing Medium

Coarse gravels	0 – 5%	
Sand	50 – 80%	
Silt have	10 – 25%	Silt and clay combined should a maximum of 35%
Clay	0 – 25%	
Organic Content	5 – 10%	
Acidity (pH)	6.0 – 7.0	

- c) To construct or cause to be constructed, the respective Plan, in accordance with the specifications and standards shown on the attached Schedule A,
- d) To place, repair, protect, and maintain the Absorbent Topsoil on the Lands as herein provided, and to not disturb, reshape, modify or in any way alter any portion of the finished ground surface, the minimum required soil depth (300 mm), and slope of the soils, without written permission from the City;

- e) To place the Absorbent Topsoil on any pervious landscaped/planting areas including, without limiting the generality of the foregoing, any sodded areas and planting beds, to a minimum depth of 300 mm;
- f) That any works undertaken with respect to this Covenant shall be performed in accordance with best management practices embraced by professional engineers and landscape architects;
- g) To establish that the Absorbent Topsoil has been properly placed, the Covenantor shall call the Covenantor's Engineer of Record (the "Engineer of Record") to inspect the works and the Engineer of Record will provide a Final Letter of Inspection and Assurance to the City confirming that the Absorbent Topsoil works have been completed in accordance with this Covenant; and
- h) That no occupancy permit shall be issued for the final building constructed on any of the Lands until the Final Letter of Inspection and Assurance that the Absorbent Topsoil has been properly placed in accordance with this Covenant has been provided by the Engineer of Record.

2. THE COVENANTOR COVENANTS AND AGREES WITH THE CITY:

- a) A sump and on-lot storm detention system (the "System") shall be constructed on the said Lands, as designed by the Engineer of Record.
- b) The design and/or siting criteria and specifications for the System shall be in accordance with the guidelines and policies for Stormwater Management as set out by the City.
- c) The System will include the following requirements and/or capabilities:
 - i. It must be able to perform under all reasonable circumstances and be capable of dealing with the design run-off return periods and run-off intensity as determined by the City's Engineering Standards or the current British Columbia Building Code, whichever is more restrictive;
 - ii. It must be capable of handling normal structural residential surface water loading conditions;
 - iii. The sump shall be provided with a combination of pumped and / or direct gravity overflow into the storm sewer connection. This overflow shall be designed to ensure that storm drains (rain water leaders, lawn sumps, perimeter drains etc.) located on the said Lands will function at all times and, in particular, where the storm detention/ground system is failing or has failed to function;

- iv. The sump must be installed and maintained to drain any surface water and, as such cannot be buried or otherwise made inoperable; and
 - v. Where the Owner proposes to dispose of storm drainage waters generated within their Lands by means of certain works comprising of a chamber with a sump pump unit and storm sewer force main (the "Works"), such Works upon completion will remain in the ownership of the Owner, to be perpetually operated, maintained and replaced when necessary by the Owner at no cost to the City;
- d) A record of the location of the System shall be provided by the Covenantor to the City. To establish this record the Covenantor shall call the Engineer of Record to inspect the System, prior to backfilling and shall provide a surveyed elevation of:
- i. The lowest footing drain; and
 - ii. The top of the overflow in the sump.

The Engineer of Record will provide Certification of Compliance of the System to the City together with a signed Schedule C-B pursuant to the British Columbia Building Code.

- e) The Covenantor shall ensure that the System, including the drain, sump and appurtenances, are inspected on a yearly basis, or as otherwise required, to ensure that the System is operational at all times. This inspection shall include removal of any silt build-up and to ensure that all of the connections entering or leaving the sump are free of debris and free to drain as designed which shall include, but is not limited to, ensuring that silt and/or debris has not clogged up or impeded the orifice control which is at the bottom of the overflow pipe in the sump.
- f) No change in the design, and/or the siting criteria, and specifications, as submitted with the Building Permit will be permitted except with the prior review and written approval of the Business Licensing, Permits and Bylaws Department of the City of Maple Ridge.
- g) No occupancy permit shall be issued for said Lands until design and installation approval has been provided by the Engineer of Record.

- h) The Covenantor covenants with the City:
 - i. That no building, structure, fence, foundation, excavation, well or obstruction shall be made, placed, erected or maintained on any portion of the System except with express written consent and approval of the City;
 - ii. That no growth other than what is permitted by the Engineer of Record shall be planted or allowed to grow upon the System except with the express consent and approval of the City;
 - iii. That the Covenantor shall not do or knowingly permit to be done any act or thing which will interfere with or obstruct the System; and
 - iv. That the Covenantor shall not disturb, reshape, modify or in any way alter any portion of the finished ground surface to the System.

3. THE COVENANTOR COVENANTS AND AGREES WITH THE CITY:

- a) No ground water discharge of new construction residential, commercial, road or parking areas shall be allowed. All such drainage shall be carried to storm water ditches or sewers.
- b) All storm ditches shall be constructed to avoid ponding of water. All ditches shall drain to the north and west by gravity. No discharge shall be allowed into river-bank ravines.
- c) No storm water discharge shall be permitted over river-bank slopes or ravines unless transferred to river level in continuous storm sewers or pipes.
- d) Landscape ponding is not permitted.
- e) Swimming pools are not permitted to drain into rock pits.

4. IT IS UNDERSTOOD AND AGREED BY AND BETWEEN THE PARTIES HERETO THAT:

- a) This Covenant does not affect the Covenantor's responsibility to comply with all Municipal bylaws and requirements otherwise provided;
- b) The City has made no representations, covenants, warranties, guarantees or promises (verbal or otherwise) to the Covenantor other than those contained herein;

- c) The terms and conditions and covenants contained herein run with the Lands, including all lands into which the Lands may be subdivided, and are binding on the Owner and future owners of the Lands, but only for so long as they are owners of such Lands;
- d) The Covenantor will, at the expense of the Covenantor, do or cause to be done all acts reasonably necessary to grant priority to this Covenant over all charges and encumbrances which have been registered against the title to the lands in the New Westminster Land Title Office, save and except those specifically exempted in writing by the City or those in favour of the City;
- e) The Covenantor hereby releases, indemnifies, and saves the City harmless from and against any and all actions, causes of action, losses, damages, costs, claims, debts and demands whatsoever by any person, arising out of or in any way due to the granting or existence or enforcement of this Covenant;
- f) In the event of the inability or refusal of the Engineer of Record to perform the duties and responsibilities herein contained, another engineer, being a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia, acceptable to the City, shall be retained by the Covenantor under the terms and conditions prescribed herein;
- g) This Agreement shall enure to the benefit of and be binding upon the parties hereto, their respective heirs, executors, administrators, successors and assigns; and
- h) Wherever the singular or masculine is used herein, the same shall be construed as meaning the plural, feminine or body corporate or politic where the context or the parties so require.

As evidence of their agreement to be bound by the terms of this instrument, the parties hereto have executed the Land Title Act Form C to which this Agreement is attached.

CONSENT AND PRIORITY AGREEMENT

THE TORONTO-DOMINION BANK, in consideration of the payment of ONE (\$1.00) DOLLAR and other good and valuable consideration (the receipt and sufficiency of which is hereby acknowledged), hereby agrees and consents to the registration of the covenant herein granted under Section 219 of the *Land Title Act*, running with the *Lands* and against the *Lands* in priority to encumbrances, liens and interests registered in favour of The Toronto-Dominion Bank under instrument numbers CA6265768 (as extended by CA7031487, CA7417761, CA7428386 and CA7931661) and CA6265769 (as extended by CA7031488, CA7417762, CA7428387 and CA7931662) in the same manner and to the same effect as if such charges had been dated, granted and registered prior to the said encumbrances, liens and interests.

STORM WATER MANAGEMENT

Tier A: Small Rainfall Events with Intensities less than or equal to 50% of MAR
 Capture small events from impervious areas and detain, evapo-transpire or re-use

Site Elevation: 35.0 m geodetic
 Site Area: 15,015 m² 1.502 ha
 Runoff Coefficient R: 0.35
 Rainfall Intensity (I): 3.06 mm/hr (2-yr 24-hr rainfall event)
 MAR Volume: 386 m³ MAR = 2-yr Rainfall
 Required Retention Volume (50% MAR): 193 m³

Type of Land Use: 1

Land Use	Imperviousness (%)	5/10yr (R)	100yr (R)
1 Suburban Residential	20	0.35	0.40
2 Low Density Residential	40	0.50	0.55
3 Medium Density Residential	65	0.60	0.65
4 High Density Residential	78	0.75	0.80
5 Commercial	80	0.80	0.85
6 Industrial	90	0.80	0.85
7 Institutional (i.e. schools)	80	0.75	0.80
8 Parks/Grasslands	20	0.25	0.30
9 Cultivated Fields	30	0.30	0.40
10 Woodlands/Forested	5	0.10	0.30

STORM WATER MANAGEMENT

Tier B: Rainfall Events with Intensities between 50% of MAR to MAR
 Detain runoff from impervious areas for large rainfall events and release at 2-yr forested flow.

Rainfall Intensity: 1 = k^aw^bT^c

Elevation Factor k = 1.00
 a₁ = 14.29
 b₁ = -0.485

2-yr Forested Flow Condition:	2-yr Post-development Condition:	
Runoff Coefficient R	0.10	0.60
Soil Adjustment Factor (SAF)	1.0	1.0
Overland Catchment Area (A)	1.50 Ha	1.50 Ha
N	0.00278	0.00278
Overland Flow Length (L)	200 m	16 min
Overland Slope (S)	3.00 %	25.6 mm/hr
Overland Travel Time (T _o)	32.1 min	Peak Flow (Q _p at T _o =T _c): 0.0642 m ³ /s
Ditch Length	m	
Manning's n	m/m	
Ditch Slope	m/m	
Ditch Travel Time (T _d)	0.0 min	
Time of Concentration (T _c)	32.1 min	
Rainfall Intensity (I)	19.4 mm/hr	
Release Rate (Q _{re})	0.00800 m ³ /s	

Rainfall Duration (min)	Rainfall Intensity (mm/hr)	Peak Inflow Q _p (m ³ /s)	Inflow Volume (m ³)	Release Volume (m ³)	Detention Volume (m ³)
100	6.5	0.0164	295.1	144.0	152.7
310	6.4	0.0161	300.2	148.8	153.0
320	6.3	0.0159	305.1	153.6	153.1
330	6.3	0.0157	310.0	158.4	153.3
340	6.2	0.0154	314.8	163.2	153.3
350	6.1	0.0152	319.5	168.0	153.3
360	6.0	0.0150	324.2	172.8	153.2
370	5.9	0.0148	328.8	177.6	153.0
380	5.8	0.0146	333.3	182.4	152.8
390	5.8	0.0144	337.8	187.2	152.5
400	5.7	0.0143	342.3	192.0	152.2
410	5.6	0.0141	346.7	196.8	151.8
420	5.6	0.0139	351.0	201.6	151.3
430	5.5	0.0138	355.3	206.4	150.8
440	5.4	0.0136	359.5	211.2	150.3
450	5.4	0.0135	363.7	216.0	149.7
460	5.3	0.0133	367.8	220.8	149.1
470	5.3	0.0132	371.9	225.6	148.4
480	5.2	0.0131	376.0	230.4	147.7
490	5.2	0.0129	380.0	235.2	146.9
500	5.1	0.0128	384.0	240.0	146.1
Maximum 2-yr Detention Volume					153.3

STORM WATER MANAGEMENT

Tier C: Rainfall Events with Intensities exceeding MAR
 Detain runoff from impervious areas for 10-yr rainfall events and release at 2-yr forested flow.

Rainfall Intensity: 1 = k^aw^bT^c

Elevation Factor k = 1.00
 a₁ = 14.32
 b₁ = -0.480

2-yr Pre Development Flow Condition:	10-yr Post-development Condition:	
Runoff Coefficient R	0.25	0.60
Soil Adjustment Factor (SAF)	1.0	1.0
Overland Catchment Area (A)	1.50 Ha	1.50 Ha
N	0.00278	0.00278
Overland Flow Length (L)	200 m	16 min
Overland Slope (S)	3.00 %	44.1 mm/hr
Overland Travel Time (T _o)	27.3 min	Peak Flow (Q _p at T _o =T _c): 0.1103 m ³ /s
Ditch Length	0 m	
Manning's n	0.000	
Ditch Slope	0.000 m/m	
Ditch Travel Time (T _d)	0.0 min	
Time of Concentration (T _c)	27.3 min	
Rainfall Intensity (I)	20.9 mm/hr	
Release Rate (Q _{re})	0.02179 m ³ /s	

Rainfall Duration (min)	Rainfall Intensity (mm/hr)	Peak Inflow Q _p (m ³ /s)	Inflow Volume (m ³)	Release Volume (m ³)	Detention Volume (m ³)
60	24.6	0.0615	221.4	78.4	144.8
70	22.8	0.0571	239.7	91.5	150.4
80	21.4	0.0535	256.8	104.6	154.6
90	20.2	0.0505	272.8	117.6	157.9
100	19.2	0.0480	288.0	130.7	160.3
110	18.3	0.0458	302.5	143.8	162.0
120	17.6	0.0439	316.4	156.9	163.0
130	16.9	0.0423	329.7	169.9	163.9
140	16.3	0.0408	342.5	183.0	163.5
150	15.8	0.0394	354.9	196.1	163.0
160	15.3	0.0382	366.9	209.1	162.1
170	14.8	0.0371	378.5	222.2	160.9
180	14.4	0.0361	389.8	235.3	159.3
190	14.1	0.0352	400.9	248.4	157.5
200	13.7	0.0343	411.8	261.4	155.3
210	13.4	0.0335	422.1	274.5	152.9
220	13.1	0.0327	432.3	287.6	150.2
230	12.8	0.0321	442.3	300.6	147.3
240	12.5	0.0314	452.1	313.7	144.2
250	12.3	0.0308	461.7	326.8	140.9
260	12.1	0.0302	471.1	339.9	137.4
Maximum 10-yr Detention Volume					163.5

STORM WATER MANAGEMENT PLAN

- (SITE AREA = 1.50ha)
- TIER A: SOURCE CONTROL**
- LANDSCAPE AREAS ON THE SITE ARE TO HAVE MIN. 450mm ABSORBENT TOPSOIL. TOPSOIL ON THE SITE TO BE PROVIDED BY DEVELOPER AT BUILDING PERMIT STAGE. LANDSCAPE AREAS MUST BE UNDERLAIN BY IMPERVIOUS LINER TO ENSURE MINIMAL GROUNDWATER INFILTRATION. REFER TO LANDSCAPE ARCHITECT'S DRAWINGS FOR ALL SURFACE TREATMENTS.
 - INSTALL AND MAINTAIN ONSITE OIL/WATER SEPARATORS AS SUITABLE TO TREAT ALL SURFACE PARKING AND ROAD AREAS.
 - GRADE THE NORTH HALF PARKING AREA TO DRAIN TOWARDS THE BIOFILTRATION/RETENTION SWALE. THE SWALE MUST EMPLOY IMPERVIOUS LINERS. PER THE DETAIL ON THIS DRAWING TO RESTRICT GROUNDWATER INFILTRATION
 - ALL SITE DRAINAGE IS TO BE DISCHARGED INTO THE OFFSITE STORM SYSTEM THROUGH THE DETENTION FACILITY PROPOSED ON THE SITE FOR THE TIER B APPLICATION.

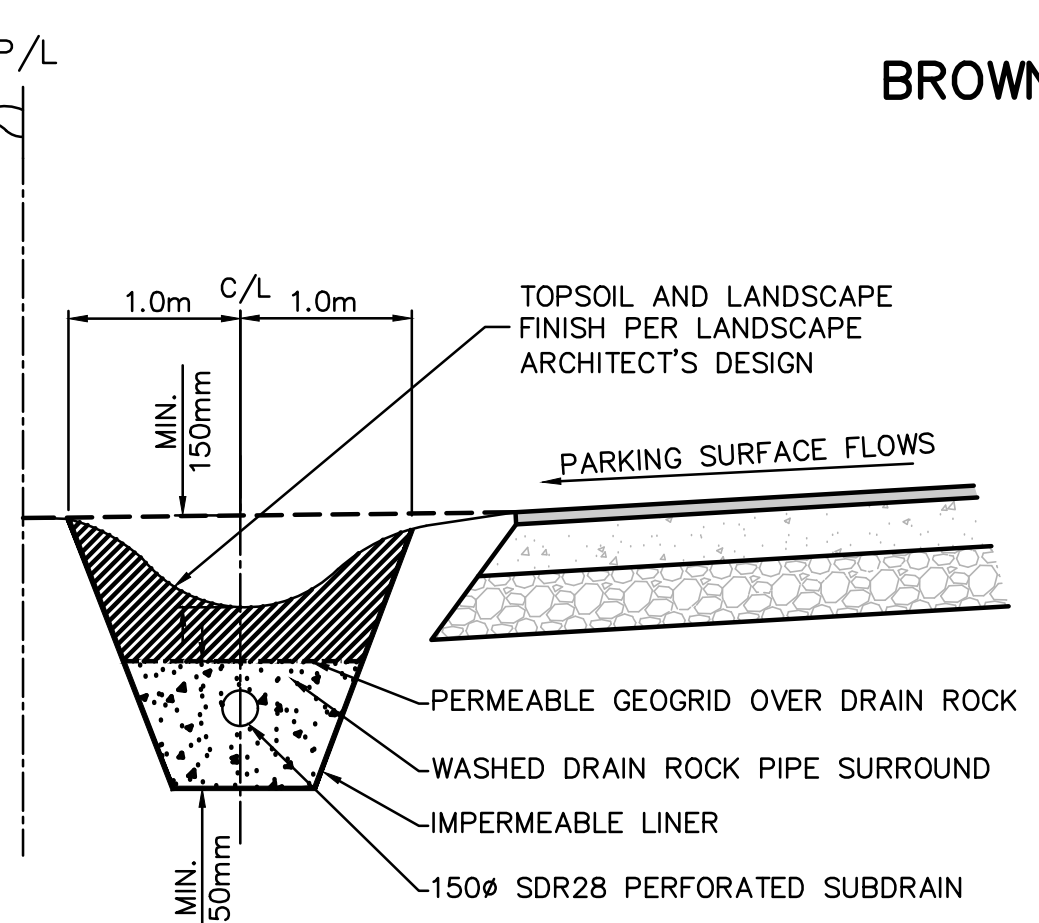
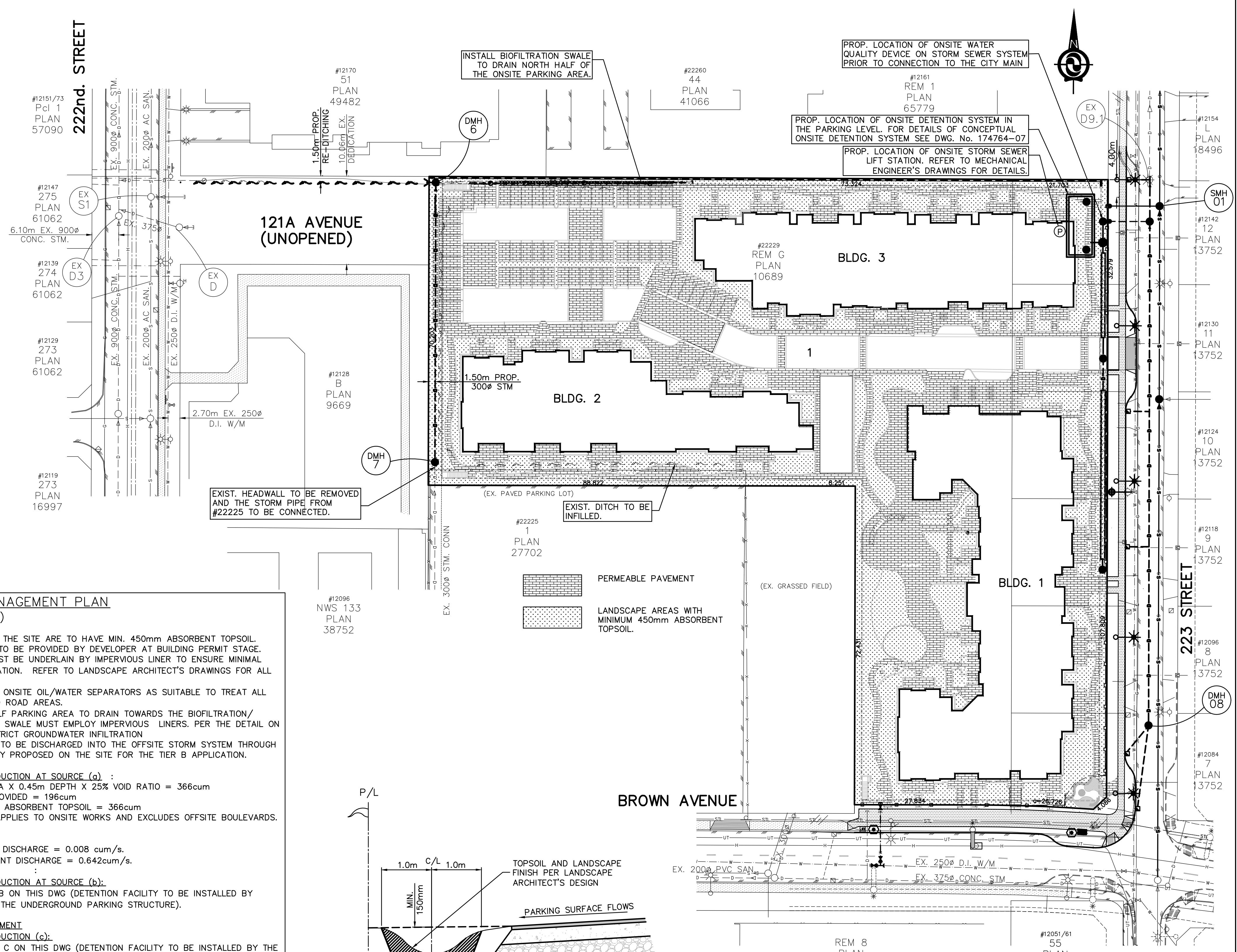
TARGET RUNOFF VOLUME REDUCTION AT SOURCE (a) :
 = 3251sqm LANDSCAPE AREA X 0.45m DEPTH X 25% VOID RATIO = 366cum
 REQUIRED VOLUME TO BE PROVIDED = 196cum
 PROPOSED VOLUME TO BE IN ABSORBENT TOPSOIL = 366cum
 * LANDSCAPE AREA ONLY APPLIES TO ONSITE WORKS AND EXCLUDES OFFSITE BOULEVARDS.

TIER B: RUNOFF CONTROL
 Q_{rel}, 2YR PRE DEVELOPMENT DISCHARGE = 0.008 cum/s.
 Q₁ in 2yr, POST DEVELOPMENT DISCHARGE = 0.642cum/s.

TARGET RUNOFF VOLUME REDUCTION AT SOURCE (b):
 = 153.3cum AS PER TABLE B ON THIS DWG (DETENTION FACILITY TO BE INSTALLED BY OWNER ON THIS SITE WITHIN THE UNDERGROUND PARKING STRUCTURE).

TIER C: FLOOD RISK MANAGEMENT
TARGET RUNOFF VOLUME REDUCTION (c):
 = 163.50cum AS PER TABLE C ON THIS DWG (DETENTION FACILITY TO BE INSTALLED BY THE OWNER ON THIS SITE WITHIN THE UNDERGROUND PARKING STRUCTURE).

- NOTES:**
- DETENTION IS BEING PROVIDED ONSITE FOR THE 100yr. CONDITION AS THE DISCHARGE FROM THE SITE IS TO 223 STREET. AS SURFACE FLOWS HIT THE 122 AVENUE / 223 STREET INTERSECTION THEY TEND TO HEAD EAST DUE TO THE INTERSECTION GRADING.
 - THE PROJECT WILL INCORPORATE AN ONSITE STORM SEWER LIFT STATION TO PUMP THE FOUNDATION DRAINAGE AND ANY OTHER STORM WATER COLLECTED BELOW THE INVERT OF THE DETENTION SYSTEM AND SHALL DIRECT THE DRAINAGE TO THE DETENTION SYSTEM. REFER TO MECHANICAL ENGINEER'S DRAWINGS FOR LIFT STATION DETAILS.
 - A RESTRICTIVE COVENANT HAS BEEN REGISTERED ON THE LANDS TO OUTLINE INSTALLATION AND MAINTENANCE OF THE STORM WATER MANAGEMENT SYSTEM AND ONSITE STORM SEWER LIFT STATION.



BIOFILTRATION/RETENTION SWALE DETAIL
 SCALE: N.T.S.

No.	DATE	REVISION	BY
A	09/30/20	ISSUED FOR SERVICING AGREEMENT	DJR
B	10/07/20	ISSUED FOR SERVICING AGREEMENT	RSO
C	11/23/20	ISSUED FOR FINAL SERVICING AGREEMENT ACCEPTANCE	RED
D	12/08/20	REVISED PER CITY COMMENTS	RED

BENCHMARK:
 ALL ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM MON. 84H0012 LOCATED AT EDGE STREET AND BROWN AVENUE. ELEVATION = 39.032m DATUM CVD28GVRD(2018)

LEGAL DESCRIPTION:
 LOT "G" PLAN 10689 EXCEPT PORTIONS IN PLANS 19681, 59663, 63321 AND LMP27701, AND LOTS 14 - 19 PLAN 13752, ALL OF DISTRICT LOT 399 GROUP 1 NEW WESTMINSTER DISTRICT

HY. ENGINEERING LTD.

• #200-9128-152nd. St. Surrey, BC V3R 4E7 • TEL 604-583-1616
 • Website: www.hyengineering.com • FAX 604-583-1737

DRAWN	GC	SEAL
DESIGNED	RED	
CHECKED	RED	
APPROVED	DJR	
SCALES	H 1:500	

CITY FILE # 2017-306

CORPORATION OF THE CITY OF MAPLE RIDGE
 ENGINEERING DEPARTMENT

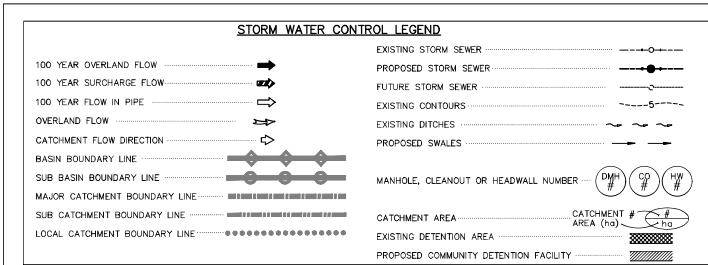
STORM WATER MANAGEMENT PLAN

22229 BROWN AVENUE
 MAPLE RIDGE, B.C.

DATE: SEP. 2020
 SHEET: 09 OF 15
 DWG. No.: 174764-09

DRAWING PATH: E:\PROJECTS\174764\174764-09D.DWG [C:\OSWIN] PLOT FILE UPDATED: DECEMBER 09 2020 - 9:37:12 AM BY: AOHNSDA

SCHEDULE A - STORMWATER CONTROL PLAN



STORM WATER CALCULATION SHEET - 22229 Brown Avenue Apartment Site

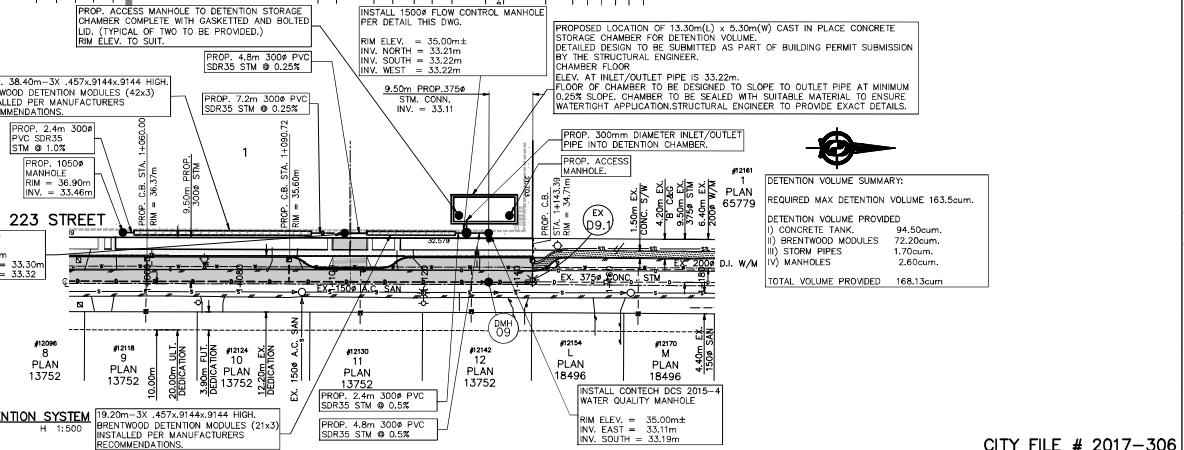
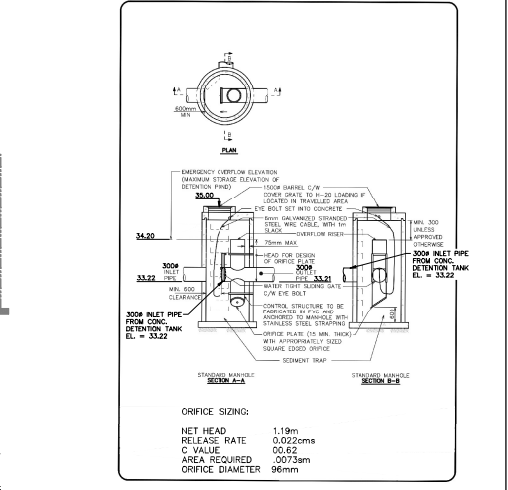
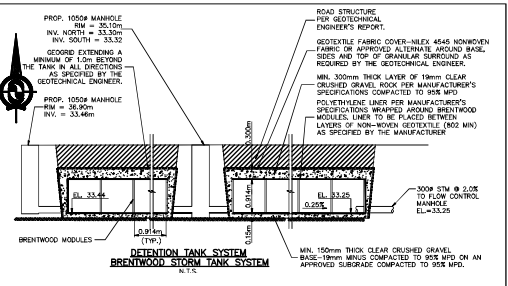
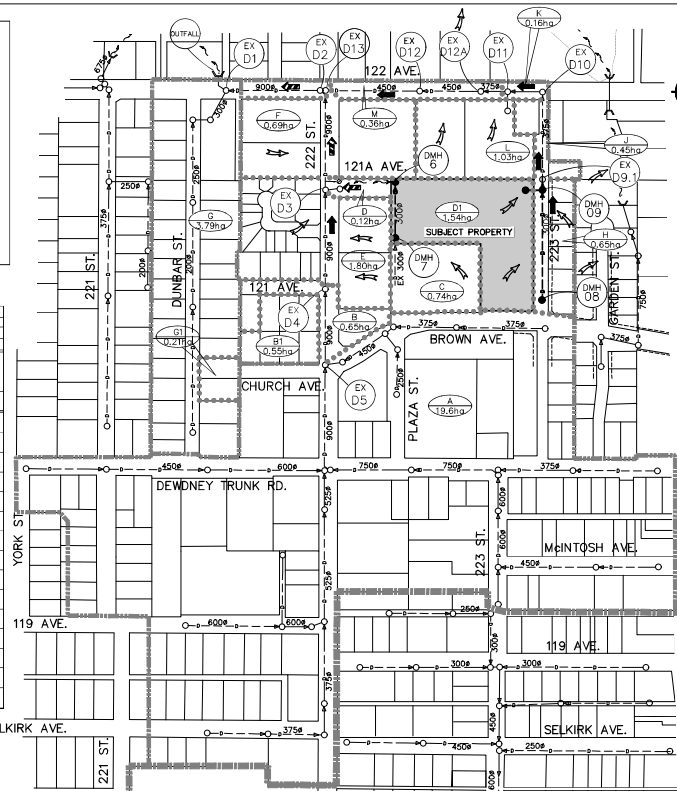
QTY PROJECT NO.: 17194 Date: 28 Apr 20
 ENGINEERING FILE: 17194 Design: mjb
 LOCATION: 22229 Brown Avenue Checked: djb
 CLIENT: Platinum Enterprises Ltd. Intensity Curve: 10 Maple Ridge (19yr100y)
 DESIGN RAINFALL PERIOD: 16 year/100 year
 #40193 PVC #40193 Conc

Location of Drainage Area	From	To	Area "A"	"R"	"X"	"Y"	Time of Concentration	Runoff Intensity	Q (l/s)	Sewer/Conc			Remarks				
										Inlet	Section	Total		Flow	Depth	Vel	Friction
			m ²				min	mm/hr	mm ³	mm	m	m/s	m				
A,B	EX	EX	30.20	0.88	13.33	13.33	24.0	0.4	24.4	57.6	2.51	1.15	0.9	81.1	3.1	0.013	2015
	OS	D4							97.4	1.416							
B1	EX	EX	0.55	0.42	0.22	13.55	24.4	0.8	25.2	56.9	2.143	0.65	0.8	109.1	2.3	0.013	1516
	DMH	D4H							46.1	0.52							
C	T	E	0.74	0.50	0.44	0.44	15.0	1.4	16.4	70.2	0.537	0.40	0.3	71.9	0.9	0.013	0.683
	DMH	E							42.1	0.29							
D	EX	EX	0.12	0.50	0.07	6.32	15.4	0.8	17.2	68.5	0.068	0.40	0.45	56.0	1.1	0.013	0.187
	DMH	E							44.1	0.33							
E	OS	D3	1.80	0.50	1.08	15.15	25.2	0.8	26.0	96.1	0.583	0.76	0.9	113.1	2.5	0.013	1.638
	EX	EX							36.6	1.87							
F,H	DMH	D1	1.88	0.90	1.13	18.57	28.0	0.5	26.5	56.5	2.670	1.42	0.9	98.5	3.4	0.013	2.239
	EX	EX							36.5	2.52							
G,G1	DMH	D1	4.00	0.58	2.32	20.69	28.5	0.0	26.5	55.6	3.227	18.12	0.9	18.8	12.2	0.013	8.000
	OUTFALL								44.1	0.33							
I	DMH	D1H	1.54	0.50	0.82	6.82	18.0	0.0	18.0	67.0	0.172	2.00	0.3	2.3	1.9	0.013	0.141
	DMH	D1H							46.3	0.33							
J	DMH	E	0.65	0.40	0.26	0.26	15.0	1.3	16.3	70.0	0.591	1.30	0.3	130.0	1.6	0.013	0.174
	DMH	E							42.7	0.162							
K	EX	EX	0.46	0.40	0.18	1.38	18.0	1.2	19.3	68.0	0.266	0.72	0.275	100.0	1.4	0.013	0.164
	D10	D11							42.9	0.172							
L	EX	EX	0.16	0.50	0.16	1.46	11.9	0.3	11.9	64.3	0.361	1.03	0.375	32.9	1.6	0.013	0.184
	EX	EX							41.9	0.29							
M	EX	EX	1.03	0.50	0.82	2.08	11.9	0.4	11.9	63.8	0.368	0.40	0.45	24.1	1.1	0.013	0.187
	D12	D13							41.9	0.29							
N	EX	EX	0.05	0.50	0.06	2.08	11.9	0.7	20.6	62.7	0.362	0.60	0.45	68.0	1.7	0.013	0.280
	D13	D13							40.9	0.361							
O	EX	EX	0.36	0.50	0.22	2.29	11.9	1.0	21.0	62.2	0.387	0.90	0.45	107.5	1.7	0.013	0.280
	D12	D2							40.9	0.361							
P	EX	EX	0.02	0.50	0.02	2.29	21.0	0.0	21.0	62.1	0.386	1.00	0.45	6.0	1.8	0.013	0.285
	D12	D2							62.1	0.386							

-ANALYSIS INDICATES 10 YEAR HGL IS SURCHARGED ON PIPE SEGMENTS EX. D11 TO EX. D12A AND DMH 09 TO EX. D10. BOTH SECTIONS OF SEWER WERE CONSTRUCTED IN 2018 PROJECT 16-0277. THE MAIN FACTOR FOR THE SURCHARGE IS THAT PROJECT 16-0277 DID NOT ACCOUNT FOR THIS SITE (AREA D) DRAINING TO 222 STREET AND HAD IT SHOWN DISCHARGING TO 222 STREET WHICH THE CITY WILL NOT PERMIT UNDER CURRENT DEVELOPMENT.

-THE CALCULATED SURCHARGE ABOVE THE PIPE IN THE EXISTING STORM IS 0.15m AT EX. D11, 0.05m AT EX. D10 AND 0.05m AT DMH09. THERE IS NO SURCHARGE AT DMH-08.

-THE SHOWN ANALYSIS DOES NOT FACTOR IN THE IMPLEMENTATION OF ONSITE DETENTION AT THIS SITE NOR AT PROJECT 16-0277 WHERE ONSITE DETENTION SYSTEMS ARE PROPOSED AND OR EXISTING. ANALYSIS OF THE STORM SYSTEM CONSIDERING THE INSTALLATION OF DETENTION AT THESE TWO SITES SHOWS A REDUCTION IN THE 10 YEAR HGL WHERE NO SURCHARGE CONDITION WOULD EXIST IN THE EXISTING STORM SYSTEM.



DETENTION VOLUME SUMMARY:

1 PLAN 65779
 REQUIRED MAX DETENTION VOLUME 163.50cum.

DETENTION VOLUME PROVIDED:

(I) CONCRETE TANK 94.50cum.
 (II) BREWTOND MODULES 72.20cum.
 (III) STORM PIPES 1.70cum.
 (IV) MANHOLES 2.60cum.

TOTAL VOLUME PROVIDED 168.13cum

No.	DATE	REVISION	BY
A	04/17/20	REVISED TABLE AND PLAN	RED
B	09/30/20	ISSUED FOR SERVING AGREEMENT	DJR
C	10/07/20	ISSUED FOR SERVING AGREEMENT	RSD

BENCHMARK:
 ALL ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM MGN 84#012 LOCATED AT EDGE STREET AND BROWN AVENUE. ELEVATION = 59.032m DATUM CVD28(VRD)(2018)

LEGAL DESCRIPTION:
 LOT "O" PLAN 10689 EXCEPT PORTIONS IN PLANS 19681, 59663, 63321 AND LMP27701, AND LOTS 14 - 19 PLAN 13752, ALL OF DISTRICT LOT 399 GROUP 1 NEW WESTMINSTER DISTRICT

H.Y. ENGINEERING LTD.

• #200-9128-152nd St. Surrey, BC V3R 4E7 • TEL 604-583-1616
 • Website: www.hyengineering.com • FAX 604-583-1737

DRAWN GC
 DESIGNED RED
 CHECKED RED
 APPROVED DJR
 SCALES H 1:2500

CITY FILE # 2017-306

CORPORATION OF THE CITY OF MAPLE RIDGE
 ENGINEERING DEPARTMENT

STORM WATER CONTROL PLAN
 22229 BROWN AVENUE
 MAPLE RIDGE, B.C.

DATE SEP. 2020
 SHEET 08 OF 15
 Dwg. No. 174764-08

SCHEDULE B**GUIDELINES FOR OPERATION AND MAINTENANCE OF THE STORMWATER SYSTEM**

November 2020

1) INTRODUCTION

One of the most important aspects of a sustainable development relates to stormwater and how development impacts the hydrology of the watershed. As development increases hard surface areas such as rooftops, asphalt roads and driveways, it simultaneously prevents rainwater from mimicking natural runoff conditions. Under past practices, the increased rainwater runoff has mostly been discharged into a storm sewer system. This not only contributes to downstream flooding and erosion of natural watercourses, but also allows contaminants to enter the runoff flow, causing negative impacts on fish habitats.

Research tells us that 70% of the overall volume of all rainfall occurs during small rainfall events. This presents an opportunity to implement Low Impact Development measures to manage this rainwater. In addition to storm sewers and overland conveyance measures, the development uses absorbent landscape (thickened topsoil) and a stormwater detention system as a method of capturing rainfall.

2) HOW THE STORMWATER SYSTEM WORKS

- a) Rainwater landing on roofs of buildings is collected in gutters and flows via downspouts and storm pipes to a building sump. Foundation drains around the building also drain to a building sump. This system is typical of most multi-family residential developments.
- b) The roof drain sumps from buildings will drain directly to the drainage cistern located in the underground parking structure.
- c) Access in the form of a manholes or cleanouts is provided for all storm sewers ease of maintenance.
- d) In the event that stormwater is conveyed overland, there are two different pathways: swales and roadways. The combination will ensure that even in rain events larger than the 1 in 100-year event, runoff is contained and directed safely offsite.
- e) Storm drainage is directed to a storm detention system and the discharge from the site is restricted to mimic pre-development flow levels by holding water within the detention system.
- f) These Guidelines refer to the Stormwater Concept Plan, the Landscaping Plan, Drawing Details, the tables of maintenance requirements that are attached in Schedule A.

3) **DO'S AND DON'TS**

Stormwater System

- a) Do not flush sediment, sand, leaves, other debris, oil, grease, and contaminants into the storm system. They **will** plug the system, and adversely affect the natural watercourses and habitat downstream. Sweeping and collection is preferred to flushing into the storm system.
- b) Do not plant trees over any part of, or within 2.0 metres of the perimeter of a storm sewer trench.
- c) Do not alter the connection from the downspouts to the building sumps.
- d) Do not cover up, fill, or plug any catchbasin or lawn drain.
- e) Do not block, fill, reroute or re grade any swale.
- f) Do not alter the control structure on the detention system discharge.

Landscape Areas

- a) Do have an appropriately qualified landscaper undertake weeding, pruning and maintenance of vegetation areas in accordance with these guidelines.
- b) Do not remove plant or replace any vegetation within the Landscape Areas without consulting The Grantee.
- c) Avoid all forms of digging and/or activities that could lead to damaging the root systems of trees or other vegetation within the Landscape Areas.
- d) Do not dump refuse, garden waste or composting materials within or adjacent to the Landscape Areas.
- e) Do not place any chemicals or contaminants (e.g., antifreeze, hydrocarbons, household chemicals, herbicides) or deleterious materials (e.g., garbage, fill, car batteries) within or immediately adjacent to the Landscape Areas.
- f) Do not trim and/or remove trees or other vegetation for the purpose of creating a pathway or line of sight through the Landscape Areas.
- g) Invasive and noxious weeds are to be removed from the Landscape Areas as part of maintenance. Removal of invasive and noxious weeds must be undertaken manually or in a manner as not to damage native species.

4) **MAINTENANCE Stormwater System and Landscape Areas**

a) **Absorbent Soils**

Absorbent soils will steadily become more compact and will lose some of their absorption capacity over time. Proper maintenance and soil amendments will ensure better long-term performance of the soil absorption capacity. Avoid excessive pedestrian or vehicular traffic on absorbent soils to maintain optimum foot bearing soil density (approximately 80% Proctor Density).

b) **Absorbent Turf Grass Maintenance**

Provide regular mowing at 40 mm to 65 mm height to stimulate plant growth and encourage dense coverage. Mow rural swales a minimum of once yearly. Clippings from vegetated swales may contain concentrations of urban pollutant and may require appropriate disposal. Avoid the use of non-organic fertilizers, pesticides, and herbicides, a potential source of water pollution.

Once a year, rake the turf with a metal rake to remove excess thatch and aerate. Amend the soil by topdressing the turf with 5-10 mm of sand and weed free composted soil blend. Rake in the soil amendment and grade to provide a smooth surface. Spread additional grass seed to address thinning areas of the turf.

c) **Swale**

- maintain swale to Absorbent Soil maintenance specifications as in a) above
- remove leaves each fall
- inspect overflow structures annually
- inspect periodically during wet weather to observe function and after large storms
- inspect hydraulic and structural facilities annually
- at outset of rainy season and after each significant storm - remove trash and floatables, correct erosion problems, unclog outlet structures, keep inlet flow spreaders free of debris may require aeration of turf areas
- remove clippings to prevent clogging of outlets and prevent nutrient release
- remove sediments by hand using flat shovel if sediment covers vegetation or begin to reduce capacity
- reseed damaged areas immediately

d) **Absorbent Plant Bed Maintenance**

Provide regular pruning, thinning and weeding to stimulate plant growth and maintain the desired plant community. Plant trimmings from vegetated swales may contain concentrations of urban pollutants and may require appropriate disposal. Avoid the use of non-organic fertilizers, pesticides, and herbicides, a potential source of water pollution.

Once a year, amend the soil by topdressing the plant beds with 25-50 mm of sand and weed free composted soil blend. Scarify the 50-100 mm surface layer and blend in the soil amendment. In dry areas, provide a surface layer of bark mulch to increase soil moisture retention.

e) Storm Sewers

- i) Maintenance should be performed in such a way so as not to disturb slopes, vegetation along slopes, and retaining structures.
- ii) Check all sump manholes, detention control manhole, detention tanks (both interior cistern and exterior Brentwood system), catchbasins and lawn drains and remove all sediment, leaves, and other debris which may have been collected. Check the integrity of all swales to ensure that they are conveying drainage from the site and draining to the intended lawn drains. This should be carried out at least at the following times during the year:
 - at the end of summer just before the start of winter rains
 - at the end of autumn after the main leaf fall
 - after any substantial rainfall event
- iii) Street sweeping using a vacuum sweeper truck is an important aspect of keeping sediment out of the system and ensuring its long life. Street sweeping should be carried out at least at the following times during the year:
 - at the end of winter after all sand, salt, or winter measures are complete
 - at the end of autumn after the main leaf fall
 - at the end of summer just before the start of winter rains
- iv) Retain the services of a qualified professional to clean the manholes, solid storm sewers, detention control manhole, detention tanks (both interior cistern and exterior Brentwood system), catchbasins, and lawn drains, this may involve flushing the manholes and pipes. In the event of blockage, contact a pipe cleaning professional. Catchbasins and lawn drains should be cleaned using a vacuum truck. This should be carried out a minimum of once every two years.
- v) Provide maintenance to the rain gardens using proper landscape practices. See maintenance guidelines for Landscape Areas.

5. PREVENTATIVE MAINTENANCE

a) System Malfunction

If (after allowing enough time for flows to pass through the system after a rainfall event) a catchbasin, lawn drain is not draining properly, then call in a qualified plumber or drainage contractor to carry out any necessary repairs.

Important Note: Before the plumber or contractor does any work, please ensure that s/he reads these guidelines and fully understands how the system is designed to work. Contractors should be advised to obtain copies of the approved plans and design specifications for the stormwater system from The Grantee of Maple Ridge before proceeding with any works. Modifications to the system may be subject to permits or approvals by the Grantee.

Landscape Areas

a) Maintenance

All maintenance of the Landscape Areas should be carried out by an appropriately qualified landscaper. Routine maintenance should include:

- i) Overall cleaning of debris, garbage and refuse within the Landscape Areas (landscaped areas and swales) in both the spring and fall seasons.
- ii) Pruning of trees and/or shrubs only as required.
- iii) Irrigation of landscape areas throughout the summer.

Important Note: Before the landscape does any work, please ensure that the guidelines are read. Landscape contractors should be advised to obtain copies of the approved plans from The Grantee of Maple Ridge before proceeding with any maintenance activities. Modifications to landscaping areas or plants within them may be subject to approvals by the Grantee

END OF DOCUMENT