Box 100 | 7400 Prospect Street
Pemberton BC V0N 2L0
P: 604.894.6135 / Email:
developmentservices@pemberton.ca
Website: www.pemberton.ca

DEVELOPMENT PROJECT APPLICATION FORM

Application Type:

- ✓ ~~**(OR)** OCP Bylaw Amendment~~ &/or Zoning Bylaw Amendment
- ○ **(SO)** Subdivision
- ○ **(DP)** Development Permit
- ○ **(DVP)** Development Variance Permit
- ○ **(TUP)** Temporary use Permit
- ○ **Other** (Please Specify):_____

Site/Property Information

Civic Address (if applicable): 7421,7423 & 7425 PROSPECT ST, PEMBERTON

Legal Description: ~~LOTS 2,3 &4, D.L 203, LILLOET DISTRICT, PLAN KAP31658~~
LOT 1 DISTRICT LOT 203 LILLOOET DISTRICT PLAN EPP124721

PID: ~~002-014-505 / 003-621-740 / 003-621-774~~ 031-847-226

Parcel Size: 23,538 sqft/ 2186 sqm

Current land use: 002-014-505 / 003-621-740 / 003-621-774

Existing Zone: C-1

Existing OCP land use designation: URBAN GROWTH/ DOWNTOWN

Applicable Development Permit Area Designations: DOWNTOWN

Proposal Information

Project Name: 7421, 7423 & 7425 PROSPECT STREET

Project Description:

4 STOREY MIXED USE, NEW BUILD WITH A MIX OF 45 STUDIO, 1BED + 2BED HOMES, SECURE UNDERGROUND PARKING AND GROUND FLOOR COMMERCIAL UNITS.

Proposed Zone: CD - COMPREHENSIVE DEVELOPMENT

Detailed List of Variances required, if any:	
Proposed Number of New Dwellings: n/a	
New SFD Count: n/a	New Townhouse Count: n/a
New Apartment Count: 45	Other: 10 NEW COMMERCIAL UNITS
Proposed Number of New Lots: 1	
Parking Stalls required per current Zoning Bylaw: 66	
Parking Stalls proposed: 54	
Proposed New Non-Residential floor space (square meters): 1000 sqm	
Application Fee as calculated by Applicant: $16,400.00	

Owner and Agent Information

Land Owner Name(s): FITZGERALD BUILDING CO 1268914 BC Ltd.	Phone: 604 894 5697
Email: TOM@FITZGERALDINC.CA	Mailing Address: 7330 ARBUTUS ST. #101 PEMBERTON, BC V0N 2L0
Ow[redacted]	*Signature Date:* 2023-03-07
Owners Agent Name: STARK ARCHITECTURE LTD. DAVID ARNOTT - ARCHITECT AIBC, , LAURA SPENCE, ANNA RODIE	Phone: 604 620 1210
Email: CONTACT@STARKARCH.COM LAURA@STARKARCH.COM	Mailing Address: 210 - 38026 SECOND AVENUE, SQUAMISH, V8B 0C3
Agent Signature: [redacted]	*Signature Date:* 2023-03-07

Pre-Application Meeting

It is strongly recommended that prior to submitting an application an applicant meet with Village of Pemberton Development Services Department to review application requirements. The intent of the pre-application will be to confirm specific submission requirements.

It is important to have the Village identify the information required for the application since any applications deemed incomplete by the Development Services Department will not be processed.

TITLE SEARCH PRINT 2023-03-27, 14:29:50

File Reference: Requestor: Nikki Segovia

CURRENT INFORMATION ONLY - NO CANCELLED INFORMATION SHOWN

Title Issued Under	SECTION 98 LAND TITLE ACT
Land Title District	KAMLOOPS
Land Title Office	KAMLOOPS
Title Number	CB339269
From Title Number	CA8501186 CA8501187 CA8515189
Application Received	2022-11-16
Application Entered	2022-11-30
Registered Owner in Fee Simple	
Registered Owner/Mailing Address:	1268913 B. C. LTD., INC.NO. BC1268913 1359 GREENWOOD STREET PEMBERTON, BC V0N 2L0
Taxation Authority	North Shore - Squamish Valley Assessment Area Pemberton, Village of Pemberton Valley Dyking District

Description of Land

Parcel Identifier: 031-847-226

Legal Description:

LOT 1 DISTRICT LOT 203 LILLOOET DISTRICT PLAN EPP124721

Legal Notations	NONE
Charges, Liens and Interests	NONE
Duplicate Indefeasible Title	NONE OUTSTANDING
Transfers	NONE
Pending Applications	NONE

Ministry of Environment and Climate Change Strategy

SCHEDULE 1
SITE DISCLOSURE STATEMENT

Has the site been used for any industrial or commercial purposes or activities described in SCHEDULE 2 of the Contaminated Sites Regulation?

☐ Yes ☒ No

Exemptions (See the Contaminated Sites Regulation, Division 3 of Part 2):

Does the application qualify for an exemption from submitting a site disclosure statement?

☐ Yes ☒ No

If yes, indicate which exemption applies _____

I. CONTACT INFORMATION

A: SITE OWNER(s) or OPERATOR(s)

LAST NAME	FIRST NAME(s)
FITZGERALD	THOMAS

COMPANY (if applicable): FITZGERALD BUILDING CO 1268914 BC Ltd.

ADDRESS - STREET	CITY
7330 ARBUTUS STREET, #101	PEMBERTON

PROVINCE/STATE	COUNTRY	POSTAL CODE
BRITISH COLUMBIA	CANADA	V0N 2L0

PHONE	E-MAIL
(604) 894-5697	TOM@FITZGERALDINC.CA

B: PERSON COMPLETING SITE DISCLOSURE STATEMENT (Leave blank if same as above)

☒ Agent authorized to complete form on behalf of the owner or operator

LAST NAME	FIRST NAME(s)
ARNOTT	DAVID

COMPANY (if applicable): STARK

C: PERSON TO CONTACT REGARDING THE SITE DISCLOSURE STATEMENT

LAST NAME	FIRST NAME(s)
ARNOTT	DAVID

COMPANY (if applicable): STARK

ADDRESS - STREET	CITY
210 - 38026 SECOND AVENUE	SQUAMISH

PROVINCE/STATE	COUNTRY	POSTAL CODE
BRITISH COLUMBIA	CANADA	V8B 0C3

PHONE	E-MAIL
604 620 1210	CONTACT@STARKARCH.COM

II. SITE INFORMATION

Coordinates (using the North American Datum 1983 convention) for the centre of the site:

Latitude			Longitude		
DEGREES	MINUTES	SECONDS	DEGREES	MINUTES	SECONDS
50	19	17	237	11	29

☒ **Attach a map of appropriate scale showing the location and boundaries of the site.**

For Legally Titled, Registered Property

SITE ADDRESS (or nearest street name/intersection if no address assigned)	
7421,7423 & 7425 PROSPECT STREET	
CITY	POSTAL CODE
PEMBERTON	V0N 2L0

PID 031-847-226	*Land Decription*	Add	Delete
~~092-014-505 / 003-621-740~~	~~LOTS 2,3 &4, D.L 203, LILLOET DISTRICT, PLAN KAP31658~~	+	-

LOT 1 DISTRICT LOT 203 LILLOOET DISTRICT PLAN EPP124721

For Untitled Crown Land

PIN numbers and associated Land Description (if applicable)

PIN	*Land Decription*	Add	Delete
		+	-

And if available

Crown Land File Numbers	Add	Delete
	+	-

III. INDUSTRIAL OR COMMERCIAL PURPOSES OR ACTIVITIES

In the format of the example provided, which of the industrial or commercial purposes or activities have occurred or are occurring on this site.

EXAMPLE

Schedule 2 Reference	Description
E1	appliance, equipment or engine maintenance, repair, reconditioning, cleaning or salvage
F10	solvent manufacturing, bulk storage, shipping or handling

Schedule 2 Reference	Description	Add	Delete
		+	-

IV. ADDITIONAL INFORMATION

1. Provide a brief summary of the planned activity and proposed land use at the site.

2. Indicate the information used to complete this site disclosure statement including a list of record searches completed.

3. List any past or present government orders, permits, approvals, certificates or notifications pertaining to the environmental condition of the site. *(Attach extra pages, if necessary):*

V. DECLARATIONS

Where a municipal approval is not required, please indicate the reason for submission directly to the registrar:

☐ Under Order ☐ Foreclosure ☐ CCAA Proceedings ☐ BIA Proceedings

☐ Decommissioning ☐ Ceasing Operations

By signing below, I confirm that the information in this form is complete and accurate to the best of my knowledge:

[redacted]

SIGNATURE

2023-03-07

DATE SIGNED (YYYY-MM-DD)

APPROVING AUTHORITY CONTACT INFORMATION

NAME	AGENCY
ADDRESS	
PHONE	E-MAIL

Reason for submission (Please check one or more of the following):

☐ Building Permit ☐ Subdivision ☒ Zoning ☐ Development Permit

DATE RECEIVED (YYYY-MM-DD)

DATE SUBMITTED TO REGISTAR (YYYY-MM-DD)

STARK | fitzgerald CONSTRUCTION | DEVELOPMENT

The attached is a project summary of the proposal to rezone lands at 7421, 7423 & 7425 Prospect Street, Pemberton. These 3 single lots have been amalgamated into one continuous lot.

As the lands fall within OCP "urban growth" and "downtown", the intent is for the owners to work with the planning department to rezone the lands from C1 to a CD zone.
The current owners wish to redevelop the lots to a mixed use residential and commercial building consistent with similar projects in the neighbouring downtown.

This document should be read in combination with the rezoning plans produced by STARK.

Massing of building from Foughburg park

SUBJECT LANDS:

Site plan with surrounding context

LOCATION:

The site is positioned in the downtown core, on the intersection of Prospect St & Aster St. To the east of the site is Foughburg Park, with a 2-storey building immediately to the south across Aster St. The west, the site borders a statutory right of way itself, adjacent to the BC Hydro works building. Prospect Street is largely low sloping across the frontage of the lots, whilst Aster Street slopes uphill in a westerly direction.

The properties are owned by 1268913 BC ltd. (Fitzgerald Building Co.)

aerial view showing existing three buildings across property

LEGAL DESCRIPTION:

The legal descriptions are LOT 1 DISTRICT LOT 203 LILLOOET DISTRICT PLAN EPP124721, PID – 031-847-226

EXISTING USE:

The site currently consists of three single family homes, one of which operates as a Thrift store.

street view at aster & prospect junction

A site survey has been conducted which is included in the Architectural package.

OCP

The existing OCP designations align with the proposals being that they are downtown and within the urban growth area.

> ***Official Community Plan*** – MAP The lands are currently designated as ***Residential*** use within the Urban Growth Boundary.
>
> The following provides the designations of the lands in the OCP Maps:

A	Within Urban Growth Boundary
B	Land Use Downtown
C	Development Permit Downtown
G	Proposed Open Space & Greenways and Proposed Public Parks Access from property across Prospect to Foughburg Park
I-1	Water Servicing Indicates an existing watermain & future watermain
I-2	Sanitary Servicing Adjacent to sewer main
J-1	Transportation Aster & Prospect are collector roads.
J-2	Public Transportation and Sidewalks Existing Illuminated sidewalks down Aster and adjacent to the lots. Proposed illuminated sidewalks along the Prospect frontage.
L	Land Constraints None
M	Fire Protection Within the Village of Pemberton Fire Protection Area

ZONING:

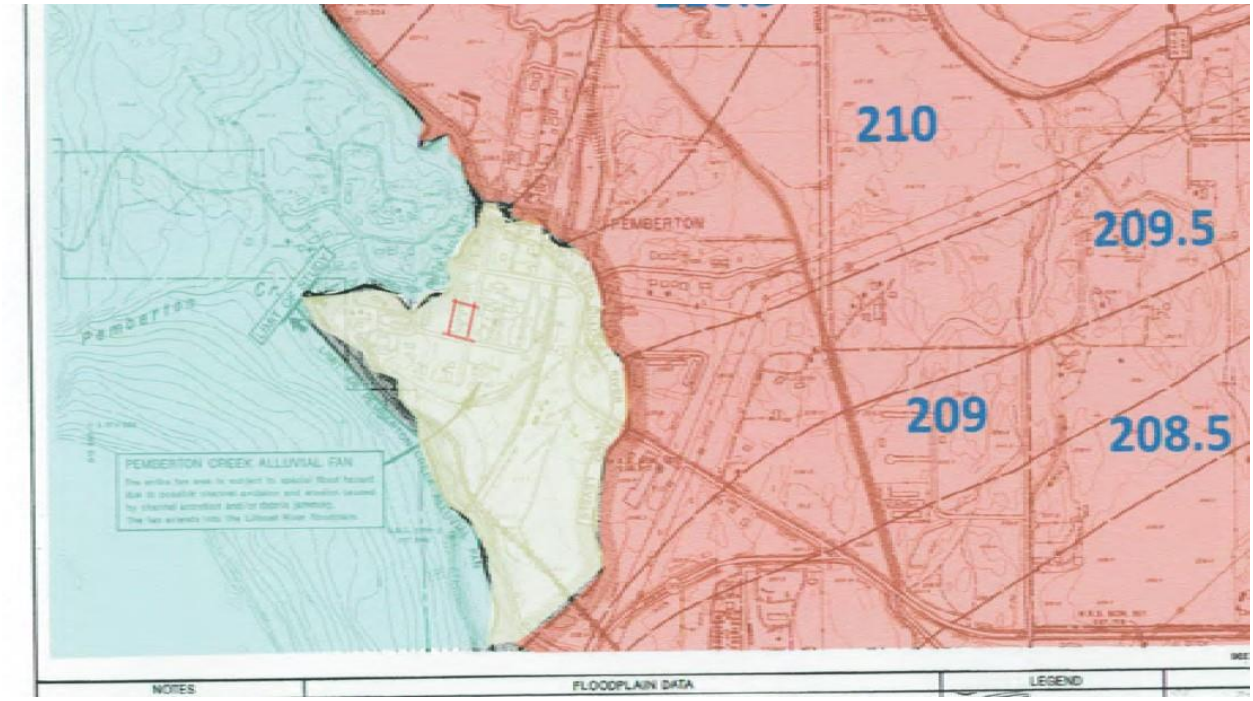
The current sites are all zoned **C-1 "Town Centre Commercial 1"**, zoned to allow a multitude of commercial uses as well as residential combined with commercial use. The existing zone, with minor variances to parking and height would have accommodated the proposed design. It was suggested by Planning that a rezoning be applied for, rather than vary height (10.5m to 17.5m) to accommodate the 4th storey. The site density of C-1 at 2.5FAR would have allowed for the proposed density within 4 storeys. The proposed development is approx. 2.1FAR.

PROPERTY AREA:

The three lots in aggregate measure approx. 23,538 ft² / 2,186 m² or 0.54 acre

FLOOD PLAIN:

The site is in one of the higher areas of downtown Pemberton.



FCL schedule b (red rectangle indicates approx. location of site)

A geodetic topographical survey was carried out by Doug Bush Surveying on 10th October 2021. The survey showed minimum geodetic heights of 217.09m in the northeast of the site, with the highest point of the site being in the southwest corner of the site, at 219.00m.

Current Flood Regulation Bylaw Map 716, 2021 shows the areas of the site as being wholly within "Requires Geotech" area. (Schedule B).

The proposed underground parkade would have an approx. top of slab of 215.22m. Significantly higher than required FCLs of surrounding areas shown on Schedule B, which range from 206.5m to 211.5m.

The applicant would engage a Geotechnical Engineer to provide information regarding the suitability of the underground parkade at Building Permit submission.

PROPOSED DEVELOPMENT

Design Intent

Initial discussions with the Village of Pemberton generally supported the project, with the implication that a rezoning, rather than a variance for height and parking was appropriate, as the proposed FAR and uses of the project aligned with the existing C-1 zone.

The building is designed as a place maker or node in downtown, making use of its prominent location as an important junction in the downtown core.

Given its proximity to Foughburg park, and the continuation of Prospect and Aster streets, the ground floor of the building is intended to be home to a number of businesses and offices, sized appropriately for Pemberton, to encourage the use of the spaces by small and growing local businesses. A wrap around, covered patio would be used by the businesses on the ground floor, to help activate the street and provide shelter and outdoor amenity to the businesses.

The building itself, pursues a human scale to the street side elevation, with planting and landscaping, glazing and access into the commercial units and access into the apartments. Natural materials such as stone (for walls) and wood texture (for soffits), creates a tactile and warm space.

Above the lower floor, the building is articulated with covered balconies set into the façade. This works to create interest in the massing, whilst a restrained colour palette reduces the complexity of the façade. Balconies would have solid balustrades, to reduce the glazing on the residential areas, whilst providing privacy to owners and reducing visual busyness that can sometimes accompany owners use of balconies for storage / plants / BBQs etc.

The upper floor is set back from the lower three floors by 7’ and a total of 15’ setback from the property line along Prospect Street. The primary aim of this is to reduce the massing of the fourth storey whilst providing balcony space for the upper units. To maintain the west coast style, the upper penthouse decks are protected by a cantilevered roof canopy.

In relation to the current OCP policies, the design works to maintain the downtown as a commercial hub, as well as a social focal point for the Village of Pemberton.
The building provides, interest, convenience and encourages a pedestrian and bicycle friendly downtown setting.

The Downtown Enhancement Strategy suggest the building meet a number of considerations which the proposal meets.

- Provide a mix of land uses at increased densities.
- Be environmentally, socially and economically sustainable.
- Ensure great, focused and designed open spaces.
- Be pedestrian, bike and stroller friendly and accessible.
- Provide a strong sense of arrival.
- Ensure appropriate parking and transit facilities.
- Be economically vibrant.
- Showcase the natural assets.
- Share Pemberton’s authentic identity; and
- Work together to meet stakeholder and community needs

UNIT COUNT

Conceptually, the unit mix is as follows.

Residential	No of Units	Approx Area of Units (m2)
1st Floor Residential	2 12 3	Studio (50.5 m^2) One Bedroom (71.6-91.5 m^2) Two Bedroom (96.2 m^2)
2nd Storey Residential	2 12 3	Studio (50.5 m^2) One Bedroom (71.6-91.5 m^2) Two Bedroom (96.2 m^2)
3rd Floor Residential (Penthouse)	5 6	One Bedroom (102 m^2 – 139.4 m^2) Two Bedroom (77m^2 - 97 m^2)
Total Units	**45**	

With the property being zoned C-1 as existing, the development seeks to stay as close to the existing zoning of the land and those adjacent, as illustrated by the table below.

	C-1	Proposed
Permitted Uses	Commercial, Civic, Restaurant Service uses.	Residential and Commercial, Restaurant and Service uses.
Permitted Accessory Uses	Residential Bed and Breakfast Home Occupation	
Max FAR	2.5	2.1
Max Lot Coverage:	100%	73%
Min Lot Size	220 m2	2,816 m2
Min Lot Width	12 m	60.12 m x 36 m
Min Principal Building Width		
Min Front Setback	0 m	0 m
Min Rear Setback	4.5 m	4.5 m
Min Interior Side Setback*	0	0
Min Exterior Side Setback:	0	Same as front setback
Max Building Height, Principal: 10.5 m	10.5 m	**17.5 m**
Max Building Height, Accessory: 4.6 m	4.6	n/a

PARKING RATIONALE

Based on standard parking zoning requirements, the proposal would generate the following baseline parking needs.

BASE LINE

	Formula	Requirement
4 x Studio	1 space/unit	4
29 x One Bedrooms	1 space/unit	29
12 x Two Bedrooms	1.75 space/unit	21
Visitor	0.25 space/unit	11.25 (12)
Total		**66**
1,000 m2 commercial	0.25 space/100 m^{2} *	2.5 (3)
Bikes		-

The applicant would propose the following parking requirements.

PROPOSED

	Formula	Proposed
4 x Studio	1 space/unit	4
29 x One Bedrooms	1 space/unit	29
12 x Two Bedrooms	1.25 space/unit	15
Visitor / Commercial	6 per building	6
Total		**54**
1,000 m2 commercial	0.25 space/100 m^{2} *= 2.5 (3)	6 off-street (shared with visitor parking)
Bikes	Min 2 Class A per unit (90)	150

The underground parking can accommodate a total of **54** spaces.

Given the area available underground and the desire to reduce car trips within the Pemberton downtown core, the necessity for providing both off-street commercial and visitor stalls exclusively could be minimized. The baseline requirement for commercial requires 3 off street parking and 12 visitor stalls. Since the commercial establishments will primarily function during the day and visitors are expected to frequent in the evening hours the development suggests utilizing 6 x shared off-street stalls for commercial use during daytime hours and visitor stalls during evening hours/overnight. This approach optimizes the space and serves the intended purpose effectively.

Commercial/Visitor shared stalls would be accessible to the public and a secure garage door would provide separation to the other 48 residential stalls for tenant use only. It is the developer's intent to supply ALL underground parking spaces as EV Ready. 10 x stall will have primary connections installed.

Pemberton's public transport offers 2 bus routes, route 99 (local) and 100 (connector to whistler) that run from the blackbird bakery 2 minutes walk from the proposed development. The proximity to local transport and amenities makes cycling and walking a preferable option. The scheme

proposes a generous number of **150** secure Class A bike stalls (more than 3 stalls per home) to encourage and support a more protected, cycling friendly community.

AFFORDABILITY

The unit mix, layout and size have been carefully considered and designed to respond to the needs of a rapidly growing community within Pemberton. Providing a variety of practical studio, 1 and 2 bed apartments would be appealing for residents looking for a more affordable, low maintenance and centrally located home. Providing smaller and more efficient layouts maximizes land use, supports density and walkability, offers environmental benefits, and meets the needs of a diverse range of residents.

COMMUNITY AMENITY CONTRIBUTIONS

During the preapplication meeting, staff mentioned the potential for Community contributions, however a final proposal of what these would entail has not been discussed.

REZONING APPLICATION

7421-7425 PROSPECT ST

COVER PAGE

PROSPECT STREET

PEMBERTON, B.C.

fitzgerald CONSTRUCTION | DEVELOPMENT

DP000

PROJECT NO. 1679

STARK

PROJECT DATA

PROSPECT APARTMENTS - REZONING APPLICATION

Occupancy : Commercial & Residential

CIVIC ADDRESS:
7421, 7423 & 7425 PROSPECT STREET,
PEMBERTON, BC, V0N 2L1

LEGAL DESCRIPTION:
LOT 1 DISTRICT LOT 203 LILLOOET DISTRICT PLAN EPP124721

PID: 031-847-226

EXISTING ZONING

ZONE: - C1

SETBACKS : F 0M
R 4.5M
IS 0M
ES N/A
FCL: N/A GEOTECH TO PROVIDE
HEIGHT
ALLOWABLE PRINCIPAL 10.5M

SITE AREA: 23,538 ft² / 2,186 m²
MAX LOT COVERAGE 100%

GROSS FLOOR AREA PERMITTED: - / m² OR 2.5 FAR (58,845 ft² / 5,466.8 m²)

PROPOSED ZONING

PROPOSED ZONE: - CD-XX

SETBACKS : F 0M
R 4.5M
IS 0M
ES N/A
FCL: N/A GEOTECH TO PROVIDE

HEIGHT
ALLOWABLE PRINCIPAL 17.5M (MAX 4 STOREYS)

SITE AREA: 23,538 ft² / 2,186 m²
MAX LOT COVERAGE 100%

GROSS FLOOR AREA PERMITTED: - / m² OR 2.5 FAR (58,845 ft² / 5,466.8 m²)

PARKING: SEE PARKING COLUMN

PROPOSED BUILDING

PROPOSED LOT COVERAGE 73% (17,263.38 ft² / 1603.82 m²)

DENSITY PROPOSED: 2.1 FAR 49,429.8 SQ FT (4,592.18M²)

UG PARKING & CIRCULATION NOT COUNTED TOWARDS FAR.

AREA:
EXCLUDED IN FAR:
Underground Parkade : 20,574 ft² / 1,911 m²
Circulation: 9,593.88 ft² / 891.3 m²

INCLUDED IN FAR:

Commercial Floor	14,034.9 ft² / 1,303.8 m²
Residential 1 :	12,810 ft² / 1,190 m²
Residential 2 :	12,810 ft² / 1,190 m²
Residential 3:	11,900 ft² / 1,105 m²

TOTAL COMM & RESI 48,320 ft² / 4,489 m²
TOTAL BUILT 68,894 ft² / 6,400 m²

HEIGHT
ALLOWABLE 14.9M
PROPOSED 14.9M

UNIT COUNT:
First Floor: 17 Units
: 2 Studios (460 ft² - 565ft²)
: 12 One Beds (705 ft² - 850ft²)
:3 Two Bed (990 - 1150 ft²)
Second Floor: 17 Units
: 2 Studios (460 ft² - 565ft²)
: 12 One Beds (705 ft² - 850ft²)
:3 Two Bed (990 - 1150 ft²)
Third Floor: 11 Units
:5 One Beds (660 ft² - 770ft²)
:6 Two Bed (850 - 1150 ft²)

Unit Summary:
: 4 Studios
:29 One Beds
:12 Two Beds

Total 45 Units.

Items requiring creation of CD Zoning:

Designed Under Part 3 2018 BC Building Code (Step 3)

Unit Breakdown

Studios: 9%
1 Beds: 64%
2 Beds: 27%

Commercial Space :
Proposed Approx 10 Units
CRU 01 : 1630 ft²
BIKE ROOM 02 : 760 ft² (90 Class A Stalls)
CRU 03 : 995 ft²
CRU 04 : 995 ft²
CRU 05 : 1160 ft²
CRU 06 : 1300 ft²
CRU 07 : 950 ft²
CRU 08 : 1000 ft²
CRU 09 : 950 ft²
CRU 10 : 950 ft²
CRU 11 : 1065 ft²

Approx Total 10,760ft² / 1000m²

PARKING

Required:
: 4 Studios @ 1 p/d/u = 4
: 29 One beds @ 1 p/d/u = 29
:12 Two beds @ 1.75 p/d/u = 21
: Visitor @ 0.25 * 45 = 11.25 (12)
Total Required : 66

Proposed:
: 4 Studios @ 1 p/d/u = **4**
: 29 One beds @ 1 p/d/u = **29**
:12 Two beds @ 1.25 p/d/u = **15**
: Visitor/Commercial@ 0.13 * 45 = 5.85 (**6**)
Total Required : 54

Total provided 54 underground.
- inc. 3 accessible.
- inc. 6 Visitor/Commercial parking stalls
10 electric vehicle charging connections.

Commercial Space : Proposed Approx 10 units.
Total 10,800ft² / 1000m²
(Reduce to 1000 for parking)

Neighbourhood Commercial
0.25 per 100m² = 2.5 (3)

6x Commercial Parking stalls proposed in parkade to be used during day time hours and visitor parking during evening hours.

Prospect street provides 11 on street parking spaces for open use.

AMENITIES

Communal Roof Deck. 1165 ft² / 108.2m²
Partially covered patio.

All units have min 70 ft² / 6.5m² private deck.

Total Interior Bike & Ski Storage - 1734 ft² / 161m²

Class A bike stalls -
BIKE ROOM 01 (PARKADE): 60
BIKE ROOM 02: 90
TOTAL: 150

All underground parking stalls are EV ready.

DESIGN RATIONALE

INTRODUCTION

7241, 7423 & 7425 PROSPECT STREET CONSTITUTE THREE EXISTING SINGLE FAMILY HOMES, LOCATED ON C1 ZONE LOTS.
GIVEN ITS LOCATION IN THE CORE OF DOWNTOWN PEMBERTON AND ITS ADJACENCY TO THE PROSPECT & ASTER STREET JUNCTION, DEVELOPMENT IN THIS AREA THAT WOULD SUPPORT A HIGHER DENSITY HAS BEEN PROPOSED.

WITH A PROLIFERATION OF SINGLE-FAMILY AND LOW DENSITY DEVELOPMENTS AROUND THE PERIMETER OF PEMBERTON, CREATING APPROPRIATE DENSITY WITHIN THE CORE OF PEMBERTON IS KEY TO THIS REZONING APPLICATION.

THE OWNER & APPLICANT HAS BEEN LOCAL TO PEMBERTON FOR 6 YEARS AND SEEKS TO BALANCE REASONABLY SIZED APARTMENTS, WITH COMPACT COMMERCIAL SPACES, SUITED TO LOCAL BUSINESSES.

THE BUILDING

COMPROMISED OF AN UNDERGROUND PARKADE, ACCESSED FROM ASTER STREET, THE BUILDING HAS THREE RESIDENTIAL FLOORS ABOVE A COMMERCIAL GROUND FLOOR. PREFERENCE HAS BEEN GIVEN TO APPROPRIATELY SIZED APARTMENTS TO PROVIDE OPTIONS FOR LOCALS.
EACH UNIT HAS A PRIVATE BALCONY, WITH A COMMUNAL TOP FLOOR OUTDOOR AMENITY SPACE FOR RESIDENTS WHICH ADDITIONALLY REDUCES THE MASS OF THE BUILDING AS IT ABUTS TO EXISTING SINGLE FAMILY RESIDENCES.

AN 8' CANOPY WRAPS AROUND THE BUILDING AT GROUND LEVEL ON ASTER AND PROSPECT STREET, PROVIDING A COVERED AREA AND ACCESS TO COMPACT COMMERCIAL UNITS, DESIGNED TO SERVE LOCAL BUSINESSES.

TOWARDS THE REAR OF THE BUILDING, COMMERCIAL UNITS OPEN ONTO A LANDSCAPED GARDEN AREA WITH SEATING.

UNDERSTANDING THE NEEDS OF LOCALS, THERE IS AMPLE SECURED BIKE AND SKI STORAGE, AS WELL AS ELECTRIC VEHICLE CHARGING STATIONS AND WIDE CORRIDORS FOR THE MOVEMENT OF GEAR.

ENERGY EFFICIENCY

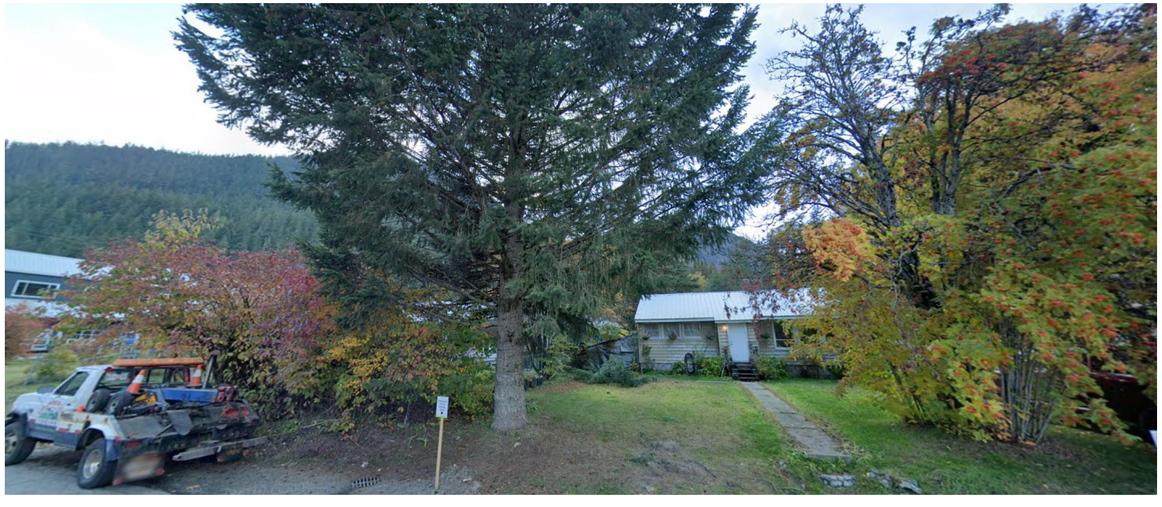
THE BUILDING UTILISES TRIPLE GLAZED WINDOWS, WOOD FRAMED CONSTRUCTION, INCREASED INSULATION AND HIGH EFFICIENCY MECHANICAL AND ELECTRICAL SYSTEMS TO REDUCE ENERGY CONSUMPTION AND INCREASE INDOOR AIR QUALITY AND REDUCE NOISE.

DECK OVERHANGS AND UPPER ROOF OVERHANGS PROVIDE SHADING AND PROVIDE PASSIVE COOLING IN THE SUMMER.
PRE-INSTALLED CONDUIT ON THE ROOF ALLOWS FOR THE BUILDING TO BE RENEWABLE ENERGY READY.

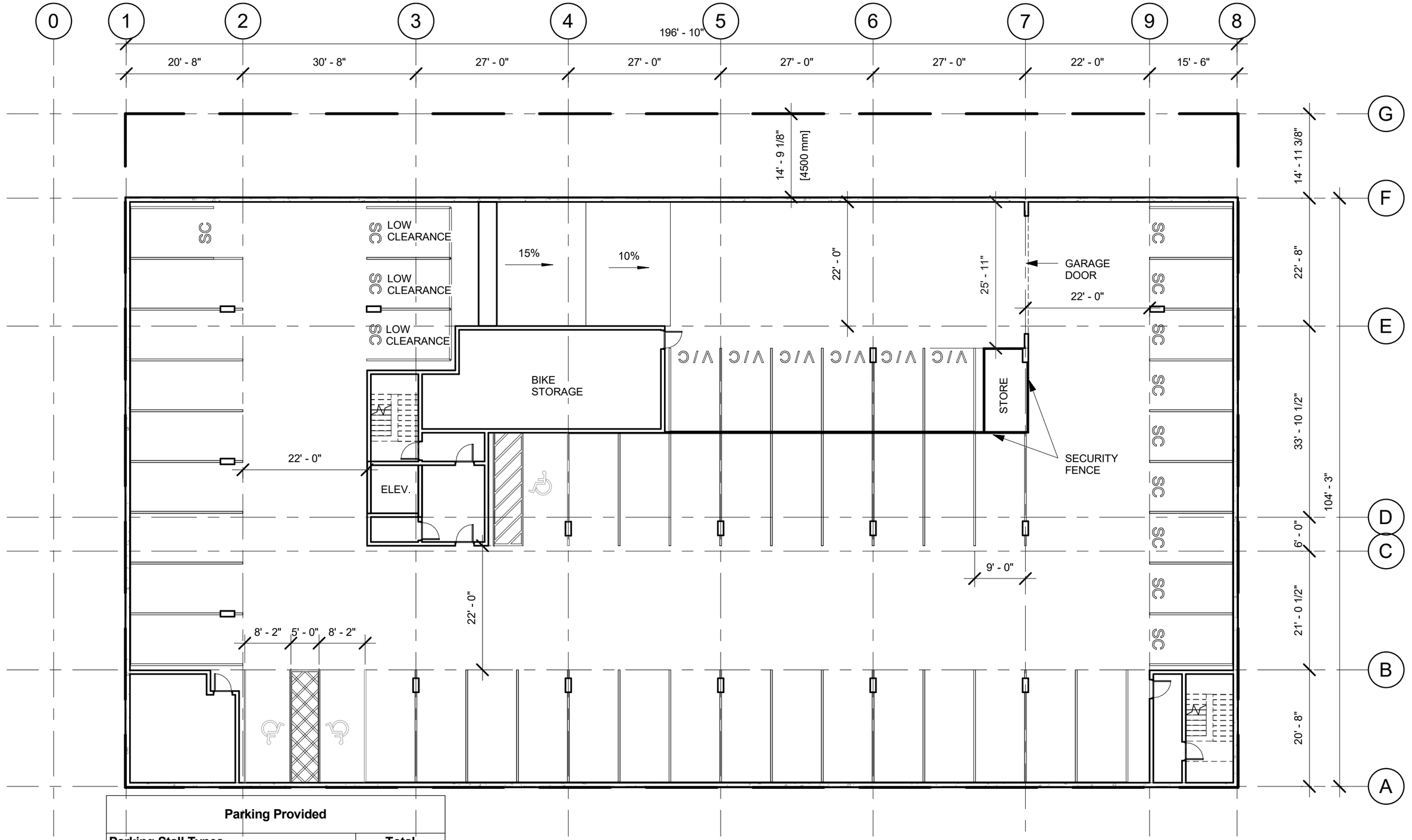
THE BUILDING WILL BE DESIGNED TO MEET STEP 4 OF THE BUILDING CODE, THE HIGHEST AVAILABLE FOR MULTI-FAMILY.

VIEW FROM CORNER OF ASTER & PROSPECT

VIEW OF 7241 PROSPECT ON THE LEFT, WITH 7423 PROSPECT ON THE RIGHT



VIEW OF 7425 PROSPECT STREET



Parking Provided	
Parking Stall Types	**Total**
Accessible Parking Stall 8-2 x 20	**3**
Reg Car Stall- 9 x 20	**32**
Small Car Stall- 9 x 14-10	**13**
Small Car Stall- 9 x 14-10 VISITOR/COMMERCIAL	**6**
	54

PARKADE
Project Name
WHISTLER, B.C.

fitzgerald CONSTRUCTION | DEVELOPMENT

DP003
PROJECT NO. 0000

STARK

COMMERCIAL LAYOUT

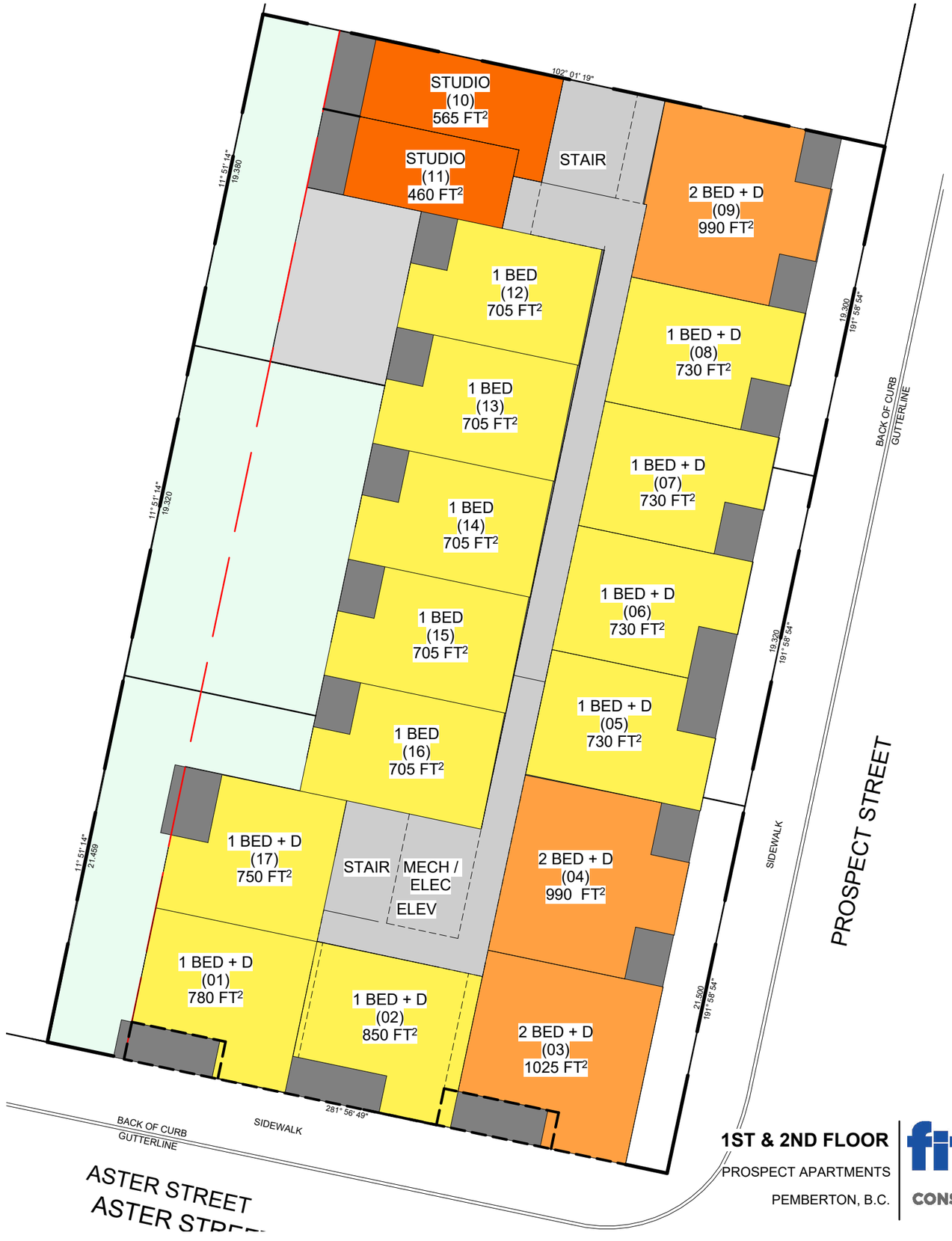
PROSPECT APARTMENTS

PEMBERTON, B.C.

fitzgerald CONSTRUCTION | DEVELOPMENT

DP004

STARK



1ST & 2ND FLOOR

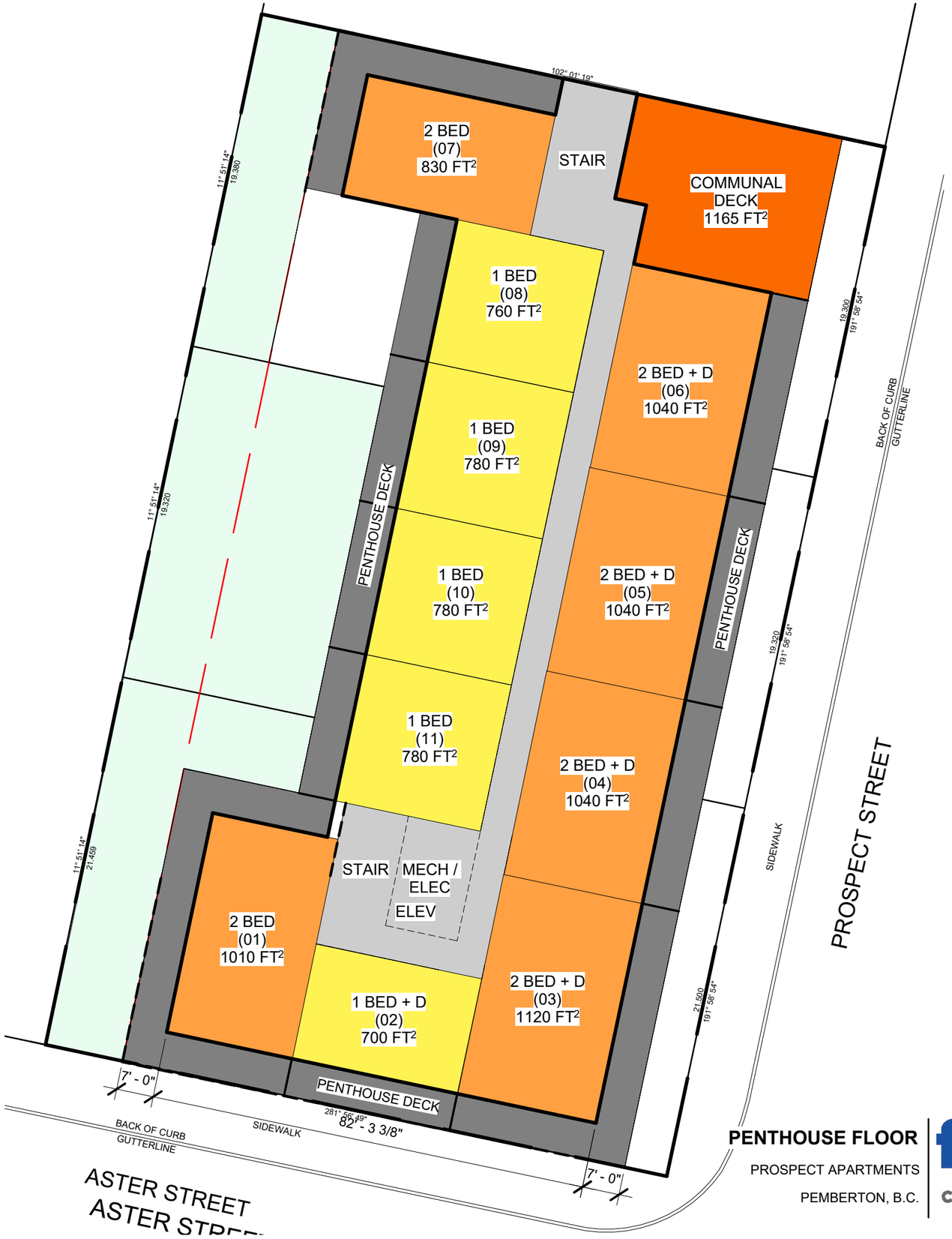
PROSPECT APARTMENTS

PEMBERTON, B.C.

fitzgerald CONSTRUCTION | DEVELOPMENT

DP005

STARK



PENTHOUSE FLOOR

PROSPECT APARTMENTS

PEMBERTON, B.C.

fitzgerald CONSTRUCTION | DEVELOPMENT

DP006 STARK

RENDERING

PROSPECT STREET

PEMBERTON, B.C.

fitzgerald

CONSTRUCTION | DEVELOPMENT

DP008

PROJECT NO. 1679

STARK

RENDERING

PROSPECT STREET

PEMBERTON, B.C.

fitzgerald

CONSTRUCTION | DEVELOPMENT

DP009

PROJECT NO. 1679

STARK

RENDERING

PROSPECT STREET

PEMBERTON, B.C.

fitzgerald CONSTRUCTION | DEVELOPMENT

DP011

PROJECT NO. 1679

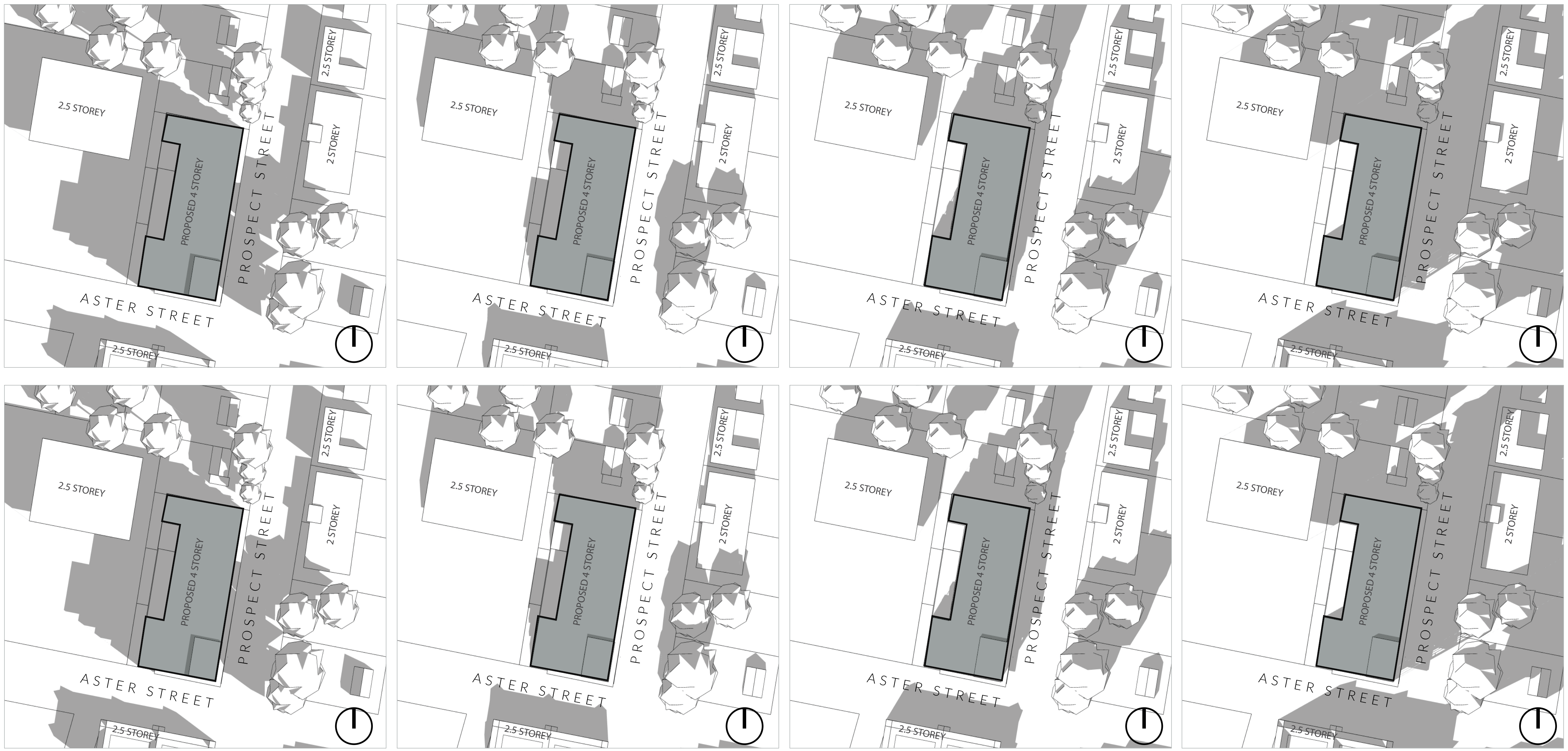
STARK

1679 PROPECT STREET / 2023 February

Shadow Studies

SPRING EQUINOX

FALL EQUINOX



9AM | 12PM | 2PM | 4PM

STARK

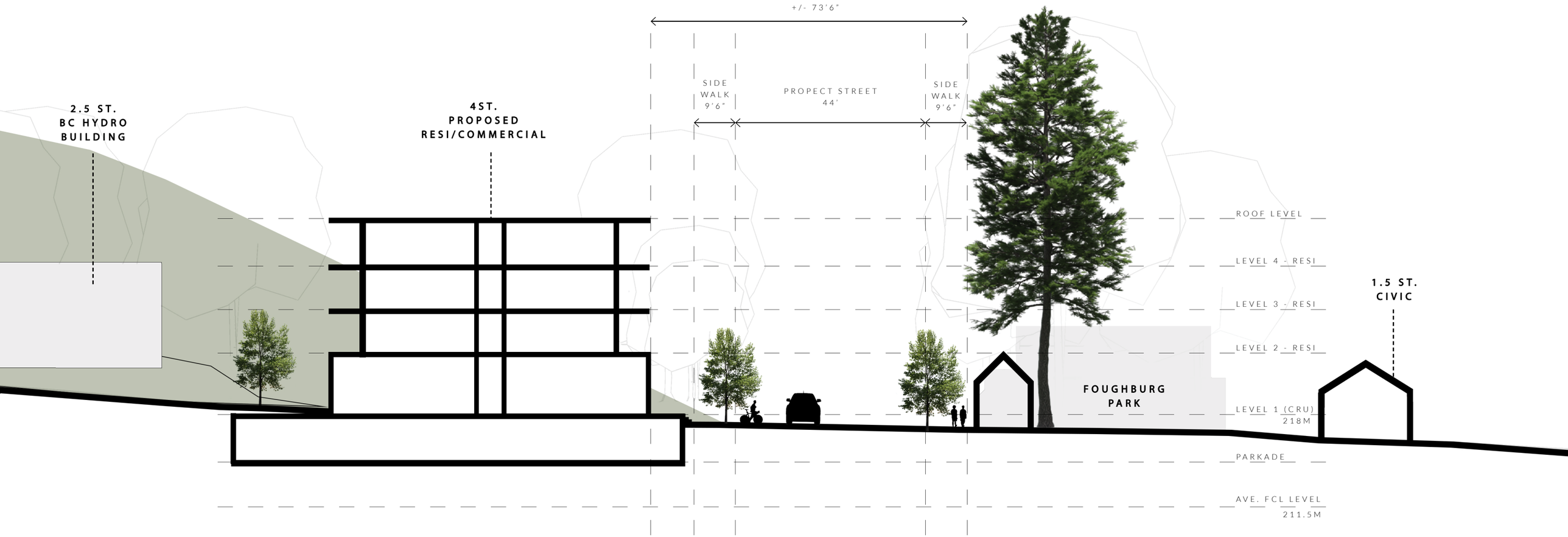
1679 PROPECT STREET / 2023 February

Street Scape

PROPOSED 4 ST.
RESI/COMMERCIAL

STARK

Cross Section



STARK

KONTUR
GEOTECHNICAL CONSULTANTS INC

November 9, 2022 (Version 0)
Project No.: **K-221341-00**

Tom Fitzgerald
Fitzgerald Building Company
Unit 101 – 7330 Arbutus St
Pemberton, BC
V0N 2L0

Attention: Tom Fitzgerald
tom@fitzgeraldinc.ca

RE: Geotechnical Assessment
Multi-Family Residential
7421, 7423 & 7425 Prospect St, Pemberton, BC

Dear Tom Fitzgerald,

1.0 INTRODUCTION

In accordance with your recent authorization, Kontur Geotechnical Consultants Inc. (Kontur) has completed this geotechnical assessment for the above-referenced project. The purposes of this study were to characterize the site from a geotechnical point-of-view and to provide comments and recommendations with respect to the construction of a multi-family residential building.

This letter, which summarizes the findings of the geotechnical assessment, has been prepared in accordance with standard and widely accepted geotechnical engineering principles and practices for similar projects in this region. This letter does not address any environmental issues or considerations related to the proposed project.

Review and use of this letter should be completed in accordance with the attached *Interpretation and Use of Study and Report* document. It is included as an integral part of this letter and should be read in conjunction with all parts of this letter.

2.0 UNDERSTANDING OF PROJECT

Based on review of provided information the project generally consists of the removal of three single family residential buildings and construction of a four-level building with underground parking. The lower level would consist of retail and office space, with the upper three levels being residential comprising a total of 45 units.

3.0 SOURCES OF INFORMATION

The following sources of information were used to assist this assessment:

- Information obtained from Kontur's in-house geotechnical database of nearby projects;
- Geotechnical exploration completed by Kontur on October 7, 2022;
- Rezoning application prepared by Stark/Fitzgerald Building Company;
- Project summary prepared by Stark/Fitzgerald Building Company;
- Site field survey completed by Doug Bush Survey Services Ltd. On October 5, 2021; and,

- Published surficial geology map "*Surficial Geology And Landslide Inventory Of The Upper Sea To Sky Corridor*" open file 5324.

4.0 FIELD AND LABORATORY WORK

On October 7, 2022, a geotechnical exploration program was completed which comprised four exploratory boreholes, designated BH-01 to BH-04, to depths ranging from 3.7m to 10m. The boreholes consisted of solid stem augers from a truck mounted rid. A Dynamic Cone Penetrometer Test was performed at each borehole from the surface to depths between 3.7m and 10m, to gather information on the relative density of the underlying soils.

Representative samples were taken for subsequent laboratory testing, which comprised four grain size distribution tests. Results of laboratory testing are attached.

The bores were backfilled using drilled spoil, tamped with the auger then capped with bentonite and sand in accordance with Provincial Groundwater Protection Regulations. The approximate test locations are shown in the attached '*Test Hole Location Plan – Proposed Multi-Family Residential Building*' (Drawing 1). Detailed test hole logs are attached to this report.

5.0 SITE DESCRIPTION

5.1 General

The subject properties cover an approximate area of 1500m^2 situated within the Village of Pemberton. The subject properties extend across three civic address'; 7421, 7423 and 7425 Prospect Street; and cover an approximate rectangular dimension of 40m (aligned to the east-south-east) by 62m (aligned to the north-north-east). The property is bounded to the east by Prospect Street, to the north by neighbouring residential properties, to the west by an easement followed by neighbouring commercial properties and to the south by Aster Street.

At the time of geotechnical exploration, three single-family residential buildings were located within the subject site (one at each civic address). A lock block wall, about 1.8m exposed height, is offset laterally about 2m from the western property line, retaining a parking area and walkway for the commercial property.

Natural topography at the subject site sloped gently to the south-east. It should be noted that cut slopes (less than about 0.8m high) abutting to the pathway on the western side of Prospect Street indicates that previous site grading at the subject site had been completed for levelling purposes prior (or during) to the construction of the single-family residential buildings.

5.2 Sub-Surface Conditions

Review of surficial geology map "Surficial Geology and Landslide Inventory of the Upper Sea To Sky Corridor" indicates that the site is underlain by fan sediments consisting of poorly sorted sand and gravel, generally 2m to 15m thick.

Sub-surface conditions encountered during the geotechnical investigation generally comprised the following:

- **Unit A – SANDY SILT:** Encountered at BH-01 and BH-02 from the surface up to 0.3m depth (eastern portion of site). Stiff or very stiff, some surficial grass and rootlets.
- **Unit B – SILTY SAND:** Encountered at BH-03 and BH-04 from the surface to between about 1.5m and 2.1m depth (western portion of site). Typically compact, locally very loose to loose between about 1.2m and 2.1m depth in BH-04.
- **Unit C – GRAVELLY SAND/SANDY GRAVEL (compact):** Encountered in BH-01 through BH-03, beneath Units A and B, silt portion varies with depth and location. Locally loose to compact in BH-01 between about 3.7m and 6.7m depth.
- **Unit D – SILTY SAND (compact to dense):** Locally encountered in BH-02 between about 6.1m and 7.9m depth.
- **Unit E – GRAVELLY SAND (very dense):** Encountered in BH-01 and BH-02 below about 7.9m and 8.5m depth; and in BH-03 and BH-04 below about 2.1m and 3m depth (practical auger refusal depth, likely due to presence of boulder or till-like soils).

The sub-surface soil conditions encountered in the boreholes appeared to be in general agreement with the geological mapping. Detailed borehole logs are attached to this report.

Direct measurement of groundwater was not achievable due to borehole collapse. Observations of moisture content in the soil profile suggest that groundwater may be within the order of 6m to 8.5m depth. It should be noted that the exploratory program was undertaken following a prolonged period of dry weather.

It should be noted that the soil and groundwater conditions described above and encountered in the borehole is representative of the soil conditions in the immediate vicinity of each test location. Variation in stratigraphic conditions should be expected.

6.0 COMMENTS AND RECOMMENDATIONS

6.1 General

It is understood that the proposed development comprises the construction of a four-level multi-family residential building with underground parking. Excavations for the proposed underground parkade are expected to be in the order of 3m to 4m below existing site grades, anticipated to expose soil Unit C at the eastern portion of the site, and Unit E at the western portion. Special considerations may be necessary to ensure undermining of neighbouring structures is not induced.

Compact to dense granular soils, or structural fill placed thereon, would provide adequate bearing support for the proposed development on conventional pad and strip footings.

6.2 Temporary Excavations and Dewatering

Excavations deeper than 1.2m will require an initial review by the Geotechnical Engineer. Temporary excavations should be planned for inclinations no steeper than 1H:1V (Horizontal:Vertical). If significant seepage is encountered during excavation flatter slopes may be required. Excavation guidelines provided by WorkSafeBC must be followed.

Special considerations may be required regarding excavations adjacent to neighbouring properties and hard landscape features. Such features include, but are not limited to;

- Lock-block wall located alongside the western property boundary (offset from the subject property line about 2m);
- Footpath abutting to the eastern and southern property line; and,
- Adjacent property to the north.

For preliminary purposes, temporary excavations should not intrude into a zone defined as a 1H:1V gradient line projected down from the toe of any neighbouring structure, to the base of the excavation.

Temporary shoring may be required where excavations cannot meet the above guidelines. Kontur could provide additional guidance regarding temporary excavations/shoring as site plans develop.

Temporary slopes should be continually reviewed by the contractor who will be on site on a full-time basis and will be able to note changes in slope profile and monitor performance of the cut slope. Kontur should be notified immediately of any significant changes to temporary slopes.

Temporary construction dewatering of the excavations should be carried out as required to facilitate the excavations and placement of structural fill in the dry. Based on Kontur's experience for similar projects in the area, conventional ditch and sump methods would likely be sufficient for construction dewatering. However, the contractor would need to select a dewatering system in response to actual seepage volumes encountered during construction.

6.3 Site Preparation

Site preparation for the proposed construction should include the removal of organics, topsoil, moisture affected subgrade and other deleterious material to expose dry, compact native granular soils. Exposed native granular soils should be compacted with suitable equipment to achieve at least 95% Modified Proctor Maximum Dry Density (MPMDD) in the upper 300mm.

For areas requiring reinstatement of grade, structural fill consisting of 150mm minus or 75mm minus crushed sand and gravel with less than 5% fines passing the #200 sieve (0.075mm) should be placed in lifts no greater than 300mm thick, and compacted with a heavy ride-on type vibratory drum roller to achieve at least 95% Modified Proctor Maximum Dry Density (MPMDD).

6.4 Backfill and Structural Fill

Backfill and structural fill should comprise 75mm minus sand and gravel. Fill should be placed in lifts with a maximum thickness of 300mm compacted with suitable equipment to achieve at least 95% MPMDD. Structural fill should have no more than 5% fines content passing the 0.075 mm sieve (#200).

Any structural fill placed on ground inclined steeper than 5H:1V should be placed on horizontal benches, at least 300mm wide, progressively cut into the slope from bottom to top to prevent the creation of a preferential slip plane.

Structural fill should be placed on subgrade reviewed and approved by the geotechnical engineer. Compaction of fill should be confirmed by density testing.

6.5 Seismic Considerations

The British Columbia Building Code (BCBC 2018) provides guidelines and parameters for seismic design. The design earthquake corresponds to a 2% probability of exceedance in 50 years which is equivalent to a 1 in 2475-year return period. The Natural Resources Canada website provides interpolated site-specific hazard values and indicates a peak horizontal firm ground acceleration of 0.17g for the subject property.

Based on the characterization of the anticipated subsurface conditions within the subject property provided in this report, compact to dense granular soils, liquefaction of subsurface soil layers during the design earthquake is considered unlikely. Site Class D for Seismic Response Table 4.1.8.4.A is considered appropriate for the subject site.

6.6 Foundation Design

It is anticipated that conventional pad and strip footings, if required, will be placed on compact native granular soils represented by soil Unit C, or structural fill placed thereon.

Post construction settlement is expected to be less than about 25mm, with differential settlement being less than about 12mm over 8m. The following foundation values should be used for the design of footings:

Foundation Material	Factored Ultimate Bearing Resistance	Allowable Bearing Pressure
Native compact granular soils or structural fill placed thereon	150 kPa	100 kPa

The bearing capacities above are subject to the following conditions:

- Strip and pad footings have minimum widths of 450 mm and 600 mm, respectively:
- Footings are founded at least 0.6m below adjacent finished grade for confinement and frost protection purposes; and,
- Site preparations have been completed as described in Section 6.3 (site preparation) and load bearing surfaces should be reviewed by the geotechnical engineer.

6.7 Perimeter Drainage

A perimeter drain should be installed for areas of the building where the floor slab is less than 150 mm above adjacent grade. The perimeter drain should consist of a 150 mm perforated PVC pipe surrounded by at least 150 mm of 19 mm clear crushed gravel separated from the remaining backfill with a non-woven filter fabric. The perimeter drain should be installed no deeper than the adjacent footing base and at least 200 mm below adjacent floor slabs. The perimeter drain should be connected to a suitable outlet, anticipated to comprise of a sump/permanent pump at this site. Roof drains should not discharge into the perimeter drain system.

The perimeter drain should be hydraulically connected to a 19mm clear crush gravel chimney drain at least 450mm wide adjacent to any below grade wall.

6.8 Slab on Grade

Slab-on-grade should be supported on suitable prepared subgrades as described in Sections 6.3 and 6.4. A 100 mm thick layer of 19 mm clear crushed gravel, compacted with a vibratory compactor should be placed beneath concrete slabs to provide a bedding and drainage layer for potential seepage zones. A layer of 6 mil poly vapour barrier should also be placed over the clear crushed gravel to protect it from concrete contamination and to limit dampness of the slab from capillary moisture which could damage floor coverings.

6.9 Permanent Slopes or Retaining Walls

Compacted structural fill should be no steeper than 2H:1V with planted vegetation to protect against erosion. Slope inclinations may be steepened with the use of retaining walls. Retaining walls may include, but is not limited to, rock stack, concrete lock block or Allan block. If required, recommendations and design of retaining walls can be provided by Kontur under separate cover. Cast-in-place concrete retaining walls should be designed by a structural engineer.

6.10 Lateral Earth Pressures

Retaining and parkade walls should be provided with adequate drainage to prevent the build-up of hydrostatic pressure behind the wall. A chimney drain, at least 450mm wide, comprised of clear crushed gravel should be placed directly against any below grade walls, hydraulically connected to a perimeter drain. The wall backfill should be compacted to at least 85% MPMDD in non-structural areas and at least 95% MPMDD in areas where pavement or other hard landscape features is proposed.

A uniform lateral earth pressure of 20kPa should be used for design for compaction effort adjacent to below ground walls up to 3m in height. A static lateral earth pressure of 5.5kPa/m with a triangular distribution and a seismic lateral earth pressure of 2.2kPa/m with an inverted triangular distribution should be used for below grade walls greater than 3m height.

7.0 FIELD REVIEW

To sign-off on the work, Kontur must complete the necessary field reviews during the construction stage of the project. Field reviews may be required, but are not limited to, the following stages:

- Bulk excavation, stripping and final excavation;
- Subgrade and bearing surface review and approvals;
- Placement and compaction of fills; and/or,
- Installation of perimeter and/or site drainage.

Kontur requires at least 48 hours of advanced notice to visit the site when the work is ready for review.

8.0 CLOSURE

The comments and recommendations presented in this letter are based on the referenced information and Kontur's understanding of the project as described herein. If site conditions or project parameters differ from those described in this letter, Kontur should be notified promptly to review geotechnical

aspects of the project and provide additional or modified comments and recommendations, as deemed appropriate. Contractors should make their own assessments of subsurface conditions at this site and select the construction means and methods that are most appropriate for encountered site conditions.

The subject properties are considered "safe" for intended purpose, that being the construction of a multi-family residential building. The term "safe" specifically refers to the ability of the subsurface soils to support the proposed building within typically tolerable settlement for such buildings and global slope stability being adequate for static and seismic conditions.

This letter has been prepared for the exclusive use of Fitzgerald Building Company and/or their designated agents or consultants. Any use of the information contained in this letter for other than its intended purpose or by any other party must first be verified in writing by Kontur. Kontur does not accept any responsibility or damages because of any other party relying on or using the information, interpretations, opinions, comments, and/or recommendations that are contained in this letter.

Kontur trusts that the information described above meets your current requirements. If you should have any concerns or questions, please do not hesitate to contact the undersigned.

Sincerely,

Kontur Geotechnical Consultants Inc.
EGBC Permit to Practice #1000925

Per:

[redacted]

Peter Knott EIT
Geotechnical Engineer

Reviewed by:

[redacted]

Evan Sykes PEng
Principal | Geotechnical Engineer

Attachments: Interpretation and Use of Study and Report Document
Photographs
Drawing 1 – Site and Test Location Plan
Borehole Logs
Results of Laboratory Testing

INTERPRETATION AND USE OF STUDY AND REPORT DOCUMENT

1.0 STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering consulting practices in this area. No other warranty, expressed or implied, is made. Engineering studies and reports do not include environmental engineering or consulting.

2.0 COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3.0 BASIS OF THE REPORT

The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document are only valid to the extent that there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4.0 USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT. WE WILL CONSENT TO ANY REASONABLE REQUEST BY THE CLIENT TO APPROVE THE USE OF THIS REPORT BY OTHER PARTIES AS "APPROVED USERS". The contents of the Report remain our copyright property and we authorise only the Client and Approved Users to make copies of the Report only in such quantities as are reasonably necessary for the use of the Report by those parties. The Client and Approved Users may not give, lend, sell or otherwise make the Report, or any portion thereof, available to any party without our written permission. Any use which a third party makes of the Report, or any portion of the Report, are the sole responsibility of such third parties. We accept no responsibility for damages suffered by any third party resulting from unauthorised use of the Report.

5.0 INTERPRETATION OF THE REPORT

Nature and Exactness of Descriptions: Classification and identification of soils, rocks, geological units, contaminant materials, building envelopment assessments, and engineering estimates have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature and even comprehensive sampling and testing programs, implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations, or building envelope descriptions, utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarising such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and all persons making use of such documents or records should be aware of, and accept, this risk. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

Reliance on Provided information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the report as a result of misstatements, omissions, misrepresentations or fraudulent acts of persons providing information.

To avoid misunderstandings, KONTUR should be retained to work with the other design professionals to explain relevant engineering findings and to review their plans, drawings, and specifications relative to engineering issues pertaining to consulting services provided by KONTUR. Further, KONTUR should be retained to provide field reviews during the construction, consistent with building codes guidelines and generally accepted practices. Where applicable, the field services recommended for the project are the minimum necessary to ascertain that the Contractor's work is being carried out in general conformity with KONTUR's recommendations. Any reduction from the level of services normally recommended will result in KONTUR providing qualified opinions regarding adequacy of the work.

6.0 ALTERNATE REPORT FORMAT

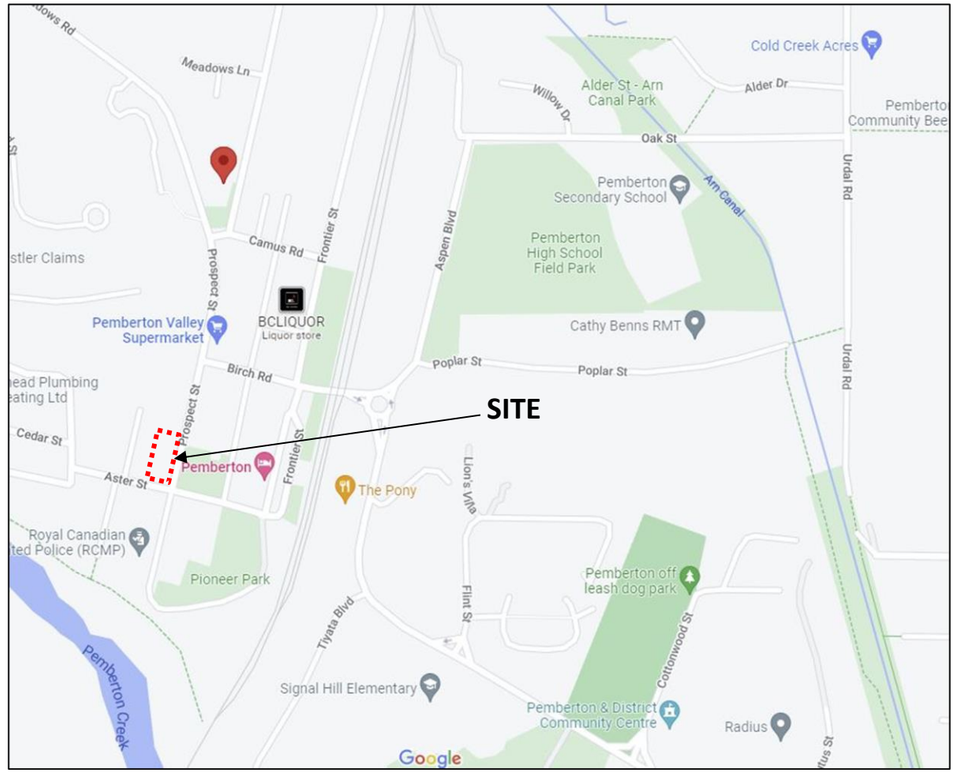
When KONTUR submits both electronic file and hard copies of reports, drawings and other documents and deliverables (KONTUR's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by KONTUR shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancy, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by KONTUR shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of KONTUR's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except KONTUR. The Client warrants that KONTUR's instruments of professional service will be used only and exactly as submitted by KONTUR.

The Client recognizes and agrees that electronic files submitted by KONTUR have been prepared and submitted using specific software and hardware systems. KONTUR makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

Photograph 1 – Drilling BH-02 on October 7, 2022 looking north-west

Photograph 2 – Western portion of property looking south-south-east on October 7, 2022



SITE LOCALITY PLAN

Notes:

1. Aerial image extrapolated from Google Earth Pro.
2. Site locality plan extrapolated from Google Maps.
3. Test locations are approximate only and shown with reference to existing features.

KONTUR GEOTECHNICAL CONSULTANTS inc.

Unit 65, 1833 Coast Meridian Road, Port Coquitlam, B.C. V3C 6G5
t. 1 (778) 730 1747 | toll-free. +1 (833) 301 7575 | e. info@kontur.ca | www.**kontur**.ca

SEAL

VERSIONS

NO	DESCRIPTION	DATE
0	Test Hole Location Plan	12 Oct 2022

TITLE: Test Hole Location Plan – Multi-Family Residential Building

PROJECT NO.: K-221341-00

CLIENT: Fitzgerald Building Company

DATE: 12 Oct 22 | SCALE: NA | DWG NO.: 1

PROJECT LOCATION: 9421, 9423 & 9425 Prospect Street, Pemberton BC

DRAFT: PAK | DESIGN: PAK | CHECK: EGS

Kontur Geotechnical Consultants Inc.
65-1833 Coast Meridian Road
Port Coquitlam, B.C. V3C 2W2
Telephone: (778) 730-1747

RECORD OF TESTHOLE : BH-01

CLIENT Fitzgerald Building Company
PROJECT NUMBER K-221341-00
PROJECT NAME Multi-Family Residential
PROJECT LOCATION 7421, 7423 & 7425 Prospect St, Pemberton BC
DRILLING DATE 2022-10-07
BOREHOLE LOCATION
DRILLING METHOD Hollow Stem Auger
ELEVATION 217.4m (approx. - interpolated off site plan by Doug Bush-Oct 10, 2021)
DRILLING CONTRACTOR Blue Max Environmental Drilling
GROUNDWATER DEPTH AT TIME OF DRILLING
EQUIPMENT TYPE CME 55 Truck Mounted Rotary Drill
LOGGED BY PAK **CHECKED BY** EGS

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT 'N' VALUE BLOWS/0.3m / DYNAMIC CONE BLOWS/0.3m	POCKET PEN. (kPa) / FIELD VANE SHEAR (kPa) Peak Remold	FINES CONTENT (%) / PLASTIC & LIQUID LIMIT WATER CONTENT PL MC LL	GROUNDWATER
		SANDY SILT, sand is fine grained, rootlets, pale brown, dry (very stiff)	217.1							
1		SANDY GRAVEL, some silt and cobbles, pale brown, dry (compact), gravel and cobbles are sub-rounded, gravel is dominantly medium to coarse grained	0.3	S1	GB		18, 52, 53			
			215.9				31			
2		GRAVELLY SAND, some silt and cobbles, pale brown, dry (compact), gravel and cobbles are sub-rounded, gravel is dominantly medium to coarse grained	1.5				10, 16			
				S2	GB		15, 15			
3							21, 21			
			213.8				69, 67			
4		GRAVELLY SAND, trace silt, brown, damp (loose to compact), gravel is subrounded and dominantly fine to medium grained	3.7	S3	GB		25, 5, 7, 10			
5		- Becoming moist below approximately 4.9m depth					11, 11			
				S4	GB		12, 7			
6			210.7				7, 6			
7		GRAVELLY SAND, some silt, brown, moist to wet (compact), gravel is subrounded and dominantly fine to medium grained	6.7	S5	GB		36, 39			
							15, 14			
8			208.9				9, 11			
9		GRAVELLY SAND, some silt, trace cobbles, brown, wet (very dense)	8.5				73, 100/400			
10			207.4							

Bottom of hole at 10.1m.

Kontur Geotechnical Consultants Inc.
65-1833 Coast Meridian Road
Port Coquitlam, B.C. V3C 2W2
Telephone: (778) 730-1747

RECORD OF TESTHOLE : BH-02

CLIENT Fitzgerald Building Company
PROJECT NUMBER K-221341-00
PROJECT NAME Multi-Family Residential
PROJECT LOCATION 7421, 7423 & 7425 Prospect St, Pemberton BC
DRILLING DATE 2022-10-07
BOREHOLE LOCATION
DRILLING METHOD Hollow Stem Auger
ELEVATION 218.0m (approx. - interpolated off site plan by Doug Bush-Oct 10, 2021)
DRILLING CONTRACTOR Blue Max Environmental Drilling
GROUNDWATER DEPTH AT TIME OF DRILLING
EQUIPMENT TYPE CME 55 Truck Mounted Rotary Drill
LOGGED BY PAK **CHECKED BY** EGS

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT 'N' VALUE BLOWS/0.3m / DYNAMIC CONE BLOWS/0.3m	POCKET PEN. (kPa) / FIELD VANE SHEAR (kPa)	FINES CONTENT (%) / PLASTIC & LIQUID LIMIT WATER CONTENT	GROUNDWATER
		SANDY SILT, sand is fine grained, rootlets, pale brown, dry (stiff), surficial grass	217.7							
1		GRAVELLY SAND, some silt and cobbles, pale brown, dry (compact), gravel and cobbles are sub-rounded	0.3	S6	GB		14, 14, 20, 37			
2		- Becoming dense below approximately 1.2m depth	216.0				71, 73, 94			
3		GRAVELLY SAND, trace silt, brown, damp (compact), gravel is sub-rounded	2.0	S7	GB		16, 8, 17			
4							12, 20			
5		- Becoming moist to wet below apporximately 4.6m depth					66			
6			211.9	S8	GB		28, 13, 11, 28			
7		SILTY SAND, trace gravel, brown, wet (compact to dense), sand is dominantly fine grained	6.1	S9	GB		44, 46, 21, 30, 14			
8			210.1				89, 100+			
9		GRAVELLY SAND, trace to some silt, brown, wet (very dense), gravel portion is fine to coarse and sub-rounded	7.9				100+100			
10			208.0							

Bottom of hole at 10.1m.

Kontur Geotechnical Consultants Inc.
65-1833 Coast Meridian Road
Port Coquitlam, B.C. V3C 2W2
Telephone: (778) 730-1747

RECORD OF TESTHOLE : BH-03

CLIENT Fitzgerald Building Company
PROJECT NUMBER K-221341-00
PROJECT NAME Multi-Family Residential
PROJECT LOCATION 7421, 7423 & 7425 Prospect St, Pemberton BC
DRILLING DATE 2022-10-07
BOREHOLE LOCATION
DRILLING METHOD Hollow Stem Auger
ELEVATION 218.2m (approx. - interpolated off site plan by Doug Bush-Oct 10, 2021)
DRILLING CONTRACTOR Blue Max Environmental Drilling
GROUNDWATER DEPTH AT TIME OF DRILLING
EQUIPMENT TYPE CME 55 Truck Mounted Rotary Drill
LOGGED BY PAK **CHECKED BY** EGS

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT 'N' VALUE BLOWS/0.3m / DYNAMIC CONE BLOWS/0.3m	POCKET PEN. (kPa) / FIELD VANE SHEAR (kPa) Peak Remold	FINES CONTENT (%) / PLASTIC & LIQUID LIMIT WATER CONTENT PL MC LL	GROUNDWATER
0		SILTY SAND, fine grained, pale brown, dry (compact)		S10	GB		17, 17, 11			
1		- Becoming loose to compact below approximately 0.6m depth	216.7				6, 19, 24			
2		GRAVELLY SAND, some cobbles, trace silt, pale brown, dry (compact)	1.5	S11	GB		16, 15, 20, 29			
3		- Becoming very dense below approximately 3m depth	214.6				65, 100/100			

Limit of investigation due to refusal on probable cobble, boulder or till-like soils

Bottom of hole at 3.7m.

NOTES: Attempted two additional test holes within 1m radius of original hole, refusal depth was consistent at approximately 3.7m depth

Kontur Geotechnical Consultants Inc.
65-1833 Coast Meridian Road
Port Coquitlam, B.C. V3C 2W2
Telephone: (778) 730-1747

RECORD OF TESTHOLE : BH-04

CLIENT Fitzgerald Building Company
PROJECT NUMBER K-221341-00
PROJECT NAME Multi-Family Residential
PROJECT LOCATION 7421, 7423 & 7425 Prospect St, Pemberton BC
DRILLING DATE 2022-10-07
BOREHOLE LOCATION
DRILLING METHOD Hollow Stem Auger
ELEVATION 218.1m (approx. - interpolated off site plan by Doug Bush-Oct 10, 2021)
DRILLING CONTRACTOR Blue Max Environmental Drilling
GROUNDWATER DEPTH AT TIME OF DRILLING
EQUIPMENT TYPE CME 55 Truck Mounted Rotary Drill
LOGGED BY PAK **CHECKED BY** EGS

DEPTH (m)	STRATA	SOIL DESCRIPTION	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY %	SPT 'N' VALUE BLOWS/0.3m / DYNAMIC CONE BLOWS/0.3m	POCKET PEN. (kPa) / FIELD VANE SHEAR (kPa) Peak Remold	FINES CONTENT (%) / PLASTIC & LIQUID LIMIT WATER CONTENT PL MC LL	GROUNDWATER
1		SILTY SAND, fine grained, pale brown, dry (compact)	216.9	S12	GB		11, 21, 15			
2		SILTY SAND, fine grained, pale brown, dry (very loose to loose)	1.2 / 216.0				8, 5, 2, 8			
3		GRAVELLY SAND, some silt and cobbles, brown grey, moist to wet (very dense) - Difficult auger drilling conditions below approximately 2.8m depth.	2.1				39, 95, 100/100			
4				S13	GB					
5			212.9				100/100			

Limit of investigation due to refusal on probable cobble, boulder or till-like soils

Bottom of hole at 5.2m.

NOTES: Attempted three additional test holes within 1m radius of original hole, refusal depth between 3.1m and 5m depth. Consistently difficult drilling below approximately 3m depth.

Kontur Geotechnical Consultants Inc.
Unit 107 - 2071 Kingsway Avenue
Port Coquitlam, B.C. V3C 6N2

SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

TO:
FITZGERALD BUILDING COMPANY
UNIT 101, 7330 ARBUTUS ST
PEMBERTON, BC
V0N 2L0

ATTN: TOM FITZGERALD

PROJECT NO.: K-221341
CLIENT: FITZGERALD BUILDING COMPANY
C.C.:

PROJECT: 7421 PROSPECT ST PEMBERTON

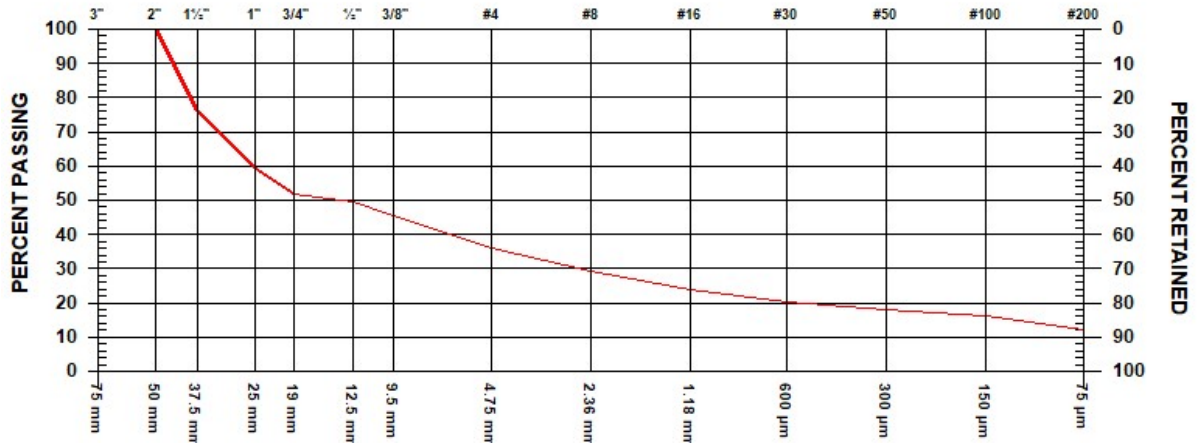
LOCATION: 7421, 7423 & 7425 PROSPECT ST PEMBERTON

CONTRACTOR: FITZGERALD BUILDING COMPANY

SIEVE TEST NO.: 1 **DATE RECEIVED:** 2022.Oct.18 **DATE TESTED:** 2022.Oct.20 **DATE SAMPLED:** 2022.Oct.12

SUPPLIER: NATIVE MATERIAL
SOURCE: NATIVE SITE
SPECIFICATION:
MATERIAL TYPE: SANDY GRAVEL, some silt

SAMPLED BY: PK
TESTED BY: HA
TEST METHOD: WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm	100.0	
1 1/2"	37.5 mm	76.3	
1"	25 mm	59.4	
3/4"	19 mm	51.7	
1/2"	12.5 mm	49.7	
3/8"	9.5 mm	45.5	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	35.9	
No. 8	2.36 mm	29.1	
No. 16	1.18 mm	23.7	
No. 30	600 µm	20.3	
No. 50	300 µm	18.2	
No. 100	150 µm	16.1	
No. 200	75 µm	12.0	

COMMENTS:
LOCATION: BH-01, S1.

[redacted]
Hamidreza Alaghehband
Laboratory Technician

Kontur Geotechnical Consultants Inc. **PER.**

Kontur Geotechnical Consultants Inc.
Unit 107 - 2071 Kingsway Avenue
Port Coquitlam, B.C. V3C 6N2

SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

TO:
FITZGERALD BUILDING COMPANY
UNIT 101, 7330 ARBUTUS ST
PEMBERTON, BC
V0N 2L0

ATTN: TOM FITZGERALD

PROJECT NO.: K-221341
CLIENT: FITZGERALD BUILDING COMPANY
C.C.:

PROJECT: 7421 PROSPECT ST PEMBERTON

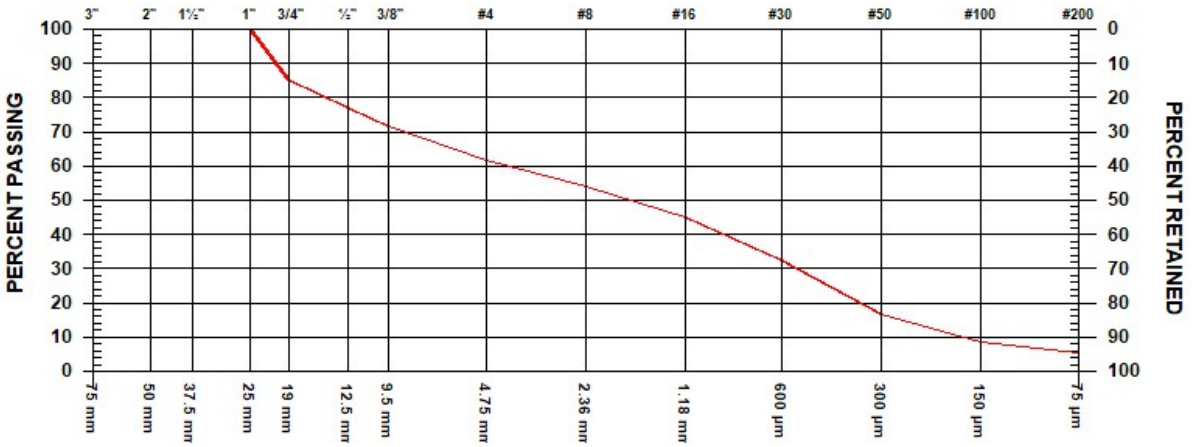
LOCATION: 7421, 7423 & 7425 PROSPECT ST PEMBERTON

CONTRACTOR: FITZGERALD BUILDING COMPANY

SIEVE TEST NO.: 2 **DATE RECEIVED:** 2022.Oct.18 **DATE TESTED:** 2022.Oct.20 **DATE SAMPLED:** 2022.Oct.12

SUPPLIER: NATIVE MATERIAL
SOURCE: NATIVE SITE
SPECIFICATION:
MATERIAL TYPE: GRAVELLY SAND, trace silt

SAMPLED BY: PK
TESTED BY: HA
TEST METHOD: WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	85.0	
1/2"	12.5 mm	77.1	
3/8"	9.5 mm	71.5	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	61.5	
No. 8	2.36 mm	53.9	
No. 16	1.18 mm	45.0	
No. 30	600 µm	32.3	
No. 50	300 µm	16.8	
No. 100	150 µm	8.6	
No. 200	75 µm	5.3	

COMMENTS:
LOCATION: BH-01, S3.

[redacted]
Hamidreza Alaghenband
Laboratory Technician

Kontur Geotechnical Consultants Inc. **PER.**

Kontur Geotechnical Consultants Inc.
Unit 107 - 2071 Kingsway Avenue
Port Coquitlam, B.C. V3C 6N2

SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

TO:
FITZGERALD BUILDING COMPANY
UNIT 101, 7330 ARBUTUS ST
PEMBERTON, BC
V0N 2L0

ATTN: TOM FITZGERALD

PROJECT NO.: K-221341
CLIENT: FITZGERALD BUILDING COMPANY
C.C.:

PROJECT: 7421 PROSPECT ST PEMBERTON

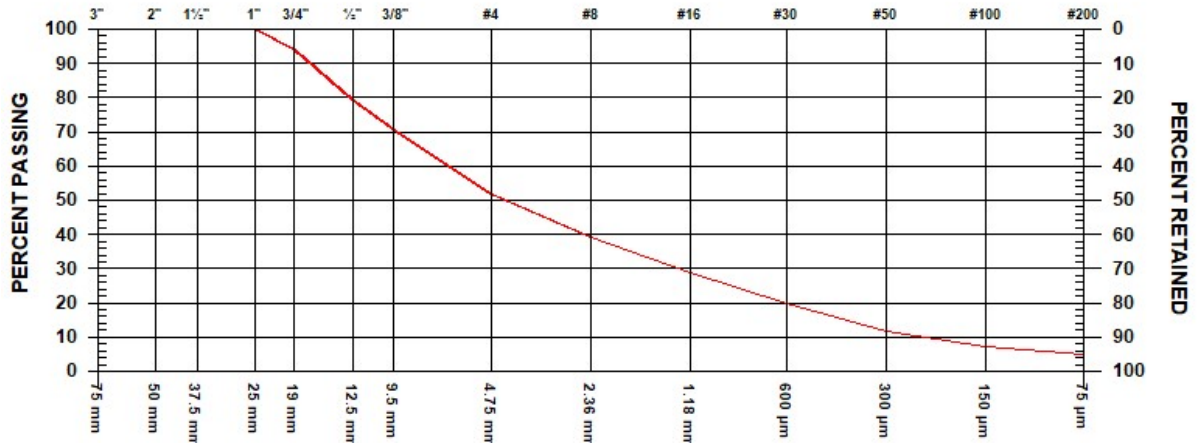
LOCATION: 7421, 7423 & 7425 PROSPECT ST PEMBERTON

CONTRACTOR: FITZGERALD BUILDING COMPANY

SIEVE TEST NO.: 3 **DATE RECEIVED:** 2022.Oct.18 **DATE TESTED:** 2022.Oct.20 **DATE SAMPLED:** 2022.Oct.12

SUPPLIER: NATIVE MATERIAL
SOURCE: NATIVE SITE
SPECIFICATION:
MATERIAL TYPE: SAND & GRAVEL, trace silt

SAMPLED BY: PK
TESTED BY: HA
TEST METHOD: WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	94.0	
1/2"	12.5 mm	79.2	
3/8"	9.5 mm	70.8	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	51.7	
No. 8	2.36 mm	39.1	
No. 16	1.18 mm	29.0	
No. 30	600 µm	19.9	
No. 50	300 µm	11.7	
No. 100	150 µm	7.4	
No. 200	75 µm	4.9	

COMMENTS:
LOCATION: BH-02, S7.

[redacted]
Hamidreza Alaghehband
Laboratory Technician

 2022.Oct.24 **Kontur Geotechnical Consultants Inc.** **PER.**

Kontur Geotechnical Consultants Inc.
Unit 107 - 2071 Kingsway Avenue
Port Coquitlam, B.C. V3C 6N2

SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

TO:
FITZGERALD BUILDING COMPANY
UNIT 101, 7330 ARBUTUS ST
PEMBERTON, BC
V0N 2L0

ATTN: TOM FITZGERALD

PROJECT NO.: K-221341
CLIENT: FITZGERALD BUILDING COMPANY
C.C.:

PROJECT: 7421 PROSPECT ST PEMBERTON

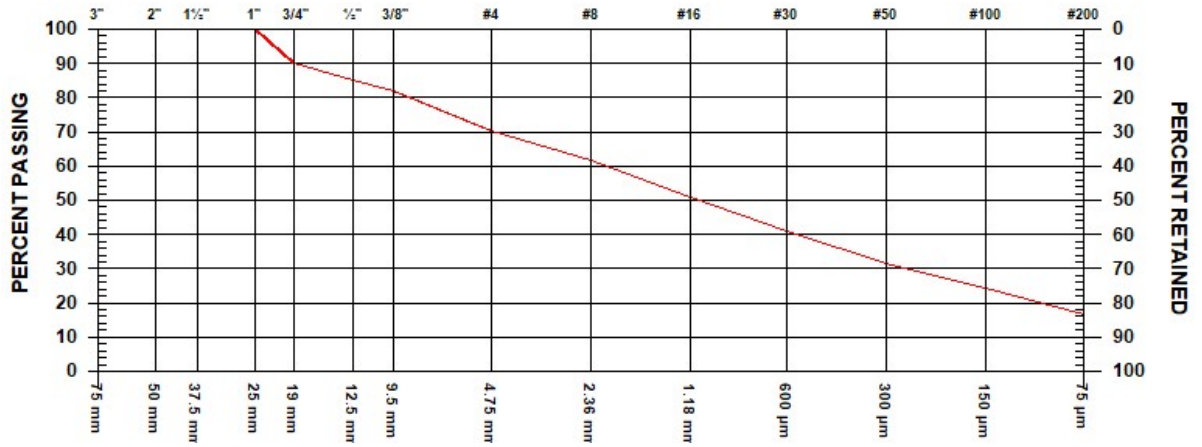
LOCATION: 7421, 7423 & 7425 PROSPECT ST PEMBERTON

CONTRACTOR: FITZGERALD BUILDING COMPANY

SIEVE TEST NO.: 4 **DATE RECEIVED:** 2022.Oct.18 **DATE TESTED:** 2022.Oct.20 **DATE SAMPLED:** 2022.Oct.12

SUPPLIER: NATIVE MATERIAL
SOURCE: NATIVE SITE
SPECIFICATION:
MATERIAL TYPE: GRAVELLY SAND, some silt

SAMPLED BY: PK
TESTED BY: HA
TEST METHOD: WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	90.1	
1/2"	12.5 mm	85.2	
3/8"	9.5 mm	81.8	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	70.1	
No. 8	2.36 mm	61.5	
No. 16	1.18 mm	51.0	
No. 30	600 µm	40.8	
No. 50	300 µm	31.6	
No. 100	150 µm	24.3	
No. 200	75 µm	16.6	

COMMENTS:
LOCATION: BH-04, S13.

[redacted]
Laboratory Technician

 2022.Oct.26 **Kontur Geotechnical Consultants Inc.** **PER.**

TRANSPORTATION PLANNERS AND ENGINEERS

bunt & associates

7421-23-25 Prospect Street, BC

Transportation Impact Assessment

Version 1

Prepared for

Fitzgerald Building Company

Date

January 27, 2023

Project No.

04-22-0348

January 27, 2023
04-22-0348

Tom Fitzgerald
Fitzgerald Building Company
7330 Arbutus St #101
Pemberton, BC
V0N 2L0

Dear Tom:

Re: 7421-23-25 Prospect Street, Pemberton
Transportation Impact Assessment

This report has been produced to provide a Transportation Impact Assessment for the proposed mixed-use development at 7421-23-25 Prospect Street, Pemberton. The review has been based on the latest design schedule of 45 multi-family residential units and commercial land use. A Terms of Reference was provided to the Village and was agreed to. Therefore, this report has been developed in accordance with the agreed scope.

Bunt has been responsible for providing high level transportation related advice, while we have also undertaken access and site design review, as well as provided and indication on future traffic that could be generated by the development, including the distribution through the road network and the related operational assessment of existing and future conditions. A summary of our findings and recommendations is presented herein.

Yours truly,
Bunt & Associates

Tyler Thomson, MURB MCIP RPP PTP
Associate – Senior Transportation Planner

Hugo Johnston, B.Sc
Transportation Planner

CORPORATE AUTHORIZATION

Prepared By: Hugo Johnston
Amanda Reale, EIT

Bunt & Associates Engineering Ltd.
1550-1050 West Pender Street
Vancouver, BC V6E 3S7
Canada

Reviewed By: Tyler Thomson, MCIP RPP PTP
Senior Transportation Planner

Telephone: +1 604 685 6427
Facsimile: +1 604 685 6579

Date: 2023-01-27
Project No. 04-22-0348

Approved By: Yulia Liem, P.Eng., PTOE
Principal

TABLE OF CONTENTS

EXHIBITS

TABLES

1. INTRODUCTION

1.1 Study Purpose & Objectives

Fitzgerald Building Company (Fitzgerald) have engaged Bunt & Associates Engineering Ltd. to prepare a Transportation Impact Assessment (TIA) for the proposed development at 7421, 7423 and 7425 Prospect Street, Pemberton, BC referred to as 'The Site' hereon within. The proposed development will consist of a 4-storey mixed-use building with residential above ground-floor retail. Vehicle access to The Site will be provided from Aster Street to the south.

The Site will feature approximately 45 residential strata units, with commercial units located at the ground floor. Parking will be provided within the underground parkade, on-street parking will be provided in a more formalized manner with frontage improvements on Aster Street and Prospect Street. Pedestrian access to the site will be possible at the grade from both Aster Street and Prospect Street, while bicycle access will be from the parkade ramp and/or the residential elevator in the lobby.

A Terms of Reference (TOR) for this TIA was agreed upon by the Village of Pemberton (VoP) and their transportation consultants, ISL Engineering and Land Services Ltd (ISL), the letter and any corresponding emails are included in **Appendix A**. The purpose of this study is to:

- Explain the existing transportation facilities around the site;
- Evaluate the potential transportation impacts of the proposed development, including traffic impact analysis at four (4) study intersections;
- Review the development's parking and servicing strategy; and
- Evaluate the proposed site plan, its proposed access, and internal vehicle circulation.

1.2 Study Scope & Area

The site area is bounded by Prospect Street to the east, Aster Street to the south, and adjacent properties to the west (industrial/business) and north (residential). **Exhibit 1.1** illustrates the site location within the Village of Pemberton, BC. The study area is located close to the downtown core of the village and is a mixed-use area with several commercial properties and residential dwellings within the vicinity. The residential areas are primarily to the west of the site, whilst the east, north and south are primary commercial and administrative uses.

M:\Operations\Dept BC\Projects\2022\04-22-0348 7421-23-25 Prospect St\5.0 Deliverables\5.1 Draft Report\Graphics

Exhibit 1.1

Site Location & Study Area

7421-23-25 Prospect Street
04-22-0348 January 2023

bunt & associates

1.3 Organization of Report

The report is structured as follows:

- **Section 1** – Introduces the study and outlines the proposed development;
- **Section 2** - Presents the existing transportation infrastructure within the study area and existing traffic conditions;
- **Section 3** - Describes the future traffic conditions with and without the proposed development and any potential impacts to the surrounding street network;
- **Section 4** - Reviews the Bylaw parking requirements for the development in the context of the proposed supply; and,
- **Section 5** - Presents the study conclusions and recommendations.

1.4 Proposed Development

The proposed development breakdown is summarized in **Table 1.1**.

Table 1.1: Proposed Land Uses

LAND USE	DENSITY (SQM)	UNITS
Residential	3,485	45
Commercial	1,303	10 CRU's

The current site plan is shown in **Exhibit 1.2**.

The total development will be supported by 54 parking spaces located within the underground parkade. Additionally, it is anticipated that the visitors to the site and commercial visitors will make use of the on-street parking provided within the vicinity of the site. As previously mentioned, the parkade will be accessed via a driveway off Aster Street to the south of the site.

Source: Prospect Apartments by Stark Architecture (August 2022)

M:\Operations\Dept BC\Projects\2022\04-22-0348 7421-23-25 Prospect St\5.0 Deliverables\5.1 Draft Report\Graphics

Exhibit 1.2
Site Plan

7421-23-25 Prospect Street
04-22-0348 January 2023

bunt & associates

2. EXISTING CONDITIONS

The following outlines a brief description of the relevant existing transportation networks/facilities including road network connections, cycling, and walking facilities in the surrounding area.

2.1 Land Use

The development is currently zoned C1 "Commercial, Town Centre" and is located to the southwest of the downtown centre of Pemberton. The site is made up of three lots, currently occupied by two single level dwellings and a small commercial property. The site is approximately 2,150 sq m and adjacent to the Rona Building centre and Foughburg Park.

Developments along Prospect Street follow a similar pattern to the low to mid-rise residential and mixed-use developments within the vicinity of the site and with access via the local roads or laneways. To the south of the site, along Aster Street and Prospect Street are commercial and community buildings.

2.2 Existing Transportation Network

2.2.1 Road Network

Exhibit 2.1 sets out the surrounding road network near the site and the intersection controls and laning within the study area. Aster Street is a two-way road that extends east-west to the south of the site and connects to Frontier Street in the east and Dogwood Street in the west. The road provides connections to residential areas of Pemberton and the Fire department to the west of the site.

Prospect Street extends north-south along the eastern frontage of the site and is a key road to the north of Pemberton. Prospect Street provides connection to Birch Road to the northeast and Pemberton Meadows Road further north. Birch Road travels east-west from the intersection with Prospect Street and connects to the roundabout intersection with Pemberton Portage Road and Aspen Boulevard in the east, this is the primary access point into the town centre, with all traffic travelling through the roundabout to access the town centre of Pemberton to/from Highway 99.

There is on-street parking located on both sides of the road along the length of Prospect Street. Aster Street also has on-street parking on both sides of the street. **Table 2.1** summarizes the characteristics of the key streets in the study area.

Table 2.1: Existing Street Characteristics

STREET	CLASSIFICATION	NUMBER OF TRAVEL LANES	POSTED* SPEED	PARKING FACILITIES
Aster Street	Local	2	30 kph	Parking bays on both sides
Prospect Street	Collector	2	30 kph	Parking bays on both sides
Birch Street	Collector	2	30 kph	Parking bays on both sides
Frontier Street	Local	2	30 kph	Parking bays on both sides for north, south has large central parking lot.

*based on signage on Pemberton Portage Road.

Collector Roads provide a mixture of both mobility and land access functions, connecting all types of activity areas in the Village and within the vicinity neighbourhoods. The function of these streets is to "collect" traffic from the neighbourhoods through which they pass and distribute this traffic to Arterial Roads and the highway, while also providing direct access to adjacent lands. Collector Roads connect local neighbourhood and district-wide origins and destinations, allowing trips to be efficiently distributed by providing a choice of routes for transit, pedestrians, drivers, and bicyclists.

Local Roads primarily carry vehicle traffic with an origin and/or destination along its length and are not intended to carry significant volumes of through traffic.

Most of the roadways in the adjacent street network are two-lane roads with sidewalks. There are on-street parking facilities provided as well.

2.3 Active Transportation Networks

The site is located to the southwest of the town centre of Pemberton and therefore, is well connected by pedestrian facilities and cycling options. The pedestrian and cycling networks are set out in **Exhibit 2.2**.

2.3.1 Pedestrian Network

Walking is an everyday activity whether as a single-purpose journey or linked with transit and driving. Typically, people are willing to walk up to 10 minutes for certain activities (i.e., work, school, and recreational activities, which is circa 800m in distance. The pedestrian network surrounding the development includes both recreational and commuter routes. There are footways provided along the length of Prospect Street within the vicinity of the site, these connect to the wider network of Birch Road and Aster Street. Likewise, Aster Street, to the south, has footways running adjacent to the road.

Most streets in the vicinity of the site have sidewalks on at least one side of the roadway although some older local roadways with limited connections or limited residential presence have no sidewalks. Pedestrian crossing facilities are provided at the adjacent intersections at Prospect Street & Aster Street and Prospect Street & Birch Road. Sidewalks are provided to key destinations such as the primary and elementary schools to the east of the site.

2.3.2 Bicycle Network

Whilst there are no significant trails within the vicinity of the site, a number of roads have been identified as providing low traffic routes (i.e., neighbourhood bikeway) that are safe for cyclists, including the Joseph Despard Pemberton Laneway and Elements Lane. Pemberton Meadows Road, to the north of the site, is also a popular route for cyclists undertaking recreational activities.

Proposed Cycling Improvements

As part of Village of Pemberton Active Transportation plan it is proposed to markup a number of routes as part of the cycling network. These routes include Aster Street, Prospect Street and Frontier Street which will provide additional routes for cyclists.

M:\Operations\Dept BC\Projects\2022\04-22-0348 7421-23-25 Prospect St\5.0 Deliverables\5.1 Draft Report\Graphics

Exhibit 2.1

Study Network

7421-23-25 Prospect Street
04-22-0348 January 2023

bunt & associates

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Exhibit 2.2

Pedestrian Facilities & Cycling Facilities

7421-23-25 Prospect Street
04-22-0348 January 2023

bunt & associates

2.4 Existing Traffic Volumes

2.4.1 Traffic Data Collection Program

To document existing traffic volumes in the study area, Bunt conducted weekday AM (07:00-09:00) and weekday PM (15:00-18:00) peak period survey and spot counts. These counts occurred over several days due to the changing nature of the study scope. **Table 2.2** summarizes the intersection traffic data, collection dates and peak hour for the counts longer than one hour.

Table 2.2: Summary of Available and Counted Traffic Data

INTERSECTION	SOURCE	DATE OF COUNT	IDENTIFIED PEAK HOURS	
			AM	PM
Prospect Street / Aster Street	Bunt	October 25th 2022	07:00-08:00*	15:30-16:30
	Bunt	November 8th, 2022	-	
Prospect Street / Birch Road	Bunt	October 25th, 2022	08:00-09:00	16:15-17:15
	Bunt	November 8th, 2022	-	
Birch Road / Frontier Street	Bunt	October 18th 2022	08:00-09:00	-
	Bunt	November 8th, 2022	-	16:15-17:15
Birch Road/ Pemberton Portage Road / Aspen Blvd	Bunt	October 18th, 2022	08:00-09:00	16:45 -17:45
OVERALL STUDY AREA PEAK HOUR			08:00-09:00	16:30-17:30

*Only one hour of data collected.

Initial surveys were carried out on the 18th October, 2022. However, the full study area had not been agreed to by the Village and they requested additional intersections be included within the scope. Therefore, the additional data was collected over two typical weekdays. The days were split due to the availability of counters; however, a full peak period was ultimately observed. The identified peak hour in the AM was 08:00-09:00. Within the PM peak, it was ensured that any traffic associated to the school was observed, however, the PM peak was noted at 16:30-17:30.

The peak hours were calculated using the observed traffic data, all the movements for each intersection were totaled to determine which 15min rolling hour was highest across the observed time periods.. The network peak hour was taken from the highest traffic observed at all study intersections.

2.4.2 Peak Hour Traffic Volumes

Peak hour traffic volumes were extracted from the count data at the determined AM and PM. The observed peaks are presented in **Exhibit 2.3**.

2.4.3 Pedestrian and Cyclist's movements

As part of the traffic counts, the number of pedestrians and cyclists using the intersections was also observed, these counts enabled a review of the number of pedestrians and cyclists that utilize the network within the vicinity of the site. **Exhibits 2.4** demonstrates the counts for the AM and PM peak. This exhibit

demonstrates that there are no significant number of movements within the study network. The highest number of movements were observed along the southern arm at Pemberton Portage Road, with 40 pedestrians crossing in the AM peak hour.

M:\Operations\Dept BC\Projects\2022\04-22-0348 7421-23-25 Prospect St\5.0 Deliverables\5.1 Draft Report\Graphics

Exhibit 2.3

Existing Peak Hour Vehicle Traffic Volumes

7421-23-25 Prospect Street
04-22-0348 January 2023

bunt & associates

M:\Operations\Dept BC\Projects\2022\04-22-0348 7421-23-25 Prospect St\5.0 Deliverables\5.1 Draft Report\Graphics

Exhibit 2.4

Existing Peak Hour Pedestrian & Cycling Traffic Volumes

7421-23-25 Prospect Street
04-22-0348 January 2023

bunt & associates

2.4.4 Existing Traffic Volumes

Table 2.3 presents a summary of the two-way peak-hour vehicle movements for the streets in the study area. As shown, Pemberton Portage Road is the busiest road in the network with over 600 two-way movements in the AM peak hour, and around 860 two-way movements in the PM peak hour. Birch Road and Prospect Street were next busiest with two-way traffic flows in the range of 300 – 400 movements in the AM peak hour, and 450 – 550 movements in the PM peak hour.

Table 2.3: Existing Peak Hour Roadway Link Volumes

ROAD LINK	PEAK LINK VOLUMES (VEH/HR)	
	AM	PM
Aster Street	55	102
Prospect Street	314	453
Birch Road	398	548
Pemberton Portage Road	610	859
Aspen Blvd	252	154
Frontier Street	82	260

2.4.5 Existing Site Vehicle Trip Generation

The site is currently made up of a small thrift store and 2 townhouses. Therefore, it was determined that the existing trips were considered to be very low within the peak hours and would not have a noticeable impact if removed from the analysis, therefore, no net trip generation will be calculated, and all proposed trips associated with the site will be considered on top of the surveyed traffic numbers.

2.5 Existing Operations

2.5.1 Performance Thresholds

The existing operations of study area intersections and access points were assessed using the methods outlined in the 2000 Highway Capacity Manual (HCM), using the Synchro 11 analysis software (Build 11.1.16). The traffic operations were assessed using the performance measures of Level of Service (LOS) and volume-to-capacity (V/C) ratio.

The LOS rating is based on average vehicle delay and ranges from “A” to “F” based on the quality of operation at the intersection. LOS “A” represents optimal, minimal delay conditions while a LOS “F” represents an over-capacity condition with considerable congestion and/or delay. Delay is calculated in seconds and is based on the average intersection delay per vehicle.

Table 2.4 below summarizes the LOS thresholds for the six Levels of Service, for both signalized and unsignalized intersections.

Table 2.4: Intersection Level of Service Thresholds

LEVEL OF SERVICE	AVERAGE DELAY PER VEHICLE (SECONDS)	
	SIGNALIZED	UNSIGNALIZED
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: Highway Capacity Manual

The volume to capacity (V/C) ratio of an intersection represents ratio between the demand volume and the available capacity. A V/C ratio less than 0.85 indicates that there is sufficient capacity to accommodate demands and generally represents reasonable traffic conditions in suburban settings. A V/C value between 0.85 and 0.95 indicates an intersection is approaching practical capacity; a V/C ratio over 0.95 indicates that traffic demands are close to exceeding the available capacity, resulting in saturated conditions. A V/C ratio over 1.0 indicates a very congested intersection where drivers may have to wait through several signal cycles. In downtown and Town Centre contexts, during peak demand periods, V/C ratios over 0.90 and even 1.0 are common.

As directed by the ISL Engineering on behalf of the Village of Pemberton, the performance thresholds that were used to trigger consideration of roadway or traffic control improvements to support roadway or traffic control improvements employed in this study are listed below:

Signalized Intersections:

- Overall intersection Level of Service = LOS D or better;
- Overall intersection V/C ratio = 0.85 or less;
- Individual movement Level of Service = LOS E or better; and,
- Individual movement V/C ratio = 0.90 or less.

Unsignalized Intersections and Roundabouts:

- Individual movement Level of Service = LOS E or better, unless the volume is very low in which case LOS F is acceptable.

In interpreting of the analysis results, note that the HCM methodology reports performance differently for various types of intersection traffic control. In this report, the performance reporting convention is as follows:

- For unsignalized two-way stop-controlled intersections: HCM 6 and V/C output is reported just for individual lanes as the HCM methodology does not report overall performance. SimTraffic estimated queues and Level of Service have also been reported, as the HCM 2000 methodology does not directly take into account the gaps afforded by adjacent signalized intersections;

- For unsignalized Stop controlled intersections: HCM 2000 unsignalized LOS is reported for the overall intersection as well as by intersection approach LOS. The HCM 2000 methodology does not report an overall V/C ratio for All Way Stop controlled intersections. Degree of Utilization calculated with the HCM 2000 methodology is reported for individual movements in place of V/C, which is not part of the HCM 2000 report;

- For roundabouts: SIDRA roundabout analysis output is reported since as HCM 2000 does not calculate LOS for roundabouts. Overall LOS, and LOS and V/C by movement are provided for roundabouts but no overall V/C ratio is provided for roundabouts in the HCM 2010 methodology. This was undertaken inline with MoTI guidelines on SIDRA analysis.

The performance reporting conventions noted above have been consistently applied throughout this document and the detailed outputs are provided in **Appendix C**.

2.5.2 Existing Conditions Analysis Assumptions

Synchro and SIDRA Parameters

- Peak Hour Factor: Existing peak hour factors were informed by available counts.
- Pedestrian Volumes: pedestrian crossing demand were entered as per Bunt's counts.
- Heavy Vehicle Percentages: Most intersections use heavy vehicle percentage informed by existing counts, with low volume intersections assuming a Synchro default of 2%.

2.5.3 Existing Operational Analysis Results

The operation analysis results are summarized in **Table 2.5** for the AM & PM peak hour conditions.

Table 2.5: Existing Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Aster Street / Prospect Street (Two-Way Stop Control)	*OVERALL*	*A*	-	-	*A*	-	-
	EB	A	0.01	3	A	0.01	-
	WB	A	0.00	-	A	0.00	-
	NB	A	0.01	8	A	0.02	11
	SB	A	0.08	15	A	0.10	18
Prospect Street / Birch Road (All-Way Stop Control)	*OVERALL*	*A*	-	-	*A*	-	-
	WB	A	0.29	28	A	0.35	25
	NB	A	0.09	17	A	0.12	17
	SB	A	0.28	24	A	0.37	26
Birch Road / Frontier Street (Two-Way Stop Control)	*OVERALL*	*A*	-	-	*A*	-	-
	EB	*A*	*0.00*	*6*	*A*	*0.01*	*14*
	WB	*A*	*0.03*	*11*	*A*	*0.07*	*27*
	NB	*A*	*0.10*	*17*	*A*	*0.24*	*23*
	SB	*A*	*0.03*	*9*	*B*	*0.34*	*19*
Birch Road / Pemberton Portage Road / Aspen Blvd (Roundabout)	*OVERALL*	*A*	-	-	A	-	-
	EB	A	0.25	12	A	0.32	18
	NB	A	0.25	13	A	0.37	20
	SB	A	0.19	8	A	0.09	3

All intersections within the study area were reported to operate within the performance thresholds during both the AM and PM peak hours.

3. FUTURE TRAFFIC CONDITIONS

This section documents the analysis results for future traffic operations for Opening Day (2025), Opening Day + 5 years (2030), and Opening Day + 10 years (2035) horizon years with and without the development in place and provides a discussion on the assumptions for the future forecasts, covering changes to the background conditions along with new movements generated from the development plan.

3.1 Traffic Forecasts

The future horizon year scenarios that will be examined in the traffic analysis are as follows:

- Opening Day (2025) Background Traffic
- Opening Day (2025) Total Traffic
- Opening Day + 5 Years (2030) Background Traffic
- Opening Day + 5 Years (2030) Total Traffic
- Opening Day + 10 Years (2035) Background Traffic
- Opening Day + 10 Years (2035) Total Traffic.

3.1.1 Background Traffic Forecasts

Background traffic is traffic that would be present on the road network if the site did not redevelop. Future background scenarios were developed by adding a growth factor to the existing vehicle volumes.

Future background volumes were calculated by applying a 1.0% per year linear growth rate to existing traffic volumes at the study intersections as per the approved Terms of Reference (ToR).

Exhibit 3.1 illustrate the Opening Day Horizon (2025) Background Traffic forecasts for Weekday AM & PM, while **Exhibit 3.2**, illustrate the Opening Day Horizon + 5 Years (2030) background traffic forecasts, and **Exhibit 3.3**, showing the Opening Day Horizon + 10 Years (2035) background traffic forecasts for the Weekday AM & PM peak hours.

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Exhibit 3.1

Opening Day Background Traffic Forecasts

7421-23-25 Prospect Street
04-22-0348 January 2023

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Exhibit 3.2

Opening Day + 5 Years (2030) Background Traffic Forecasts

7421-23-25 Prospect Street
04-22-0348 January 2023

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Exhibit 3.3

Opening Day + 10 Years (2035) Background Traffic Forecasts

7421-23-25 Prospect Street
04-22-0348 January 2023

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3.1.2 Site Traffic

Vehicle Trip Generation

The vehicle trip generation calculation for the proposed development utilizes the trip rates from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition, for the general urban/suburban context for the residential component.

Each commercial unit has been split in accordance with the office and retail land uses. The rates applicable to the current development statistics are summarized in **Table 3.1.** This is seen as a conservative approach and ensures that all floor area is accounted for.

Table 3.1: Peak Hour Vehicle Trip Rates

LAND USE	QUANTITY	UNITS	AM PEAK HOUR			PM PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL
220 Residential - Low Rise	Dwelling units	45	0.10	0.30	0.40	0.32	0.19	0.51
822 - Strip Retail Plaza	1,000 sqft	6.55	1.42	0.94	2.36	3.30	3.26	6.59
712 - Small Office		4.36	1.37	0.30	1.67	0.73	1.43	2.16

Table 3.2 summarizes the anticipated future site generated vehicle trips for the proposed development based on the above rates. As shown, the site is expected to generate approximately 44 two-way vehicle trips in the weekday AM peak hour (less than one vehicle per minute), and 80 two-way vehicle trips in the weekday PM peak hour (just over one vehicle per minute).

Table 3.2: Estimated Peak Hour Site Vehicle Trips

LAND USE	AM PEAK HOUR			PM PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL
220 Residential - Low Rise	4	14	18	14	8	23
822 - Strip Retail Plaza	9	6	15	22	22	43
712 - Small Office	9	2	11	5	9	14
TOTAL	23	22	44	41	39	80

Trip Distribution & Assignment

Trips generated by the proposed development were assigned to the study network based largely on existing travel patterns observed for the area.

Table 3.3 summarizes the assumed site traffic distribution through the study area, while **Exhibit 3.4** presents the site generated traffic assignment on the area road network.

Table 3.3: Estimated Trip Distribution

ORGIN/DESTINATION	WEEKDAY AM PEAK HOUR		WEEKDAY PM PEAK HOUR	
	IN (%)	OUT (%)	IN (%)	OUT (%)
Prospect Street North	15%	15%	15%	15%
Frontier Street North	5%	5%	5%	5%
Aspen Blvd	5%	5%	5%	5%
Pemberton Portage Road	75%	75%	75%	75%
Aster Street West	0%	0%	0%	0%
Prospect Street South	0%	0%	0%	0%
Pioneer Road	0%	0%	0%	0%
TOTAL	100%	100%	100%	100%

3.1.3 Total Traffic

Total traffic consists of the future background traffic volumes plus the proposed development's site-generated traffic volumes layered on. **Exhibit 3.5** presents the forecasted future traffic volumes for the Opening Day (2025) Total Traffic scenario (Weekday AM & PM), while **Exhibit 3.6 & Exhibit 3.7** highlight the forecasted future traffic volumes for the Opening Day + 5 Years (2030) Total Traffic scenario (Weekday AM & PM) and Opening Day + 10 Years (2035) Total Traffic scenario (Weekday AM & PM), respectively.

Exhibit 3.4

Site Traffic Forecasts

7421-23-25 Prospect Street
04-22-0348 January 2023

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Exhibit 3.5

Opening Day (2025) Total Traffic Forecasts

7421-23-25 Prospect Street
04-22-0348 January 2023

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Exhibit 3.6

Opening Day + 5 Years (2030) Total Traffic Forecasts

7421-23-25 Prospect Street
04-22-0348 January 2023

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Exhibit 3.7

Opening Day + 10 Years (2035) Total Traffic Forecasts

7421-23-25 Prospect Street
04-22-0348 January 2023

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3.2 Future Traffic Operations

3.2.1 Future Conditions Analysis Assumptions

The traffic operational analysis for future conditions was completed using the following assumptions:

- The peak hour factor, pedestrian and cyclist levels remained consistent with the surveyed levels.
- Intersection configurations and link speeds were kept the same as the existing conditions since no road improvements are planned for the study area.

3.2.2 Future Background Traffic Operations

Table 3.4, 3.5 and 3.6 summarise the weekday AM and PM peak hour traffic operations results for the Opening Day Horizon (2025) Background, Opening Day Horizon +5 Years (2035) Background traffic and Opening Day Horizon + 10 Years (2035) Background traffic scenarios.

Table 3.4: Opening Day (2025) Background Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Aster Street / Prospect Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.01	4	A	0.01	3
	WB	A	0.00	-	A	0.00	-
	NB	A	0.01	8	A	0.02	10
	SB	A	0.09	16	A	0.11	16
Prospect Street / Birch Road (All-Way Stop Control)	*OVERALL*	*A*			*A*		
	WB	A	0.31	25	A	0.38	26
	NB	A	0.09	17	A	0.13	17
	SB	A	0.30	28	A	0.40	31
Birch Road / Frontier Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	*A*	*0.00*	*7*	*A*	*0.01*	*13*
	WB	*A*	*0.08*	*17*	*A*	*0.07*	*25*
	NB	*A*	*0.12*	*17*	*B*	*0.27*	*27*
	SB	*A*	*0.04*	*9*	*B*	*0.40*	*19*
Birch Road / Pemberton Portage Road / Aspen Blvd (Roundabout)	*OVERALL*	*A*			A		
	EB	A	0.27	13	A	0.34	20
	NB	A	0.27	14	A	0.39	22
	SB	A	0.21	9	A	0.09	4

As can be seen above, the anticipated background growth traffic does not cause a significant change to the intersection performance across the network. The level of service at Birch Road and Frontier Street has changed from Level A to B, in the PM peak, on the controlled approaches with a slight increase in queue length, but this increase is still significantly below the thresholds allowed.

Table 3.5: Opening Day + 5 Years (2030) Background Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Aster Street / Prospect Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.01	2	A	0.02	-
	WB	A	0.00	-	A	0.00	-
	NB	A	0.01	9	A	0.02	12
	SB	A	0.10	15	A	0.12	16
Prospect Street / Birch Road (All-Way Stop Control)	*OVERALL*	*A*			*A*		
	WB	A	0.35	29	A	0.43	30
	NB	A	0.11	18	A	0.15	19
	SB	A	0.33	27	A	0.45	32
Birch Road / Frontier Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.00	4	A	0.01	17
	WB	A	0.03	13	A	0.08	32
	NB	A	0.14	19	B	0.31	28
	SB	A	0.04	10	B	0.53	20
Birch Road / Pemberton Portage Road / Aspen Blvd (Roundabout)	*OVERALL*	*A*			A		
	EB	A	0.30	15	A	0.38	23
	NB	A	0.30	16	A	0.43	26
	SB	A	0.23	10	A	0.11	4

As seen in the background year analysis, the 2030 results also demonstrate no significant changes to the operations of the highway network, the intersections within the study area continue to operate well below the thresholds. A slight increase to the delays and Volume /Capacity is seen throughout but the Level of Service remains unchanged.

Table 3.6: Opening Day + 10 Years (2035) Background Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Aster Street / Prospect Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.01	3	A	0.02	4
	WB	A	0.00	-	A	0.00	-
	NB	A	0.01	9	A	0.02	12
	SB	A	0.11	15	A	0.13	15
Prospect Street / Birch Road (All-Way Stop Control)	*OVERALL*	*A*			*A*		
	WB	A	0.39	32	A	0.49	39
	NB	A	0.12	18	A	0.17	18
	SB	A	0.38	31	A	0.51	35
Birch Road / Frontier Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.00	7	A	0.02	22
	WB	A	0.04	22	A	0.10	35
	NB	B	0.16	22	C	0.38	31
	SB	A	0.05	8	C	0.75	26
Birch Road / Pemberton Portage Road / Aspen Blvd (Roundabout)	*OVERALL*	*A*			A		
	EB	A	0.34	18	A	0.42	28
	NB	A	0.27	19	A	0.48	31
	SB	A	0.33	12	A	0.13	5

The table above demonstrates that similar to the 2030 background results, there have been sight increases in the queues and volume/capacity ratios. However, the delays witnessed at Frontier Street / Birch Road have been increased further from a Level B to a Level C on the controlled approaches. These still operate below the thresholds.

3.2.3 Future Total Traffic Operations

Future total traffic operations examine the background future volumes with the addition of the proposed development's site trips. **Tables 3.5, 3.6**, and **3.7** summarize the intersection operations results for the weekday AM and PM peak hours for the Opening Day (2025) Total Traffic, Opening Day + 5 Years (2030), and Opening Day + 10 Years (2034) Total Traffic scenarios. The results from the Total scenario were compared with the Background operations (i.e., without the proposed development) to assess the predicted net impact of the proposed development.

Table 3.7: Opening Day (2025) Total Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Aster Street / Prospect Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.03	2	A	0.04	7
	WB	A	0.00	-	A	0.00	-
	NB	A	0.01	8	A	0.02	9
	SB	A	0.11	17	A	0.15	19
Prospect Street / Birch Road (All-Way Stop Control)	*OVERALL*	*A*			*A*		
	WB	A	0.34	31	A	0.43	30
	NB	A	0.12	20	A	0.18	21
	SB	A	0.31	29	A	0.42	31
Birch Road / Frontier Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.00	4	A	0.01	15
	WB	A	0.03	18	A	0.08	27
	NB	A	0.13	19	B	0.29	28
	SB	A	0.04	10	B	0.46	19
Birch Road / Pemberton Portage Road / Aspen Blvd (Roundabout)	*OVERALL*	*A*			A		
	EB	A	0.30	15	A	0.37	22
	NB	A	0.30	16	A	0.41	24
	SB	A	0.22	9	A	0.10	4

The addition of development traffic to the network model has not led to anything significant impacts on the study intersections. The previously noted increases to volume/capacity ratios, and queue lengths within in the PM Peak hour at Frontier Street / Birch Road during the Opening Day 2025 scenario are still present but are significantly below the thresholds.

Table 3.8: Opening Day + 5 Year (2030) Total Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Aster Street / Prospect Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.03	3	A	0.04	10
	WB	A	0.00	-	A	0.00	-
	NB	A	0.01	10	A	0.02	10
	SB	A	0.12	18	A	0.16	20
Prospect Street / Birch Road (All-Way Stop Control)	*OVERALL*	*A*			*A*		
	WB	A	0.38	31	A	0.49	31
	NB	A	0.14	17	A	0.20	18
	SB	A	0.34	29	A	0.48	31
Birch Road / Frontier Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.00	8	A	0.02	15
	WB	A	0.04	20	A	0.09	34
	NB	A	0.15	22	B	0.34	31
	SB	A	0.05	9	C	0.62	21
Birch Road / Pemberton Portage Road / Aspen Blvd (Roundabout)	*OVERALL*	*A*			A		
	EB	A	0.33	17	A	0.40	26
	NB	A	0.32	18	A	0.46	28
	SB	A	0.25	11	A	0.11	5

Within the PM peak hour, increases to the volume/capacity ratios and the 95th percentile queues were observed to the north and southbound movements of Frontier Street, at the intersection with Birch Road. The increase saw a Level of Service C on the controlled approaches. However, both movements continue to operate well within the thresholds. No significant impact is observed within the AM peak and across the other intersections of the PM peak.

Table 3.9: Opening Day + 10 Years (2035) Total Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
Aster Street / Prospect Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.03	3	A	0.04	9
	WB	A	0.00	-	A	0.00	-
	NB	A	0.01	10	A	0.03	10
	SB	A	0.13	16	A	0.18	19
Prospect Street / Birch Road (All-Way Stop Control)	*OVERALL*	*A*			*A*		
	WB	A	0.42	32	A	0.55	38
	NB	A	0.15	21	A	0.23	22
	SB	A	0.39	27	A	0.54	36
Birch Road / Frontier Street (Two-Way Stop Control)	*OVERALL*	*A*			*A*		
	EB	A	0.00	9	A	0.02	20
	WB	A	0.04	19	A	0.10	33
	NB	B	0.17	20	B	0.41	28
	SB	A	0.06	11	C	**0.86**	32
Birch Road / Pemberton Portage Road / Aspen Blvd (Roundabout)	*OVERALL*	*A*			A		
	EB	A	0.37	20	A	0.45	30
	NB	A	0.28	21	A	0.50	34
	SB	A	0.35	12	A	0.13	6

As per the previous results, the introduction of traffic has been demonstrated to have negligible effect on the background 2035 scenario, with minor increases within the PM peak period. The southbound movement volume capacity at Birch Road / Frontier Street is slightly above 0.85 (0.86) but is still below 0.95 and therefore, whilst it is approaching practical capacity, it is still deemed as operational. No mitigation is being suggested to the intersection at Frontier Street / Birch Road as the rest of the intersections operate without issue in the PM peak and has no issues with any movement in the AM peak.

3.2.4 Summary of Traffic Impacts

The surrounding road network operates well within capacity during the weekday AM and PM peak hours. All intersections are below the 0.85 threshold, apart from the southbound movement at Frontier Street / Birch Road in the Total 2035 PM peak, this sees a V/C ratio of 0.86 but the delay queues are still below the thresholds. Across the intersection (northbound), the peak queues are seen to be higher in the PM peak, however this is not caused by the proposed development traffic, but rather the increased through traffic volume.

4. SITE PLAN REVIEW

This section provides a design review of the transportation-related components of the development including the site access driveways, parkade access, loading access, and waste collection facilities. Within this section the bylaw calculations for all vehicle types.

4.1 Site Access Design

As **Exhibit 4.1** indicates, residents would enter and exit the site via a ramp to the south of the site, off Aster Street. The ramp connecting to the underground parkade has a maximum slope of 10%, before leveling out at the bottom of the access ramp. As shown, the site access design allows for concurrent passenger vehicle movements on the ramp entrance and within the parkade.

Residential and commercial visitors to the site would use the on-street parking that is provided within the vicinity of the site.

4.2 Parkade Circulation

Exhibit 4.2 demonstrates passenger vehicle circulation at the key corners within the parkade of where most interactions are likely to occur. The exhibit demonstrates that a standard P-TAC and small passenger vehicle can pass each other at the corners.

The parkade is set out with one driveway aisle. As the parkade is for residential land uses, the parking spaces will be allocated per resident upon the purchase of their unit, therefore, residents will travel directly to their specified space and would not circulate through the rest of the parkade. The allocation of spaces will be based on the vehicle type of the property owners.

The parking spaces that are located at the end of the southern aisle are not accessible by P-TAC passenger vehicles but can be accessed by a small car vehicle (Jeep) as demonstrated in **Exhibits 4.3 and 4.4**. This stall has been demonstrated as accommodating a small car and as such will be labelled as a small car stall, as shown in **Exhibit 4.4**.

4.3 Parking Bylaw Review

4.3.1 Vehicle Parking

The vehicle parking requirements for the proposed development as per *Village of Pemberton Bylaw No. 832, 2018* are noted in **Table 4.**1 below along with the proposed provided parking supply.

Table 4.1: Vehicle Parking Supply Requirement & Provision

LAND USE		DENSITY	BYLAW RATE	BYLAW SUPPLY REQUIREMENT	PROVIDED	DIFFERENCE
Residential	Studio	4 Units	1 per dwelling unit[1]	4	4	0
	One Bedroom	29 Units	1 per dwelling unit	29	29	0
	Two Bedroom	12 Units	1.75 per dwelling unit	21	15	-6
	Visitor	45	0.25 per dwelling Units	11	6[2]	-8
Commercial	Neighbourhood Commercial	1,021m^2	0.25 per 100m^2	3		
				68	54	-14

1. Studio dwellings are not specified in the Bylaw therefore the one-bedroom rate has been applied.
2. Shared residential visitor/commercial retail

As shown, the development is required to provide a total of 68 parking spaces, including 54 residential spaces, 11 residential visitor spaces, and 3 commercial spaces, while the proposed parking supply is 54 spaces (48 residential, and 6 shared residential visitor/commercial spaces) which is 14 spaces short of the requirement. As such, there is a parking relaxation requested, and the supporting rationale is provided below.

4.4 Parking Relaxation Supporting Rationale

The current proposal seeks a parking relaxation of 20%, or 14 parking spaces. Given the nature and scale of the development and its context within the village centre area of Pemberton Bunt considers the proposed parking provisions to be appropriate. Various factors should be considered in determining the appropriate parking provisions, including the appropriate parking rate requirements as well as the practical use and function of the site and availability of onsite and offsite parking. These factors are described in detail below.

4.4.1 Residential Parking Rate (Two-Bedroom Units)

The Village of Pemberton Zoning Bylaw requires a parking supply rate of 1.75 spaces per unit for 2-bedroom units, which when comparing with other similar municipalities, Bunt considers to be high. Bunt recommends the Village to consider a lower rate of 1.25 per unit, which is in line with average rates of other municipalities of similar size and context that are also located in more remote locations. **Table 4.2** summarizes the two-bedroom + residential parking requirements for various comparable municipalities within BC along with the number of parking spaces that would be required for 2-bedroom + units.

Table 4.2: Two Bedroom Parking Requirements for Comparable Municipalities

MUNICIPALITY	UNITS / AREA	BYLAW RATE	REQUIRED SPACES
Nelson	12	Multi-Unit Residential (2+ Bedrooms): 1 space per dwelling unit	12
Duncan		1.2 per unit with two or more bedrooms	14
Kamloops		1.5 spaces per 2-bedroom unit	18
District of Lillooet		1.25 per Dwelling Unit (includes a visitor parking area)	15
Revelstoke		1.5 per dwelling unit	18
Merritt		1 space per 1or 2 Bedroom unit	12
Salmon Arm		Upper Floor Dwelling Unit: 1.25 per dwelling unit	15
Oliver		Studio suite, 1 or 2 bedrooms: 1 per dwelling unit	12
Average Rate		**1.21 per dwelling unit**	**15**

As shown, the average rate for two-bedroom units or similar in comparable communities in BC would yield a parking requirement of 15 parking spaces, which would be 6 parking spaces less than the Village's current requirement for 2-bedroom + units.

4.4.2 Residential Visitor Parking

The Village of Pemberton Zoning Bylaw requires a residential visitor parking rate of 0.25 spaces per unit, which is also considered to be high compared with recent trends in visitor parking demand for multi-family residential buildings[1]. Given the provision of 11 formalized on-street parking spaces on the site frontages (Prospect Street and Aster Street) available to support the development, as well as consideration of visitor parking requirements in other similar municipalities, and other supporting information below, Bunt recommends an adjusted parking supply rate of 0.08 visitor parking spaces per unit be considered by the Village of Pemberton for this development as well as allowing for sharing between residential visitors and commercial customers.

Bunt has prepared the following rationale to support the proposed parking supply of 6 shared visitor/commercial parking spaces.

Table 4.3 summarizes the residential visitor parking requirements for various comparable municipalities within BC.

[1] Bunt data for multi-family residential sites indicates that visitor parking demand is typically in the realm of 0.05 to 0.10 spaces per unit or lower, which is consistent with the MVAPS and RPS studies

Table 4.3: Residential Visitor Parking Requirements for Comparable Municipalities

LAND USE	UNITS / AREA	BYLAW RATE	REQUIRED SPACES
Nelson	45	Multi-Unit Residential (2+ Bedrooms): 0.1 visitor spaces per dwelling unit	5
Duncan		No residential visitor parking requirement	0
Kamloops		Additional 15% for designated visitor parking	7
District of Lillooet		A minimum of 15% of required parking	7
Salmon Arm		No residential visitor parking requirement	0
Revelstoke		No residential visitor parking requirement	0
Merritt		0.1 parking stall per unit	5
Oliver		0.2 parking stall per unit	9
AVERAGE (0.0875/UNIT)			4

Based on the comparable municipalities, the average visitor parking supply rate of 0.0875 spaces per unit would require 4 parking spaces.

Metro Vancouver Apartment Parking Study (2012) & Regional Parking Study (2018)

The Metro Vancouver Apartment Parking Study (MVAPS) is a regional-scale apartment parking study prepared by Metro Vancouver in 2012, and supplemented in 2018 with the Regional Parking Study (RPS). One of the key findings stated in these studies is that visitor parking may be oversupplied throughout the region. Specifically, observed parking demand rates were below 0.10 spaces per apartment unit, compared to the typical municipal requirement of 0.20 visitor spaces per apartment unit.

In addition, interviews undertaken with apartment developers as part of this study indicated that a visitor parking rate of 0.20 spaces per unit was found to be excessive in their experience. As such, in some instances, surplus visitor spaces have been sold to tenants as privately assigned spaces rather than retained as designated visitor parking to be more space economical.

Previous Bunt Parking Studies

Table 4.4 provides a summary of the peak visitor parking rates observed at several multi-family residential buildings in Metro Vancouver. At these locations, peak visitor parking demand data was collected over the course of one to four days.

Table 4.4: Visitor Parking Studies by Bunt

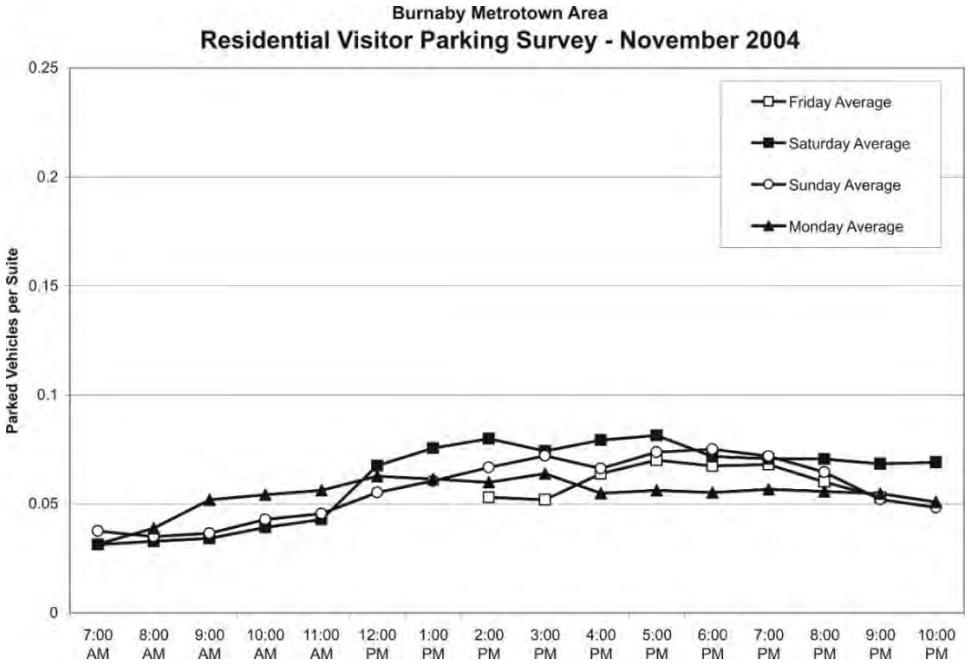
DESCRIPTION	MUNICIPALITY	# DAYS OF DATA	PEAK VISITOR PARKING DEMAND RATE (SPACES/UNIT)
One Lonsdale Corridor Rental Tower	City of North Vancouver	1 Day	0.05
Two Guildford Town Centre Apartment Towers	City of Surrey	4 Days	0.08
Six Metrotown Area Apartment Towers	City of Burnaby	2 Days	0.08

The peak visitor parking demand rate observed ranged from 0.05 to 0.08 spaces per unit. This visitor parking demand falls well under the 0.25 spaces per unit required by the Village of Pemberton.

It should be noted that during the Guildford Towers visitor parking surveys, which covered Friday and Saturday afternoon and evening periods at two buildings, Bunt interviewed the drivers who were using the designated visitor parking spaces. Over 50% of these users indicated that they were residents using the visitor parking for short-term convenience parking. As such, it is Bunt's view that this may be a common occurrence, leading to higher than required visitor parking rates when such rates are based solely on direct observation.

To provide an indication of how visitor parking demand varies over the course of a day, **Figure 4.1** provides the average observed parking demand profile from six Metrotown area apartment buildings included in Bunt's visitor parking study. As this figure indicates, visitor parking demand is generally highest on weekend afternoons, with the highest demand found to be on Saturday afternoon with a demand rate of 0.08 spaces per unit.

Figure 4.1: Residential Visitor Parking Survey



Residential Visitor Parking Summary

Based on the parking rates for comparable municipalities, information from the MVAPS and RPS studies, and Bunt's visitor parking study as well as the fact that there will be 11 on street parking spaces provided on the site frontage as part of the development it is Bunt's opinion that providing the Village of Pemberton's current visitor parking rate of 0.25 spaces per unit would overstate the anticipated demand and result in an over-supply of visitor parking for the site. Therefore, Bunt recommends the Village of Pemberton consider a visitor parking supply rate of 0.08 spaces per unit for this development which would equate to a parking supply of 4 visitor parking spaces.

4.4.3 Commercial Parking

The Village of Pemberton Bylaw requires a rate of 0.25 spaces per 100m^2 of neighbourhood commercial area. Applying this rate to the proposed development results in a requirement of 3 commercial visitor spaces. However, it is important to consider the behaviour of users driving to visit the commercial units within the building. While commercial visitors may utilize underground parking for large-format retailers, they are less likely to enter an underground parkade to visit smaller commercial street-oriented retail units which typically have higher rates of turnover with shorter visits. Further, there is likely to be some internal capture with the mixed-use nature of the development whereby residents living above, or in proximity off-site would not drive and would walk or cycle to the commercial businesses on the site.

Visitors of the commercial units will likely utilize the street parking within the area, and thus the supply of on street parking should be considered adequate to serve the limited commercial parking needs of the site, without providing any commercial parking in the underground parking garage. Notwithstanding this, it is recommended that residential visitor parking be shared with commercial parking to accommodate additional demand that may occur from time to time.

4.4.4 Parking Requirements with Adjusted Rates

Using the recommended parking ratios that were observed in similar contexts across BC as well as supporting information from the MVAPS and RPS studies, Bunt's visitor parking studies, and that there will be 11 on-street parking spaces directly adjacent to the development's frontages, a recommended level of parking for the proposed development has been set out within **Table 4.5**. The parking rate for two-bedroom units has been reduced to 1.25 parking spaces per unit and the visitor parking rate has been reduced from 0.25 to 0.08 spaces per unit (shared with commercial), while commercial parking demands as discussed, could be accommodated with the on-street parking provided along the site frontages and in the surrounding village centre area along with additional shared visitor/commercial parking spaces (6 shared spaces total).

Table 4.5: Vehicle Parking Supply with Adjusted Rates

LAND USE		DENSITY	REQUESTED RATE	ADJUSTED SUPPLY REQUIREMENT	PROVIDED	DIFFERENCE
Residential	Studio	4 Units	1 space per dwelling unit	4	4	0
	One Bedroom	29 Units	1 space per dwelling unit	29	29	0
	Two Bedroom	12 Units	1.25 spaces per dwelling unit	15	15	0
	Visitor	45	0.08 spaces per unit (shared with commercial)	6 shared	6 shared	0
Commercial	Neighbourhood Commercial	1,021m^2	4 spaces to be shared with residential visitors			
				54	54	0

The adjusted requested rates for the residential element of the site are deemed to be more inline with other remote districts within BC. Given the constraints on the site and the provision of on-street parking within the vicinity of the site, this is determined to be a reasonable level of parking for the proposed development.

4.4.5 Existing Parking Provision

The existing site does not provide any parking provision off-street, therefore, residents of the two dwellings and visitors to the small retail unit use the on-street parking provision. The proposed off-street parkade will be able to accommodate all residential parking and visitors associated with the commercial parking. This will, therefore, alleviate the existing on-street parking demand. The additional spaces gained will be able to assist in accommodating the future commercial parking demand.

4.5 Bicycle Parking

Well managed, secure, accessible, and covered bicycle parking will be provided as part of the development plan. The development will supply at least 90 bicycle parking spaces located within a secure bike room within the ground floor and/or parkade levels. The bicycle parking requirement as per the Pemberton Bylaw requires 20% of the required vehicle parking. The provision of 90 bicycle parking spaces is significantly greater than the required 14 bicycle parking spaces (i.e., 20% of 68 required vehicle parking spaces) as per the Bylaw. This bike room will be used as a ski storeroom within the winter months.

4.6 Service Vehicle Operations

Due to the constraints on the site, residential and commercial loading is proposed to occur on-street within the layby provided along Aster Street and Prospect Street. The required number of loading vehicles is in **Table 4.5**.

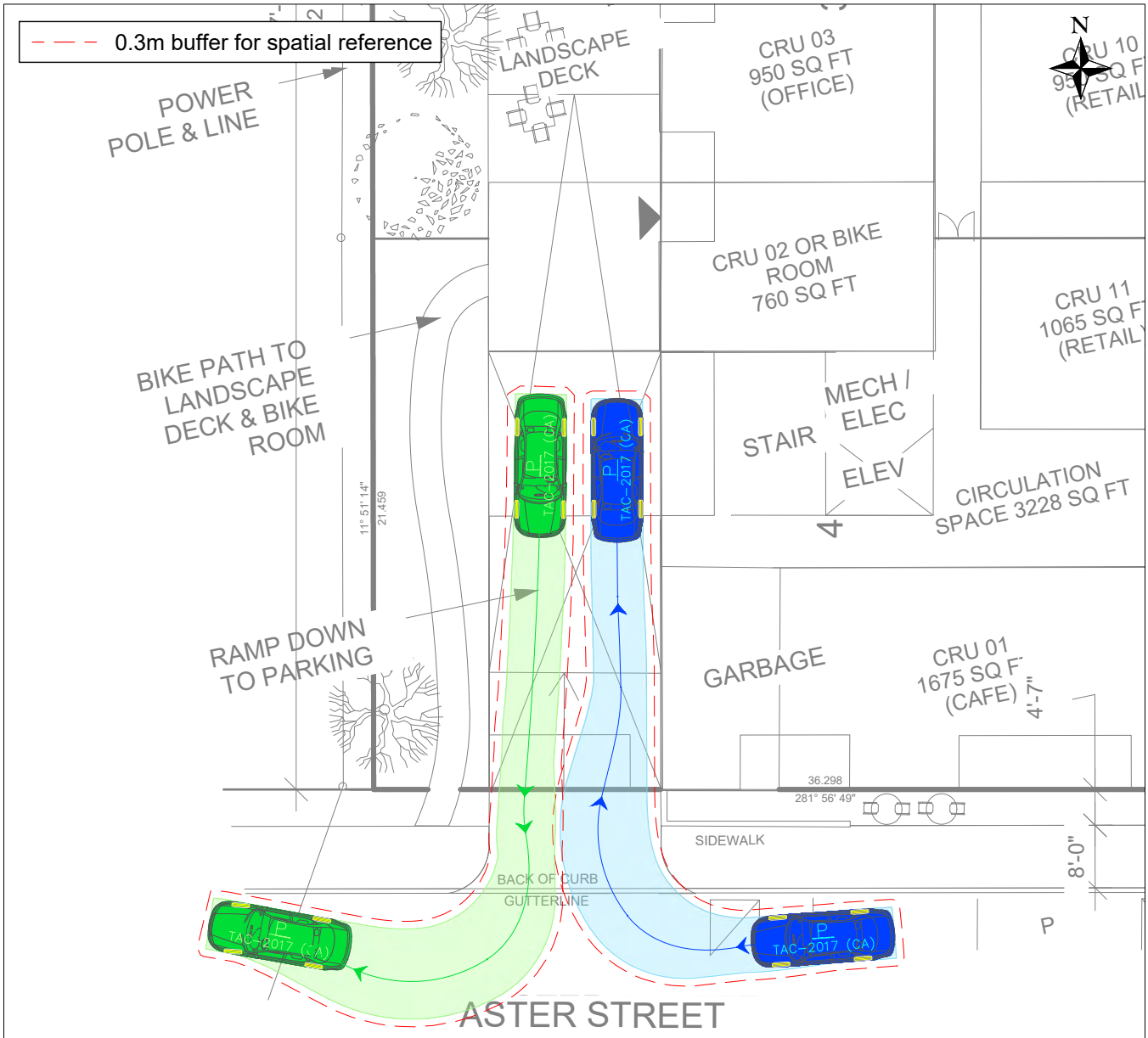
Table 4.5: Loading Bylaw Rates

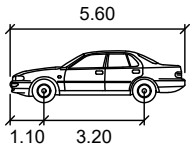
LAND USE	DENSITY	BYLAW RATE	BYLAW SUPPLY REQUIREMENT	PROVIDED	DIFFERENCE
Commercial	1,021m^2	1 space for the 300m^2 to 500m^2 of GFA or 2 spaces for 501m^2 to 2,500m^2 of GFA, and 1 space	2	0	-2
			2	0	-2

Given the small commercial unit sizes, it is unlikely that there will be frequent loading activity. Curbside loading is considered to be adequate to serve the needs of the site. If there is insufficient space on-street, then the loading vehicle will be able to utilise the residential driveway. It is proposed that a dedicated on-street loading bay between 7am to 5pm, on Aster Street, will be implemented.

Waste collection will take place as per the existing scenario, with garbage being collected on-street. The garbage collection room is located at ground level and therefore, bins will be wheeled out by site management on collection day. The bins will be stored next to the residential driveway access.

Exhibit 4.5 and **Exhibit 4.6** demonstrates the waste collection and medium loading vehicle delivery operation.





P

	meters
Width	: 2.00
Track	: 2.00
Lock to Lock Time	: 6.0
Steering Angle	: 35.9

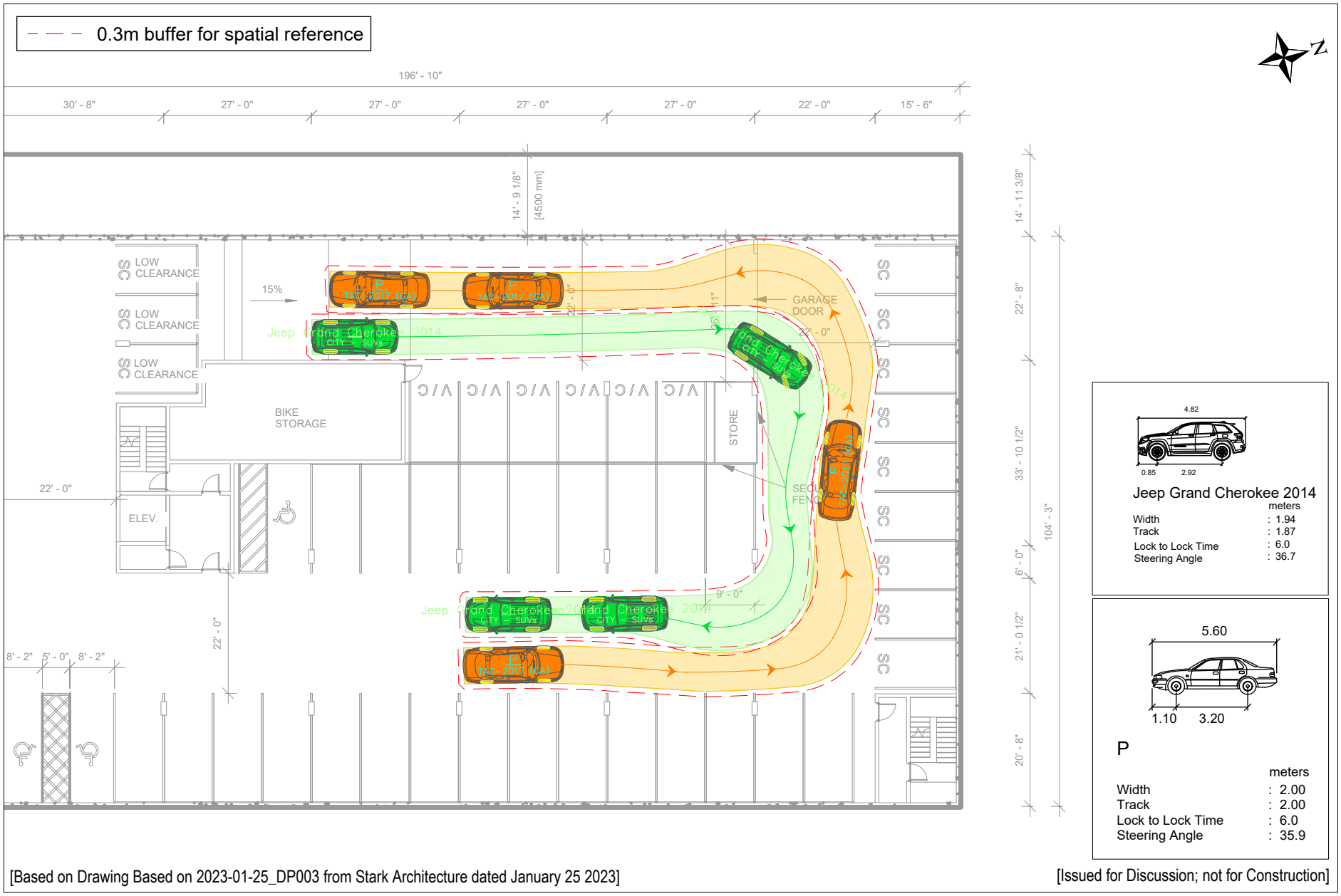
[Based on Drawing DP004 from Stark Architecture dated December 21 2022]
[Issued for Discussion; not for Construction]

Exhibit 4.1

Passenger Vehicle: Parkade Ramp Entrance Circulation

7421-23-25 Prospect Street
04-22-0348 January 2023 Scale 1:250 on Letter Prepared by HJ

bunt & associates



Jeep Grand Cherokee 2014

	meters
Width	: 1.94
Track	: 1.87
Lock to Lock Time	: 6.0
Steering Angle	: 36.7

P

	meters
Width	: 2.00
Track	: 2.00
Lock to Lock Time	: 6.0
Steering Angle	: 35.9

[Based on Drawing Based on 2023-01-25_DP003 from Stark Architecture dated January 25 2023]

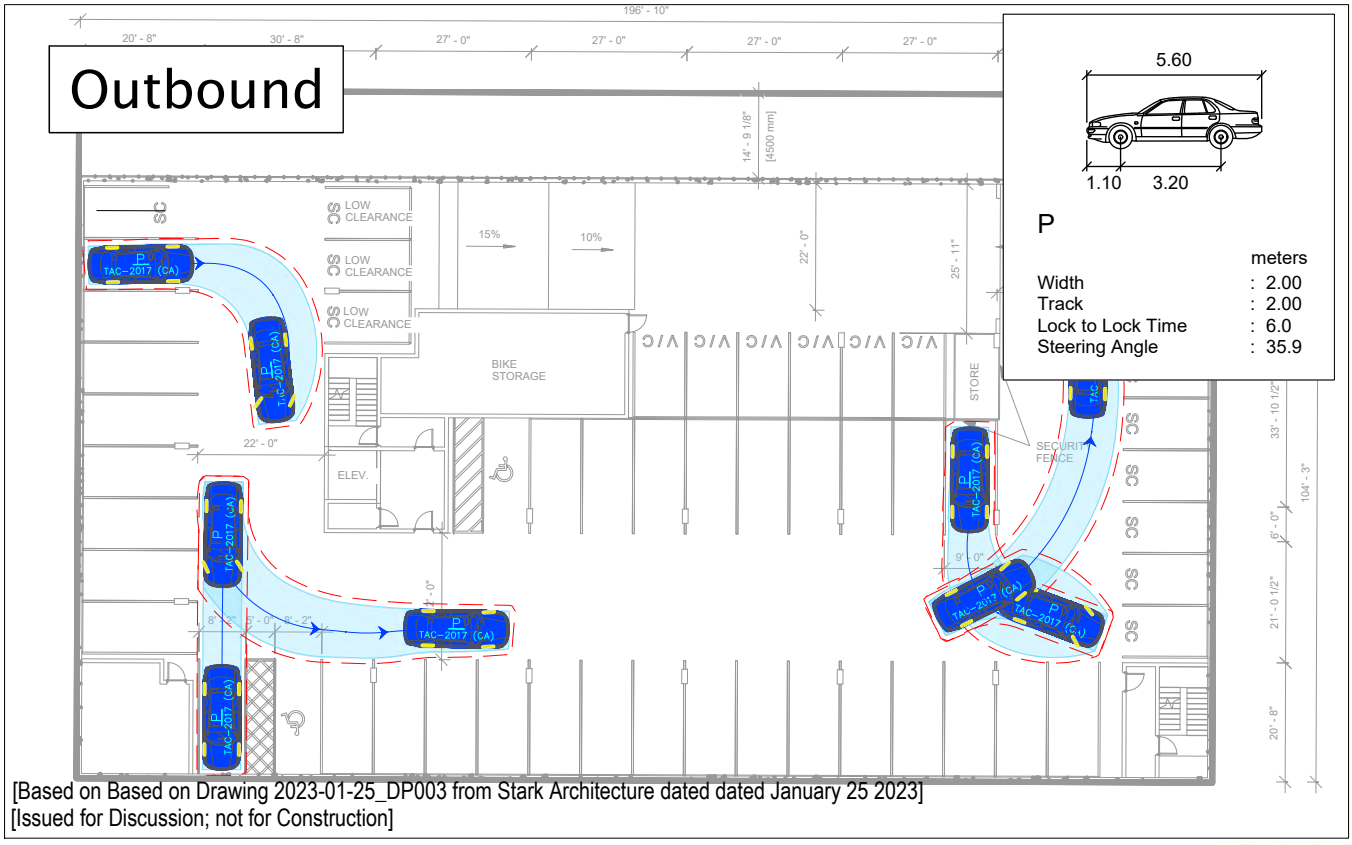
[Issued for Discussion; not for Construction]

Exhibit 4.2

Passenger Vehicle and Small Car: Parkade Maneuvering

7421-23-25 Prospect Street
04-22-0348 January 2023 Scale 1:300 on Letter Prepared by HJ

bunt & associates



[Based on Based on Drawing 2023-01-25_DP003 from Stark Architecture dated dated January 25 2023]
[Issued for Discussion; not for Construction]

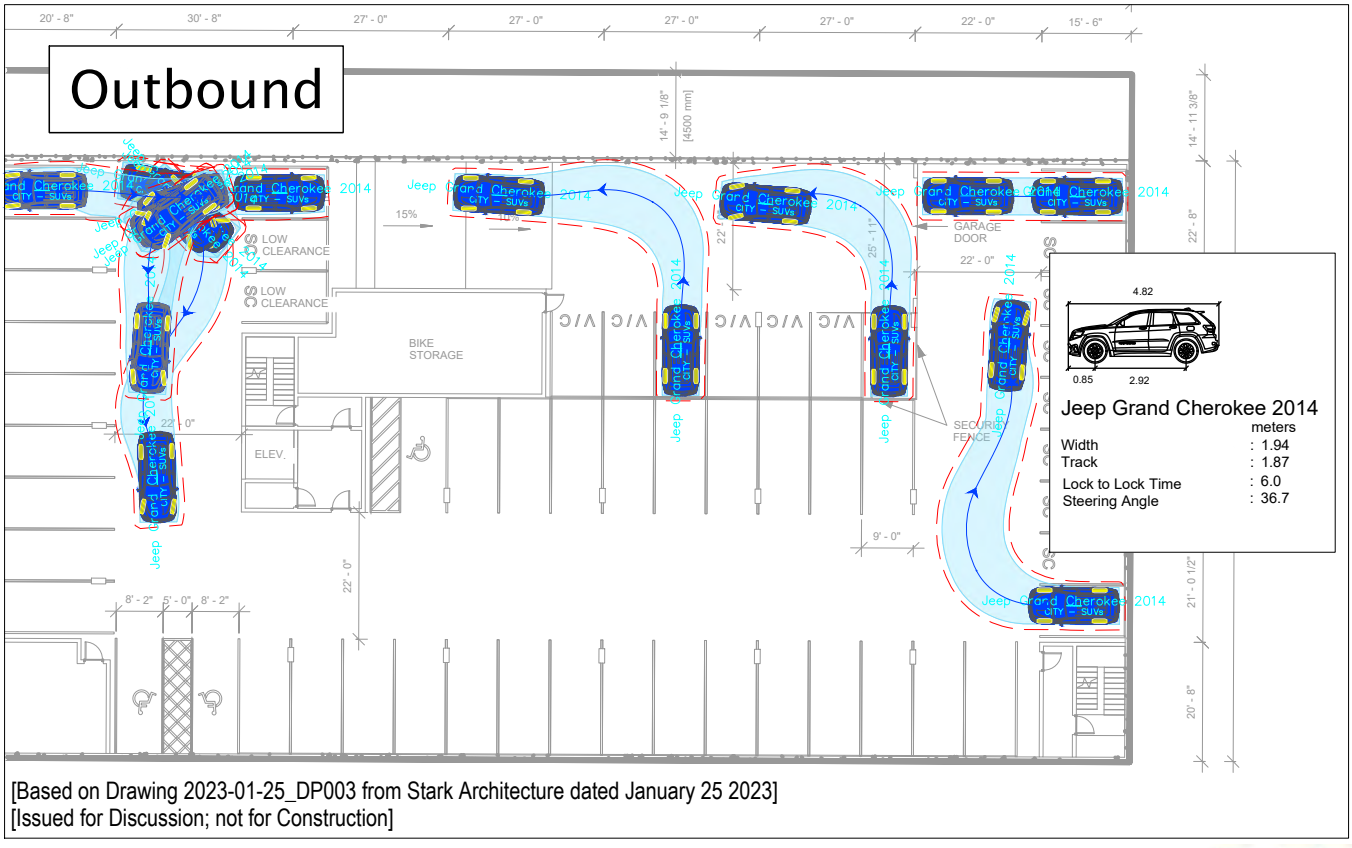
Exhibit 4.3

Passenger Vehicle: Parking Stall Access

7421-23-25 Prospect Street
04-22-0348 January 2023 Scale 1:400 on Letter Prepared by HJ

bunt & associates

M:\Operations\Dept BC\Projects\2022\04-22-0348 7421-23-25 Prospect St\4.0 Analysis & Design\2. CAD\04-22-0348_7421-23-25_Prospect_Street_AT_V02-02.dwg
2023/01/26 14:50, Plotted by Allan Conopio



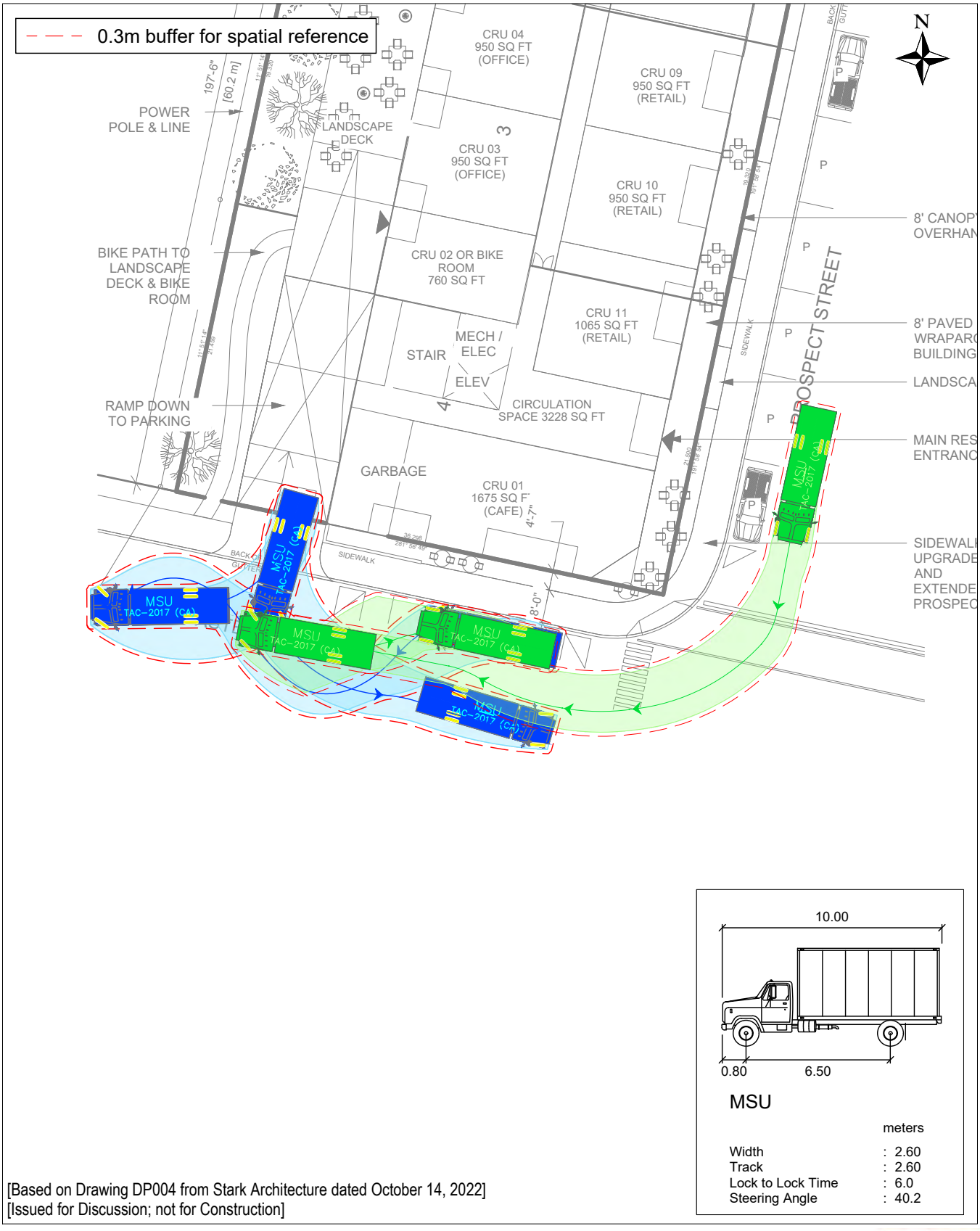
[Based on Drawing 2023-01-25_DP003 from Stark Architecture dated January 25 2023]
[Issued for Discussion; not for Construction]

Exhibit 4.4

Small Vehicle: Parking Stall Access

7421-23-25 Prospect Street
04-22-0348 January 2023 Scale 1:400 on Letter Prepared by HJ

bunt & associates



[Based on Drawing DP004 from Stark Architecture dated October 14, 2022]
[Issued for Discussion; not for Construction]

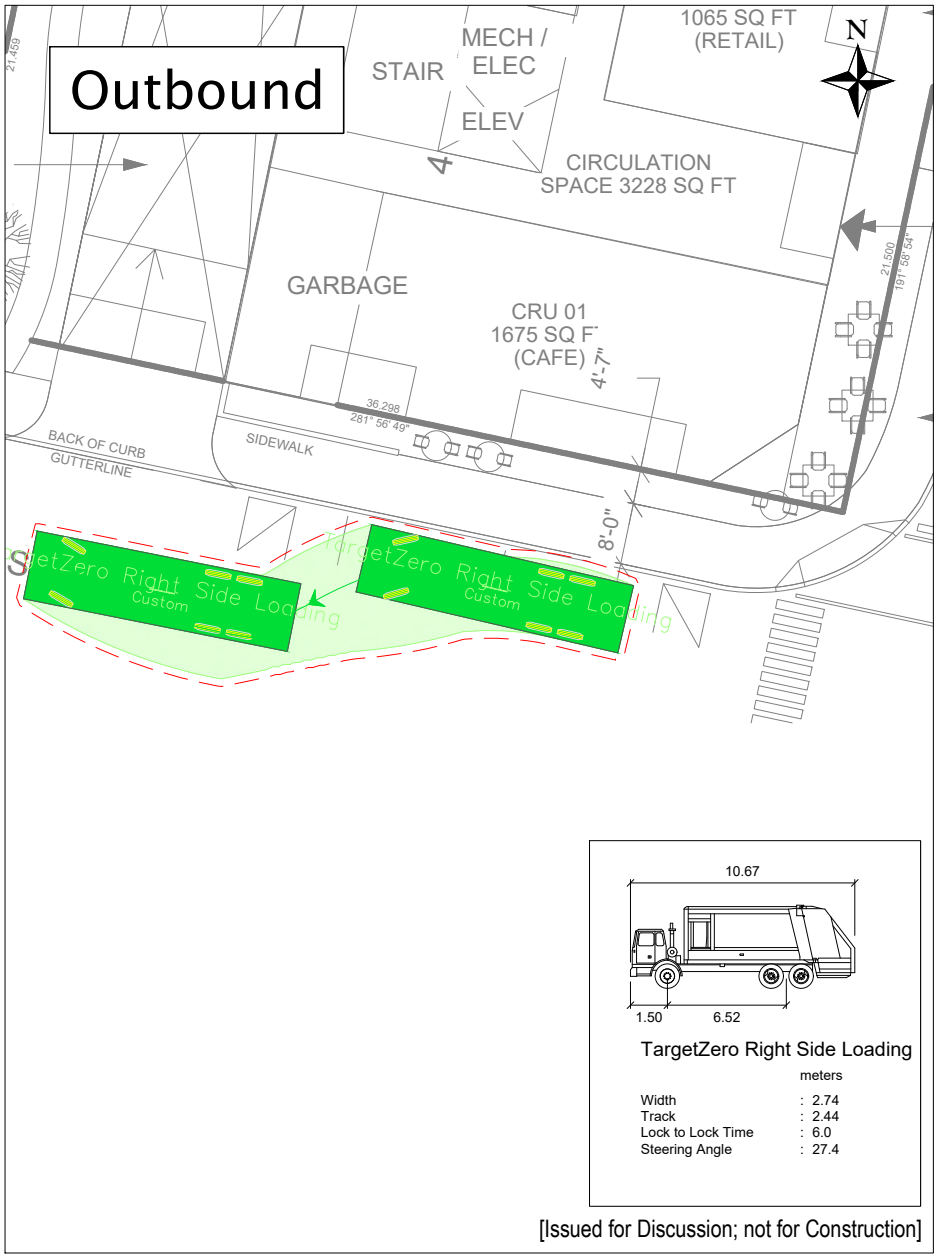
Exhibit 4.5

MSU: On-Street Loading Activity

7421-23-25 Prospect Street
04-22-0348 January 2023 Scale 1:400 on Letter Prepared by HJ

bunt & associates

[Based on Drawing DP004 from Stark Architecture dated October 14, 2022]



[Issued for Discussion; not for Construction]

Exhibit 4.6

Side Loader Waste Collector: Garbage / Recycling Collection

7421-23-25 Prospect Street
04-22-0348 January 2023 Scale 1:300 on Letter Prepared by HJ

bunt & associates

5. CONCLUSIONS & RECOMMENDATIONS

Bunt's conclusions and recommendations are presented in the sections below.

5.1 Conclusions

Key points from the study are outlined below.

Existing Conditions

1. The proposed development is located at 7421, 7423, 7425 Prospect Street, BC, which is currently made up of 2 single residential dwellings and a small commercial unit.
2. The site is located to the southwest of Pemberton village, and the corner of the Aster Street / Prospect Street intersection.
3. All intersections within the study area, including the roundabout of Birch Road / Pemberton Portage Ave / Aspen Blvd are within the prescribed operational thresholds for both the Weekday AM and PM peak periods.

Future Traffic

1. The proposed development is anticipated to generate circa 44 and 80 two-way vehicle trips (inbound and outbound combined) during the AM and PM peaks periods respectively.
2. Without the development in place (i.e., background traffic) for both future scenarios, 2030 and 2035 are seen to continue to operate within the thresholds across the network. With no movement or intersection reaching the threshold of 0.85.
3. With the addition of the proposed development's site traffic, the opening day and 2030 scenarios continue to operate sufficiently across all time periods. Within the PM peak hour during the 2035 scenario, the southbound movement of Frontier Street / Birch Road has a Volume Capacity of 0.86 for the southbound approach only, the delay and queue are still considered to be below the thresholds. This result of 0.86 is within the 0.85-0.95 range, which is approaching the operational capacity but not seen to be a significant concern.

Site Design and Development Plan Review

1. The proposed development is planning to provide access from Aster Street, which will provide access to the driveway ramp and ultimately P1.
2. The current site plans show a provision of 54 parking spaces (48 residential, and 6 shared residential visitor and commercial). In addition to this, 11 on-street parking spaces are provided fronting the site.
3. A total of 90 bicycle parking spaces will be provided within the parkade, this is above and beyond the required 14 bicycle spaces as per the bylaw.
4. The garbage and loading for the commercial and residential units will take place on-street as per the existing operations at the site.

5.2 Recommendations

1. The Village of Pemberton consider a parking supply rate of 1.25 spaces per unit for two-bedroom units.
2. Given the context of the rationale provided herein, that the Village of Pemberton consider a parking supply of 0.08 spaces per unit for residential visitor parking (i.e., 4 spaces) and that this should be shared along with shared commercial parking spaces (i.e., total of 6 shared parking spaces).
3. The Village of Pemberton should consider allowing the 11 on-street parking spaces on the site frontage be applicable towards accommodating the future residential visitor and commercial customer short-term parking demands.
4. A short-term loading bay (07:00-17:00 Monday to Friday) to be implemented on Aster Street, to the east of the site driveway to accommodate additional loading demands.

APPENDIX A

Terms of Reference

September 28th, 2022
04-22-0348P

Scott McRae
Manager, Development Services
Village of Pemberton
Box 100, 7400 Prospect Street
Vancouver, BC
V0N 2L0

VIA E-MAIL: smcrae@pemberton.ca

Dear Scott,

Re: 7421/23/35 Prospect St, Village of Pemberton
Terms of Reference – Transportation Impact Assessment

We have prepared the following Terms of Reference (ToR) for Bunt & Associates Engineering Ltd. (Bunt) to undertake a Transportation Impact Assessment (TIA) for the proposed residential-led mixed-use development located at 7421 / 7423 / 7435 Prospect Street in the Village of Pemberton. This ToR is intended to be reviewed and approved by the Village of Pemberton (VoP) staff before commencing work on the study.

As part of this Rezoning Application submission Bunt will provide required transportation planning and engineering documents, anticipated at this time to be a TIA report with network modelling and traffic impact. We also anticipate that our services will be required for site design review and provided commentary/guidance on the loading and garbage strategy, supply, and operation.

If you have questions regarding the below or need further clarification, please call me at 604.685.6427 ext. 251 or email me at hjohnston@bunteng.com

Yours truly,

Bunt & Associates

Hugo Johnston, BSc
Transportation Planner

Tyler Thomson, MURB MCIP RPP PTP
Senior Transportation Planner

1. SCOPE OF WORK

1.1 Existing Conditions

- Provide context on-site location, as well as existing site and adjacent land uses.
- Outline the proposed development plan and statistics.
- Describe existing transportations systems of all modes (vehicles, pedestrians, cyclists, and public transit) in the vicinity of the development site in the context of amenities nearby.
- Discuss on-street and off-street parking arrangements adjacent to the site.
- Review any relevant policies or plans from the VoP.
- Undertake transportation counts (vehicles, pedestrians, cyclists and heavy vehicles) at two intersections within the vicinity of the site. These intersections have been selected using knowledge of the area and the anticipated traffic distribution as well as taking into consideration the expected vehicle trip generation for the proposed development. The transportation surveys will be undertaken for the morning (07:00-09:00) and afternoon (16:00-18:00) peak periods at the following intersections:
- Prospect Street / Aster Street
- Prospect Street / Birch Road
- Conduct an existing conditions traffic operations analysis at the study intersections using the Synchro traffic analysis model and software program at the intersections listed above

1.2 Future Conditions Assessment

- Background traffic - Apply a 1% annual growth rate to existing traffic volumes (recommended based on the analysis of existing datasets in the region) to develop future background traffic volumes. It is considered that any survey undertaken is similar to levels that were observed prior to the Covid-19 Pandemic, therefore, no additional growth or uplift will be applied to the observed traffic counts.
- Calculate expected future vehicle trip generation based on the ITE Trip Generation Manual and Bunt's Database. The rates Bunt proposes to use are as follows:

LAND USE	QUANTITY	MEASURE	AM PEAK HOUR			PM PEAK HOUR		
			%ENTER	%EXIT	RATE	%ENTER	%EXIT	RATE
ITE 220 - Multifamily Housing (Low-Rise)	45	Units	24%	76%	0.4	63%	37%	0.51
ITE 822 – Strip Plaza Commercial	4,540	Sq ft	60%	40%	2.36	50%	50%	6.59
ITE 712 – Small Office Building Office	4,915	Sq ft	82%	18%	1.67	34%	66%	2.16

- Calculate a net development traffic uplift based on the existing and proposed land usage.
- Assign site-generated traffic onto the study network intersections based on existing traffic distributions in the study area. As part of the study, Bunt intends to conduct traffic operations analysis at the study intersections for the following scenarios:
- The Existing AM and PM peak hours.
- Opening Day – Background (2025) AM and PM peak hours; and Opening Day (2025) Total AM and PM traffic conditions.
- Future Horizon Year (Opening Day + 10 Years)– Background (2035) AM and PM peak hours; and Opening Day + 10 Years (2035) Total AM and PM traffic conditions.
- Assess operations using methods outlined in the Highway Capacity Manual (HCM) 6th Edition, with Synchro 11 and SimTraffic analysis software, where appropriate. Should HCM 6th Edition not provide an appropriate result HCM 2010 will be referred to.

1.3 Site Plan Review

- Utilize AutoTurn software to conduct a review of the proposed site plan to identify and provide feedback on potential traffic-related issues, e.g., vehicle site circulation, intersection sightlines, site access for driveway and parking ramp geometry and locations, waste collection, fire truck/ emergency access, and pedestrian, cycling, and micro-mobility facilities.
- Review how non-auto modes will access the site, with connections to the surrounding network.
- Conduct parking (vehicle and bicycle) and loading supply reviews, including conducting a review of VoP's parking requirements compared to our database to identify a preferred strategy.

1.4 Reporting

- Prepare a TIA draft report to summarize the data, findings, and recommendations.
- Finalized Report based on received comments from the Village.

We look forward to receiving the Village's comments on these proposed Terms of Reference.

Memorandum

101, 38026 Second Avenue, Squamish, BC V8B 0C3 | T: 604.815.4646 F: 604.815.4647

To:	**Village of Pemberton**	Date:	**October 14, 2022**
Attention:	**Scott McRae | Manager, Development Services**	Project No.:	**30387**
Cc:	**Graham Schulz and Borg Chan (ISL)**		
Reference:	**Review of Transportation Impact Assessment Terms of Reference for 7421 / 7423 / 7435 Prospect Street Development, Pemberton BC**		
From:	**Alvin Tse, P.Eng.**		

1.0 Introduction

The Village of Pemberton (the Village) retained ISL Engineering (ISL) to review and comment on the letter of *7421/23/35 Prospect St, Village of Pemberton Terms of Reference – Transportation Impact Assessment* issued by Bunt & Associates Engineering (Bunt) on September 28, 2022. To be consistent with other traffic impact studies in Pemberton, ISL also crosschecked the scope of work from these past and ongoing reports. This Technical Memorandum intends to review Bunt's Terms of Reference (ToR) and verify whether their methodologies and assumptions are reasonable. With consideration of the professional ethic practices, Bunt has been informed by ISL before reviewing the ToR.

2.0 General Questions and Specific Comments

The following questions and comments are provided based on reviewing the above available document and crosschecking with other similar studies:

- **Page 1** – Verify the address of the proposed sites. Should "7435" be read as 7425 Prospect Street? Are there two separate lots or side-by-side for this development? It is assumed that it does not include 7427 and 7429.
- **Page 2 | Section 1.1 (6th Bullet)** – Include two additional Portage Road intersections for traffic analysis: unsignalized at Frontier Street / Birch Road as it was previously projected to have the worst traffic performance in Downtown Pemberton, and roundabout at Aspen Boulevard / Pemberton Portage Road as it acts as the gateway of the Downtown core.
- **Page 2 | Section 1.2 (1st Bullet)** – Annual growth rates used for previous Pemberton traffic impact studies were 2% or higher; therefore, annual growth rate of 2% should be used instead of 1%, especially if comparing to pre-pandemic traffic.
- **Page 3 | Section 1.2 (7th Bullet overall)** – For consistency, add a scenario of Future Horizon Year (Opening Day + 5 Years) for Background and Total (combined) traffic conditions to be analyzed.

We trust this Technical Memorandum meets the Village's requirements. If there are any questions or further information is required or need more clarifications, please do not hesitate to contact the undersigned.

Sincerely,

ALVIN TSE

Alvin Tse, P.Eng.
Traffic / Road Safety Engineer

The attached information is provided to support the agency's review process and shall not be distributed to other parties without written consent from Bunt & Associates Engineering Ltd.

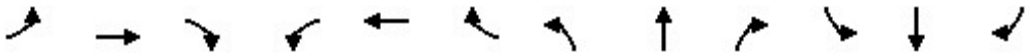
APPENDIX B

Synchro and Sidra Reports

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	65	126	21	35	142	25
Future Volume (vph)	65	126	21	35	142	25
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	80	156	26	43	175	31

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	236	69	206
Volume Left (vph)	80	0	175
Volume Right (vph)	156	43	0
Hadj (s)	-0.17	-0.28	0.29
Departure Headway (s)	4.4	4.4	4.8
Degree Utilization, x	0.29	0.09	0.28
Capacity (veh/h)	771	755	706
Control Delay (s)	9.2	7.9	9.7
Approach Delay (s)	9.2	7.9	9.7
Approach LOS	A	A	A

Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	176	4	29	207	10	11	2	36	8	0	0
Future Volume (Veh/h)	0	176	4	29	207	10	11	2	36	8	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	0	232	5	38	272	13	14	3	47	11	0	0
Pedestrians		10			3			2			22	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	307			239			601	620	240	662	616	310
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	307			239			601	620	240	662	616	310
tC, single (s)	4.1			4.1			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			97			96	99	94	97	100	100
cM capacity (veh/h)	1242			1337			384	387	774	333	389	715

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	237	323	64	11
Volume Left	0	38	14	11
Volume Right	5	13	47	0
cSH	1242	1337	610	333
Volume to Capacity	0.00	0.03	0.10	0.03
Queue Length 95th (m)	0.0	0.7	2.8	0.8
Control Delay (s)	0.0	1.1	11.6	16.2
Lane LOS		A	B	C
Approach Delay (s)	0.0	1.1	11.6	16.2
Approach LOS			B	C

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	39.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	12	208	204	98	100	42
Future Volume (veh/h)	12	208	204	98	100	42
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	15	260	255	122	125	52
Approach Volume (veh/h)	275			377	177	
Crossing Volume (veh/h)	125			15	255	
High Capacity (veh/h)	1256			1369	1134	
High v/c (veh/h)	0.22			0.28	0.16	
Low Capacity (veh/h)	1044			1147	934	
Low v/c (veh/h)	0.26			0.33	0.19	

Intersection Summary			
Maximum v/c High	0.28		
Maximum v/c Low	0.33		
Intersection Capacity Utilization	53.3%	ICU Level of Service	A

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.1
Total Del/Veh (s)	4.6	0.2	3.5	4.5	2.8	4.3	4.2	3.7

2: Frontier Street & Birch Road Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	All
Denied Del/Veh (s)	0.0		0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0
Total Del/Veh (s)	0.8		1.9	0.6	0.2	7.3	3.4	3.5	5.5	1.2

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.3	0.2	0.2	0.2
Total Del/Veh (s)	1.7	0.4	1.8	3.8	3.8	2.1	2.1	2.7

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1			0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.0	0.2			0.0	2.5	1.5	4.5	2.4	3.3	2.2

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	35.5

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	27.4	15.7	23.5
Average Queue (m)	17.3	8.9	15.7
95th Queue (m)	28.0	16.6	24.1
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	6.4	10.6	16.2	7.3
Average Queue (m)	0.7	2.6	9.2	2.7
95th Queue (m)	6.0	10.8	16.5	9.4
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

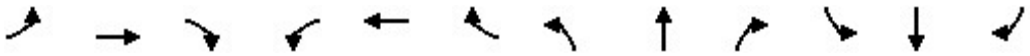
Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	16.7	23.4	17.4
Average Queue (m)	7.9	9.1	8.1
95th Queue (m)	18.9	24.4	18.4
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	0.9	7.1	12.6
Average Queue (m)	0.3	1.9	9.0
95th Queue (m)	2.8	7.8	14.6
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	6	0	2	1	13	0	6	1	4	23	35
Future Volume (Veh/h)	13	6	0	2	1	13	0	6	1	4	23	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	16	7	0	2	1	16	0	7	1	5	28	43
Pedestrians		1									3	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	20			7			110	63	7	60	55	13
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	20			7			110	63	7	60	55	13
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	99	97	96
cM capacity (veh/h)	1586			1607			800	814	1072	915	823	1061

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	19	8	76
Volume Left	16	2	0	5
Volume Right	0	16	1	43
cSH	1586	1607	840	950
Volume to Capacity	0.01	0.00	0.01	0.08
Queue Length 95th (m)	0.2	0.0	0.2	2.1
Control Delay (s)	5.1	0.8	9.3	9.1
Lane LOS	A	A	A	A
Approach Delay (s)	5.1	0.8	9.3	9.1
Approach LOS			A	A

Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	18.1%	ICU Level of Service	A	
Analysis Period (min)	15			

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - EX_2022_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	378	6.0	1497	0.252	100	2.2	LOS A	1.7	12.6	Full	500	0.0	0.0
Approach	378	6.0		0.252		2.2	LOS A	1.7	12.6				
NorthEast: Aspen Blvd													
Lane 1[d]	178	5.0	928	0.191	100	3.9	LOS A	1.1	7.8	Full	300	0.0	0.0
Approach	178	5.0		0.191		3.9	LOS A	1.1	7.8				
West: Portage Road													
Lane 1[d]	275	4.2	1110	0.248	100	1.4	LOS A	1.6	11.9	Full	200	0.0	0.0
Approach	275	4.2		0.248		1.4	LOS A	1.6	11.9				
Intersection	830	5.2		0.252		2.3	LOS A	1.7	12.6				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	255	123	378	6.0	1497	0.252	100	NA	NA
Approach	255	123	378	6.0		0.252			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	125	53	178	5.0	928	0.191	100	NA	NA
Approach	125	53	178	5.0		0.191			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	15	260	275	4.2	1110	0.248	100	NA	NA
Approach	15	260	275	4.2		0.248			

	Total	%HV	Deg.Satn (v/c)
Intersection	830	5.2	0.252

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

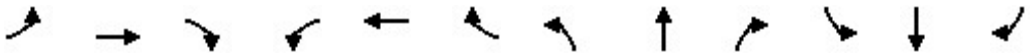
Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	84	168	41	43	205	39
Future Volume (vph)	84	168	41	43	205	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	93	187	46	48	228	43

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	280	94	271
Volume Left (vph)	93	0	228
Volume Right (vph)	187	48	0
Hadj (s)	-0.30	-0.27	0.21
Departure Headway (s)	4.5	4.7	4.9
Degree Utilization, x	0.35	0.12	0.37
Capacity (veh/h)	750	714	695
Control Delay (s)	9.9	8.3	10.8
Approach Delay (s)	9.9	8.3	10.8
Approach LOS	A	A	B

Intersection Summary			
Delay	10.0		
Level of Service	B		
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		



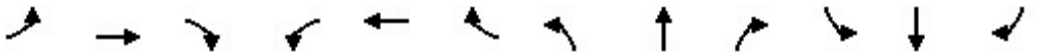
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	235	25	81	260	89	11	2	131	48	10	5
Future Volume (Veh/h)	12	235	25	81	260	89	11	2	131	48	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	13	253	27	87	280	96	12	2	141	52	11	5
Pedestrians		37						10			17	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		3						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	393			290			852	870	276	954	835	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	393			290			852	870	276	954	835	382
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			93			95	99	81	71	96	99
cM capacity (veh/h)	1160			1261			241	263	756	177	275	640

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	293	463	155	68
Volume Left	13	87	12	52
Volume Right	27	96	141	5
cSH	1160	1261	635	199
Volume to Capacity	0.01	0.07	0.24	0.34
Queue Length 95th (m)	0.3	1.8	7.6	11.4
Control Delay (s)	0.5	2.1	12.5	32.1
Lane LOS	A	A	B	D
Approach Delay (s)	0.5	2.1	12.5	32.1
Approach LOS			B	D

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	34	368	402	62	27	31
Future Volume (veh/h)	34	368	402	62	27	31
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	38	413	452	70	30	35
Approach Volume (veh/h)	451			522	65	
Crossing Volume (veh/h)	30			38	452	
High Capacity (veh/h)	1353			1344	970	
High v/c (veh/h)	0.33			0.39	0.07	
Low Capacity (veh/h)	1132			1124	787	
Low v/c (veh/h)	0.40			0.46	0.08	

Intersection Summary			
Maximum v/c High	0.39		
Maximum v/c Low	0.46		
Intersection Capacity Utilization	64.6%	ICU Level of Service	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	16	2	0	10	18	2	8	2	29	2	55
Future Volume (Veh/h)	18	16	2	0	10	18	2	8	2	29	2	55
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	20	18	2	0	11	20	2	9	2	32	2	61
Pedestrians		1									7	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	38			20			143	97	19	94	88	29
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	38			20			143	97	19	94	88	29
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			100			100	99	100	96	100	94
cM capacity (veh/h)	1538			1609			769	782	1065	849	791	1033

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	40	31	13	95
Volume Left	20	0	2	32
Volume Right	2	20	2	61
cSH	1538	1609	813	957
Volume to Capacity	0.01	0.00	0.02	0.10
Queue Length 95th (m)	0.3	0.0	0.4	2.6
Control Delay (s)	3.7	0.0	9.5	9.2
Lane LOS	A		A	A
Approach Delay (s)	3.7	0.0	9.5	9.2
Approach LOS			A	A

Intersection Summary				
Average Delay	6.4			
Intersection Capacity Utilization	24.8%	ICU Level of Service	A	
Analysis Period (min)	15			

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.1
Total Del/Veh (s)	5.2	0.2	4.1	4.4	3.5	4.9	5.5	4.5

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.3		0.2	0.2	0.2	0.1
Total Del/Veh (s)	4.1	1.2	1.0	3.3	1.3	1.1	8.6		5.3	10.6	8.9	5.0

2: Frontier Street & Birch Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	2.7

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.6	0.5	0.1	0.1	0.3
Total Del/Veh (s)	1.7	0.3	1.8	5.5	5.5	2.4	2.3	3.8

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.1	0.1	0.1		0.1	0.1	0.0	0.0	0.0	0.1
Total Del/Veh (s)	1.0	0.1	0.0	0.2	0.0		3.3	1.9	4.4	1.1	3.4	2.1

Total Zone Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	57.0

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	23.7	16.4	25.1
Average Queue (m)	17.0	10.7	17.7
95th Queue (m)	25.1	17.1	26.1
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	11.6	26.0	23.8	17.5
Average Queue (m)	3.7	10.8	14.1	10.9
95th Queue (m)	13.9	26.8	23.1	19.0
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	19.5	38.6	13.9
Average Queue (m)	7.0	13.1	5.4
95th Queue (m)	20.5	38.2	14.8
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	8.9	17.3
Average Queue (m)	3.9	10.5
95th Queue (m)	11.1	17.5
Link Distance (m)	95.1	128.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - EX_2022_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	521	5.7	1425	0.366	100	2.9	LOS A	2.7	19.9	Full	500	0.0	0.0
Approach	521	5.7		0.366		2.9	LOS A	2.7	19.9				
NorthEast: Aspen Blvd													
Lane 1[d]	65	4.9	770	0.085	100	4.5	LOS A	0.5	3.3	Full	300	0.0	0.0
Approach	65	4.9		0.085		4.5	LOS A	0.5	3.3				
West: Portage Road													
Lane 1[d]	452	3.7	1401	0.322	100	0.7	LOS A	2.5	18.3	Full	200	0.0	0.0
Approach	452	3.7		0.322		0.7	LOS A	2.5	18.3				
Intersection	1038	4.7		0.366		2.1	LOS A	2.7	19.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	452	70	521	5.7	1425	0.366	100	NA	NA
Approach	452	70	521	5.7		0.366			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	30	35	65	4.9	770	0.085	100	NA	NA
Approach	30	35	65	4.9		0.085			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	38	413	452	3.7	1401	0.322	100	NA	NA
Approach	38	413	452	3.7		0.322			

	Total	%HV	Deg.Satn (v/c)
Intersection	1038	4.7	0.366

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	69	134	22	37	151	27
Future Volume (vph)	69	134	22	37	151	27
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	85	165	27	46	186	33

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	250	73	219
Volume Left (vph)	85	0	186
Volume Right (vph)	165	46	0
Hadj (s)	-0.17	-0.28	0.29
Departure Headway (s)	4.5	4.5	4.9
Degree Utilization, x	0.31	0.09	0.30
Capacity (veh/h)	762	744	699
Control Delay (s)	9.4	8.0	9.9
Approach Delay (s)	9.4	8.0	9.9
Approach LOS	A	A	A

Intersection Summary			
Delay	9.4		
Level of Service	A		
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

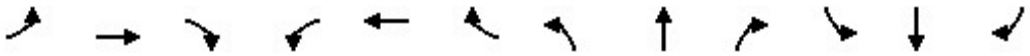
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	187	4	31	220	11	12	2	38	8	0	0
Future Volume (Veh/h)	0	187	4	31	220	11	12	2	38	8	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	0	246	5	41	289	14	16	3	50	11	0	0
Pedestrians		10			3			2			22	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	325			253			638	658	254	703	653	328
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	325			253			638	658	254	703	653	328
tC, single (s)	4.1			4.1			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			97			96	99	93	96	100	100
cM capacity (veh/h)	1223			1322			361	367	761	310	370	699

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	251	344	69	11
Volume Left	0	41	16	11
Volume Right	5	14	50	0
cSH	1223	1322	584	310
Volume to Capacity	0.00	0.03	0.12	0.04
Queue Length 95th (m)	0.0	0.8	3.2	0.9
Control Delay (s)	0.0	1.2	12.0	17.0
Lane LOS		A	B	C
Approach Delay (s)	0.0	1.2	12.0	17.0
Approach LOS			B	C

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	13	221	216	104	106	45
Future Volume (veh/h)	13	221	216	104	106	45
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	16	276	270	130	132	56
Approach Volume (veh/h)	292			400	188	
Crossing Volume (veh/h)	132			16	270	
High Capacity (veh/h)	1249			1367	1121	
High v/c (veh/h)	0.23			0.29	0.17	
Low Capacity (veh/h)	1038			1146	922	
Low v/c (veh/h)	0.28			0.35	0.20	

Intersection Summary			
Maximum v/c High	0.29		
Maximum v/c Low	0.35		
Intersection Capacity Utilization	55.5%	ICU Level of Service	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	6	0	2	1	14	0	6	1	4	25	37
Future Volume (Veh/h)	14	6	0	2	1	14	0	6	1	4	25	37
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	17	7	0	2	1	17	0	7	1	5	31	46
Pedestrians		1									3	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	21			7			117	66	7	62	58	14
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	21			7			117	66	7	62	58	14
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	99	96	96
cM capacity (veh/h)	1584			1607			787	811	1072	911	820	1060

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	24	20	8	82
Volume Left	17	2	0	5
Volume Right	0	17	1	46
cSH	1584	1607	836	946
Volume to Capacity	0.01	0.00	0.01	0.09
Queue Length 95th (m)	0.3	0.0	0.2	2.3
Control Delay (s)	5.2	0.7	9.3	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	5.2	0.7	9.3	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	18.4%	ICU Level of Service	A
Analysis Period (min)	15		

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1
Total Del/Veh (s)	4.6	0.3	3.6	4.3	3.4	4.7	4.8	4.0

2: Frontier Street & Birch Road Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.2	0.1	0.0
Total Del/Veh (s)	0.9	0.7	2.3	0.8	0.4	7.7	9.9	3.7	7.4	1.5

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.4	0.2	0.3	0.2
Total Del/Veh (s)	1.5	0.3	1.8	3.8	4.0	2.0	2.4	2.7

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	WBL	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1		0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.3	0.0		0.0	4.5	1.5	4.9	2.3	3.2	2.3

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	33.8

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	25.1	17.2	27.1
Average Queue (m)	17.6	9.5	18.0
95th Queue (m)	25.3	17.2	27.7
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	5.9	18.0	15.4	7.3
Average Queue (m)	1.0	4.9	9.7	2.4
95th Queue (m)	7.4	17.2	17.3	9.0
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	17.2	22.1	17.3
Average Queue (m)	7.1	8.0	8.8
95th Queue (m)	17.7	23.3	20.4
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	2.8	7.9	15.1
Average Queue (m)	0.4	2.0	10.0
95th Queue (m)	3.5	8.1	15.8
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - BG_2025_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	400	6.0	1493	0.268	100	2.2	LOS A	1.9	13.7	Full	500	0.0	0.0
Approach	400	6.0		0.268		2.2	LOS A	1.9	13.7				
NorthEast: Aspen Blvd													
Lane 1[d]	189	5.0	914	0.206	100	4.0	LOS A	1.2	8.6	Full	300	0.0	0.0
Approach	189	5.0		0.206		4.0	LOS A	1.2	8.6				
West: Portage Road													
Lane 1[d]	293	4.2	1101	0.266	100	1.4	LOS A	1.8	13.0	Full	200	0.0	0.0
Approach	293	4.2		0.266		1.4	LOS A	1.8	13.0				
Intersection	881	5.2		0.268		2.3	LOS A	1.9	13.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	270	130	400	6.0	1493	0.268	100	NA	NA
Approach	270	130	400	6.0		0.268			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	133	56	189	5.0	914	0.206	100	NA	NA
Approach	133	56	189	5.0		0.206			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	16	276	293	4.2	1101	0.266	100	NA	NA
Approach	16	276	293	4.2		0.266			

	Total	%HV	Deg.Satn (v/c)
Intersection	881	5.2	0.268

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

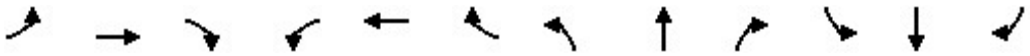
Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	89	178	44	46	218	41
Future Volume (vph)	89	178	44	46	218	41
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	99	198	49	51	242	46

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	297	100	288
Volume Left (vph)	99	0	242
Volume Right (vph)	198	51	0
Hadj (s)	-0.30	-0.27	0.21
Departure Headway (s)	4.6	4.7	5.0
Degree Utilization, x	0.38	0.13	0.40
Capacity (veh/h)	739	700	687
Control Delay (s)	10.3	8.5	11.2
Approach Delay (s)	10.3	8.5	11.2
Approach LOS	B	A	B

Intersection Summary			
Delay	10.4		
Level of Service	B		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		



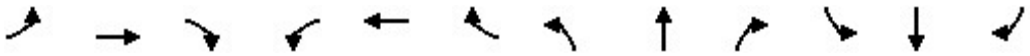
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	249	27	86	276	94	12	2	139	51	11	5
Future Volume (Veh/h)	13	249	27	86	276	94	12	2	139	51	11	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	14	268	29	92	297	101	13	2	149	55	12	5
Pedestrians		37						10			17	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		3						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	415			307			900	920	292	1009	884	402
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	415			307			900	920	292	1009	884	402
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			93			94	99	80	65	95	99
cM capacity (veh/h)	1138			1243			221	244	741	159	256	624

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	311	490	164	72
Volume Left	14	92	13	55
Volume Right	29	101	149	5
cSH	1138	1243	612	179
Volume to Capacity	0.01	0.07	0.27	0.40
Queue Length 95th (m)	0.3	1.9	8.6	14.2
Control Delay (s)	0.5	2.2	13.0	37.9
Lane LOS	A	A	B	E
Approach Delay (s)	0.5	2.2	13.0	37.9
Approach LOS			B	E

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	36	391	427	66	29	33
Future Volume (veh/h)	36	391	427	66	29	33
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	40	439	480	74	33	37
Approach Volume (veh/h)	479			554	70	
Crossing Volume (veh/h)	33			40	480	
High Capacity (veh/h)	1349			1342	948	
High v/c (veh/h)	0.35			0.41	0.07	
Low Capacity (veh/h)	1129			1123	768	
Low v/c (veh/h)	0.42			0.49	0.09	

Intersection Summary			
Maximum v/c High	0.41		
Maximum v/c Low	0.49		
Intersection Capacity Utilization	67.7%	ICU Level of Service	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	17	2	0	11	19	2	9	2	30	3	58
Future Volume (Veh/h)	19	17	2	0	11	19	2	9	2	30	3	58
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	21	19	2	0	12	21	2	10	2	33	3	64
Pedestrians		1									7	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	40			21			151	102	20	98	92	30
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	40			21			151	102	20	98	92	30
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	99			100			100	99	100	96	100	94
cM capacity (veh/h)	1535			1608			756	776	1064	841	786	1031

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	42	33	14	100
Volume Left	21	0	2	33
Volume Right	2	21	2	64
cSH	1535	1608	804	951
Volume to Capacity	0.01	0.00	0.02	0.11
Queue Length 95th (m)	0.3	0.0	0.4	2.8
Control Delay (s)	3.7	0.0	9.6	9.2
Lane LOS	A		A	A
Approach Delay (s)	3.7	0.0	9.6	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.1
Total Del/Veh (s)	5.3	0.2	4.3	5.0	3.5	5.5	5.1	4.9

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.1	0.2	0.1
Total Del/Veh (s)	2.4	1.2	0.9	2.9	1.1	1.0	9.7	10.2	5.4	10.3	10.2	5.0

2: Frontier Street & Birch Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	2.7

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.6	0.6	0.1	0.2	0.3
Total Del/Veh (s)	1.8	0.7	1.8	5.1	4.8	2.1	2.4	3.5

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.2	0.1		0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.1	0.0	0.1	0.0		3.3	2.7	3.8	1.1	3.4	2.1

Total Zone Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	58.3

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	24.4	15.9	31.2
Average Queue (m)	17.7	10.1	19.9
95th Queue (m)	25.6	17.2	31.2
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	13.4	21.6	27.2	19.0
Average Queue (m)	3.6	9.6	15.3	11.5
95th Queue (m)	13.1	25.0	26.5	19.3
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	21.1	34.1	12.7
Average Queue (m)	6.4	11.3	6.1
95th Queue (m)	20.8	31.6	14.9
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	1.8	8.9	16.4
Average Queue (m)	0.3	3.3	10.1
95th Queue (m)	2.7	10.2	16.2
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - BG_2025_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	554	5.7	1422	0.390	100	3.0	LOS A	3.0	21.9	Full	500	0.0	0.0
Approach	554	5.7		0.390		3.0	LOS A	3.0	21.9				
NorthEast: Aspen Blvd													
Lane 1[d]	70	4.9	749	0.093	100	4.8	LOS A	0.5	3.7	Full	300	0.0	0.0
Approach	70	4.9		0.093		4.8	LOS A	0.5	3.7				
West: Portage Road													
Lane 1[d]	480	3.7	1396	0.344	100	0.7	LOS A	2.8	20.1	Full	200	0.0	0.0
Approach	480	3.7		0.344		0.7	LOS A	2.8	20.1				
Intersection	1103	4.7		0.390		2.1	LOS A	3.0	21.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	480	74	554	5.7	1422	0.390	100	NA	NA
Approach	480	74	554	5.7		0.390			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	33	37	70	4.9	749	0.093	100	NA	NA
Approach	33	37	70	4.9		0.093			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	40	439	480	3.7	1396	0.344	100	NA	NA
Approach	40	439	480	3.7		0.344			

	Total	%HV	Deg.Satn (v/c)
Intersection	1103	4.7	0.390

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1
Total Del/Veh (s)	4.8	0.3	4.0	3.8	3.1	4.7	4.3	4.0

2: Frontier Street & Birch Road Performance by movement

Movement	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	All
Denied Del/Veh (s)	0.1	0.0	0.1	0.0	0.0	0.1	0.3	0.1	0.1	0.1
Total Del/Veh (s)	0.9	0.7	2.1	0.8	0.6	6.0	8.6	3.7	6.7	1.3

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.4	0.2	0.3	0.2
Total Del/Veh (s)	2.2	0.2	2.4	4.3	4.2	2.2	2.5	3.2

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1			0.1	0.1		0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.0	0.3			0.0	3.2		5.3	2.3	3.2	2.2

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	37.2

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	28.1	17.9	26.6
Average Queue (m)	19.4	10.6	18.0
95th Queue (m)	29.1	17.8	27.3
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	2.3	12.4	18.1	9.2
Average Queue (m)	0.3	3.8	10.6	3.1
95th Queue (m)	3.8	13.2	18.6	10.0
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	22.2	26.4	21.4
Average Queue (m)	11.2	10.9	9.3
95th Queue (m)	23.4	28.5	21.9
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	0.9	8.7	13.4
Average Queue (m)	0.1	2.3	9.4
95th Queue (m)	1.9	9.0	15.3
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

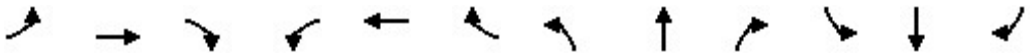
Zone Summary

Zone wide Queuing Penalty: 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	76	148	25	41	166	29
Future Volume (vph)	76	148	25	41	166	29
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	94	183	31	51	205	36

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	277	82	241
Volume Left (vph)	94	0	205
Volume Right (vph)	183	51	0
Hadj (s)	-0.17	-0.28	0.29
Departure Headway (s)	4.5	4.6	5.0
Degree Utilization, x	0.35	0.11	0.33
Capacity (veh/h)	747	721	685
Control Delay (s)	10.0	8.2	10.4
Approach Delay (s)	10.0	8.2	10.4
Approach LOS	A	A	B

Intersection Summary			
Delay	9.9		
Level of Service	A		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		



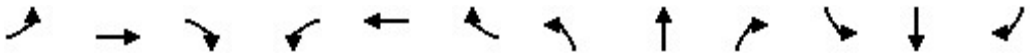
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	206	5	34	243	12	13	2	42	9	0	0
Future Volume (Veh/h)	0	206	5	34	243	12	13	2	42	9	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	0	271	7	45	320	16	17	3	55	12	0	0
Pedestrians		10			3			2			22	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	358			280			704	724	280	774	720	360
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	358			280			704	724	280	774	720	360
tC, single (s)	4.1			4.1			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			97			95	99	93	96	100	100
cM capacity (veh/h)	1190			1292			325	335	735	274	337	671

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	278	381	75	12
Volume Left	0	45	17	12
Volume Right	7	16	55	0
cSH	1190	1292	551	274
Volume to Capacity	0.00	0.03	0.14	0.04
Queue Length 95th (m)	0.0	0.9	3.8	1.1
Control Delay (s)	0.0	1.2	12.6	18.7
Lane LOS		A	B	C
Approach Delay (s)	0.0	1.2	12.6	18.7
Approach LOS			B	C

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	14	244	239	115	117	49
Future Volume (veh/h)	14	244	239	115	117	49
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	18	305	299	144	146	61
Approach Volume (veh/h)	323			443	207	
Crossing Volume (veh/h)	146			18	299	
High Capacity (veh/h)	1235			1365	1095	
High v/c (veh/h)	0.26			0.32	0.19	
Low Capacity (veh/h)	1025			1144	899	
Low v/c (veh/h)	0.31			0.39	0.23	

Intersection Summary			
Maximum v/c High	0.32		
Maximum v/c Low	0.39		
Intersection Capacity Utilization	59.3%	ICU Level of Service	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	7	0	2	1	15	0	7	1	5	27	41
Future Volume (Veh/h)	15	7	0	2	1	15	0	7	1	5	27	41
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	19	9	0	2	1	19	0	9	1	6	33	51
Pedestrians		1									3	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	23			9			130	74	9	70	64	14
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	23			9			130	74	9	70	64	14
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	99	96	95
cM capacity (veh/h)	1582			1604			765	802	1070	898	811	1059

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	22	10	90
Volume Left	19	2	0	6
Volume Right	0	19	1	51
cSH	1582	1604	822	942
Volume to Capacity	0.01	0.00	0.01	0.10
Queue Length 95th (m)	0.3	0.0	0.3	2.5
Control Delay (s)	5.0	0.7	9.4	9.2
Lane LOS	A	A	A	A
Approach Delay (s)	5.0	0.7	9.4	9.2
Approach LOS			A	A

Intersection Summary				
Average Delay	7.2			
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - BG_2030_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	443	6.0	1492	0.297	100	2.2	LOS A	2.2	16.1	Full	500	0.0	0.0
Approach	443	6.0		0.297		2.2	LOS A	2.2	16.1				
NorthEast: Aspen Blvd													
Lane 1[d]	208	5.0	888	0.234	100	4.3	LOS A	1.4	9.9	Full	300	0.0	0.0
Approach	208	5.0		0.234		4.3	LOS A	1.4	9.9				
West: Portage Road													
Lane 1[d]	323	4.2	1078	0.299	100	1.6	LOS A	2.1	15.0	Full	200	0.0	0.0
Approach	323	4.2		0.299		1.6	LOS A	2.1	15.0				
Intersection	973	5.2		0.299		2.4	LOS A	2.2	16.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	299	144	443	6.0	1492	0.297	100	NA	NA
Approach	299	144	443	6.0		0.297			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	146	61	208	5.0	888	0.234	100	NA	NA
Approach	146	61	208	5.0		0.234			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	18	305	323	4.2	1078	0.299	100	NA	NA
Approach	18	305	323	4.2		0.299			

	Total	%HV	Deg.Satn (v/c)
Intersection	973	5.2	0.299

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									
West Exit: Portage Road Merge Type: **Not Applied**											
Full Length Lane	1	Merge Analysis not applied.									

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.2
Total Del/Veh (s)	5.3	0.3	4.5	4.6	3.7	5.4	6.1	5.0

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.2	0.2	0.2	0.1
Total Del/Veh (s)	4.1	1.3	1.4	3.3	1.4	1.3	13.2	7.9	7.0	13.1	13.9	18.5

2: Frontier Street & Birch Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	3.4

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.6	0.5	0.2	0.1	0.3
Total Del/Veh (s)	2.6	0.6	2.2	5.6	5.6	3.0	2.9	4.1

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.2	0.1		0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.8	0.0	0.0	0.2	0.0		3.3	1.7	4.1	1.1	3.4	2.0

Total Zone Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	68.5

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	28.8	18.0	31.3
Average Queue (m)	19.5	11.8	21.1
95th Queue (m)	29.7	18.8	31.9
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	18.6	28.8	25.4	21.2
Average Queue (m)	5.2	14.3	16.5	12.0
95th Queue (m)	17.2	31.6	27.5	20.2
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	24.9	34.6	15.8
Average Queue (m)	9.0	13.5	7.5
95th Queue (m)	27.9	38.5	18.4
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	NB	SB
Directions Served	LTR	LTR
Maximum Queue (m)	10.2	15.3
Average Queue (m)	4.3	9.9
95th Queue (m)	12.1	15.8
Link Distance (m)	95.1	128.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

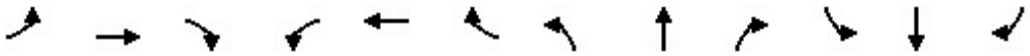
Zone Summary

Zone wide Queuing Penalty: 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	98	197	48	50	240	46
Future Volume (vph)	98	197	48	50	240	46
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	109	219	53	56	267	51

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	328	109	318
Volume Left (vph)	109	0	267
Volume Right (vph)	219	56	0
Hadj (s)	-0.30	-0.27	0.21
Departure Headway (s)	4.7	4.9	5.1
Degree Utilization, x	0.43	0.15	0.45
Capacity (veh/h)	722	676	672
Control Delay (s)	11.1	8.8	12.2
Approach Delay (s)	11.1	8.8	12.2
Approach LOS	B	A	B

Intersection Summary			
Delay	11.2		
Level of Service	B		
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		



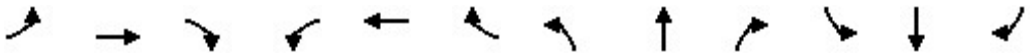
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	275	29	95	305	104	13	2	153	56	12	6
Future Volume (Veh/h)	14	275	29	95	305	104	13	2	153	56	12	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	15	296	31	102	328	112	14	2	165	60	13	6
Pedestrians		37						10			17	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		3						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	457			337			989	1012	322	1112	972	438
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	457			337			989	1012	322	1112	972	438
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			92			93	99	77	53	94	99
cM capacity (veh/h)	1099			1212			189	213	713	129	225	595

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	342	542	181	79
Volume Left	15	102	14	60
Volume Right	31	112	165	6
cSH	1099	1212	575	148
Volume to Capacity	0.01	0.08	0.31	0.53
Queue Length 95th (m)	0.3	2.2	10.7	21.1
Control Delay (s)	0.5	2.3	14.1	54.4
Lane LOS	A	A	B	F
Approach Delay (s)	0.5	2.3	14.1	54.4
Approach LOS			B	F

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	40	431	471	73	32	36
Future Volume (veh/h)	40	431	471	73	32	36
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	45	484	529	82	36	40
Approach Volume (veh/h)	529			611	76	
Crossing Volume (veh/h)	36			45	529	
High Capacity (veh/h)	1346			1337	912	
High v/c (veh/h)	0.39			0.46	0.08	
Low Capacity (veh/h)	1126			1118	735	
Low v/c (veh/h)	0.47			0.55	0.10	

Intersection Summary			
Maximum v/c High	0.46		
Maximum v/c Low	0.55		
Intersection Capacity Utilization	73.2%	ICU Level of Service	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	19	2	0	12	21	2	10	2	33	3	64
Future Volume (Veh/h)	21	19	2	0	12	21	2	10	2	33	3	64
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	23	21	2	0	13	23	2	11	2	37	3	71
Pedestrians		1									7	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	43			23			166	111	22	107	100	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	43			23			166	111	22	107	100	32
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	98			100			100	99	100	96	100	93
cM capacity (veh/h)	1531			1605			733	767	1061	829	777	1029

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	46	36	15	111
Volume Left	23	0	2	37
Volume Right	2	23	2	71
cSH	1531	1605	791	944
Volume to Capacity	0.02	0.00	0.02	0.12
Queue Length 95th (m)	0.4	0.0	0.5	3.2
Control Delay (s)	3.7	0.0	9.6	9.3
Lane LOS	A		A	A
Approach Delay (s)	3.7	0.0	9.6	9.3
Approach LOS			A	A

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - BG_2030_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	611	5.7	1413	0.432	100	3.0	LOS A	3.5	25.8	Full	500	0.0	0.0
Approach	611	5.7		0.432		3.0	LOS A	3.5	25.8				
NorthEast: Aspen Blvd													
Lane 1[d]	76	4.9	710	0.108	100	5.3	LOS A	0.6	4.3	Full	300	0.0	0.0
Approach	76	4.9		0.108		5.3	LOS A	0.6	4.3				
West: Portage Road													
Lane 1[d]	529	3.7	1388	0.381	100	0.8	LOS A	3.2	23.4	Full	200	0.0	0.0
Approach	529	3.7		0.381		0.8	LOS A	3.2	23.4				
Intersection	1217	4.7		0.432		2.2	LOS A	3.5	25.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	529	82	611	5.7	1413	0.432	100	NA	NA
Approach	529	82	611	5.7		0.432			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	36	40	76	4.9	710	0.108	100	NA	NA
Approach	36	40	76	4.9		0.108			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	45	484	529	3.7	1388	0.381	100	NA	NA
Approach	45	484	529	3.7		0.381			

	Total	%HV	Deg.Satn (v/c)
Intersection	1217	4.7	0.432

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	84	163	27	45	184	32
Future Volume (vph)	84	163	27	45	184	32
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	104	201	33	56	227	40

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	305	89	267
Volume Left (vph)	104	0	227
Volume Right (vph)	201	56	0
Hadj (s)	-0.17	-0.28	0.29
Departure Headway (s)	4.6	4.8	5.1
Degree Utilization, x	0.39	0.12	0.38
Capacity (veh/h)	732	699	672
Control Delay (s)	10.6	8.4	11.1
Approach Delay (s)	10.6	8.4	11.1
Approach LOS	B	A	B

Intersection Summary			
Delay	10.5		
Level of Service	B		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

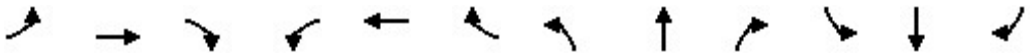
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	228	5	38	268	13	14	3	47	10	0	0
Future Volume (Veh/h)	0	228	5	38	268	13	14	3	47	10	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	0	300	7	50	353	17	18	4	62	13	0	0
Pedestrians		10			3			2			22	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	392			309			777	798	308	854	792	394
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	392			309			777	798	308	854	792	394
tC, single (s)	4.1			4.1			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			96			94	99	91	95	100	100
cM capacity (veh/h)	1156			1261			289	303	708	237	305	642

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	307	420	84	13
Volume Left	0	50	18	13
Volume Right	7	17	62	0
cSH	1156	1261	515	237
Volume to Capacity	0.00	0.04	0.16	0.05
Queue Length 95th (m)	0.0	1.0	4.6	1.4
Control Delay (s)	0.0	1.3	13.3	21.0
Lane LOS		A	B	C
Approach Delay (s)	0.0	1.3	13.3	21.0
Approach LOS			B	C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	16	269	264	127	129	54
Future Volume (veh/h)	16	269	264	127	129	54
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	20	336	330	159	161	68
Approach Volume (veh/h)	356			489	229	
Crossing Volume (veh/h)	161			20	330	
High Capacity (veh/h)	1221			1363	1069	
High v/c (veh/h)	0.29			0.36	0.21	
Low Capacity (veh/h)	1012			1142	875	
Low v/c (veh/h)	0.35			0.43	0.26	

Intersection Summary			
Maximum v/c High	0.36		
Maximum v/c Low	0.43		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	8	0	3	1	17	0	8	1	5	30	45
Future Volume (Veh/h)	17	8	0	3	1	17	0	8	1	5	30	45
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	21	10	0	4	1	21	0	10	1	6	37	56
Pedestrians		1									3	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	25			10			147	85	10	80	74	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	25			10			147	85	10	80	74	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	100	99	95	95
cM capacity (veh/h)	1579			1603			737	789	1068	881	799	1057

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	31	26	11	99
Volume Left	21	4	0	6
Volume Right	0	21	1	56
cSH	1579	1603	808	933
Volume to Capacity	0.01	0.00	0.01	0.11
Queue Length 95th (m)	0.3	0.1	0.3	2.8
Control Delay (s)	5.0	1.1	9.5	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	5.0	1.1	9.5	9.3
Approach LOS			A	A

Intersection Summary				
Average Delay	7.2			
Intersection Capacity Utilization	20.3%	ICU Level of Service	A	
Analysis Period (min)	15			

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1
Total Del/Veh (s)	5.1	0.4	4.1	4.5	3.7	4.7	4.8	4.1

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	All
Denied Del/Veh (s)		0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.1		0.1
Total Del/Veh (s)		0.9	0.4	2.6	1.0	0.7	10.2	12.0	4.6	8.7		1.7

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.5	0.4	0.2	0.2	0.3
Total Del/Veh (s)	2.1	0.3	2.2	5.7	5.7	2.6	2.7	3.9

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	0.8	0.0	0.0	3.3	1.8	3.9	2.5	3.4	2.1

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	40.9

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	31.9	21.6	26.9
Average Queue (m)	20.9	12.2	17.1
95th Queue (m)	32.0	21.0	26.6
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.3	21.2	19.0	10.4
Average Queue (m)	1.2	6.1	11.6	3.3
95th Queue (m)	8.7	18.9	20.0	11.0
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	25.8	34.6	20.3
Average Queue (m)	11.6	16.5	11.5
95th Queue (m)	26.4	41.1	23.9
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	2.7	9.5	16.6
Average Queue (m)	0.4	2.6	10.3
95th Queue (m)	3.4	9.5	16.2
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	109	217	53	56	265	50
Future Volume (vph)	109	217	53	56	265	50
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	121	241	59	62	294	56

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	362	121	350
Volume Left (vph)	121	0	294
Volume Right (vph)	241	62	0
Hadj (s)	-0.30	-0.27	0.21
Departure Headway (s)	4.8	5.1	5.2
Degree Utilization, x	0.49	0.17	0.51
Capacity (veh/h)	703	646	655
Control Delay (s)	12.4	9.2	13.6
Approach Delay (s)	12.4	9.2	13.6
Approach LOS	B	A	B

Intersection Summary			
Delay	12.4		
Level of Service	B		
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

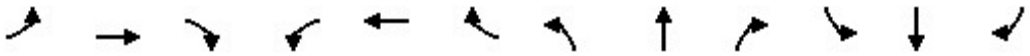
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	304	32	105	336	115	14	3	169	62	13	6
Future Volume (Veh/h)	16	304	32	105	336	115	14	3	169	62	13	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	17	327	34	113	361	124	15	3	182	67	14	6
Pedestrians		37						10			17	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		3						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	502			371			1087	1116	354	1228	1071	477
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502			371			1087	1116	354	1228	1071	477
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			90			91	98	73	33	93	99
cM capacity (veh/h)	1058			1178			158	182	684	101	194	566

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	378	598	200	87
Volume Left	17	113	15	67
Volume Right	34	124	182	6
cSH	1058	1178	530	116
Volume to Capacity	0.02	0.10	0.38	0.75
Queue Length 95th (m)	0.4	2.5	14.0	33.4
Control Delay (s)	0.5	2.5	15.9	96.2
Lane LOS	A	A	C	F
Approach Delay (s)	0.5	2.5	15.9	96.2
Approach LOS			C	F

Intersection Summary			
Average Delay	10.5		
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	44	476	520	80	35	40
Future Volume (veh/h)	44	476	520	80	35	40
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	49	535	584	90	39	45
Approach Volume (veh/h)	584			674	84	
Crossing Volume (veh/h)	39			49	584	
High Capacity (veh/h)	1343			1333	873	
High v/c (veh/h)	0.43			0.51	0.10	
Low Capacity (veh/h)	1123			1114	701	
Low v/c (veh/h)	0.52			0.61	0.12	

Intersection Summary			
Maximum v/c High	0.51		
Maximum v/c Low	0.61		
Intersection Capacity Utilization	79.3%	ICU Level of Service	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	21	3	0	13	23	3	11	3	37	3	71
Future Volume (Veh/h)	23	21	3	0	13	23	3	11	3	37	3	71
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	26	23	3	0	14	26	3	12	3	41	3	79
Pedestrians		1									7	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	47			26			185	124	24	120	112	35
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			26			185	124	24	120	112	35
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	98			100			100	98	100	95	100	92
cM capacity (veh/h)	1526			1601			705	753	1058	810	764	1025

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	52	40	18	123
Volume Left	26	0	3	41
Volume Right	3	26	3	79
cSH	1526	1601	782	935
Volume to Capacity	0.02	0.00	0.02	0.13
Queue Length 95th (m)	0.4	0.0	0.6	3.6
Control Delay (s)	3.8	0.0	9.7	9.4
Lane LOS	A		A	A
Approach Delay (s)	3.8	0.0	9.7	9.4
Approach LOS			A	A

Intersection Summary				
Average Delay	6.6			
Intersection Capacity Utilization	27.7%	ICU Level of Service	A	
Analysis Period (min)	15			

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.1
Total Del/Veh (s)	6.3	0.4	5.5	4.6	3.8	6.0	5.7	5.6

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.1	0.2	0.2	0.1	0.3
Total Del/Veh (s)	4.5	1.5	1.1	3.8	1.9	1.5	14.7	19.2	7.7	15.8	20.1	16.0

2: Frontier Street & Birch Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	4.1

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.7	0.7	0.2	0.2	0.4
Total Del/Veh (s)	2.0	0.2	2.4	6.5	7.1	3.4	3.0	4.6

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.1	0.1		0.1	0.1	0.0	0.0	0.0	0.1
Total Del/Veh (s)	1.2	0.1	0.0	0.1	0.1		3.4	3.0	4.4	1.2	3.3	2.1

Total Zone Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	82.7

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	38.5	18.3	35.5
Average Queue (m)	22.2	11.6	21.9
95th Queue (m)	39.0	18.2	34.8
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	19.9	36.1	28.0	23.3
Average Queue (m)	7.3	15.1	19.3	13.3
95th Queue (m)	21.6	34.9	30.8	25.7
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	25.9	43.0	15.7
Average Queue (m)	9.1	17.0	7.5
95th Queue (m)	26.8	43.7	18.0
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	3.3	9.0	13.9
Average Queue (m)	0.5	4.4	10.0
95th Queue (m)	4.3	11.6	14.7
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - BG_2035_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	674	5.7	1407	0.479	100	3.1	LOS A	4.2	30.7	Full	500	0.0	0.0
Approach	674	5.7		0.479		3.1	LOS A	4.2	30.7				
NorthEast: Aspen Blvd													
Lane 1[d]	84	4.9	671	0.126	100	5.8	LOS A	0.7	5.2	Full	300	0.0	0.0
Approach	84	4.9		0.126		5.8	LOS A	0.7	5.2				
West: Portage Road													
Lane 1[d]	584	3.7	1383	0.423	100	0.8	LOS A	3.8	27.6	Full	200	0.0	0.0
Approach	584	3.7		0.423		0.8	LOS A	3.8	27.6				
Intersection	1343	4.7		0.479		2.3	LOS A	4.2	30.7				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	584	90	674	5.7	1407	0.479	100	NA	NA
Approach	584	90	674	5.7		0.479			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	39	45	84	4.9	671	0.126	100	NA	NA
Approach	39	45	84	4.9		0.126			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	49	535	584	3.7	1383	0.423	100	NA	NA
Approach	49	535	584	3.7		0.423			

	Total	%HV	Deg.Satn (v/c)
Intersection	1343	4.7	0.479

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	84	134	25	53	151	29
Future Volume (vph)	84	134	25	53	151	29
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	104	165	31	65	186	36

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	269	96	222
Volume Left (vph)	104	0	186
Volume Right (vph)	165	65	0
Hadj (s)	-0.14	-0.31	0.29
Departure Headway (s)	4.5	4.5	5.0
Degree Utilization, x	0.34	0.12	0.31
Capacity (veh/h)	746	736	685
Control Delay (s)	9.9	8.2	10.2
Approach Delay (s)	9.9	8.2	10.2
Approach LOS	A	A	B

Intersection Summary			
Delay	9.7		
Level of Service	A		
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

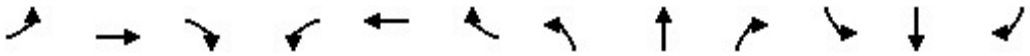
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	202	4	32	234	11	12	2	40	8	0	1
Future Volume (Veh/h)	1	202	4	32	234	11	12	2	40	8	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	1	266	5	42	308	14	16	3	53	11	0	1
Pedestrians		10			3			2			22	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	344			273			682	700	274	749	696	347
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	344			273			682	700	274	749	696	347
tC, single (s)	4.1			4.1			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			97			95	99	93	96	100	100
cM capacity (veh/h)	1204			1300			336	346	741	287	349	682

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	272	364	72	12
Volume Left	1	42	16	11
Volume Right	5	14	53	1
cSH	1204	1300	564	301
Volume to Capacity	0.00	0.03	0.13	0.04
Queue Length 95th (m)	0.0	0.8	3.5	1.0
Control Delay (s)	0.0	1.2	12.3	17.4
Lane LOS	A	A	B	C
Approach Delay (s)	0.0	1.2	12.3	17.4
Approach LOS			B	C

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	42.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	14	237	231	104	106	46
Future Volume (veh/h)	14	237	231	104	106	46
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	18	296	289	130	132	58
Approach Volume (veh/h)	314			419	190	
Crossing Volume (veh/h)	132			18	289	
High Capacity (veh/h)	1249			1365	1104	
High v/c (veh/h)	0.25			0.31	0.17	
Low Capacity (veh/h)	1038			1144	907	
Low v/c (veh/h)	0.30			0.37	0.21	

Intersection Summary			
Maximum v/c High	0.31		
Maximum v/c Low	0.37		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	8	0	2	3	14	0	6	1	4	25	55
Future Volume (Veh/h)	33	8	0	2	3	14	0	6	1	4	25	55
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	41	10	0	2	4	17	0	7	1	5	31	68
Pedestrians		1									3	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	24			10			193	120	10	116	112	16
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	24			10			193	120	10	116	112	16
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	99	100	99	96	94
cM capacity (veh/h)	1580			1603			677	746	1068	830	754	1056

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	51	23	8	104
Volume Left	41	2	0	5
Volume Right	0	17	1	68
cSH	1580	1603	775	932
Volume to Capacity	0.03	0.00	0.01	0.11
Queue Length 95th (m)	0.6	0.0	0.3	3.0
Control Delay (s)	5.9	0.6	9.7	9.3
Lane LOS	A	A	A	A
Approach Delay (s)	5.9	0.6	9.7	9.3
Approach LOS			A	A

Intersection Summary				
Average Delay	7.3			
Intersection Capacity Utilization	24.1%	ICU Level of Service	A	
Analysis Period (min)	15			

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.1
Total Del/Veh (s)	4.9	0.4	3.8	4.0	3.1	4.8	4.9	3.9

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	All
Denied Del/Veh (s)		0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1		0.1
Total Del/Veh (s)		0.9	0.5	2.2	0.8	0.8	7.7	4.4	3.7	5.1		1.4

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.4	0.4	0.2	0.2	0.2
Total Del/Veh (s)	1.7	0.2	1.8	4.2	4.0	2.5	2.1	3.0

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2		0.1	0.1	0.1		0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.0	0.0		0.0	0.0	4.8	1.5	4.1	2.4	3.3	2.2

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	38.5

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	29.3	20.0	27.8
Average Queue (m)	19.8	11.7	17.3
95th Queue (m)	30.8	20.3	28.3
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	3.3	17.9	19.5	9.2
Average Queue (m)	0.5	6.0	10.7	2.8
95th Queue (m)	3.7	18.0	19.2	9.8
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	17.1	26.5	18.1
Average Queue (m)	7.8	9.4	9.4
95th Queue (m)	18.3	27.7	20.5
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	0.9	7.8	16.5
Average Queue (m)	0.1	2.1	10.7
95th Queue (m)	1.9	8.2	16.5
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - Tot_2025_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	438	6.0	1484	0.295	100	2.3	LOS A	2.1	15.8	Full	500	0.0	0.0
Approach	438	6.0		0.295		2.3	LOS A	2.1	15.8				
NorthEast: Aspen Blvd													
Lane 1[d]	191	5.1	880	0.217	100	4.3	LOS A	1.2	9.1	Full	300	0.0	0.0
Approach	191	5.1		0.217		4.3	LOS A	1.2	9.1				
West: Portage Road													
Lane 1[d]	329	4.2	1103	0.298	100	1.5	LOS A	2.1	15.1	Full	200	0.0	0.0
Approach	329	4.2		0.298		1.5	LOS A	2.1	15.1				
Intersection	958	5.2		0.298		2.4	LOS A	2.1	15.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	308	130	438	6.0	1484	0.295	100	NA	NA
Approach	308	130	438	6.0		0.295			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	133	59	191	5.1	880	0.217	100	NA	NA
Approach	133	59	191	5.1		0.217			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	19	310	329	4.2	1103	0.298	100	NA	NA
Approach	19	310	329	4.2		0.298			

	Total	%HV	Deg.Satn (v/c)
Intersection	958	5.2	0.298

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

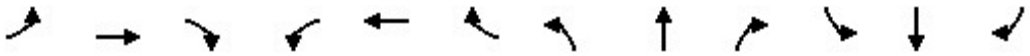
Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	119	178	49	73	218	47
Future Volume (vph)	119	178	49	73	218	47
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	132	198	54	81	242	52

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	330	135	294
Volume Left (vph)	132	0	242
Volume Right (vph)	198	81	0
Hadj (s)	-0.25	-0.33	0.21
Departure Headway (s)	4.7	4.8	5.1
Degree Utilization, x	0.43	0.18	0.42
Capacity (veh/h)	714	687	664
Control Delay (s)	11.3	8.9	11.8
Approach Delay (s)	11.3	8.9	11.8
Approach LOS	B	A	B

Intersection Summary			
Delay	11.1		
Level of Service	B		
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	276	27	89	304	94	12	2	142	51	11	7
Future Volume (Veh/h)	14	276	27	89	304	94	12	2	142	51	11	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	15	297	29	96	327	101	13	2	153	55	12	8
Pedestrians		37						10			17	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		3						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	445			336			972	988	322	1082	952	432
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	445			336			972	988	322	1082	952	432
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			92			93	99	79	60	95	99
cM capacity (veh/h)	1110			1213			195	221	713	138	232	600

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	341	524	168	75
Volume Left	15	96	13	55
Volume Right	29	101	153	8
cSH	1110	1213	579	162
Volume to Capacity	0.01	0.08	0.29	0.46
Queue Length 95th (m)	0.3	2.1	9.6	17.2
Control Delay (s)	0.5	2.2	13.7	45.0
Lane LOS	A	A	B	E
Approach Delay (s)	0.5	2.2	13.7	45.0
Approach LOS			B	E

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	38	418	456	66	29	35
Future Volume (veh/h)	38	418	456	66	29	35
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	43	470	512	74	33	39
Approach Volume (veh/h)	513			586	72	
Crossing Volume (veh/h)	33			43	512	
High Capacity (veh/h)	1349			1339	925	
High v/c (veh/h)	0.38			0.44	0.08	
Low Capacity (veh/h)	1129			1120	747	
Low v/c (veh/h)	0.45			0.52	0.10	

Intersection Summary			
Maximum v/c High	0.44		
Maximum v/c Low	0.52		
Intersection Capacity Utilization	71.1%	ICU Level of Service	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	20	2	0	14	19	2	9	2	30	3	94
Future Volume (Veh/h)	52	20	2	0	14	19	2	9	2	30	3	94
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	58	22	2	0	16	21	2	10	2	33	3	104
Pedestrians		1									7	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	44			24			272	183	23	180	174	34
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	44			24			272	183	23	180	174	34
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	96			100			100	99	100	95	100	90
cM capacity (veh/h)	1530			1604			592	684	1060	730	692	1026

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	82	37	14	140
Volume Left	58	0	2	33
Volume Right	2	21	2	104
cSH	1530	1604	704	928
Volume to Capacity	0.04	0.00	0.02	0.15
Queue Length 95th (m)	0.9	0.0	0.5	4.2
Control Delay (s)	5.4	0.0	10.2	9.6
Lane LOS	A		B	A
Approach Delay (s)	5.4	0.0	10.2	9.6
Approach LOS			B	A

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.3	0.3	0.1
Total Del/Veh (s)	5.7	0.3	4.5	4.5	3.8	5.5	5.6	4.9

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0	0.2		0.2	0.1	0.2	0.2
Total Del/Veh (s)	3.8	1.2	1.0	3.3	1.4	1.2	13.4		6.8	11.0	11.5	5.3

2: Frontier Street & Birch Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	3.1

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.5	0.4	0.1	0.1	0.3
Total Del/Veh (s)	2.0	0.6	2.2	5.5	5.3	2.3	2.4	3.8

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1		0.1	0.1		0.1		0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.1	0.0		0.0	0.0		3.6		4.8	1.0	3.7	2.3

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	67.6

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	29.7	21.2	29.4
Average Queue (m)	19.2	12.3	19.6
95th Queue (m)	29.6	20.6	30.7
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	14.2	23.0	25.8	17.3
Average Queue (m)	4.7	11.5	16.1	10.9
95th Queue (m)	14.8	26.8	28.0	18.8
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	24.8	40.3	12.3
Average Queue (m)	9.0	14.7	5.4
95th Queue (m)	25.7	38.6	14.6
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	7.4	8.9	19.6
Average Queue (m)	1.1	2.5	11.6
95th Queue (m)	7.0	9.1	19.4
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - Tot_2025_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	587	5.6	1419	0.413	100	3.0	LOS A	3.3	24.0	Full	500	0.0	0.0
Approach	587	5.6		0.413		3.0	LOS A	3.3	24.0				
NorthEast: Aspen Blvd													
Lane 1[d]	72	4.8	727	0.099	100	5.0	LOS A	0.5	4.0	Full	300	0.0	0.0
Approach	72	4.8		0.099		5.0	LOS A	0.5	4.0				
West: Portage Road													
Lane 1[d]	512	3.7	1402	0.366	100	0.7	LOS A	3.1	22.1	Full	200	0.0	0.0
Approach	512	3.7		0.366		0.7	LOS A	3.1	22.1				
Intersection	1171	4.7		0.413		2.1	LOS A	3.3	24.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	512	74	587	5.6	1419	0.413	100	NA	NA
Approach	512	74	587	5.6		0.413			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	33	39	72	4.8	727	0.099	100	NA	NA
Approach	33	39	72	4.8		0.099			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	43	470	512	3.7	1402	0.366	100	NA	NA
Approach	43	470	512	3.7		0.366			

	Total	%HV	Deg.Satn (v/c)
Intersection	1171	4.7	0.413

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	91	148	28	57	166	32
Future Volume (vph)	91	148	28	57	166	32
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	112	183	35	70	205	40

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	295	105	245
Volume Left (vph)	112	0	205
Volume Right (vph)	183	70	0
Hadj (s)	-0.15	-0.30	0.29
Departure Headway (s)	4.6	4.7	5.1
Degree Utilization, x	0.38	0.14	0.34
Capacity (veh/h)	732	713	672
Control Delay (s)	10.5	8.4	10.7
Approach Delay (s)	10.5	8.4	10.7
Approach LOS	B	A	B

Intersection Summary			
Delay	10.2		
Level of Service	B		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

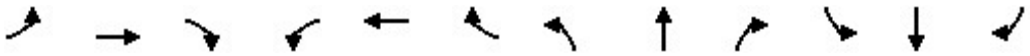
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	221	5	36	257	12	13	2	44	9	0	1
Future Volume (Veh/h)	1	221	5	36	257	12	13	2	44	9	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	1	291	7	47	338	16	17	3	58	12	0	1
Pedestrians		10			3			2			22	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	376			300			750	768	300	821	764	378
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	376			300			750	768	300	821	764	378
tC, single (s)	4.1			4.1			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			96			94	99	92	95	100	100
cM capacity (veh/h)	1172			1270			302	315	716	253	317	655

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	299	401	78	13
Volume Left	1	47	17	12
Volume Right	7	16	58	1
cSH	1172	1270	531	265
Volume to Capacity	0.00	0.04	0.15	0.05
Queue Length 95th (m)	0.0	0.9	4.1	1.2
Control Delay (s)	0.0	1.3	12.9	19.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.0	1.3	12.9	19.3
Approach LOS			B	C

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	15	260	254	115	117	50
Future Volume (veh/h)	15	260	254	115	117	50
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	19	325	318	144	146	62
Approach Volume (veh/h)	344			462	208	
Crossing Volume (veh/h)	146			19	318	
High Capacity (veh/h)	1235			1364	1079	
High v/c (veh/h)	0.28			0.34	0.19	
Low Capacity (veh/h)	1025			1143	884	
Low v/c (veh/h)	0.34			0.40	0.24	

Intersection Summary			
Maximum v/c High	0.34		
Maximum v/c Low	0.40		
Intersection Capacity Utilization	61.2%	ICU Level of Service	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	9	0	2	3	15	0	7	1	5	27	59
Future Volume (Veh/h)	35	9	0	2	3	15	0	7	1	5	27	59
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	43	11	0	2	4	19	0	9	1	6	33	73
Pedestrians		1									3	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	26			11			205	127	11	123	118	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	26			11			205	127	11	123	118	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	99	100	99	96	93
cM capacity (veh/h)	1578			1602			659	738	1067	819	747	1055

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	54	25	10	112
Volume Left	43	2	0	6
Volume Right	0	19	1	73
cSH	1578	1602	762	928
Volume to Capacity	0.03	0.00	0.01	0.12
Queue Length 95th (m)	0.7	0.0	0.3	3.3
Control Delay (s)	5.9	0.6	9.8	9.4
Lane LOS	A	A	A	A
Approach Delay (s)	5.9	0.6	9.8	9.4
Approach LOS			A	A

Intersection Summary				
Average Delay	7.4			
Intersection Capacity Utilization	25.5%	ICU Level of Service	A	
Analysis Period (min)	15			

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1
Total Del/Veh (s)	5.0	0.4	4.1	4.3	3.4	4.7	5.0	4.1

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	All
Denied Del/Veh (s)		0.0	0.0	0.1	0.1	0.0	0.1	0.3	0.2	0.1		0.1
Total Del/Veh (s)		0.9	0.7	2.8	0.9	0.7	9.7	5.9	4.2	7.0		1.5

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.5	0.4	0.2	0.3	0.3
Total Del/Veh (s)	2.9	0.5	2.3	5.1	5.4	2.5	2.8	3.7

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2		0.1	0.1	0.1		0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.3		0.1	0.0	4.2		5.2	2.8	3.5	2.3

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	47.5

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	30.6	18.5	29.4
Average Queue (m)	20.7	11.1	18.1
95th Queue (m)	30.6	17.3	28.9
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	7.8	21.7	22.1	9.1
Average Queue (m)	1.2	6.6	11.9	2.3
95th Queue (m)	7.6	19.8	22.1	8.6
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	24.8	41.1	21.1
Average Queue (m)	11.3	15.3	11.0
95th Queue (m)	25.5	42.5	22.4
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	1.8	8.5	17.5
Average Queue (m)	0.3	2.8	11.1
95th Queue (m)	2.8	9.7	17.8
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - Tot_2030_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	479	6.0	1483	0.323	100	2.3	LOS A	2.5	18.1	Full	500	0.0	0.0
Approach	479	6.0		0.323		2.3	LOS A	2.5	18.1				
NorthEast: Aspen Blvd													
Lane 1[d]	210	5.0	857	0.245	100	4.6	LOS A	1.4	10.5	Full	300	0.0	0.0
Approach	210	5.0		0.245		4.6	LOS A	1.4	10.5				
West: Portage Road													
Lane 1[d]	359	4.2	1085	0.331	100	1.6	LOS A	2.4	17.3	Full	200	0.0	0.0
Approach	359	4.2		0.331		1.6	LOS A	2.4	17.3				
Intersection	1048	5.2		0.331		2.5	LOS A	2.5	18.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	335	144	479	6.0	1483	0.323	100	NA	NA
Approach	335	144	479	6.0		0.323			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	146	64	210	5.0	857	0.245	100	NA	NA
Approach	146	64	210	5.0		0.245			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	20	339	359	4.2	1085	0.331	100	NA	NA
Approach	20	339	359	4.2		0.331			

	Total	%HV	Deg.Satn (v/c)
Intersection	1048	5.2	0.331

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

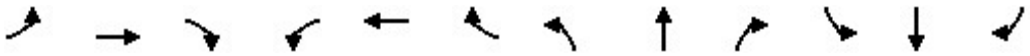
Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	128	197	53	78	240	52
Future Volume (vph)	128	197	53	78	240	52
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	142	219	59	87	267	58

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	361	146	325
Volume Left (vph)	142	0	267
Volume Right (vph)	219	87	0
Hadj (s)	-0.25	-0.32	0.21
Departure Headway (s)	4.9	5.0	5.3
Degree Utilization, x	0.49	0.20	0.48
Capacity (veh/h)	697	659	649
Control Delay (s)	12.5	9.3	13.0
Approach Delay (s)	12.5	9.3	13.0
Approach LOS	B	A	B

Intersection Summary			
Delay	12.1		
Level of Service	B		
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		



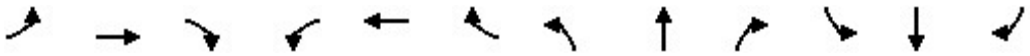
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	301	29	98	333	104	13	3	156	56	12	8
Future Volume (Veh/h)	16	301	29	98	333	104	13	3	156	56	12	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	17	324	31	105	358	112	14	3	168	60	13	9
Pedestrians		37						10			17	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		3						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	487			365			1060	1080	350	1184	1040	468
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	487			365			1060	1080	350	1184	1040	468
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			91			92	98	76	46	94	98
cM capacity (veh/h)	1071			1184			166	193	688	112	204	573

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	372	575	185	82
Volume Left	17	105	14	60
Volume Right	31	112	168	9
cSH	1071	1184	538	133
Volume to Capacity	0.02	0.09	0.34	0.62
Queue Length 95th (m)	0.4	2.3	12.2	25.7
Control Delay (s)	0.5	2.4	15.2	68.0
Lane LOS	A	A	C	F
Approach Delay (s)	0.5	2.4	15.2	68.0
Approach LOS			C	F

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	42	458	500	73	32	38
Future Volume (veh/h)	42	458	500	73	32	38
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	47	515	562	82	36	43
Approach Volume (veh/h)	562			644	79	
Crossing Volume (veh/h)	36			47	562	
High Capacity (veh/h)	1346			1335	888	
High v/c (veh/h)	0.42			0.48	0.09	
Low Capacity (veh/h)	1126			1116	714	
Low v/c (veh/h)	0.50			0.58	0.11	

Intersection Summary			
Maximum v/c High	0.48		
Maximum v/c Low	0.58		
Intersection Capacity Utilization	76.6%	ICU Level of Service	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	22	2	0	15	21	2	10	2	33	3	100
Future Volume (Veh/h)	54	22	2	0	15	21	2	10	2	33	3	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	60	24	2	0	17	23	2	11	2	37	3	111
Pedestrians		1									7	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	47			26			287	192	25	188	182	36
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			26			287	192	25	188	182	36
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	96			100			100	98	100	95	100	89
cM capacity (veh/h)	1526			1601			574	675	1057	719	684	1023

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	86	40	15	151
Volume Left	60	0	2	37
Volume Right	2	23	2	111
cSH	1526	1601	692	919
Volume to Capacity	0.04	0.00	0.02	0.16
Queue Length 95th (m)	1.0	0.0	0.5	4.7
Control Delay (s)	5.3	0.0	10.3	9.7
Lane LOS	A		B	A
Approach Delay (s)	5.3	0.0	10.3	9.7
Approach LOS			B	A

Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	31.1%	ICU Level of Service	A	
Analysis Period (min)	15			

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.1
Total Del/Veh (s)	5.8	0.3	4.9	4.3	3.7	5.7	5.3	5.0

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.2	0.2	0.1
Total Del/Veh (s)	3.7	1.2	1.0	3.6	1.8	1.3	15.0	8.9	7.0	13.8	17.8	6.5

2: Frontier Street & Birch Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	3.4

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.6	0.5	0.1	0.1	0.3
Total Del/Veh (s)	1.8	0.1	2.0	6.6	6.0	3.7	3.3	4.4

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.3	0.1	0.1	0.1		0.1	0.1	0.0	0.0	0.0	0.1
Total Del/Veh (s)	1.2	0.3	0.0	0.1	0.0		3.4	1.6	4.8	1.3	3.6	2.3

Total Zone Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	71.3

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	30.7	18.1	29.6
Average Queue (m)	20.4	11.8	20.1
95th Queue (m)	30.6	18.3	30.8
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	13.2	36.4	31.6	21.0
Average Queue (m)	4.3	14.2	16.8	11.1
95th Queue (m)	15.0	33.5	31.0	20.6
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)		0		
Queuing Penalty (veh)		0		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	25.4	43.9	15.6
Average Queue (m)	8.6	17.4	8.0
95th Queue (m)	25.0	47.2	17.6
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	11.4	8.7	19.2
Average Queue (m)	2.0	3.0	12.4
95th Queue (m)	10.0	10.1	19.9
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - Tot_2030_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	644	5.6	1411	0.456	100	3.1	LOS A	3.8	28.2	Full	500	0.0	0.0
Approach	644	5.6		0.456		3.1	LOS A	3.8	28.2				
NorthEast: Aspen Blvd													
Lane 1[d]	79	4.8	688	0.114	100	5.6	LOS A	0.6	4.7	Full	300	0.0	0.0
Approach	79	4.8		0.114		5.6	LOS A	0.6	4.7				
West: Portage Road													
Lane 1[d]	562	3.7	1393	0.403	100	0.8	LOS A	3.6	25.7	Full	200	0.0	0.0
Approach	562	3.7		0.403		0.8	LOS A	3.6	25.7				
Intersection	1284	4.7		0.456		2.2	LOS A	3.8	28.2				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	562	82	644	5.6	1411	0.456	100	NA	NA
Approach	562	82	644	5.6		0.456			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	36	43	79	4.8	688	0.114	100	NA	NA
Approach	36	43	79	4.8		0.114			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	47	515	562	3.7	1393	0.403	100	NA	NA
Approach	47	515	562	3.7		0.403			

	Total	%HV	Deg.Satn (v/c)
Intersection	1284	4.7	0.456

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	99	163	30	61	184	35
Future Volume (vph)	99	163	30	61	184	35
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	122	201	37	75	227	43

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	323	112	270
Volume Left (vph)	122	0	227
Volume Right (vph)	201	75	0
Hadj (s)	-0.15	-0.31	0.29
Departure Headway (s)	4.7	4.8	5.2
Degree Utilization, x	0.42	0.15	0.39
Capacity (veh/h)	718	691	659
Control Delay (s)	11.2	8.6	11.4
Approach Delay (s)	11.2	8.6	11.4
Approach LOS	B	A	B

Intersection Summary			
Delay	10.9		
Level of Service	B		
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		

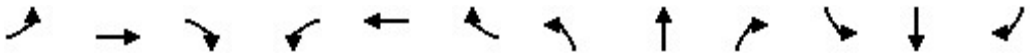
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	243	5	39	282	13	14	3	48	10	0	1
Future Volume (Veh/h)	1	243	5	39	282	13	14	3	48	10	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	1	320	7	51	371	17	18	4	63	13	0	1
Pedestrians		10			3			2			22	
Lane Width (m)		3.6			3.6			3.6			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		1			0			0			2	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	410			329			820	840	328	897	834	412
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	410			329			820	840	328	897	834	412
tC, single (s)	4.1			4.1			7.2	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.6	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			96			93	99	91	94	100	100
cM capacity (veh/h)	1138			1240			269	285	690	221	287	628

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	328	439	85	14
Volume Left	1	51	18	13
Volume Right	7	17	63	1
cSH	1138	1240	494	231
Volume to Capacity	0.00	0.04	0.17	0.06
Queue Length 95th (m)	0.0	1.0	4.9	1.5
Control Delay (s)	0.0	1.3	13.8	21.6
Lane LOS	A	A	B	C
Approach Delay (s)	0.0	1.3	13.8	21.6
Approach LOS			B	C

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	17	285	279	127	129	55
Future Volume (veh/h)	17	285	279	127	129	55
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	21	356	349	159	161	69
Approach Volume (veh/h)	377			508	230	
Crossing Volume (veh/h)	161			21	349	
High Capacity (veh/h)	1221			1362	1053	
High v/c (veh/h)	0.31			0.37	0.22	
Low Capacity (veh/h)	1012			1141	861	
Low v/c (veh/h)	0.37			0.45	0.27	

Intersection Summary			
Maximum v/c High	0.37		
Maximum v/c Low	0.45		
Intersection Capacity Utilization	65.5%	ICU Level of Service	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	10	0	3	3	17	0	8	1	5	30	63
Future Volume (Veh/h)	36	10	0	3	3	17	0	8	1	5	30	63
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	44	12	0	4	4	21	0	10	1	6	37	78
Pedestrians		1									3	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	28			12			220	136	12	132	126	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	28			12			220	136	12	132	126	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	99	100	99	95	93
cM capacity (veh/h)	1575			1600			637	728	1066	806	738	1053

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	56	29	11	121
Volume Left	44	4	0	6
Volume Right	0	21	1	78
cSH	1575	1600	750	919
Volume to Capacity	0.03	0.00	0.01	0.13
Queue Length 95th (m)	0.7	0.1	0.4	3.6
Control Delay (s)	5.8	1.0	9.9	9.5
Lane LOS	A	A	A	A
Approach Delay (s)	5.8	1.0	9.9	9.5
Approach LOS			A	A

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.1
Total Del/Veh (s)	5.1	0.4	4.1	4.5	3.7	4.7	4.8	4.1

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBR	All
Denied Del/Veh (s)		0.0	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.1		0.1
Total Del/Veh (s)		0.9	0.4	2.6	1.0	0.7	10.2	12.0	4.6	8.7		1.7

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.5	0.4	0.2	0.2	0.3
Total Del/Veh (s)	2.1	0.3	2.2	5.7	5.7	2.6	2.7	3.9

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.9	0.0	0.8	0.0	0.0	3.3	1.8	3.9	2.5	3.4	2.1

Total Zone Performance

Denied Del/Veh (s)	0.3
Total Del/Veh (s)	40.9

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	31.9	21.6	26.9
Average Queue (m)	20.9	12.2	17.1
95th Queue (m)	32.0	21.0	26.6
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	8.3	21.2	19.0	10.4
Average Queue (m)	1.2	6.1	11.6	3.3
95th Queue (m)	8.7	18.9	20.0	11.0
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	25.8	34.6	20.3
Average Queue (m)	11.6	16.5	11.5
95th Queue (m)	26.4	41.1	23.9
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	2.7	9.5	16.6
Average Queue (m)	0.4	2.6	10.3
95th Queue (m)	3.4	9.5	16.2
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - Tot_2035_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	525	6.0	1483	0.354	100	2.3	LOS A	2.8	20.8	Full	500	0.0	0.0
Approach	525	6.0		0.354		2.3	LOS A	2.8	20.8				
NorthEast: Aspen Blvd													
Lane 1[d]	231	5.0	833	0.278	100	5.0	LOS A	1.7	12.1	Full	300	0.0	0.0
Approach	231	5.0		0.278		5.0	LOS A	1.7	12.1				
West: Portage Road													
Lane 1[d]	391	4.2	1066	0.367	100	1.8	LOS A	2.7	19.9	Full	200	0.0	0.0
Approach	391	4.2		0.367		1.8	LOS A	2.7	19.9				
Intersection	1148	5.2		0.367		2.7	LOS A	2.8	20.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	366	159	525	6.0	1483	0.354	100	NA	NA
Approach	366	159	525	6.0		0.354			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	161	70	231	5.0	833	0.278	100	NA	NA
Approach	161	70	231	5.0		0.278			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	21	370	391	4.2	1066	0.367	100	NA	NA
Approach	21	370	391	4.2		0.367			

	Total	%HV	Deg.Satn (v/c)
Intersection	1148	5.2	0.367

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

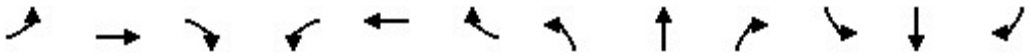
Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	139	217	58	83	265	56
Future Volume (vph)	139	217	58	83	265	56
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	154	241	64	92	294	62

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	395	156	356
Volume Left (vph)	154	0	294
Volume Right (vph)	241	92	0
Hadj (s)	-0.25	-0.32	0.21
Departure Headway (s)	5.0	5.2	5.4
Degree Utilization, x	0.55	0.23	0.54
Capacity (veh/h)	681	632	633
Control Delay (s)	14.0	9.7	14.5
Approach Delay (s)	14.0	9.7	14.5
Approach LOS	B	A	B

Intersection Summary			
Delay	13.5		
Level of Service	B		
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		



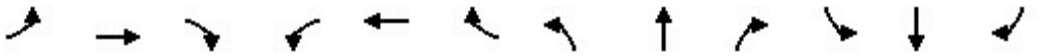
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	330	32	108	365	115	14	3	172	62	13	8
Future Volume (Veh/h)	17	330	32	108	365	115	14	3	172	62	13	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	18	355	34	116	392	124	15	3	185	67	14	9
Pedestrians		37						10			17	
Lane Width (m)		3.6						3.6			3.6	
Walking Speed (m/s)		1.2						1.2			1.2	
Percent Blockage		3						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	533			399			1157	1183	382	1298	1138	508
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	533			399			1157	1183	382	1298	1138	508
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			90			89	98	72	24	92	98
cM capacity (veh/h)	1030			1150			139	165	660	88	175	544

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	407	632	203	90
Volume Left	18	116	15	67
Volume Right	34	124	185	9
cSH	1030	1150	500	105
Volume to Capacity	0.02	0.10	0.41	0.86
Queue Length 95th (m)	0.4	2.7	15.6	39.7
Control Delay (s)	0.6	2.6	17.1	127.4
Lane LOS	A	A	C	F
Approach Delay (s)	0.6	2.6	17.1	127.4
Approach LOS			C	F

Intersection Summary			
Average Delay	12.6		
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	46	503	549	80	35	42
Future Volume (veh/h)	46	503	549	80	35	42
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	52	565	617	90	39	47
Approach Volume (veh/h)	617			707	86	
Crossing Volume (veh/h)	39			52	617	
High Capacity (veh/h)	1343			1330	850	
High v/c (veh/h)	0.46			0.53	0.10	
Low Capacity (veh/h)	1123			1111	680	
Low v/c (veh/h)	0.55			0.64	0.13	

Intersection Summary			
Maximum v/c High	0.53		
Maximum v/c Low	0.64		
Intersection Capacity Utilization	82.7%	ICU Level of Service	E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	24	3	0	16	23	3	11	3	37	3	107
Future Volume (Veh/h)	56	24	3	0	16	23	3	11	3	37	3	107
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	62	27	3	0	18	26	3	12	3	41	3	119
Pedestrians		1									7	
Lane Width (m)		3.6									3.6	
Walking Speed (m/s)		1.2									1.2	
Percent Blockage		0									1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	51			30			305	204	28	200	192	39
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	51			30			305	204	28	200	192	39
tC, single (s)	4.2			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	96			100			99	98	100	94	100	88
cM capacity (veh/h)	1521			1596			553	664	1052	704	674	1020

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	92	44	18	163
Volume Left	62	0	3	41
Volume Right	3	26	3	119
cSH	1521	1596	683	909
Volume to Capacity	0.04	0.00	0.03	0.18
Queue Length 95th (m)	1.0	0.0	0.6	5.2
Control Delay (s)	5.1	0.0	10.4	9.8
Lane LOS	A		B	A
Approach Delay (s)	5.1	0.0	10.4	9.8
Approach LOS			B	A

Intersection Summary				
Average Delay	7.1			
Intersection Capacity Utilization	31.5%	ICU Level of Service	A	
Analysis Period (min)	15			

1: Prospect Street & Birch Road Performance by movement

Movement	WBL	WBT	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.3	0.4	0.1
Total Del/Veh (s)	6.6	0.5	5.8	5.2	4.3	6.3	6.6	5.8

2: Frontier Street & Birch Road Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.1	0.2	0.2
Total Del/Veh (s)	4.6	1.5	1.4	3.6	1.7	1.3	16.7	12.6	6.9	23.7	20.3	15.9

2: Frontier Street & Birch Road Performance by movement

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	4.1

3: Pemberton Portage Road/Aspen Blvd & Birch Road Performance by movement

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0		0.0	0.7	0.6	0.1	0.1	0.4
Total Del/Veh (s)	2.3	0.2	2.2	7.4	7.9	2.8	3.0	4.9

4: Aster Street & Prospect Street Performance by movement

Movement	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.2	0.1	0.1	0.1		0.1	0.1	0.0	0.0	0.0	0.1
Total Del/Veh (s)	1.2	0.4	0.1	0.1	0.1		4.0	2.3	5.2	1.2	3.5	2.3

Total Zone Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	76.2

Intersection: 1: Prospect Street & Birch Road

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (m)	37.0	21.5	33.8
Average Queue (m)	23.0	14.0	22.4
95th Queue (m)	38.0	22.4	36.2
Link Distance (m)	95.9	128.2	257.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Frontier Street & Birch Road

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	19.6	28.9	27.6	28.2
Average Queue (m)	6.0	15.2	16.8	14.2
95th Queue (m)	19.5	32.6	28.2	31.7
Link Distance (m)	95.9	63.9	117.9	134.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Pemberton Portage Road/Aspen Blvd & Birch Road

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	24.6	56.4	17.5
Average Queue (m)	7.7	24.2	8.1
95th Queue (m)	22.9	61.3	19.3
Link Distance (m)	63.9	527.6	142.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Aster Street & Prospect Street

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	8.8	8.9	17.5
Average Queue (m)	1.5	3.3	12.2
95th Queue (m)	9.2	10.3	18.7
Link Distance (m)	104.8	95.1	128.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

LANE SUMMARY

Site: 101 [Portage Rd & Aspen Blvd - Tot_2035_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Portage Road													
Lane 1[d]	707	5.6	1404	0.504	100	3.1	LOS A	4.6	33.5	Full	500	0.0	0.0
Approach	707	5.6		0.504		3.1	LOS A	4.6	33.5				
NorthEast: Aspen Blvd													
Lane 1[d]	87	4.8	648	0.133	100	6.2	LOS A	0.8	5.6	Full	300	0.0	0.0
Approach	87	4.8		0.133		6.2	LOS A	0.8	5.6				
West: Portage Road													
Lane 1[d]	617	3.7	1387	0.445	100	0.8	LOS A	4.2	30.1	Full	200	0.0	0.0
Approach	617	3.7		0.445		0.8	LOS A	4.2	30.1				
Intersection	1410	4.7		0.504		2.3	LOS A	4.6	33.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Approach Lane Flows (veh/h)

South: Portage Road

Mov. From S To Exit:	L2 W	R1 NE	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	617	90	707	5.6	1404	0.504	100	NA	NA
Approach	617	90	707	5.6		0.504			

NorthEast: Aspen Blvd

Mov. From NE To Exit:	L1 S	R1 W	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	39	47	87	4.8	648	0.133	100	NA	NA
Approach	39	47	87	4.8		0.133			

West: Portage Road

Mov. From W To Exit:	L1 NE	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.
Lane 1	52	565	617	3.7	1387	0.445	100	NA	NA
Approach	52	565	617	3.7		0.445			

	Total	%HV	Deg.Satn (v/c)
Intersection	1410	4.7	0.504

Lane flow rates given in this report are based on the arrival flow rates subject to upstream capacity constraint where applicable.

Merge Analysis

	Exit Lane Number	Short Lane Length m	Percent Opng in Lane %	Opposing Flow Rate veh/h	Opposing Flow Rate pcu/h	Critical Gap sec	Follow-up Headway sec	Lane Flow Rate veh/h	Capacity veh/h	Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
NorthEast Exit: Aspen Blvd Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										
West Exit: Portage Road Merge Type: **Not Applied**												
Full Length Lane	1	Merge Analysis not applied.										