

Rock Pit for Tier A

Calculation Sheet for OnSite Storm Water Exfiltration (RockPit)

Client: Jent Construction Ltd
 Project Location: 23436 Dogwood Ave, Maple Ridge, BC
 Service Description: Rock Pit Design

Project Number: 24-9815
 Project Date: May 9, 2024
 Designer: Joseph Gh, P.Eng.

City of Maple Ridge

Site Data - Table 1

Return Period (yrs)	2
Surface Drainage Area (m ²)	455
Surface Coefficient (C)	0.9
Recurrence Coefficient (n)	1
Time Of Concentration (min)	10
Rock Pit Floor (m ²)	40
Rock Pit Voids	0.35
Max. Allow. Storage Time (hr)	48
Proposed Rock Pit Depth (m)	0.5
Perimeter Drain Flow (m ³ /day)	0

Rock Pit Calculations - Table 3

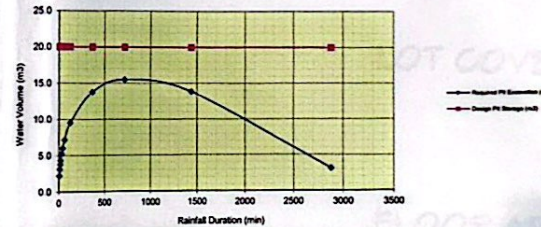
Rainfall Duration (min)	Peak Inflow (m ³ /s)	Storm Volume (m ³)	Exfiltration Volume (m ³)	Required Storage (m ³)	Standing Water Time (hrs)	Required Pit Excavation (m ³)	Design Pit Storage (m ³)	City of Maple Ridge 50 % Rainfall Intensity (month curves)
5	0.0227	0.8	0.0354	0.8	1.8	2.2	20.0	23.8
10	0.0219	1.2	0.0707	1.1	2.6	3.1	20.0	17.0
15	0.0216	1.4	0.1061	1.3	3.1	3.8	20.0	14.0
20	0.0214	1.7	0.1415	1.5	3.6	4.3	20.0	12.2
30	0.0211	2.0	0.2122	1.8	4.3	5.2	20.0	10.0
40	0.0210	2.4	0.2830	2.1	4.9	6.0	20.0	8.7
60	0.0208	2.9	0.4245	2.5	5.9	7.1	20.0	7.1
120	0.0206	4.2	0.8489	3.3	7.8	8.5	20.0	5.1
360	0.0203	7.4	2.5468	4.8	11.3	13.8	20.0	3.0
720	0.0202	10.5	5.0937	5.4	12.8	15.5	20.0	2.1
1440	0.0202	15.0	10.1874	4.8	11.4	13.8	20.0	1.5
2880	0.0201	21.5	20.3747	1.1	2.6	3.2	20.0	1.1

Percolation Test Data - Table 2

Field Percolation (sec / inch)	1435
Infiltration Rate (m/s) FS=3	2.95E-06

above from Abbotsford's empirical correlation
 City of Abbotsford Dwg. ES-D-4, (0.0127/3)

Chart 1 - Design Rockpit Capacities



APPLICANT'S COPY

ROCK PIT FOR TIER B & C:

6m x 9m x 0.5m x 0.35(VOID) = 9.45m³
 πr² x (0.9m) x 0.5m x 0.65(VOID) = 0.21m³
 9.66m³ > 9.6m³

Orifice

V = C_v√2-g-h
 Q = A·V (m³/sec)
 g = 9.81 m/sec²
 C_v = 0.6

Q_{2yr pre-development rate} = Runoff Coefficient x A x MAR Intensity x N

h = 0.5 m
 d = 0.065 m
 A = 0.00332 m²
 V = 1.879 m/sec
 Q = 0.00624 m³/sec < 0.00676 m³/sec

Lot Area	3120 m ²	0.312 ha
Slope	2.06 %	
Roof Area	455 m ²	

Tier A Detain on-site through infiltration, evapotranspiration or re-use.
 Rain Fall Intensity : 50% Mean Annual Rainfall (MAR)
 Water from roof leader would be discharged into the rock pit and infiltrated into ground.
 Water collected in the vegetated area would be infiltrated into the ground and/or evaporated.

Tier B Detain runoff from the entire site resulting from larger rainfall events that exceed Tier A, up to and including MAR.
 Release rate shall be limited to the 2yr forested flow rate derived based on:
 - Slow forested flow rate using MAR intensity:
 Q_{slow} = Forested Runoff Coefficient x A x MAR Intensity x N = 0.00027 m³/sec
 Where: Forested Runoff Coefficient = 0.1 x Soil Adjustment Factor (1.0) = 0.1
 A = Total Site Area (hectares) = 0.312 ha
 MAR Intensity (24 hr Duration) = 3.1 mm/hr
 N = 0.00278
 - Full forested flow rate using derived rainfall intensity:
 Q_{full} = Forested Runoff Coefficient x A x MAR Intensity x N = 0.00211 m³/sec
 Where: Forested Runoff Coefficient = 0.1 x Soil Adjustment Factor (1.0) = 0.1
 A = Total Site Area (hectares) = 0.312 ha
 MAR Intensity (Time of Concentration (T_c) Duration) = 24.3 mm/hr
 N = 0.00278
 T_c = time of concentration (seconds) for a Forested Condition = 23 min

Tier C Tier C will need to be calculated using the methods detailed in the City's Design Criteria Manual section D7.2 and D7.3.
 Cannot rely on any infiltration, and must detain the 10yr storm over the entire site, and release at the 2yr pre-development rate.
 Q_{2yr pre-development rate} = Runoff Coefficient x A x MAR Intensity x N = 0.00676 m³/sec
 Where: Predevelopment Runoff Coefficient x Soil Adjustment Factor (1.0) = 0.3
 A = Total Site Area (hectares) = 0.312 ha
 MAR Intensity (Time of Concentration (T_c) Duration) = 26.0 mm/hr
 N = 0.00278
 T_c = time of concentration (seconds) = 18 min

D7.2 Design Volume (Small Catchments)
 The storage volume (m³) can be calculated by:
 Storage Volume (T_c (Q_{0.2} - Q_{0.1}) + 0.5 T_c Q_{0.2} (1/Q_{0.2} - 1/Q_{0.1}))
 Where T_c = duration of specified storm (seconds) Runoff Coefficient = 0.4
 T_c = time of concentration (seconds) SAF = 1
 Q_{0.1} = peak flow for storm duration T_c = T_c (m³/s) Runoff Coefficient x SAF = 0.4
 Q_{0.2} = peak flow for specified storm duration (m³/s) Time of Concentration = 18 min
 Q_{0.4} = maximum release rate (m³/s)

Hyd No.	Rainfall Duration T _c (min)	Rainfall Intensity I (mm/h)	Peak Flow Q _{0.2} (m ³ /s)	Inflow Runoff Volume (m ³)	Max Release Q _{0.4} (m ³ /s)	Required Storage Volume (m ³)	Peak Flow Q _{0.1} (m ³ /s)
1	18	44.08	0.0153	16.50	0.00676	9.2	0.0153
2	20	41.88	0.0145	17.42	0.00676	9.4	0.0153
3	25	37.59	0.0130	19.55	0.00676	9.6	0.0153
4	30	34.41	0.0119	21.47	0.00676	9.6	0.0153
5	40	29.93	0.0104	24.90	0.00676	9.1	0.0153



PTP# 1002594

Rev.	Description	Date
Rev 0	Issued for Comments	May 9, 2024
Rev 1	Revised Proposed House Location	June 11, 2024

Client	Jent Construction Ltd.
Project	Proposed Single-Family Dwelling 23436 Dogwood Ave, Maple Ridge, BC
Project no.	24-9815
Drawn	DD
Design	JO
Checked	JW
Date	June 11, 2024

Title	STORMWATER MANAGEMENT PLAN CALCULATION SHEET
Date	May 9, 2024
Scale	NTS
Drawing no.	24-9815-SWMP-03



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