LAWSON ENGINEERING LTD.

Salmon Arm
#201 - 2110 11 Ave NE
PO Box 106
Salmon Arm, BC V1E 4N2

Revelstoke
#301 - 616 3 St W
Revelstoke, BC
V0E 2S0

Vernon
#Unit B – 4705 29 Street
Vernon, BC
V1T 5C1

MEMORANDUM

Thursday, November 28, 2024

TO: Mr. Chris Larson, Approving Officer, City of Salmon Arm
FROM: Dave Sonmor, P.Eng, Civil Engineer

Subject: 370 – 20th Street SE - PLR file number 24.04 Variance Request

The following memorandum is meant to provide insight into the variance(s) the property owner (Mr. Ryan Scorgie) and consultant (Lawson Engineering Ltd.) have proposed in regards to the PLR dated September 12th 2024 City of Salmon Arm file number 24.04.

The proposed subdivision is located at 370 – 20th street SE Salmon Arm and includes subdivision of one (1) low density residential lot into two (2) low density residential lots. The proposed subdivision is located on 20th street at a local high point between Auto Road and Okanagan Ave. The City of Salmon Arm has requested that the owner complete the following as conditions of subdivision approval:

1) Sanitary Sewer Section (a): "*A 200mm sanitary main runs along the north parcel line, while a 150mm sanitary sewer main runs along the east parcel line. The extension of the 200mm sanitary sewer main along the 20th street frontage is required. Upgrading the 150mm main to 200mm along the east parcel line is required. Owner/Developer will be responsible for all associated costs"*

   And;

2) Drainage Section (a): "*The subject parcel fronts a 450mm storm sewer on 20th street SE, a 250mm storm sewer along the north parcel line, and a 200mm storm sewer along the east parcel line. Upgrading the 200mm storm sewer main to 250mm along the east parcel line is required. As this upgrade is premature, a cash-in-lieu payment towards future upgrade will be required. the Owner/Developer will be responsible for all associated costs."*

The owner is requesting the following variances:

1) Subdivision and Development Servicing Bylaw 4293 Schedule B Part 1, Section 6.4.8

   Waive the requirement to upgrade the existing 150mm Sanitary main located along the eastern parcel line.

   And;

2) Subdivision and Development Servicing Bylaw 4293 Schedule B Part 1, Section 7.5.3

   Waive the requirement to provide cash-in-lieu payment towards future upgrade of the existing 200mm storm main located along the eastern parcel line.

1) It is in LELs opinion that the existing 150mm sanitary main is of sufficient capacity to accommodate all existing development as well as any potential future development to be serviced. The existing 150mm main is approximately 45m in length and currently services 11 low density single family homes. As the subject main is located at the top of a local high point, no potential exists for future expansion of its catchment area. LEL performed flow calculations as per the City of Salmon Arm Bylaw 4293 demonstrating that, under both existing conditions, and a proposed future scenario in which the population of each lot is doubled due to the passing of provincial housing bills 44 and 47, the existing main has the capacity to service its entire catchment area without need for current or future upgrades. Under current conditions, with 11 lots at 3.3 people per lot and an average dry weather flow rate (ADWF) of 450L/person/day, total ADWF was calculated to be 0.19 L/sec. A peaking factor of 4.34 was then applied with an Infiltration rate of 0.1 L/sec/ha over a total catchment area of 0.93ha resulting in a total peak wet weather flow rate (PWWF) of **0.91 L/sec** under existing conditions. Under assumed future conditions occupancy was doubled for each of the existing 11 serviced lots for a total calculated ADWF of 0.38 L/sec. A peaking factor of 4.28 was then applied along with Infiltration resulting in a total PWWF of **1.71 L/sec**. The above calculated PWWF's were then reviewed against existing pipe capacity. Assuming a Mannings n value of 0.011, a minimum grade of 1.0% as stipulated in City of Salmon Arm Bylaw, and pipes flowing at 75% full, the existing 150mm main has the capacity to convey **16 L/sec**, or roughly 10 times to calculated PWWF with a projected doubling of population density. For the reasons listed above it is in LELs opinion that the existing sanitary main does not require upgrades to function as intended and that upgrading of the existing sanitary main should be eliminated as a condition of subdivision.

2) It is in LELs opinion that, due to location and topography, the existing 200mm storm main is of sufficient capacity to accommodate runoff from the 25 year storm event. The existing 200mm main is approximately 45m in length and currently services a combined catchment area of approximately 1 hectare. As the subject main is located at the top of a local highpoint and in a developed residential area, limited potential exists for dramatic increase in impermeable area. LEL performed flow calculations as per the City of Salmon Arm Bylaw 4293 demonstrating that under the current, fully developed site conditions, the existing main has the capacity to service the entire catchment area without need for current or future upgrades. Under existing conditions, a Tc value of 15 minutes, a 25 year rainfall intensity of 58 mm/hr + 10%, a runoff coefficient of 0.55, and a catchment area of 0.95 hectares were used to calculate a total 25 year runoff rate of approximately **93 L/sec**. the existing pipe was then reviewed for capacity. With an estimated slope of 8%, a Mannings n value of 0.011, and pipes flowing at 75% full, the existing 200mm storm main has the capacity to convey approximately **100 L/sec**, exceeding the anticipated 25 year run off. For the reasons listed above it is in LELs opinion that the existing storm main does not require upgrades to function as intended and that cash-in-lieu payment for future upgrades of the existing storm main should be eliminated as a condition of subdivision.

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Closure

Recommendations presented herein are based on the calculations and design review completed by LEL following review of City of Salmon Arm Bylaw 4293 along with online mapping for the subject property.

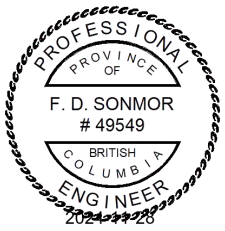
This report has been prepared for use by Mr. Ryan Scorgie and the City of Salmon Arm. Any use which a third party may make of this report, are the responsibility of such third parties. LEL does not accept responsibility for damages suffered, if any, by any third party as a result of decisions made or actions taken based on this report.

Should there be any questions or concerns with any information provided in this report, please feel free to contact the undersigned at your earliest convenience.

Sincerely,

Lawson Engineering Ltd.,
Permit Number: 1001279

Prepared By:



David Sonmor, P.Eng
Project Engineer
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Storm calculations:

Project:	370 20th St SE		**LEL Project #:**	369-1
Date:	22-Nov-24		**Prepared By:**	FDS
Location:	Salmon Arm BC		**Checked By:**	FDS
Post-Development:				
Time of Concentration: FAA Method (Tc = ((3.260334(1.1-C))*((L^0.5)*(S^-0.333)))*				
T_c = Ti + Tt				
Ti =	12.69	C =	0.55	
Ti (Min. (CoSA = 15min)) =	15	L =	200	
Ti =	15	S =	8	
Tt =	*0.00*			
Tc =	**15.00**			

25 Year pipe flow Calculation

	Tc (min)	Runoff Coefficient (C)	Area (ha.)	Intensity (mm/hr)	Q (m3/s)
$Q_{post - 25 Year}$	15.00	0.55	0.95	63.8	**0.0925986**

Manning Formula Uniform Pipe Flow at Given Slope and Depth

EXISTING STORM MAIN

Select Units: m

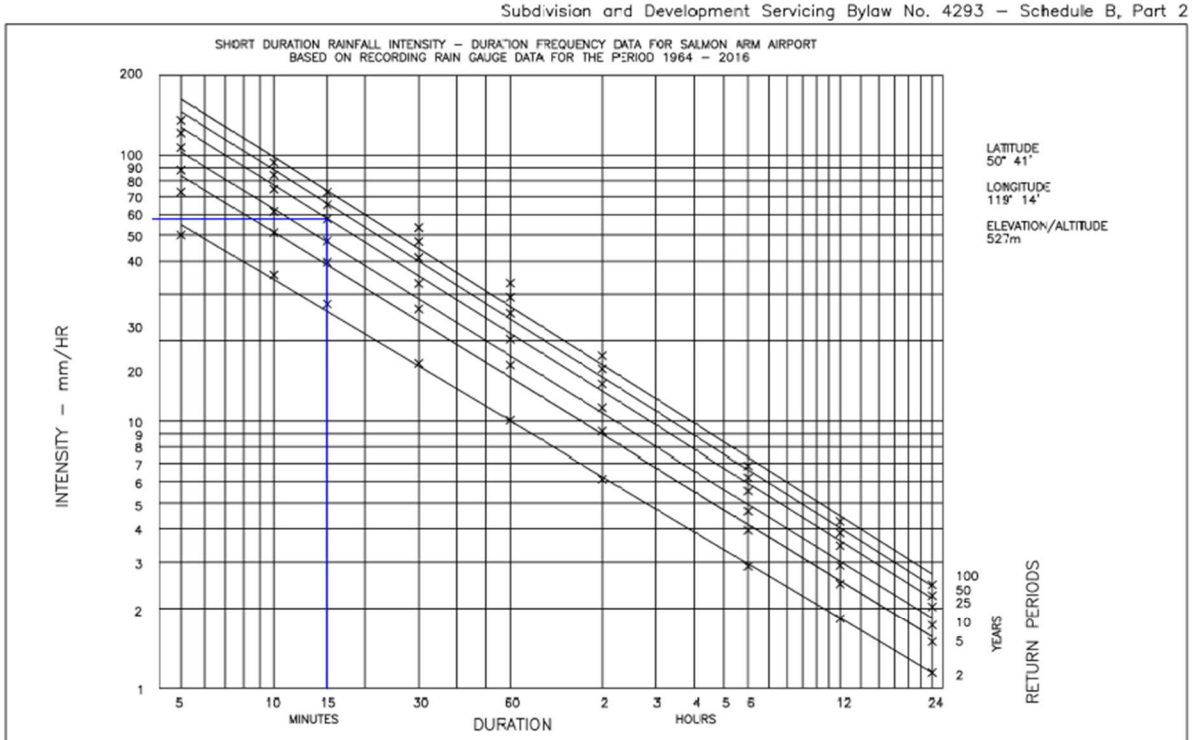
Inputs:

Pipe Diameter, d_o	0.2000	m
Manning Roughness, n	0.0110	
Pressure slope (possibly equal to pipe slope), S_o	8.0000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing fu	0.7500	fraction

Results:

Flow, Q	0.1000	m^3/s
Velocity, v	3.9556	m/s
Velocity head, hv	0.7978	m
Flow Area, A	0.0253	m^2
Wetted Perimeter, P	0.4189	m
Hydraulic Radius	0.0603	m
Top Width, T	0.1732	m
Froude Number, F	3.3120	
Shear Stress (tractive force), τ	117.6720	Pa

Subdivision and Development Servicing Bylaw No. 4293 – Schedule B, Part 2



NOTES:

1) Reproduction from Environment Canada Rainfall Intensity–Duration Frequency Values 2016

2) Calculated flows shall be adjusted for Climate Change as per EGBC best practices.

APPROVED

RAINFALL INTENSITY–DURATION DATA

CITY OF SALMONARM

No.	REVISION	Date
A	SDSB 4293 – ISSUED FOR APPROVAL	06/12/23

SPECIFICATION DRAWING No.: ST–7

Adopted by Council June 26, 2023

Sanitary Calculations:

ADWF	450	L/pop/day
pop/lot	3.3	
lot count	11	
total pop	36.3	
PF1	4.34	
PF2	4.28	
A	0.93	ha
I&I	0.1	L/sec/ha
sec/day	86400	
min slope	1%	

ADWF (L/sec)	PDWF (L/sec)	PWWF (L/sec)
0.19	0.82	0.91
0.38	1.62	1.71

Manning Formula Uniform Pipe Flow at Given Slope and Depth

EXISTING SANITARY MAIN

Select Units: m

Inputs:

Pipe Diameter, d_o	0.1500	m
Manning Roughness, n	0.0110	
Pressure slope (possibly equal to pipe slope), S_o	1.0000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing fu	0.7500	fraction

Results:

Flow, Q	0.0164	m^3/s
Velocity, v	1.1544	m/s
Velocity head, hv	0.0680	m
Flow Area, A	0.0142	m^2
Wetted Perimeter, P	0.3142	m
Hydraulic Radius	0.0453	m
Top Width, T	0.1299	m
Froude Number, F	1.1144	
Shear Stress (tractive force), τ	11.0318	Pa

= Proposed New Lot

= Proposed New Location of Building Footprint

= Remainder Lot containing original home

= City Storm System

= City Sanitary System

= City Water System

= Water Shut Off

= Gas Line