ENGINEERING DESIGN BRIEF

SANCTUARY PEMBERTON TOWNHOMES, PEMBERTON, B.C.

SANCTUARY TOWNHOMES LTD.

Prepared by:

STEEP ROCKY TERRAIN SPECIALISTS
WEBSTER ENGINEERING LTD

June 22, 2022

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APPENDICES

1.0 Proposed Development

Sanctuary Townhomes Ltd. has retained Webster Engineering Ltd. (WEL) for Civil Engineering services and to prepare supportive documentation for the proposed Sanctuary Townhomes Development in Pemberton, British Columbia.

The proposed development of approximately 1.4 hectares consists of 59 townhouses. The development is bounded by Lot B Plan KAP73119 on the north, Prospect Street on the east, single family homes on the south and Pemberton Meadows Road on the west. Access to the site will be from Prospect Street.

The following drawings have been prepared in conjunction with this report:

EX-1	EXISTING SURVEY PLAN
SERV-1	CONCEPTUAL SITE SERVICING PLAN (REZONING)
SG-1	CONCEPTUAL SITE GRADING PLAN (REZONING)
SAN-1	CONCEPTUAL SANITARY CATCHMENT PLAN – 1:750 SCALE
SS-1	PRELIMINARY SITE SECTIONS (REZONING)

2.0 Roadworks

Road A:

- The vehicle access to/from the proposed development is located on Prospect Street.
- Approximately 132 meters of 6.0 meter wide pavement complete with concrete curb & gutter, 2-travel lanes, streetlighting and sodded boulevards.
- Concrete curb and gutter at the entrance off Prospect Street, from Station 0+104 to 0+236, will be installed.
- 8 visitor parking spots are proposed on Road A.
- A traffic circle complete with concrete curb and gutter and 5 visitor parking spots is proposed at the end of Road A for fire truck turn around.

Road B:

- Approximately 55 meters of 6.0 meter wide pavement complete with concrete curb and gutter, 2-travel lanes, streetlighting, and sodded boulevards.
- 3 visitor parking spots are proposed on Road B.

The typical cross-section of the local road is shown on drawing SSG-1.

A snow dump location has been shown on the plan at the north of traffic circle.

We note that the Village of Pemberton requires a local road to be designed for a minimum 50km per hour. The local roads speed limits within a townhouse development are usually kept lower than 30km/hr and would be ideal for a high-density development.

An analysis using AutoTURN software was completed for all access scenarios required for an I-Bus design vehicle to safely enter and maneuver within development. The I-BUS design vehicle is recommended by the TAC Manual as the equivalent vehicle for a conventional fire truck with a 13m centerline turning radius. The AutoTURN analysis drawings for the site entrance and the traffic circle are included in **Appendix A**.

3.0 Water Systems

We propose to connect to the existing 200mm water main on Prospect Street and loop through Road A and Road B to the existing 250mm main on Pemberton Meadows Road. We understand the village engineer, ISL Engineering will update the VOP water modelling, size the watermain and advise HGL of our zone prior to implementing detailed design. All townhouses will be provided with fire suppression sprinklers that require water service connections with a minimum diameter of 38mm.

Fire hydrant spacing is determined as outlined by the Fire Underwriters Survey "Water Supply for Public Fire Protection, 1999".

Two (2) on-lot proposed fire hydrant and one (1) existing offsite fire hydrants on Prospect Street are within a minimum 90m distance to all units.

Above three (3) fire hydrants are located as follows:

- On-lot - Proposed fire hydrant at the site entrance
- On-lot – Proposed fire hydrant at the traffic circle
- Offsite - Existing fire hydrant 60m south of site entrance on Prospect Street

See **Appendix B** for FUS calculations and water demand.

4.0 Sanitary Sewer System

The development will be serviced with a conventional gravity sewer system. As part of the proposed development, all townhouse blocks will be provided with a 100mm diameter sanitary service connection completed with an inspection chamber.

The sanitary pipe network will divert all flows from site to an existing pump station, south of Walnut Street through a proposed manhole on the existing 200 sanitary main. We will size all new pipes according to the village subdivision criteria.

The condition and capacity of the existing pump station to handle the proposed development flows needs to be confirmed by the village engineer and ISL Engineering. See **Appendix C** for sanitary design flows.

5.0 Stormwater Management

The objective of the proposed stormwater management plan is to mitigate changes in quality of discharging water, and safely convey the minor and major storm events to neighboring watercourses. A restrictive covenant has been added as per Cascade Environmental and shall be finalized at the detail design stage.

5.1 Stormwater Management Criteria

(a) A conventional storm sewer system to convey the post-development flow of the 10-year return period (minor) storm event.

(b) Flood routing of post-development peak flows up to the 100-year return period (major) storm event and,

(c) All the drainage from the proposed development shall be discharged into the existing ditch north of the development. A detention pond is proposed at the northeast corner of the development with a controlled outlet to the existing ditch. The detention pond is sized based on the village's criteria that the run-off the post development be limited to the five year return period pre-development runoff.
(d) An Oil interceptor is proposed upstream of the pond to treat storm runoff from hard surfaces.

5.2 Minor Storm – Flow Conveyance

Stormwater management criteria: conveyance of the 10-year is satisfied using a conventional underground gravity storm sewer system. We will size the storm sewer using Manning's Formula to determine pipe capacity and the Rational Method to determine peak flows.

Webster will discuss if sustainable drainage features are required, such as drainage swales, detentions pond, porous driveways, etc. to reduce the negative impact of change on the existing drainage system at the detail design stage.

6.0 Hydro, Telus & Shaw

Shallow utility services will be provided via a dip service from one of the existing power poles on Pemberton Meadows Road.

If you have any questions or comments in this regard, please call us at 604-983-0458.

All of which is respectfully submitted by:
WEBSTER ENGINEERING LTD.
[EGBC Permit Number: 1001444]

Shruthi Tarigopula, EIT.

Review Engineer: Kalana Gunawardana , P.Eng.

Appendix A: Fire Truck Movement

DIRECTION OF TRAVEL (TYP.)

VEHICLE OVERHANG (TYP.)

VEHICLE TIRE TRACKING (TYP.)

TAC 'IBUS' VEHICLE (TYP.)
FOR DETAILS SEE BELOW RIGHT

TH-1 TH-2 TH-4 TH-6 TH-8

LOT A
Plan KAP73119
025-641-620

SL 1 SL 2 SL 3 SL 4 SL 5 SL 6 SL 7 SL 8

EX. 250 HDPE WM

EX. 200 PVC WM

Prospect Street

SANCTUARY PEMBERTON TOWNHOMES:

ENTER FORWARD INTO DEVELOPMENT FROM PROSPECT STREET AND USE THE ROUNDABOUT

(TAC MANUAL 'I-BUS' VEHICLE)

SANCTUARY PEMBERTON TOWNHOMES:

EXIT DEVELOPMENT ONTO PROSPECT STREET

(TAC MANUAL 'P' VEHICLE)

WEBSTER ENGINEERING LTD.
JUNE 24, 2022
SCALE 1:250

I-BUS DESIGN VEHICLE "STANDARD BUS"
AS PER TAC MANUAL (1999). USED FOR FIRE VEHICLE.
AUTOTURN 10.2.3 USED FOR ANALYSIS (TYP.)

F:\39001\01962 Sanctuary Pemberton Townhomes, Pemberton\PRELIM\01962 PRELIMINARY - AUTOTURN.dwg, Thu Jun 23 18:05:09 2022, P.B.B., P.B.B.

Appendix B: FUS Calculations and Water Demand

WATER DEMAND CALCULATIONS

(WITH FIRE SUPPRESSION SPRINKLERS)

i.) Fire Flow

Assumptions:

>Building Type: Wood Frame Construction
>Single family homes are considered to be Low Hazard Occupancies as defined by FUS
>Max Building Size is 540m² (5,812ft²) as per current Pemberton Zoning
>Exposures based on 9-Unit Townhouse Block # 4

Calculation:

The following calculation is based on "WATER SUPPLY FOR PUBLIC FIRE PROTECTION", 1999 by Fire Underwriters Survey (FUS)

F = Fire Flow
F_1=220CA^.5
C = 1.50 Wood Frame Construction
A = 540 m² total floor area (2,500 ft²)

F_1= 7669 L/min

a) Low content hazard, 25% credit
F_a = 1917 L/min $F_{1revised}$ = 5751

b) Fire Suppression Sprinklers, 40% credit
F_b = 2301 L/min

c) Exposures

North	7.5%	19.0m distance, wood frame, similar sprinkled bldg
East	10.0%	5.0m distance, wood frame, similar sprinkled bldg
South	20.0%	8.0m distance, wood frame, residdential bldg
West	2.5%	25.0m distance, wood frame, similar sprinkled bldg
Total	40.0%	(Max 75%)

Maximum Charge:	
0 to 3m	25%
3 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
30.1 to 45	5%

F_c = 2301 L/min

d) Fire Demand

$F = F_1 - F_a - F_b + F_c$ = 5751 L/min Fire Volume

Use:	F =	5751	L/min	for	2.0	hours	690,166	L
		96.0	L/s					
		1519	USGPM				182,319	USG

FIRE FLOW DEMAND = 96.0 L/s

ii.) DOMESTIC DEMAND

Population

Single Family Lots		59 lots
Persons per lot	x	3 capita/lot
Total Population	=	177 capita

Unit Domestic Water Demand Rates

Unit Average Daily Domestic Flow	=	455 L/capita/day
Unit Maximum Daily Domestic Flow	=	910 L/capita/day
Unit Peak Hour Domestic Flow	=	1820 L/capita/day

Domestic Water Demands

Average Daily Domestic Flow (ADD)	=	0.9 L/s
Maximum Daily Domestic Flow (MDD)	=	1.9 L/s
Peak Hour Domestic Flow (PHD)	=	3.7 L/s

iii.) PEAK DESIGN FLOWS = Max Day + Fire

Fire Flow Demand		96.0 L/s
Maximum Daily Demand	+	1.9 L/s
Design Flow	=	97.9 L/s

PEAK DESIGN FLOW = 97.9 L/s

Appendix C: Sanitary Design Flows

SANITARY DESIGN FLOW

#3962 - Sanctuary Development

Use MMCD Parameters

As per Village of Pemberton Subdivision and Development Bylaw No. 677, 2011 use MMCD methodology for design flow calculations. Use MMCD Design Guidelines 2014.

1) Population

Land Use:	Units	Pop. Equiv. (cap/unit)	
Multi-Family Residential (Townhouse)	59	3	(from SLRD Bylaw No. 741)

Population = **177 cap**

2) Average Dry Weather Flow (ADWF)

Average Daily Demand		410 L/cap/day	(VOP Bylaw No. 677)
Total Population	x	177 cap	(as above)
Average Dry Weather Flow		72570 L/day	
	=	**0.84 L/s**	

3) Peak Dry Weather Flow (PDWF)

PDWF = ADWF x Peaking Factor

Peaking Factor **=** 3.2 / population in thousands$^{0.105}$ (MMCD)

= 3.2 / $1^{0.105}$

= 3.20

Average Dry Weather Flow		0.84 L/s	(as above)
Peaking Factor	x	3.20	(as above)
Peak Dry Weather Flow	**=**	**2.69 L/s**	

4) Design Flow = Peak Wet Weather Flow (PWWF)

PWWF = PDWF + Infiltration Allowance

Catchment Area		1.4 ha	
Unit Infiltration Rate	x	0.17 L/s/ha	
Infiltration Allowance	=	0.24 L/s	(VOP Bylaw No. 677, 2011)

Peak Dry Weather Flow		2.69 L/s	(as above)
Infiltration Allowance	+	0.24 L/s	(as above)
Peak Wet Weather Flow	**=**	**2.93 L/s**	