City of Colwood
STAFF REPORT

To: Planning and Land Use Committee
Date: May 1, 2023
From: Desiree Givens, Planner II
RE: Rezoning Application RZ-22-017 for 2054-2076 Sooke Road

RECOMMENDATION

THAT the Planning and Land Use Committee recommend to Council:

THAT amendments be made to the Land Use Bylaw to rezone the properties at 2054, 2056, 2060, 2070 and 2076 Sooke Road from the Residential 1 (R1) Zone to the Transit Growth Area 1 (TGA1) Zone;

AND THAT prior to adoption of the amending bylaw, the properties are consolidated into one legal lot and a plan of consolidation is filed with the BC Land Titles Office;

AND THAT prior to adoption of the amending bylaw, a Section 107 Plan showing the proposed road dedication along Sooke Road to achieve a 30 m cross-section based on the Sooke Road Corridor Study that was considered by the Transportation Committee on May 9th 2022 be submitted to the City of Colwood for signature and registered at the BC Land Titles Office;

AND FURTHER THAT prior to adoption of the amending bylaw, the following long-term conditions be registered within a Section 219 Covenant Development Agreement:

Prior to the issuance of a Building Permit:

1. The Owner covenants and agrees with the City that the Lands shall not be built upon, and the Owner shall not apply for a building permit and the Owner agrees it is not entitled to a building permit unless and until:

OFF-SITE WORKS

a. The Owner completes frontage improvements on Sooke Road (or enters into a Servicing Agreement with the City of Colwood for the required frontage improvements) as required by applicable City of Colwood policies or bylaws.

PARKING

b. The Owner registers a Section 219 covenant over the lands that agrees to allocate parking for each residential unit as required by applicable City of Colwood bylaws and ensures that the allocated residential parking is not provided in exchange for additional compensation separate from the rent received for each residential unit.

HOUSING COVENANT

c. The Owner registers a Section 219 covenant over the lands that agrees to secure residential units on the Lands for rental tenure for no less than 20 years commencing on the date an occupancy inspection is approved.

SUMMARY AND PURPOSE

The purpose of this report is to present to the Planning and Land Use Committee Rezoning Application RZ-22-017. The applicant is requesting an amendment to the Land Use Bylaw to consolidate and rezone the properties at 2054, 2056, 2060, 2070 and 2076 Sooke Road from the Residential 1 (R1) Zone to a new Comprehensive Development zone that would enable the development of two 6-storey apartment buildings consisting of 150 units as shown in **Appendix 1** (Architectural Plans).

The proposal could provide market rental options for future Colwood residents, including students attending Royal Roads University. This would meet an area of need identified in the 2020 Housing Needs Assessment and the Colliers assessment on population and real estate projections. The proposal is consistent with the policies of the Transit Growth Area land use designation, which supports a maximum Floor Area Ratio of approximately 2.5 and multi-unit buildings up to approximately 6 storeys (in limited situations).

At its Regular Meeting of Council on April 24th, Council passed a motion to add the Transit Growth Area 1 (TGA1) Zone to Division 6 of the Land Use Bylaw and directed staff to use the TGA1 Zone to evaluate all future rezoning applications for lands that are designated by the Official Community Plan as Transit Growth Area. The expectation is that all proposals that are in the Transit Growth Area be rezoned to the TGA1 Zone rather than a CD zone to ensure that there is a consistent approach to rezoning, land use and development on Sooke Road and other transit growth areas in Colwood.

Staff are thus recommending that the subject properties be rezoned to the proposed Transit Growth Area 1 (TGA1) zone.

STRATEGIC PLAN AND RELATED POLICIES

Colwood Strategic Plan 2019-2023

To support mobility and prosperity objectives, the City of Colwood's Strategic Plan 2019-2023 encourages increasing the convenience of mass transit, improving walkability and accessibility, supporting rental housing, increasing housing choices for current and future residents, and attracting future residents.

Housing Needs Report (Urban Matters 2020)

The Housing Needs Report prepared by Urban Matters (2020) indicates that rental housing is a key area of local need in Colwood and that rental vacancy rates have historically been low in Colwood, which speaks to the demand for more rental housing supply. As of October 2022, the overall rental vacancy rate for Colwood was 0.8%. A healthy vacancy rate is generally considered to be between 3% and 5%.

BACKGROUND

Applicant Information

Applicant:	West Urban Development Ltd.
Address:	2054, 2056, 2060, 2070, and 2076 Sooke Road
Legal:	Lot 16 Sec. 101 Esquimalt Plan VIP32178; Lot 17 Sec. 101 Esquimalt Plan VIP 32178; Lot 1 Sec. 101 Esquimalt Plan VIP6399 Except Plan 32178; Lot B Sec. 101 Esquimalt Plan VIP14811 and Lot 1 Sec. 101 Esquimalt Plan VIP32147
Current Zoning:	Residential 1 (R1) Zone
Proposed Zoning:	Transit Growth Area 1 (TGA1) Zone
Current OCP Designation:	Transit Growth Area
Proposed OCP Designation:	No Change
Development Permit Area:	Form & Character – Neighbourhood

APPLICATION REVIEW

1. Proposal

The proposal is to rezone the subject properties from a Residential 1 (R1) Zone to a new zone that would enable the construction of two 6-storey multi-family apartment buildings on the subject properties, which will consist of 150 apartment units, including 95 one-bedroom units, 53 two-bedroom units, and 2 studios. Please refer to **Appendix 1** for a plan illustrating the proposed massing and siting.

2. Site Context

The subject properties are in northwest Colwood between Peace Park and Hatley Memorial Gardens. The properties front Sooke Road and are located across from Royal Roads University.

The subject properties contain 37 trees, 10 of which are protected under Urban Forest Bylaw No. 1735.

Figure 3 (on the right) illustrates the site context of the subject properties and provides information regarding the existing land uses and zoning of the adjacent properties.

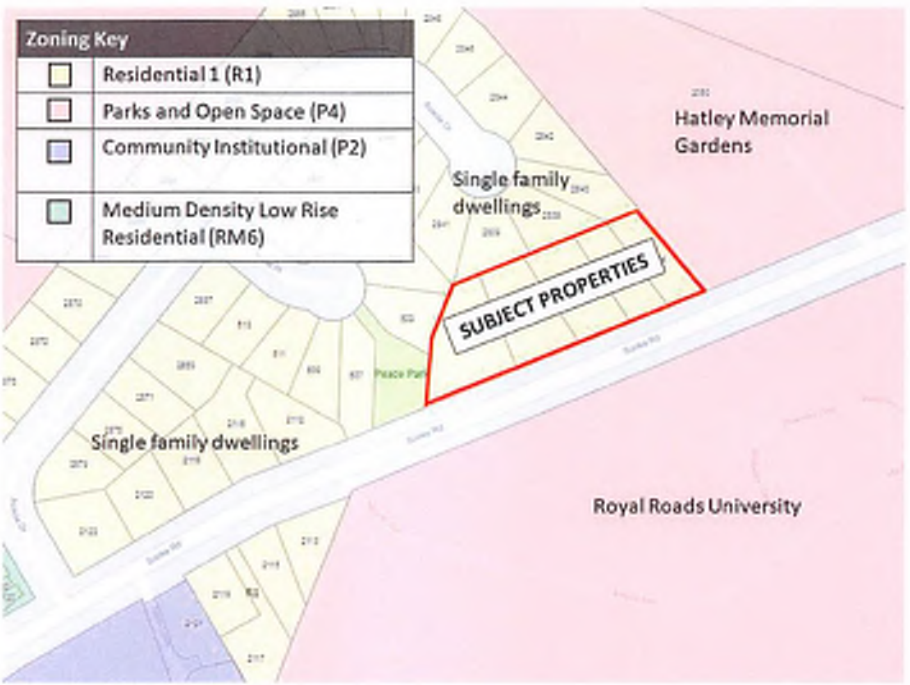


Figure 1: Subject Properties Site Context

3. Land Use Bylaw No. 151

Table 1 compares the land use requirements imposed on the lands by the current Residential 1 (R1) Zone and the proposed requirements for the property that will be imposed by the proposed Transit Growth Area 1 (TGA1) Zone.

Table 1: Comparison of Current and Proposed Zoning

	Residential 1 Zone (Current)	Transit Growth Area 1 Zone
Lot Area	Min. 695 m^2 (Single family dwelling) Min. 1,100 m^2 (Two family dwelling)	Min. 4,000 m^2 (for a 6-storey apartment)
Lot frontage	Min. 16m	Min. 60 m (for a 6-storey apartment)
Floor area ratio	0.4	2.5
Lot Coverage	35%	50% (for a 6-storey apartment)
Permitted Uses	1-family dwelling & 2-family dwelling Group Home Use Home occupation Not more than 2 boarders or lodgers Accessory buildings & structures Secondary suite Accessory dwelling unit Show homes	Accessory buildings and structures Accessory dwelling unit Affordable housing Apartment Attached housing Bakery Churches Civic uses Congregate housing Daycare Home occupation Hospitals Live/work studio Offices Personal services Restaurants Retail stores
Height	Max. 8.5m	Lesser of 6 storeys or 24 m
Storeys	--	
Building Setbacks		
Front	7.5 m	3 m (minimum); 6 m (maximum)
Rear	7.5 m	7.5 m (first 3 storeys); 10 m (above 3rd)
Side	1.5 m	4 m (first 3 storeys); 10 m (above 3rd)
Side flanking a street	3.0 m	

4. Official Community Plan (OCP) Bylaw No. 1700

The subject properties are in lands designated Transit Growth Area in the Official Community Plan (OCP). The Transit Growth Area land use designation supports low to mid-scale, multi-unit residential uses at densities that support transit use along Sooke Road.

Table 2, below, describes the OCP objectives for the land use designation and how the proposal aligns with those objectives.

Table 2: Compliance of Proposed Development with OCP Policies

Transit Growth Area OCP Policy		Proposal	Staff Comment
Land Uses Policy 7.2.23	• Multi-unit residential • Live/work and home occupations • Institutional • Limited commercial and mixed-use, on a case-by-case basis	Multi-unit residential	**Policy met**
Built form Policy 7.2.24.a	Ground-oriented and low-rise buildings up to approximately 4 storeys and up to 6 storeys in limited situations when enhanced urban design mitigates impact of additional vertical impact	Proposing two 6-storey low-rise buildings fronting Sooke Road that will step down to either 5- or 4-storeys at the rear portion of the property. The staff recommendation is to rezone the subject properties to the proposed TGA1 Zone, which would also require that the 4th-6th storeys be set back from the rear and side property lines by at least 7.5 metres. This requirement in the proposed zone satisfies the condition in this policy to permit up to 6 storeys in limited situations where enhanced urban design mitigates vertical impact.	**Policy met**
Density Policy 7.2.24.b	Floor area ratio (FAR) up to approximately 2.5	The applicant is proposing a FAR of 2.12.	**Policy met**
Policy 7.2.25 (a)	Providing access to and support for frequent transit, as part of the Transit Growth Area shown on Figure 8: Land Use	Proposed density and residential uses will provide future residents and visitors access to and support for frequent transit on Sooke Road.	**Policy met**
Policy 7.2.25 (b)	Sensitively increasing density while providing a gentle transition in scale to existing predominantly single-detached residential areas, as illustrated in the "Scale Transition" diagram in this sub-section.	The proposed density is consistent with other proposals along Sooke Road. The apartment buildings offer a transition in scale to the existing single-detached residential area behind the property thus demonstrating a sensitive increase in density. The height of both apartment buildings will step down from 6 storeys at the front (along Sooke Road) to 4 storeys at the rear (where adjacent to existing single-family homes). As mentioned above, the TGA1 Zone would also require that the 4th-6th storeys be set back from the rear	**Policy met**

Transit Growth Area OCP Policy		Proposal	Staff Comment
		and side property lines by at least 7.5 metres, which will also help satisfy this policy.	
Policy 7.2.25 (c)	Improving the public realm for pedestrians and transit users, with sidewalk amenities and improved transit facilities.	Frontage improvements will be installed on Sooke Road in accordance with the Transportation Master Plan and recommendations in an approved Traffic Impact Assessment, including sidewalks, bike lanes, and landscaped boulevards.	**Policy met**
Policy 7.2.25 (d)	Creating and maintaining a high degree of permeability – including walking connections – with adjacent residential areas leading to/from the frequent transit service.	The applicant will be installing frontage improvements along Sooke Road, which will help maintain the high degree of permeability between the adjacent properties on the east and west with the frequent transit service on Sooke Road. Peace Park will continue to provide a direct walking connection between the adjacent properties on the south to and from transit service along Sooke Road.	**Policy met**
Policy 7.2.25 (e)	Enabling limited small-scale, neighbourhood-serving retail uses where there is a demand and where they do not compromise the viability of established centres and other commercial areas.	The applicant is not proposing commercial/retail uses at this time. However, the TGA1 zone would permit small-scale retail uses that would be limited to the ground floor of a mixed-use apartment building.	**Policy met**
Policy 7.2.25 (f)	Designing buildings, public open spaces, and transportation networks to protect natural assets, consistent with site adaptive policies in Section 11: Park Areas and Natural Assets.	Not applicable as this site is not within an environmentally sensitive area and does not contain natural assets to protect.	**Not applicable**

In addition to the land use policies in Section 7 of the OCP, the applicant has indicated to staff that their proposal also meets the following housing policies in Section 9:

- Policy 9.2.2.1: Maintain the attractiveness and affordability of housing in Colwood by requiring all residential developments greater than three storeys in height to have ground floor units with front door street access, outdoor amenity space, and measures that respond to the needs of seniors, people with disabilities and families.
- Policy 9.2.2.2: "Co-locate non-market, rental, and special needs housing with transit and other amenities to enable accessibility, while ensuring that these housing types are distributed throughout the city and integrated into diverse neighbourhoods"

To secure the rental housing by this proposal, the staff recommendation includes the following agreed-upon requirement as a condition of rezoning in the Development Agreement:

HOUSING COVENANT

a. The Owner registers a Section 219 covenant over the lands that agrees to secure residential units on the Lands for rental tenure for no less than 20 years commencing on the date an occupancy inspection is approved.

5. Site Adaptive Planning

OCP Policy 11.2.2.3 encourages the application of site adaptive planning and design principles on all greenfield and hillside development sites. Given that this site is not greenfield and is not located within an environmentally sensitive or natural hazard development permit area, there is limited applicability of the principles seeking to preserve natural features and sensitive ecosystems.

6. Off-Site Works

Road Dedication

Road dedication along Sooke Road will be secured as part of this rezoning application.

On May 9th, 2022, the Transportation Committee considered several options for the long-term cross section for the Sooke Road Corridor and at that time, the Transportation Committee recommended a 30-metre right-of-way.

Staff understand that Council has not yet endorsed the ultimate cross section for Sooke Road. However, the applicant's proposed road dedication aligns with the Transportation Committee's recommendation as the site plan was designed to accommodate a 30-metre right-of-way. The staff recommendation requires that road be dedicated prior to scheduling adoption of the amending bylaw.

Frontage Improvements

Considering the amount of road dedication that may be required to achieve a 30-metre cross section along Sooke Road, frontage works will need to be moved and relocated. Frontage improvements along the property's frontage are to be completed (or entered into a Servicing Agreement with Colwood) in accordance with the standards contained in any applicable City of Colwood bylaws, including the Subdivision Servicing Bylaw and Transportation Master Plan (both as amended from time to time). Frontage improvements may include concrete curb and gutter and new concrete sidewalk along Sooke Road.

Staff are recommending that frontage improvements be secured by including the following condition in the Development Agreement:

OFF-SITE WORKS

a. The Owner completes frontage improvements on Sooke Road (or enters into a Servicing Agreement with the City of Colwood for the required frontage improvements) as required by applicable City of Colwood policies or bylaws.

7. Site Servicing

The applicant has commissioned Westbrook Consulting Ltd. to prepare a preliminary servicing report (**Appendix 3**) that considers the existing servicing infrastructure and required improvements for the development of the subject properties into two multi-family apartment buildings. The site can be serviced by water. There is an existing watermain located along Sooke Road that is owned and managed by the Capital Regional District. Sewer is also available on Sooke Road; however, the report indicates that new sewer service is likely required for this development. The applicant is aware that water and sanitary capacity will need to be confirmed during the detailed design stage in advance of Building Permit consideration so that the works can be available for connection. If the application proceeds to

development permit stage, the applicant will be required to provide Civil Plans for review and acceptance by the City's Engineering department.

8. Traffic Impact Assessment

The applicant has commissioned Watt Consulting Group to complete a Traffic Impact Assessment (TIA) commenting on the impact of the proposed development on the surrounding road network and related intersections (**Appendix 2**). The TIA indicates that the proposed development will have minor impacts to nearby intersections, including Sooke/Acacia, Sooke/Aldeane, and Sooke/Mount View Avenue. It also notes that access to the site will be restricted through a right-in/right-out movement, which will help ensure effective operation of the proposed driveway into the site. The TIA is currently under review by the City's Engineering department and must be accepted before the application can proceed to Council for 1st reading. Recommendations regarding the right-in/right-out restrictions will form part of the requirements contained within the Development Agreement.

9. Private Parking - Options for Management

At the April 11th Regular Meeting of Council, a motion was passed "that staff return to Council with options to investigate the practice of charging for parking on private lands as part of future rezoning applications." Part of the discussion at the Council table focused on the issue of off-street (private) parking spilling into on-street (public) parking areas.

A staff report exploring management practices for private and public parking will be forthcoming; however, recognizing that every rezoning application offers the opportunity to negotiate the management of private parking staff are recommending the following requirement as a condition of rezoning in the Development Agreement for this application:

PARKING

a. The owner must register a Section 219 covenant over the lands agreeing to allocate parking for each residential unit as required by Colwood's Off-Street Parking Bylaw No. 1909 and ensuring that the allocated residential parking is not provided in exchange for additional compensation separate from the rent received for each residential unit.

This condition requires would require the Owner to provide the required parking free of charge for residential units in accordance with the City's Off-Street Parking Bylaw.

Staff rationale for proposing to tie units to a parking space is two-fold:

a. There is no on-street parking permitted on Sooke Road, thus any resident parking that is not accommodated on-site can only spill-over to the on-street parking on Nellie Place and Acacia Drive.
b. The portion of Sooke Road south of Goldstream Avenue is currently only serviced by Local Routes 61,39 and 52 (average frequency of 20–120-minute service).
Council

It should be noted that the applicant's preference is to not include this condition in the Development Agreement. There are also potential benefits to not bundling private parking spaces to units, including that:

a. The property is located in a location that is a 24-minute walk, 8-minute bike ride on Sooke or 15-minute ride on the Galloping Goose Trail to the Colwood Transit Exchange, where additional connections could be made to connect tenants to their ultimate destinations;
b. Requiring that tenant parking be provided free of charge would likely mean that the costs would be transferred to the tenants in the form of increased rent; and,
c. Providing the option to charge tenants for parking on private property could potentially encourage tenants to use other modes of transportation, including walking, cycling and transit.

If Council would prefer to uphold the applicant's preference to not bundle parking, Council can amend the staff recommendation to remove this requirement if they wish.

10. Building And Life Safety

All upgrades necessary to serve the development are the responsibility of the developer. A Fire Underwriters Survey (FUS) report would be required if the development proceeds to the development permit stage and must be accepted by Colwood's Fire and Engineering departments prior to Building Permit approval.

11. Community Amenity Contributions

At its regular meeting on February 14th, 2022, Council adopted an interim Community Amenity Contribution policy to guide negotiations with developers during consideration of rezoning applications.

The applicant is proposing to meet Council's policy as identified in **Table 3**.

Table 3: Comparison of Contributions Proposed to Requirements in CAC Policy

Contributions by type	Current Council Policy Requirements	Applicant's Proposed Contributions
Community Amenity Fund	$4,500 per apartment dwelling unit	$4,500* per apartment dwelling unit
Attainable Housing Policy	1 unit per every 10 residential dwellings must be provided for affordable housing	$1,500* towards the Affordable Housing Reserve Fund in lieu of an in-kind unit contribution.
Fire Hall Fund	$525*/dwelling *Subject to annual CPI increase	$583*/dwelling

* All contribution amounts shall increase annually effective on January 1st of each calendar year in which the amending bylaw is adopted as per the Victoria Consumer Price Index (CPI).

12. Climate Change and GHG emissions

The applicant has commissioned Bartlett Tree Experts to perform a tree inventory for the subject properties and prepare a Tree Protection Plan (**Appendix 4**). The widening of Sooke Road along the property's frontage, the proposed building footprints and the land alteration associated with the proposal would require the removal of most of the existing trees.

Ten of the trees to be removed are classified as protected trees under Urban Forest Bylaw No. 1735. In accordance with Part 6 of the bylaw, replacement of protected trees is required at a ratio of 2:1 or, where replacement of trees on the lot is not possible, cash-in-lieu may be provided in the amount of $2,500 per protected tree. If the application proceeds to development permit stage, the applicant will be required to apply for a Tree Management Permit and the tree replacement requirements will form part of the conditions of the permit.

COMMUNICATION

As required by Development Application Consultation Policy DEV 001, the applicant conducted neighbourhood consultation in late January 2023 by holding an open house at the Colwood Elementary School. Property owners of adjacent properties within 75 metres of the subject lands were invited to participate in conversations with the applicant and provide comments and feedback on the application. A summary of the applicant's neighbourhood engagement strategy is included in **Appendix 5**. The City also received two letters of support in advance of the formal submission period. These are provided as **Appendix 6**.

A development notification sign was posted on the most centrally located subject property as required under Bylaw 427 (Colwood Land Use Application Procedures Bylaw) (see **Figure 4**).

Figure 2: Photo of Notification Sign

The application and supporting documents are also available for public viewing on the City's website and in person at City Hall during office hours.

If Council chooses to advance this application, the City will mail notice to owners and occupants within a 75-metre radius of the subject properties, post notice on the City's website and in two consecutive issues of a local newspaper. The notice will invite the public to provide comment on the application during the public participation portion of the meeting where 1st reading of the amending bylaw is considered.

FINANCIAL CONSIDERATION

Rezoning the subject properties to enable a multi-family residential development will increase the assessed value of lands, thus increasing its taxable value.

Table 4, below, provides a preliminary estimate for the developer contributions that would be levied from this development based on the proposed 9,014 m^2 of residential gross floor area.

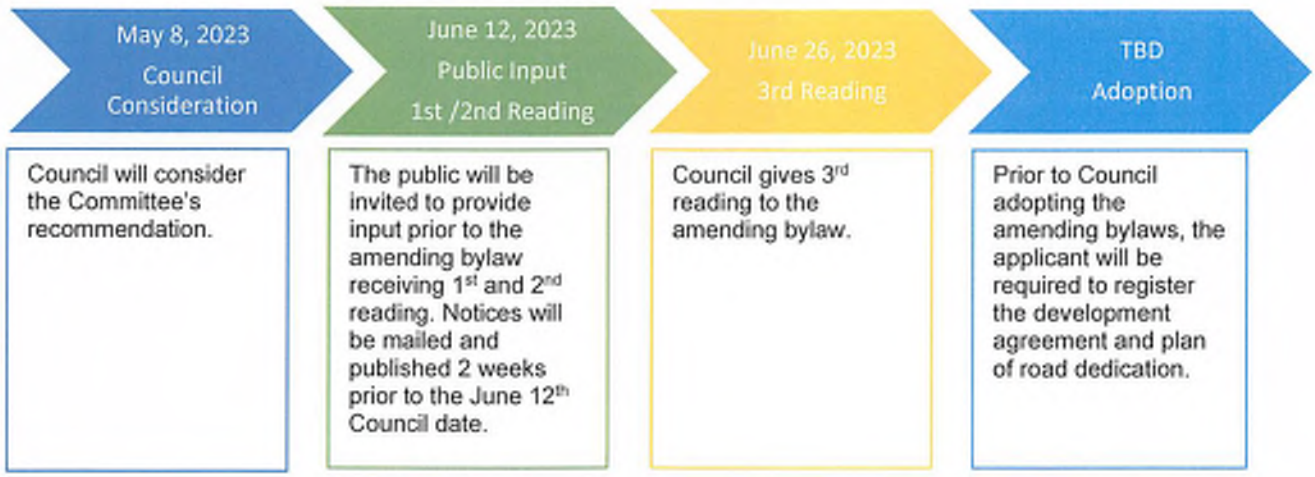
Table 4 – Preliminary Summary of Developer Contributions

Contributions by Type	Rate per m^2 of GFA	Total	Bylaw/Policy Reference
CAC fund	$4,500*/unit	$666,000	Policy COM003
Affordable Housing Reserve Fund	$1,500*/unit	$222,000	Policy COM003
Fire hall fund	$583*/unit	$86,284	Policy COM003 (as amended)
School DCCs (Payable to SD62)	$700/unit	$103,600	CRD Bylaw No. 2019-01
Road DCCs	$96.30/$m^2$	$868,048	Bylaw No. 1839
Water DCCs (Payable to CRD)	$10.24/$m^2$	$92,303	CRD Bylaw No. 2758
Colwood Sewer Enhancement Fees	$12.37/$m^2$	$111,503	Colwood Bylaw No. 1500

** Subject to annual CPI increases*

TIMELINE

If Council chooses to advance this application, the proposed timeline will be as follows:



CONCLUSION

The proposed development aligns with the policy objectives of the Transit Growth Area land use designation as well as the City's broader OCP goals of increasing housing choices that meets a range of needs and lifestyles. Staff are therefore recommending that Committee recommend to Council that the application be approved and that the subject properties be rezoned from the R1 zone to the TGA1 zone.

Respectfully submitted,

Desiree Givens, MCRP
Planner II

Reviewed By:

Yazmin Hernandez, MCIP, RPP
Manager of Development Services

ADMINISTRATORS COMMENTS:

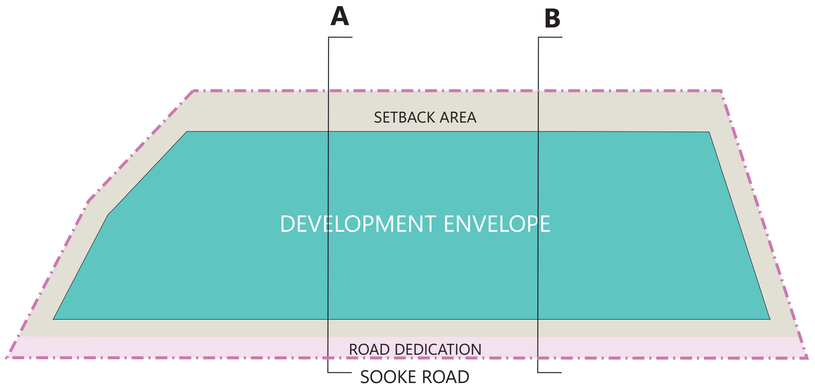
I have read the report and endorse the recommendation.

Robert Earl
Chief Administrative Officer

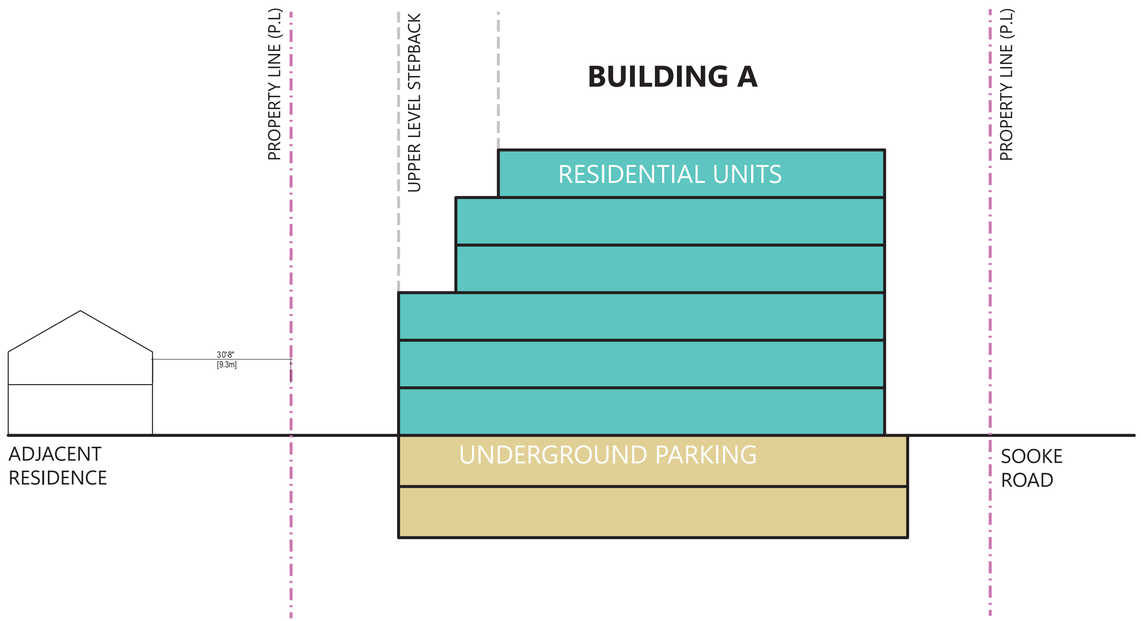
Attachments:

APPENDIX 1: Architectural Plans
APPENDIX 2: Traffic Impact Assessment
APPENDIX 3: Preliminary Servicing Report
APPENDIX 4: Tree Protection Plan
APPENDIX 5: Summary of Applicant-Led Neighbourhood Consultation
APPENDIX 6: Letters of Support

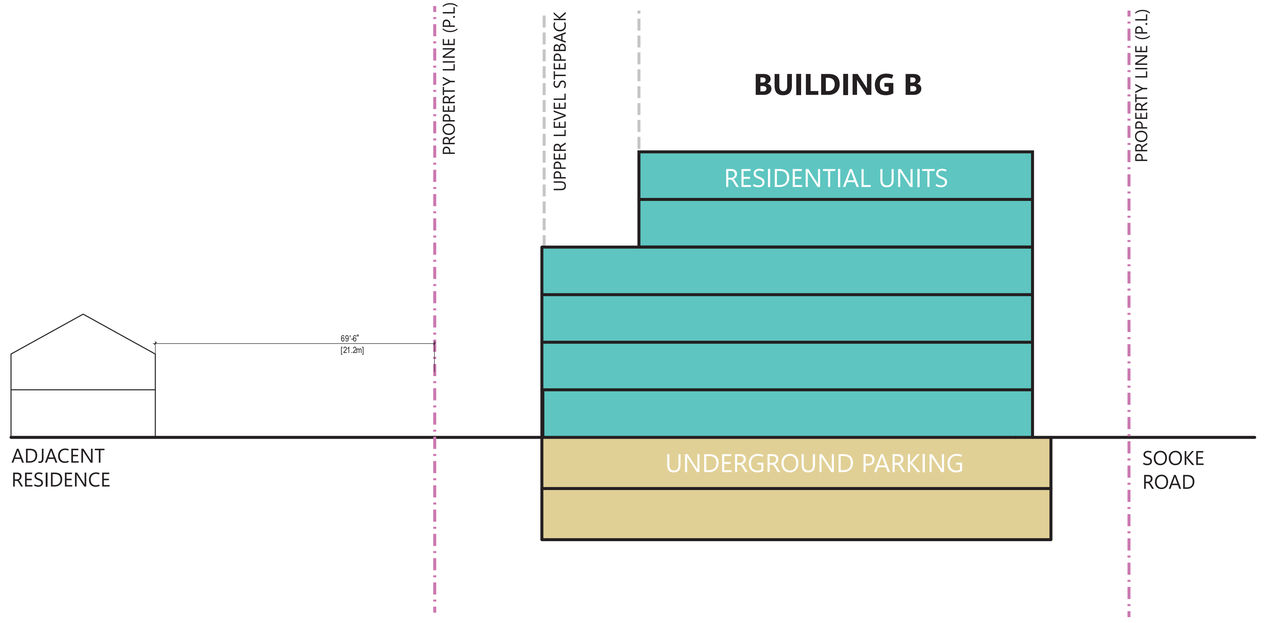
Staff Presentation



KEY PLAN



SECTION A



SECTION B

Appendix 2

REVIEWED City of Colwood Engineering Dept.
By Deanna EdenApr-20-2023

ACCEPTED City of Colwood Engineering Dept.
By Deanna Eden Apr-21-2023

2054-2076 SOOKE ROAD TIA

Traffic Impact Assessment

PERMIT TO PRACTICE
WATT CONSULTING GROUP LTD.
SIGNATURE Kristen King
DATE 2023-03-23
PERMIT NUMBER 1001432
ENGINEERS & GEOSCIENTISTS
BRITISH COLUMBIA

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
K. A. MACHINA
54513
2023-03-23

Kristen Bacler
Transportation Technologist
Author

Kristen Machina, P.Eng.
Senior Transportation Engineer
Reviewer

Prepared For: WestUrban Developments Ltd.
Date: March 23, 2023
Our File No: 3360.B01

WATT VICTORIA
302 – 740 Hillside Ave
Victoria, BC V8T 1Z4
250-388-9877

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FIGURES

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APPENDICES

1.0 INTRODUCTION

WATT Consulting Group is retained by WestUrban Developments Ltd. to prepare a Traffic Impact Assessment (TIA) for a proposed residential development at 2054-2076 Sooke Road in Colwood, BC. The site is bound by Sooke Road to the south, undeveloped land to the east, and residential homes to the north and west. The site is located approximately 850 metres west of Colwood Corners. The site location is illustrated in **Figure 1**.

1.1 The Site Today

The site today is occupied by five (5) single family homes.

1.2 Study Area

The study area includes the following intersections:

- Sooke Road / Aldeane Avenue / University Drive
- Sooke Road / Acacia Drive
- Sooke Road / Mount View Avenue
- Sooke Road / Kelly Road

1.3 Proposed Development

A Zoning Bylaw Amendment application is being submitted to the City of Colwood to change the zoning from R1 to CD, and to permit the proposed redevelopment of the site. The proposed development will include two 6-storey apartment buildings, and a total of 150 residential units.

1.4 This Report

This report is provided as part of the Zoning Bylaw Amendment application being submitted to the City of Colwood. It provides the following:

- An overview of the existing and evolving transportation context in the vicinity of the site, including vehicular, pedestrian, cycling, and transit facilities, and area travel characteristics
- An overview of the proposed development programme
- An assessment of the existing traffic activity patterns and volumes in the study area during the weekday morning and afternoon peak period
- A comprehensive review of the vehicular traffic volume changes that may occur in the area in the future with the construction of other area development projects
- An assessment of the trip generation and assignment characteristics of the proposed development
- A review of vehicular traffic operations at intersections in the area under existing and future conditions (i.e., the 2024 horizon year), including an assessment of the operational impacts of the proposed development
- A detailed review of proposed transportation demand management (TDM) measures


KELLY RD
MT VIEW AVE
ACACIA DR
SITE
SOOKE RD
ALDEANE AVE
UNIVERSITY DR
LEGEND:
STUDY INTERSECTION
PROJECT: V:\Project Files\3360 - 2054-2076 Sooke Road TIA - Colwood\5 - Design\Fig01-SL_2022-08-23.dwg

2.0 TRANSPORTATION CONTEXT

2.1 Road Network

2.1.1 Existing Road Network

The existing road network, lane configuration, and intersection control are illustrated in **Figure 2**.

Sooke Road is an east-west undivided arterial road under the jurisdiction of the City of Colwood. It extends between Wale Road in the east and Veterans Memorial Parkway in the west where it transitions to a highway under the Ministry of Transportation and Infrastructure's jurisdiction. The speed limit is 50 km/h. Sooke Road has a four-lane cross section in the vicinity of the site, with left turn lanes provided at key intersections. There are currently no bicycle lanes on Sooke Road except for a small section west of Acacia Drive to 2130 Sooke Road in the westbound direction. No parking is permitted on either side of the road.

Aldeane Avenue is a north-south rural collector road under the jurisdiction of the City of Colwood. It extends between Sooke Road in the south and Hagel Road in the north. The posted speed limit is 50 km/h. Aldeane Avenue has a two-lane cross section with no bicycle lanes provided in either direction. On-street parking is permitted on the gravel shoulder of the road where available.

University Drive is a north-south local road under the jurisdiction of the City of Colwood that runs through the Royal Roads University lands. It extends between Sooke Road in the north and College Drive in the South. The posted speed limit is 30 km/h. University Drive has a two-lane cross section. No bicycle lanes are provided in either direction. No parking is permitted on either side of the road.

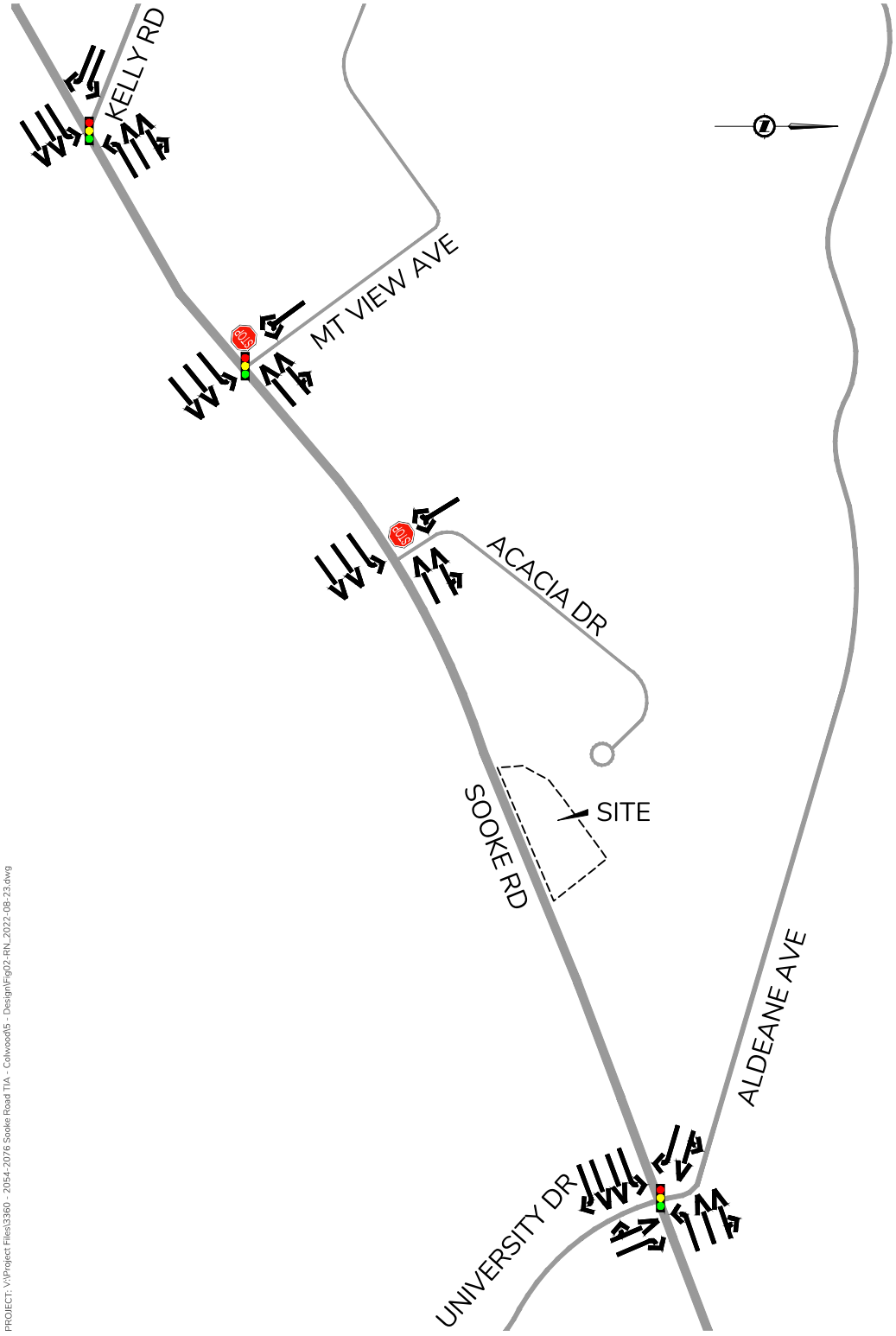
Acacia Drive is a north-south local road under the jurisdiction of the City of Colwood. It extends north from Sooke Road and terminates 370m beyond in a cul-de-sac. The unposted speed limit is 50 km/h. Acacia Drive has a two-lane cross section and currently has no separate bicycle lanes. On-street parking is permitted on the gravel shoulder of the road where available.

Kelly Road is a north-south rural collector road under the jurisdiction of the City of Colwood. It extends between Sooke Road in the south to Jacklin Road in the north. The posted speed limit is 50 km/h, with sections that are 30km/h. Kelly Road has a two-lane cross section with no separate bicycle lanes provided. No parking is permitted on either side of the road.

Mount View Avenue is a north-south rural collector road under the jurisdiction of the City of Colwood. It extends between Sooke Road in the south to Pickford Road in the north. The posted speed limit is 30 km/h. Mount View Avenue has a two-lane cross section. There is a marked bicycle lane provided in the northbound direction on the east side of the road from Sooke Road to Yeta Terrace, otherwise no separate bicycle lanes are provided. On-street parking is permitted on the gravel shoulder of the road where available.

Four key intersections were identified within the study area:

- **Sooke Road / Aldeane Avenue / University Drive** is a four-leg, signalized intersection. All approaches have channelized right turn lanes except for University Drive. The eastbound and westbound approaches on Sooke Road have separate left turn lanes.
- **Sooke Road / Acacia Drive** is a three-leg stop-controlled intersection. The southbound approach is stop-controlled, and the eastbound and westbound approaches are free flow.
- **Sooke Road / Mount View Avenue** is a three-leg stop-controlled intersection with pedestrian activated traffic control on Sooke Road. The southbound approach is stop controlled, while the eastbound and westbound approaches are free flow unless a pedestrian needs to cross and activates the traffic signals.
- **Sooke Road / Kelly Road** is a three-leg, signalized intersection. The eastbound and westbound approaches have separate left turn lanes and the southbound approach has a separate channelized right turn lane.


KELLY RD
MT VIEW AVE
ACACIA DR
SITE
SOOKE RD
ALDEANE AVE
UNIVERSITY DR
PROJECT: V:\Project Files\3360 - 2054-2076 Sooke Road TIA - Colwood\5 - Design\Fig02-RN_2022-08-23.dwg

2.1.2 Evolving Road Network

City of Colwood staff are in the process of consulting with Council to establish a 30-meter road right of way for the Sooke Road corridor to accommodate up to 5 travel lanes (including bus lanes), center medians with center turn lanes, separated and protected bike lanes, and separated sidewalks.

Four alternatives are outlined in the Sooke Road Corridor Study (2022) prepared by Urban Systems, with varying right-of-way widths, boulevard widths, transit priority schemes, dedicated cycling facility alternatives, and vehicle travel lane configurations.

It is not anticipated that the recommended improvements to Sooke Road will be constructed by opening day of the proposed development and were not considered for the purposes of this study.

2.2 Transit Network

2.2.1 Existing Transit Network

The development site is extremely well-situated relative to public transit services operated by BC Transit. Currently there are nine routes servicing the Sooke Road Corridor: (Route No. 39, 48, 51, 52, 54, 55, 59, 60, and 61). The area transit network is illustrated in **Figure 3**.

Route 39 – Westhills / Interurban / Royal Oak / UVic generally operates in an east-west direction between Westhills Exchange and the University of Victoria, passing by the Colwood Exchange, Camosun College Interurban Campus, and the Royal Oak Exchange. The closest stop is approximately 300 metres (i.e., a 4-minute walk) from the site, at Sooke Road / Aldeane Avenue. Near the site, buses operate at 30-to-60-minute headways on weekdays only.

Route 48 – Happy Valley / Downtown generally operates in an east-west direction between downtown Victoria and the Langford Exchange, passing by the Colwood Exchange. The closest stop is approximately 300 metres (i.e., a 3-minute walk) from the site, at Sooke Road / Aldeane Avenue. Buses operate at 30-minute headways making 3 trips in the morning and evening between 6:45am – 7:45am and 4:45pm- 5:45pm on weekdays only.

Route 51 – **Langford / UVic** generally operates in an east-west direction between the UVic Exchange and the Langford Exchange, passing by the Colwood Exchange, Victoria General Hospital, and the Westshore Town Centre. The closest stop is approximately 300 metres (i.e., a 3-minute walk) from the site, at Sooke Road / Aldeane Avenue. Buses operate near the site once in the morning at 8:12am and at 30-to-60-minute headways making 4 trips in the evening between 3:30pm- 6pm on weekdays only.

Route 52 – **Millstream / Bear Mountain** generally operates in a north-south direction between the Colwood Exchange and Bear Mountain Village Centre. The closest stop is approximately 300 metres (i.e., a 3-minute walk) from the site, at Sooke Road / Aldeane Avenue. Buses operate at 30-to-60-minute headways on weekdays and 60 minutes on weekends.

Route 54 – **Metchosin - Clockwise** generally operates in a north-south direction between the Lanford Exchange and the William Head Institution, passing by the Colwood Exchange. The closest stop is approximately 300 metres (i.e., a 3-minute walk) from the site, at Sooke Road / Aldeane Avenue. Buses operate at 110-to-120-minute headways on weekdays and 2-hour headways on weekends.

Route 55 – **Happy Valley - Counterclockwise** generally operates in a north-south counterclockwise direction between the Lanford Exchange and the William Head Institution, passing by the Colwood Exchange. The closest stop is approximately 400 metres (i.e., a 5-minute walk) from the site, at Sooke Road / Aldeane Avenue. Buses generally operates two early morning buses between 6am-7:30am and then transition to 2-hour headways from 10am to 6pm on weekdays only, however this route only passes by the site via the Colwood Exchange once at 7am.

Route 59 – **Triangle Mountain** operates from the Langford Exchange in a counterclockwise one-way loop through Colwood. The closest stop is approximately 900 metres (i.e., a 11-minute walk) from the site at Kelly Road / Sooke Road. Buses operate at 20 minutes to 2-hour headways on weekdays, and 2-hour headways on weekends.

Route 60 – **Wishart** operates from the Langford Exchange in a clockwise one-way loop through Colwood. The closest stop is approximately 900 metres (i.e., a 11-minute walk) from the site at Kelly Road / Sooke Road. Buses operate at 40 minutes to 2-hour and 20-minute headways on weekdays, and 2-to-2.5-hour headways on weekends.

Route 61 – Downtown / Langford / Sooke operates in an east-west direction between the District of Sooke and the Victoria Downtown core, primarily travelling along Sooke Road. The closest stop is approximately 300 metres (i.e., a 3-minute walk) from the site, at Sooke Road / Aldeane Avenue. Buses generally operate at 10-to-30-minute headways during peak periods and one-hour headways outside of peak periods. The route only services the Victoria Downtown core during the peak weekday hours in peak directions (i.e., into downtown during weekday mornings, and out of downtown during weekday afternoons). At all other times, the route continues downtown as Route 50 from the Langford Exchange.

2.2.2 Evolving Transit Network

BC Transit is collaborating with municipal, regional, and provincial partners to develop the Victoria Regional RapidBus Implementation Strategy. RapidBus routes are planned to operate two-ways, 18-20 hours per day, 7 days a week. Phase 1 of the RapidBus implementation includes the Westshore Line, which will service the Victoria Downtown Core from Langford, Colwood, View Royal, and west Saanich. Goldstream Avenue / Sooke Road is the nearest planned stop to the site, located approximately 1.1 km (i.e., a 13-minute walk) from the site.


52
53
46
65
51
Island Hwy.
53
Westshore
Recreation
Centre
50
P
Goldstream
46
LANGFORD
52
Colwood
X
Sooke
SITE
Belmont
50 39 43 46 48
51 52 53 54 61
60
61
39
43
COLWOOD
59
Royal Roads
University
Metchosin
60
Esquimalt
Lagoon
Wishart
52
Lagoon
Painter
60
52
59
Ocean
Royal Bay
Secondary
School
Metchosin
PROJECT: V:\Project Files\3360 - 2054-2076 Sooke Road TIA - Colwood\5 - Design\Fig03-TN_2022-08-24.dwg

2.3 Cycling Network

The site is served by a network of cycling facilities in its immediate vicinity. Sooke Road is designated as a shared street within the vicinity of the site. The Galloping Goose Regional Trail can be accessed from Sooke Road at Aldeane Avenue / University Drive, providing an off-street cycling connection across the City of Colwood and the Greater Victoria Area as a whole. The area cycling network is illustrated in **Figure 4**.

2.4 Pedestrian Environment

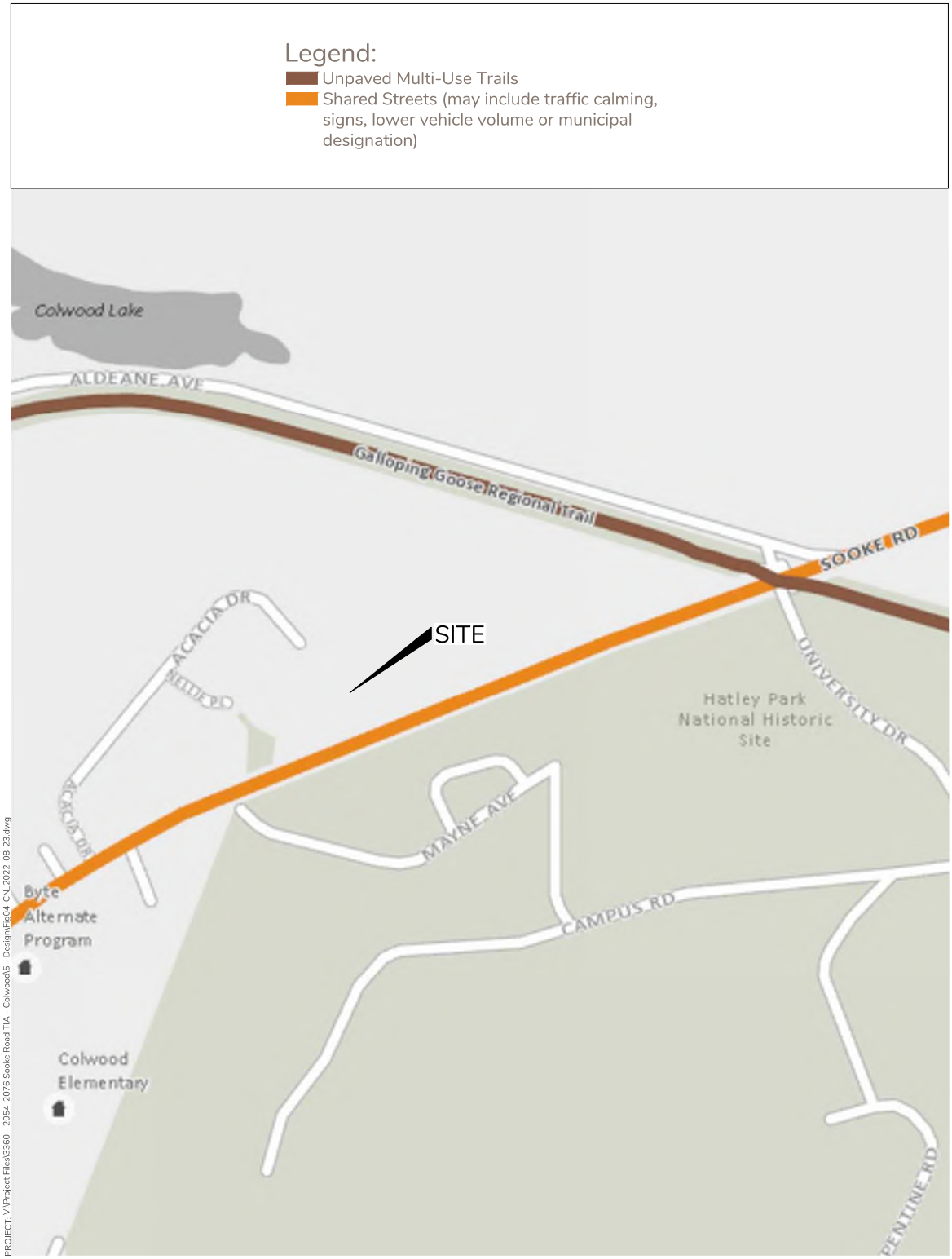
The pedestrian environment in the vicinity of the site is varied in quality and continuity.

Pedestrian infrastructure around the site on Sooke Road is continuous. The signalized intersections at Sooke Road / Aldeane Avenue, Sooke Road / Mount View Avenue, and Sooke Road / Kelly Road all have pedestrian crosswalks.

Both the north and south side of the street on Sooke Road have either a sidewalk or a raised asphalt sidewalk, though the sidewalks are directly adjacent to the road on both sides.

Aldeane Avenue, Mount View Avenue and Acacia Drive have only gravel shoulders with no sidewalks on either side of the street.

Kelly Road has a discontinuous sidewalk network. At the intersection with Sooke Road, the south side of the street has a sidewalk in front of Hatley Park Plaza which transitions to a raised asphalt sidewalk west of the plaza. The north side of the street has sidewalk only at the intersection with Sooke Road and quickly transitions to a raised asphalt sidewalk. West of Pickford Road, the paved shoulder walkway is only on the north side of the street.


Legend:
Unpaved Multi-Use Trails
Shared Streets (may include traffic calming, signs, lower vehicle volume or municipal designation)
Colwood Lake
ALDEANE AVE
Galloping Goose Regional Trail
SOOKE RD
ACACIA DR
NELLIE RD
SITE
UNIVERSITY DR
Hatley Park National Historic Site
MAYNE AVE
CAMPUS RD
Byte Alternate Program
Colwood Elementary
PENTLINE RD
PROJECT: V:\Project Files\3360 - 2054-2076 Sooke Road TIA - Colwood\5 - Design\Fig04-CN_2022-08-23.dwg

2.5 Area Travel Characteristics

2.5.1 Existing Area Travel Characteristics

The 2017 CRD Household Travel Survey provides information on area travel characteristics for southern Vancouver Island. **Table 1** outlines the mode share for the area.

Table 1 – Existing Mode Share

Mode	AM Peak	PM Peak
Auto Driver	60%	61%
Auto Passenger	16%	20%
Transit	5%	4%
Bicycle	5%	3%
Walk	7%	7%
Other	7%	5%

Notes:
1. Based on 2017 CRD Household Travel Survey data for District 16 – City of Colwood
2. Travel mode split calculation based on overall number of trips to, from, and within district.

2.5.2 Evolving Area Travel Characteristics

The 2015 City of Colwood Transportation Master Plan identifies mode share targets to reduce GHG emissions and energy use. **Table 2** outlines Colwood's mode share targets for 2026 and 2038.

Table 2 – Mode Share Targets

Mode	2026	2038
Auto	75%	70%
Transit	10%	12%
Bicycle	5%	8%
Walk	5%	10%

3.0 DEVELOPMENT PROPOSAL

The current development proposal consists of two 6-storey multi-family residential buildings containing 150 units and a 2-storey parking garage. **Table 3** outlines the development proposal and transportation-related elements of the proposed site plan. The proposed site plan is provided in **Appendix A**.

Table 3 – Development Proposal

Site Element	Details	
Residential Units	150 units	
Vehicular Parking Supply	189 spaces	
Bicycle Parking Supply	Residential	167 spaces
	Visitor	12 spaces
	Total	179 spaces
Pick-up / Drop-off Facility	A pickup and drop-off area / loading zone with capacity for 3 cars is provided in the site driveway between the two buildings	
Vehicular Access	Access to the at grade pickup/drop-off and loading area and parking facilities is provided from a north-south driveway connection to Sooke Road. The driveway will be restricted to right-in / right-out movements only.	
Cyclist Access	Bicycle access to short term bicycle parking spaces on the ground floor is provided directly from the site driveway. Access to long term parking spaces in the parking garage is provided either from the parking garage ramp or the elevators in the residential lobbies.	
Pedestrian Access	Pedestrian access to the residential lobby is provided from the site driveway, off Sooke Road	

Notes:
1. Site statistics based on architectural site plans prepared by FAAS Architecture., dated November 17, 2022.

3.1 Site Access

Access to the proposed development will be on the south side of the site from Sooke Road. Preliminary analysis restricts the driveway to right-in / right-out movements only. A channelizing right-in / right-out island and supporting signage will be provided. Please refer to the site plan in **Appendix A**.

For the purposes of this study, it is assumed that vehicles accessing Highway 1 from the site will travel westbound on Sooke Road and turn up Kelly Road, rather than attempting to turn around on any of the other area roads to continue east on Sooke Road.

3.2 Sight Distance

TAC provides criteria for minimum sight distances for a vehicle turning right onto a two-lane roadway from a stop. Drivers entering a road with a 50 km/h speed limit (Sooke Road) should be provided with 95m sight distance to make the turn without having a vehicle on Sooke Road reduce their speed to less than 70% of their initial speed. The potential site access has adequate sight lines to meet TAC requirements for 95m to each side.

3.3 Site Design and Circulation

Access to the site is provided from the driveway off Sooke Road. A north-south driveway splits between the two buildings and provides access to both visitor parking on the ground floor as well as resident parking below grade. No physical separation is proposed between the visitor and resident parking. All spaces will be signed / painted appropriately.

A ramp to the underground parking garage is provided on the east side of the site. The ramp from ground level to P1 is generally of sufficient width to permit two-way traffic simultaneously. Vehicle traffic circulates from the P1 level to the P2 level in a two-way loop.

Convex mirrors will be provided at all 90 degree turns in the garage.

3.4 Loading Operations

One loading space is provided adjacent to the western building off the north-south site driveway. Service vehicles access this loading space through a parallel parking maneuver. When not occupied by service vehicles the loading space can also be used for short-term parking operations (ridesharing, food, and parcel delivery, etc.).

Solid waste bins are stored at the north end of the site. Bins will be transferred from the waste storage area to the loading space on collection day.

4.0 TRANSPORTATION DEMAND MANAGEMENT

Transportation demand management (TDM) is the application of strategies and policies to influence individual travel choice, most commonly to reduce single-occupant vehicle travel. TDM measures typically aim to encourage sustainable travel, enhance travel options, and decrease parking demand. The following sections present a menu of TDM measures that the applicant has committed to pursue for the proposed development.

4.1 Bicycle Maintenance Facility

4.1.1 Overview

Residential developments can provide dedicated on-site bicycle maintenance facilities, such as bicycle repair tools, pumps, wash stations, etc., to support ongoing bicycle use among building users.[1] This is particularly beneficial for residents living in smaller dwelling units where space is at a premium and/or access to a bicycle repair service may be inaccessible or present a financial barrier. The following amenities should be included at minimum:

- **Repair Tools:** Bicycle repair tools including: two identical tire levers; two screwdrivers (one flat head and one phillips); double sized wrenches at following sizes 8, 9, 10, 11, 15, 32 mm; allen wrenches at the following sizes 2.5, 3, 5, 6, 8 mm; a tire pump that works with Schrader and Presta valves.
- **Bike Repair Stand**
- **Bike Wash Station**: A station with a hose, drain, and supplies which can assist a resident in cleaning their bicycle.
- **Lighting and surveillance**: The facility should be well-it (inside and out), with consideration for surveillance systems to address possible personal security issues.
- **Information:** Cycling network maps, information on bicycle shops, and an advertising space for scheduled events.

[1] Victoria Transport Policy Institute. (2015). *Parking Management: Strategies for More Efficient Use of Parking Resources.* Retrieved from: www.vtpi.org/tdm/tdm28.htm#_Toc128220491

The addition of these elements to the proposed development could result in a parking demand reduction as they would promote cycling for residents by providing accessible and functional facilities.

4.1.2 Commitment

The applicant will provide two (2) bike repair stands, one (1) additional facility than is required by the off-street parking by-law. One (1) bike repair stand will be provided on each floor of the underground parking garage.

The applicant will also provide two (2) bike wash stations. One (1) bike wash station will be provided on each floor of the underground parking garage in the dog wash area)

4.2 Unbundled Parking

4.2.1 Overview

The applicant is proposing to unbundle the proposed off-street parking supply for the residential uses from the purchase price of each unit. Parking spaces will be sold separately from the condo units, so that residents have the option of purchasing a parking space at an additional cost. Therefore, the property buyer could save money by not purchasing a parking space. Research has identified unbundled parking as an effective TDM strategy and some research has indicated vehicle ownership reduction of 6 to 8% when unbundled parking is implemented.[2] In addition, potential reductions of vehicle kilometres travelled (VKT) ranging from 10 to 30% attributed to unbundled parking were observed.[3]

4.2.2 Commitment

The applicant will unbundle the cost of purchasing a parking space from the cost of purchasing a residential unit.

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[2] Schure, J., Napolitan, F., & Hutchinson, R., (2012). "Cumulative Impacts of Carsharing and Unbundled Parking on Vehicle Ownership and Mode Choice." *Transportation Research Record, 2319*(1).

Mobility Lab (2018). *Arlington County Residential Building Study*. https://mobilitylab.org/research-document/arlington-county-residential-building-study-aggregate-analysis-update/

[3] Mobility Lab. (2018). *Arlington County Residential Building Study*; Victoria Transport Policy Institute. (2018). *Parking Management: Strategies for More Efficient Use of Parking Resources*; Shoup, D. (2005). *The High Cost of Free Parking*, p. 570.

TRAFFIC VOLUMES

4.3 Traffic Analysis Scenarios and Design Periods

Traffic operations analyses have been undertaken during the weekday morning and afternoon peak hour under the following conditions:

- Existing traffic – traffic activity under current conditions
- Background traffic – traffic activity levels into the future which includes allowances for corridor growth and background development
- Post-development traffic – traffic activity levels into the future with the site redeveloped and projected site generated traffic added to the road network

Traffic operations are discussed in the following sections for these scenarios:

- Existing conditions
- Opening day (2024) background conditions
- Opening day (2024) post-development conditions

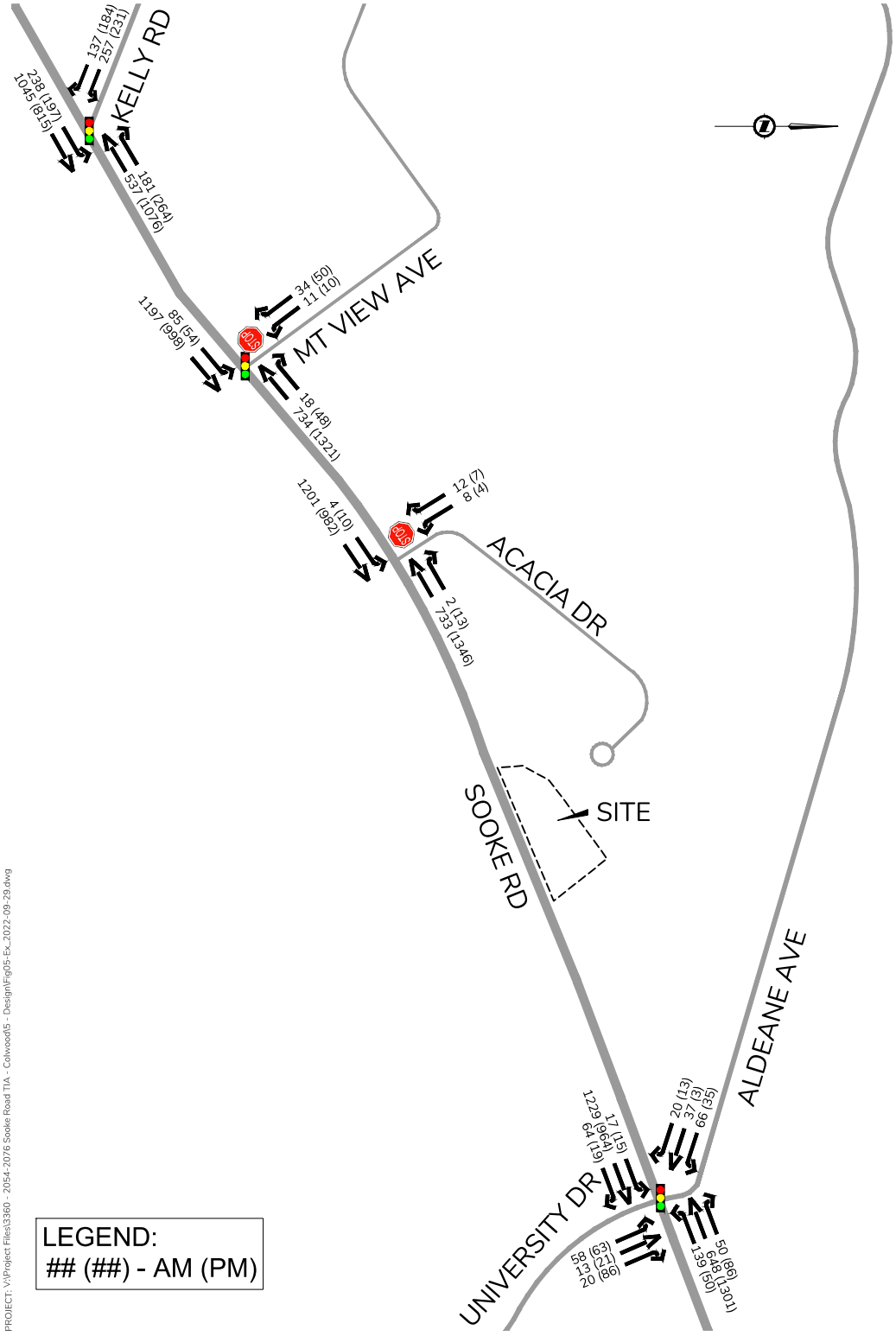
4.4 Existing Traffic Volumes

Base existing turning movement volumes were established for intersections within the study area for the weekday morning and afternoon peak period. Traffic count information adopted as the basis for the traffic operations analysis is summarized in **Table 4**.

Table 4 – Existing Traffic Count Information

Intersection	Date of Count	Source
Sooke Road / Aldeane Avenue	September 13, 2022	WATT
Sooke Road / Kelly Road	September 13, 2022	WATT
Sooke Road / Acacia Drive	September 14, 2022	WATT
Sooke Road / Mount View Avenue	September 13, 2022	WATT

The existing turning movement counts were reviewed in detail to ensure general consistency in the traffic volumes on roadways between intersections. The existing and balanced baseline area traffic volumes for the weekday morning and afternoon peak hour are illustrated in **Figure 5.**


KELLY RD
MT VIEW AVE
ACACIA DR
SOOKE RD
ALDEANE AVE
UNIVERSITY DR
SITE
137 (184)
257 (231)
238 (197)
1045 (815)
181 (264)
537 (1076)
34 (50)
11 (10)
85 (54)
1197 (998)
18 (48)
734 (1321)
12 (7)
8 (5)
4 (10)
1201 (982)
2 (13)
733 (1346)
20 (13)
37 (3)
66 (35)
17 (15)
1229 (964)
64 (19)
58 (63)
13 (21)
20 (86)
50 (88)
48 (130)
139 (50)
LEGEND:
(##) - AM (PM)
PROJECT: V:\Project Files\3360 - 2054-2076 Sooke Road TIA - Colwood\5 - Design\Fig05-Ex_2022-09-29.dwg

4.5 Background Traffic Volumes

4.5.1 Corridor Growth

Corridor growth on all streets in the study area was forecast using a 2.0% annual linear growth rate applied to the observed volumes from 2022 to the 2024 horizon year.

4.5.2 Concurrent Developments

Allowances were made to account for new traffic generated by other development proposals in proximity to the proposed site that are either under construction, approved, being reviewed, or in which an application is expected to be submitted to the City in the near future. A total of 2 background developments have been considered, comprising 165 residential units and 310m^2 of commercial retail gross floor area. A summary of the considered background developments is provided in ~~Table 6~~. Table 5

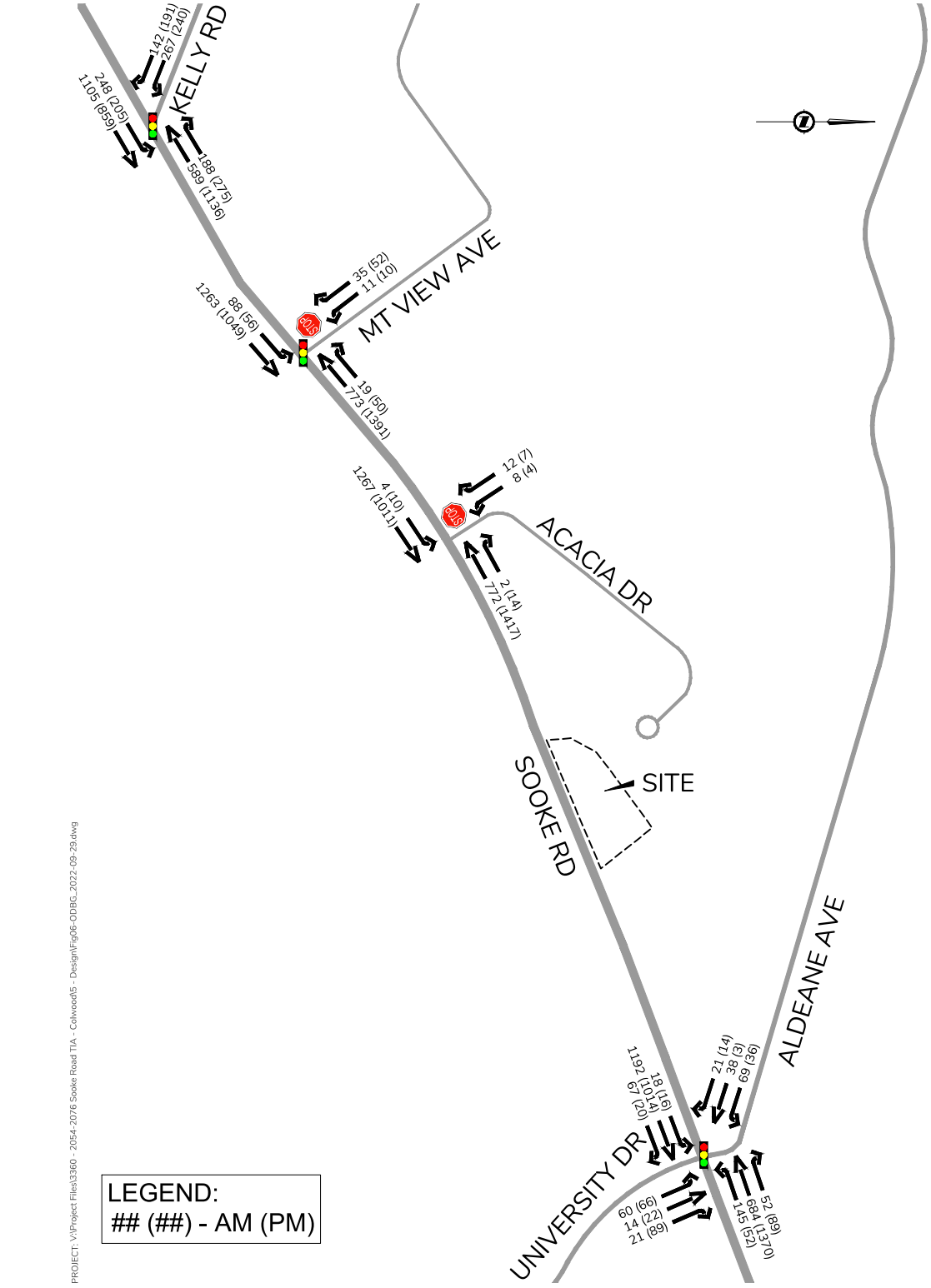
Trip generation and traffic assignments for each background development are based on information contained in the traffic impact assessments prepared for each project.

Table 5 – Background Developments

Development Address	Development Statistics	Report Source	Trip Generation / Distribution Source
1752 Island Highway	80 Residential Units 310m^2 CRU	WATT Consulting Group	TIA
2330 Sooke Road	85 Residential Units	WATT Consulting Group	TIA

4.5.3 Opening Day Background Traffic Volumes

The opening day (i.e., 2024 horizon year) background traffic volumes are the sum of the existing traffic volumes, the 2% corridor growth allowance, and the concurrent development traffic. The background traffic volumes for opening day are illustrated in **Figure 6**.


KELLY RD
142 (191)
267 (240)
248 (205)
1105 (859)
188 (275)
599 (1136)
MT VIEW AVE
35 (52)
11 (10)
88 (56)
1263 (1049)
19 (50)
773 (1391)
12 (7)
8 (4)
4 (10)
1267 (1011)
2 (14)
772 (1417)
ACACIA DR
SITE
SOOKE RD
ALDEANE AVE
21 (14)
38 (3)
69 (36)
18 (16)
1192 (1014)
67 (20)
UNIVERSITY DR
60 (66)
14 (22)
21 (89)
52 (69)
684 (1370)
145 (52)
LEGEND:
(##) - AM (PM)
PROJECT: V:\Project Files\3360 - 2054-2076 Sooke Road TIA - Colwood\5 - Design\Fig06-ODBG_2022-09-29.dwg

4.6 Site Traffic Volumes

4.6.1 Existing Site Trip Generation

Given the limited trip generation potential of the existing uses on the site (five (5) single family homes), existing trips were not removed with the contemplation of the redevelopment of the site.

4.6.2 New Site Trip Generation

A total of 150 residential units are currently proposed for the site. Vehicular trip generation rates for the proposed residential development are based on the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition). The developer has indicated that the multi-family buildings will have 6 floors.

Prior versions of the architectural site plan included 160 residential units. While the current unit count is 150 units, the unit count has been assumed to be 160 for the purposes of this analysis.

The trip generation forecast is summarized in ~~Table 7~~. Table 6

Table 6 – Vehicle Trip Generation Rates

ITE Trip Generation Manual 11th Edition Rates				
Land Use	**Peak Hour**	**Trip Rate In**	**Trip Rate Out**	**Avg. Rate**
Multifamily Housing (Mid-Rise) (Not Close to Rail Transit) (LU 221)[1]	AM	0.09	0.28	0.37
	PM	0.24	0.15	0.39
Vehicular Trip Generation				
Land Use	**Peak Hour**	**In**	**Out**	**2-Way**
Residential (150 units)	AM	13	43	56
	PM	38	24	62

Note: Trip rates are per dwelling unit

The proposed development is forecast to generate 56 two-way trips in the weekday morning peak hour, and 62 two-way trips in the weekday afternoon peak hour.

4.6.3 Trip Distribution and Assignment

The trip distribution pattern for site-generated traffic was established based on the existing traffic patterns and key origin/destinations in the region. Preliminary analysis restricts the driveway to right-in / right-out movements only. As noted in **Section 3.1**, it is assumed that vehicles accessing Highway 1 from the site will travel westbound on Sooke Road and turn up Kelly Road, rather than attempting to turn around on any of the other area roads to continue east on Sooke Road.

The distribution of inbound and outbound traffic adopted for the proposed development is outlined in ~~**Table 8**~~. Table 7

Table 7 – Site Traffic Distribution

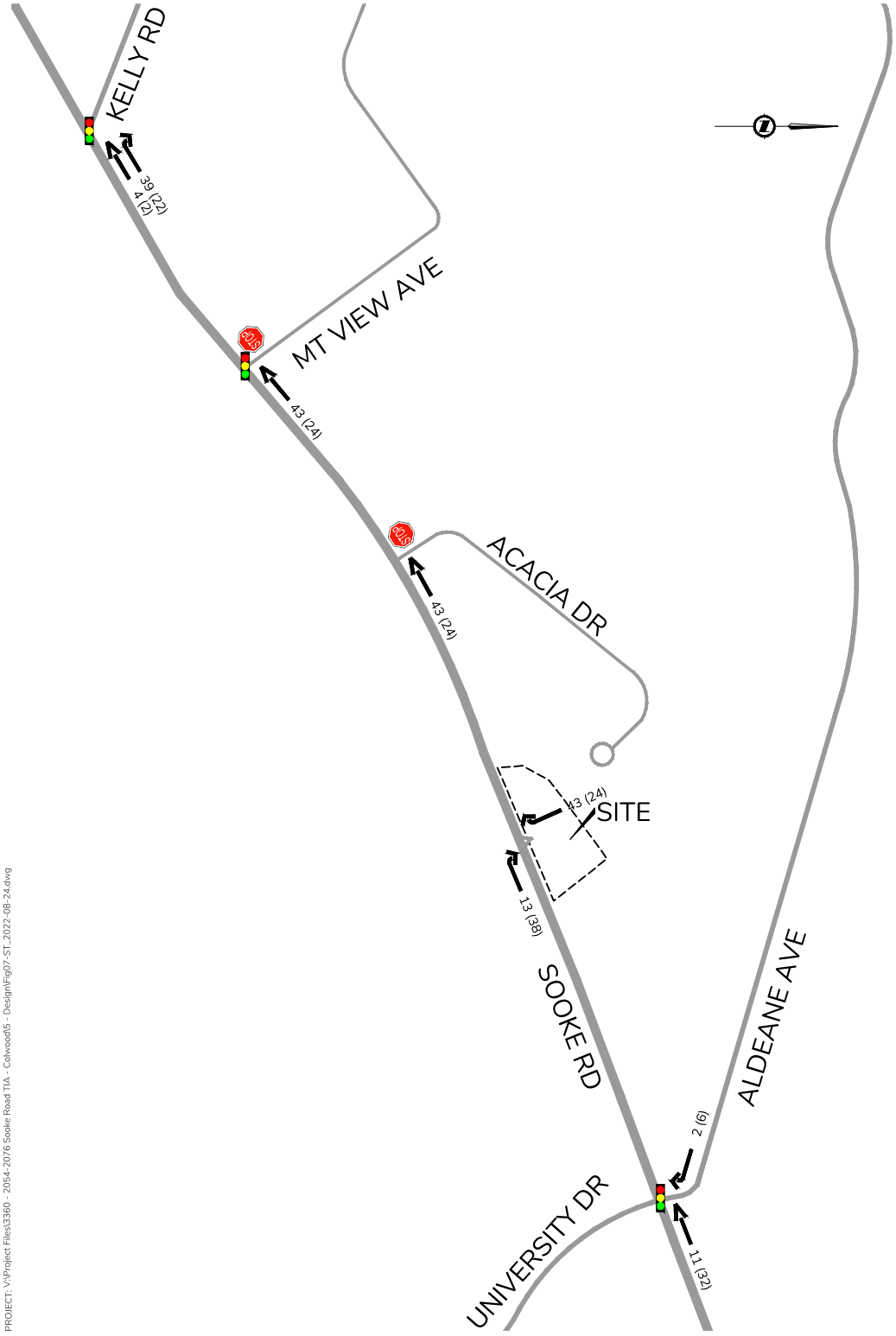
Street	Direction	AM / PM
Exiting		
Sooke Road / Kelly Road	North	90%
	West	10%
Entering		
Sooke Road / Aldeane Road-University Drive	West	85%
	South	15%

The site traffic volumes assigned to the area road network are illustrated in **Figure 7**.

4.7 Post-Development Traffic Volumes

4.7.1 Opening Day Post-Development Traffic Volumes

The opening day (i.e., 2024 horizon year) post-development traffic volumes are the sum of the background traffic volumes and the site-related traffic generated by the proposed development. Post-development traffic volumes for the opening day horizon year are illustrated in **Figure 8**.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39 (22)
4 (2)
MT VIEW AVE
43 (24)
ACACIA DR
43 (24)
43 (24)
SITE
13 (38)
SOOKE RD
ALDEANE AVE
2 (6)
UNIVERSITY DR
11 (32)
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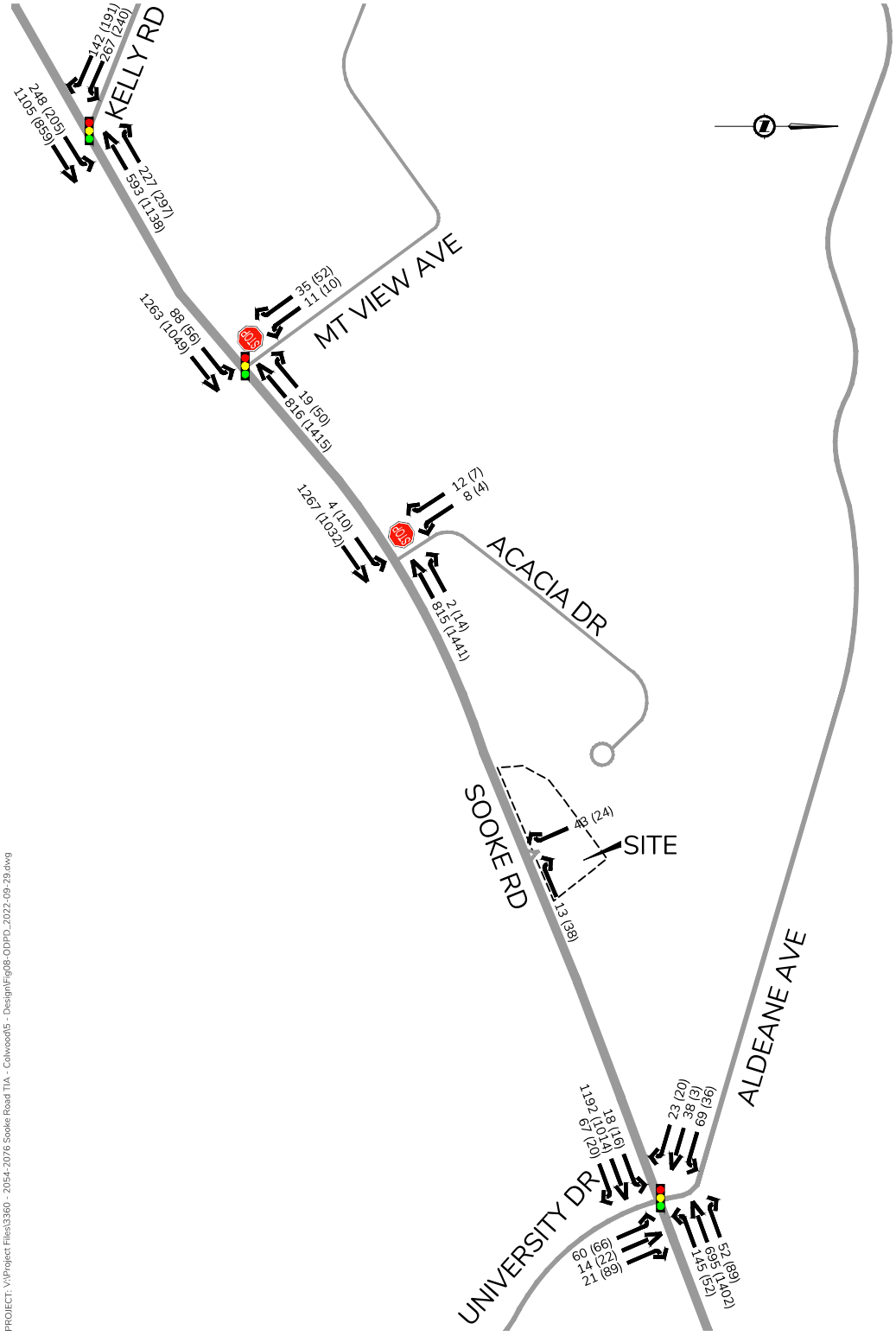
KELLY RD
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227 (297)
593 (1138)
MT VIEW AVE
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88 (56)
1263 (1049)
19 (50)
816 (1415)
ACACIA DR
12 (7)
8 (4)
4 (10)
1267 (1032)
2 (14)
815 (1441)
SOOKE RD
43 (24)
SITE
13 (38)
ALDEANE AVE
UNIVERSITY DR
1192 (1014)
67 (20)
18 (16)
4 (4)
23 (20)
38 (3)
69 (36)
60 (66)
14 (22)
21 (89)
52 (89)
995 (1202)
145 (52)
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5.0 TRAFFIC OPERATIONS ANALYSIS

5.1 Methodology

Analysis of the traffic conditions at the intersections within the study area were undertaken using Synchro software Synchro / SimTraffic is a two-part traffic modelling software that provides analysis of traffic conditions based on traffic control, geometry, volumes, and traffic operations. Synchro software is used because of its ability to provide analysis using the *Highway Capacity Manual (6th edition)* methodology, while SimTraffic integrates established driver behaviours and characteristics to simulate actual conditions by randomly "seeding" or positioning vehicles travelling throughout the network. These measures of effectiveness include Level of Service (LOS), delay (s/veh), 95th percentile queue length, and v/c ratios.

The delays and type of traffic control are used to determine the LOS. The LOS is broken down into six letter grades with LOS A being excellent operations and LOS F being unstable / failure operations. LOS C is generally considered to be an acceptable LOS by most municipalities. LOS D is generally considered to be on the threshold between acceptable and unacceptable operations. Synchro reports for all intersections in the study area and all scenarios are provided in **Appendix B**.

5.2 Input and Calibration Parameters

Heavy Vehicle Assumptions
A default value of 2 percent heavy vehicles was assumed.

Signal Timings
Existing signal timing plans were used for all signalized intersections in the study area under all scenarios (Existing, Background, Post-Development). Signal timings have not been optimized for the purposes of this study.

Peak Hour Factor
Peak hour factors for each intersection were calculated from the existing traffic count information.

Signal at Sooke Road / Mount View Avenue

The intersection of Sooke Road / Mount View Avenue has been modelled as a stop-controlled intersection for the purposes of this report. The Synchro modelling software does not have the ability to handle pedestrian controlled signals and as such only one can be modelled at a time. Given the low pedestrian crossing volumes, this intersection has been modelled primarily as a stop-controlled intersection. Preliminary analysis of the intersection during signalized operations showed acceptable LOS and delay.

for existing traffic?

5.3 Existing Conditions

A summary of the traffic analysis results for the signalized intersections in the study area on opening day (i.e., the 2024 horizon year) in the morning and afternoon peak hours is provided in **Table 5**.

Table 8

All intersections within the study area currently perform at an acceptable level of service on all approaches in both the morning and afternoon peak hours except for the southbound left/right turn lane at Sooke Road / Mount View Avenue in the afternoon peak hour. All approaches in the study area operate at LOS D or better with delays of 35 seconds or less, while the southbound left/right turn at the intersection of Sooke Road / Mount View Avenue operates at LOS E with a delay of 43 seconds. The LOS for the southbound left/right movement for both Sooke Road / Acacia Drive and Sooke Road / Mount View Avenue are currently LOS D, but are bordering (within 0.5 seconds) on LOS E.

The 95th percentile queues are acceptable and within their storage limits on all approaches within the study area, except for the eastbound left turn lane at Sooke Road / Kelly Road which exceeds the available storage by 8 metres or less (i.e., one (1) car length) in both the morning and afternoon peak hours.

Table 8 – Existing Traffic Operations

Key Movement	AM			PM		
	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)
Sooke Road / Aldeane Avenue-University Drive						
EBL	A	8.1	29	A	9.3	15
EBT	B	18.4	126	B	11.4	59
EBTR	B	18.4	128	B	11.4	61
WBL	A	9.8	27	A	6.5	28
WBT	A	4.1	36	A	6.4	75
WBTR	A	4.1	37	A	6.4	76
NBLT	B	18.4	21	B	17.4	20
NBR	B	17.8	9	B	18.3	17
SBLTR	C	20.3	27	B	18.3	15
Sooke Road / Kelly Road						
EBL	A	9.1	43	B	13.0	39
EBT	A	6.9	55	A	5.0	46
WBL	-	-	-	-	-	-
WBT	B	14.6	55	B	19.0	111
WBTR	B	14.7	65	B	19.7	120
SBL	C	20.9	55	C	26.6	50
SBR	A	0	0	A	0	0
Sooke Road / Acacia Drive						
EBLT	A	9.3	5	B	12.3	12
EBT	A	0	0	A	0.3	3
WBT	A	0	0	A	0	0
WBTR	A	0	0	A	0	0
SBLR	C	20.9	11	D	34.7	9
Sooke Road / Mount View Avenue						
EBLT	B	10.0	25	B	13.4	25
EBT	A	1.8	8	A	1.6	9
WBT	A	0	0	A	0	2
WBTR	A	0	3	A	0	2
SBLR	D	34.0	16	E	42.6	22

Note: ## - Exceeds storage/acceptable limits

5.4 Opening Day Background Conditions

5.4.1 Signalized Intersections

A summary of the traffic analysis results for the signalized intersections in the study area on opening day (i.e., the 2024 horizon year) under background conditions in the morning and afternoon peak hours is provided in **Table 9**.

Table 9 – Opening Day Background Traffic Operations – Signalized

Key Movement	AM			PM		
	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)
Sooke Road / Aldeane Avenue-University Drive						
EBL	A	8.3	29	B	10.2	22
EBT	C	22.5	188	B	12.1	65
EBTR	C	22.5	190	B	12.1	66
WBL	B	10.4	27	A	6.8	35
WBT	A	4.3	39	A	6.9	81
WBTR	A	4.3	36	A	6.9	83
NBLT	B	18.4	21	B	17.5	22
NBR	B	17.7	9	B	18.5	20
SBLTR	C	20.3	28	B	18.4	15
Sooke Road / Kelly Road						
EBL	A	9.8	44	B	14.3	40
EBT	A	7.4	58	A	5.3	49
WBL	-	-	-	-	-	-
WBT	B	15.3	57	C	22.3	245
WBTR	B	15.4	64	C	23.8	250
SBL	C	21.8	55	C	27.4	52
SBR	A	0	6	A	0	10

Notes: ## - Exceeds storage/acceptable limits

With the addition of background traffic, operational impacts to the signalized intersections in the network on opening day are generally minor, with overall delays across the network increasing by less than 5 seconds.

The 95th percentile queues increase with background traffic but remain acceptable and within their storage limits on all approaches within the study area for the signalized intersections, except for where they previously failed.

5.4.2 Unsignalized Intersections

A summary of the traffic analysis results for the unsignalized intersections in the study area on opening day (i.e., the 2024 horizon year) under background conditions in the morning and afternoon peak hours is provided in **Table 10**.

Table 10 – Opening Day Background Traffic Operations – Unsignalized

Key Movement	AM			PM		
	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)
Sooke Road / Acacia Drive						
EBLT	A	9.4	5	B	12.8	11
EBT	A	0.1	0	A	0.3	4
WBT	A	0	0	A	0	0
WBTR	A	0	0	A	0	2
SBLR	C	22.6	11	E	39.6	9
Sooke Road / Mount View Avenue						
EBLT	B	10.3	28	B	14	32
EBT	A	2.4	15	A	2	13
WBT	A	0	0	A	0	59
WBTR	A	0	2	A	0	60
SBLR	E	48.5	16	F	54.5	63

Notes: ## - Exceeds storage/acceptable limits

With the addition of background traffic, operational impacts to the unsignalized intersections in the network on opening day are generally minor, with overall delays across the network increasing by less than 15 seconds; however, the increased delays have reached LOS E/F on the southbound left/right approach for Sooke Road / Acacia Drive in the afternoon peak hour, and the southbound left/right approach for Sooke Road / Mount View Avenue in both the morning and afternoon peak hours.

The 95th percentile queues are acceptable and within their storage limits on all approaches for the unsignalized intersections within the study area.

5.5 Opening Day Post-Development Conditions

5.5.1 Signalized Intersections

A summary of the traffic analysis results for the signalized intersections in the study area on opening day (i.e., the 2024 horizon year) under post-development conditions in the morning and afternoon peak hours is provided **Table 11**.

Table 11 – Opening Day Post Development Traffic Operations – Signalized

Key Movement	AM			PM		
	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)
Sooke Road / Aldeane Avenue-University Drive						
EBL	A	8.3	33	B	10.5	12
EBT	C	22.5	155	B	12.1	64
EBTR	C	22.5	155	B	12.1	69
WBL	B	10.4	31	A	6.8	39
WBT	A	4.3	38	A	7.1	95
WBTR	A	4.3	39	A	7.1	96
NBLT	B	18.4	20	B	17.5	20
NBR	B	17.7	9	B	18.5	20
SBLTR	C	20.3	27	B	18.4	16
Sooke Road / Kelly Road						
EBL	B	10.2	45	B	14.7	39
EBT	A	7.3	63	A	5.2	46
WBL	-	-	-	-	-	-
WBT	B	15.5	62	C	23.4	187
WBTR	B	15.6	69	C	25.4	197
SBL	C	22.5	58	C	27.6	54
SBR	A	0	0	A	0	8

Notes: ## - Exceeds storage/acceptable limits

With the addition of post development traffic, operational impacts to the signalized intersections in the network on opening day are generally minor, with overall delays across the network increasing by less than 14 seconds with no degradation in LOS.

The 95th percentile queues increase with post development traffic by 7 metres or less (i.e., one (1) car length) from the background scenario and remain acceptable and within their storage limits on all approaches within the study area for the signalized intersections, except for where they previously failed at the eastbound left turn lane at Sooke Road / Kelly Road, which now exceeds the available storage by 10 metres or less (i.e., two (2) car lengths).

5.5.2 Unsignalized Intersections

A summary of the traffic analysis results for the unsignalized intersections in the study area on opening day (i.e., the 2024 horizon year) under post-development conditions in the morning and afternoon peak hours is provided in **Table 12**.

Table 12 - Opening Day Post Development Traffic Operations – Unsignalized

Key Movement	AM			PM		
	LOS	Delay (s)	95th % Queue (m)	LOS	Delay (s)	95th % Queue (m)
Sooke Road / Acacia Drive						
EBLT	A	9.6	5	B	13.0	18
EBT	A	0.1	0	A	0.3	10
WBT	A	0	0	A	0	0
WBTR	A	0	0	A	0	1
SBLR	C	23.9	11	E	41.0	9
Sooke Road / Mount View Avenue						
EBLT	B	10.5	25	B	14.3	29
EBT	A	2.5	10	A	2.0	15
WBT	A	0	0	A	0	2
WBTR	A	0	2	A	0	5
SBLR	F	55.6	17	F	59.4	20
Sooke Road / Site Driveway						
EBT	A	0	0	A	0	0
WBT	A	0	0	A	0	2
WBTR	A	0	0	A	0	0
SBR	B	11.8	39	C	17.1	12

Notes: ## - Exceeds storage/acceptable limits

Once site traffic is introduced post development, the impacts to the network are minor in terms of delay, with a maximum change of just over 7 seconds or less on any movement. LOS remains satisfactory except on movements where it had already previously failed in background conditions.

The 95th percentile queues are acceptable and within their storage limits on all approaches for the unsignalized intersections within the study area.

6.0 CONCLUSIONS

Traffic generated by the proposed development can be acceptably accommodated on the existing road network on opening day. Existing delays at stop-controlled intersections are not substantially impacted by the proposed development.

The southbound approaches at Sooke Road / Acacia Drive and Sooke Road / Mount View Avenue currently experience substantial delays due to heavy cross traffic on Sooke Road. Performance is anticipated to deteriorate further by the 2024 horizon year with the addition of corridor growth to the road network. The proposed development adds less than 8 seconds of delay to these intersections.

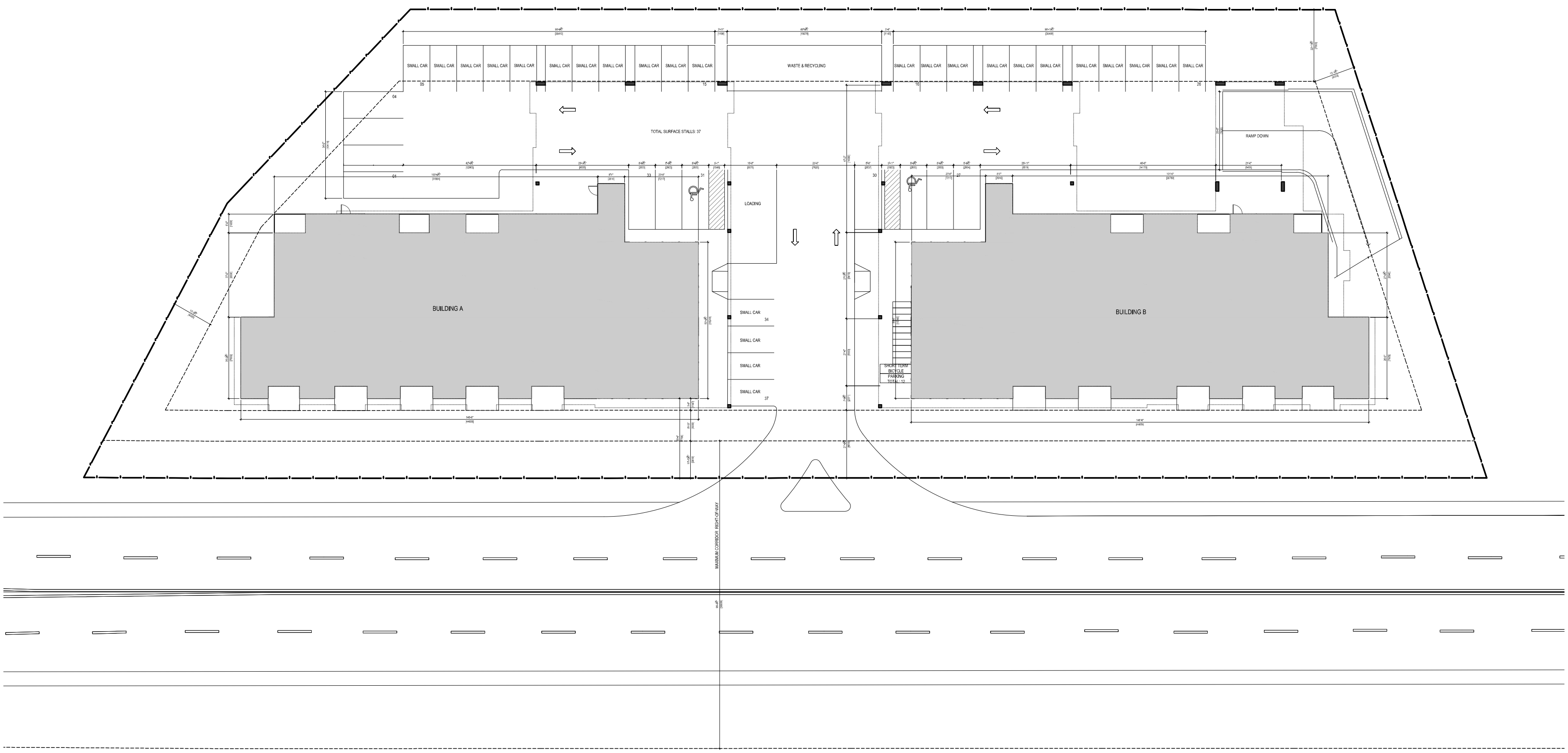
The site driveway is projected to operate well with a right in, right out restriction. As evidenced by the intersections at Sooke Road / Acacia Drive and Sooke Road / Mount View Avenue, a left-out option would cause significant delays without a traffic signal serving the movement.

Continued investment in walking, cycling and transit infrastructure by the City of Colwood and BC Transit will not only help to reduce vehicular traffic to/from this site, but also across the City. Shifting trips from vehicles to other modes will improve the expected long-term conditions.

7.0 RECOMMENDATIONS

WATT recommends that the developer restrict the site driveway to right in / right out movements only using a channelized island and appropriate signage.

APPENDIX A – SITE PLAN



1 SITE PLAN
DP.101 3/32" = 1'-0"

FAAS

FORMED ALLIANCE ARCHITECTURE STUDIO

RELEASES

NO.	DESCRIPTION	DATE
01	SD SUBMISSION	22.09.28

PROJECT NAME

SOOKE ROAD MULTIFAMILY

MUNICIPAL ADDRESS

2054-2076 SOOKE ROAD, COLWOOD BC

LEGAL ADDRESS

LOT 1, PLAN 32147, LOT B, PLAN 14811, REMAINDER LOT 1, PLAN 6399, EXCEPT PART IN PLAN 32178 AND LOTS 16 AND 17, PLAN 32178, ALL IN SECTION 101, ESQUIMALT DISTRICT

PROJECT NO.

22.42-W.U._SOOKE RD

DRAWN	CHECKED
GD, JB	JA

DATE	SCALE
2023,03,21	AS NOTED

DRAWING TITLE

SITE PLAN

DRAWING NUMBER

DP.100

APPENDIX B – SYNCHRO BACKGROUND

SYNCHRO MODELLING SOFTWARE DESCRIPTION

The traffic analysis was completed using Synchro and SimTraffic traffic modelling software. Results were measured in delay, level of service (LOS), 95th percentile queue length and volume to capacity ratio. Synchro is based on the Highway Capacity Manual (HCM) methodology. SimTraffic integrates established driver behaviours and characteristics to simulate actual conditions by randomly "seeding" or positioning vehicles travelling throughout the network. The simulation is run ten times (ten different random seedings of vehicle types, behaviours, and arrivals) to obtain statistical significance of the results.

Levels of Service

Traffic operations are typically described in terms of levels of service, which rates the amount of delay per vehicle for each movement and the entire intersection. Levels of service range from LOS A (representing best operations) to LOS E/F (LOS E being poor operations and LOS F being unpredictable/disruptive operations). LOS E/F are generally unacceptable levels of service under normal everyday conditions. A LOS C or better is considered acceptable operations, while D is on the threshold between acceptable and unacceptable operations. Highway operations will typically need to operate at LOS C or better for through movements and LOS E or better for other traffic movements with lower order roads.

The hierarchy of criteria for grading an intersection or movement not only includes delay times, but also considers traffic control type (stop signs or traffic signal). For example, if a vehicle is delayed for 19 seconds at an unsignalized intersection, it is considered to have an average operation, and would therefore be graded as an LOS C. However, at a signalized intersection, a 19 second delay would be considered a good operation and therefore it would be given an LOS B. The table below indicates the range of delay for LOS for signalized and unsignalized intersections.

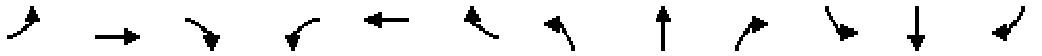
Table A1: LOS Criteria, by Intersection Traffic Control

Level of Service (LOS)	Unsignalized Intersection Average Vehicle Delay (sec / veh)	Signalized Intersection Average Vehicle Delay (sec / veh)
A	0 – 10	0 – 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50	> 80

APPENDIX C - SYNCHRO REPORTS

HCM 6th Signalized Intersection Summary
1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

03/03/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	1192	67	145	684	52	60	14	21	69	38	21
Future Volume (veh/h)	18	1192	67	145	684	52	60	14	21	69	38	21
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	1370	0	167	786	0	69	16	24	79	44	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	443	1502		377	2270		318	60	231	224	86	
Arrive On Green	0.42	0.42	0.00	0.11	0.64	0.00	0.15	0.15	0.15	0.15	0.15	0.00
Sat Flow, veh/h	689	3647	0	1781	3554	1585	1236	412	1585	683	593	1585
Grp Volume(v), veh/h	21	1370	0	167	786	0	85	0	24	123	0	0
Grp Sat Flow(s),veh/h/ln	689	1777	0	1781	1777	1585	1648	0	1585	1276	0	1585
Q Serve(g_s), s	0.9	17.1	0.0	2.1	4.9	0.0	0.0	0.0	0.6	2.7	0.0	0.0
Cycle Q Clear(g_c), s	0.9	17.1	0.0	2.1	4.9	0.0	2.0	0.0	0.6	4.8	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.81		1.00	0.64		1.00
Lane Grp Cap(c), veh/h	443	1502		377	2270		378	0	231	311	0	
V/C Ratio(X)	0.05	0.91		0.44	0.35		0.22	0.00	0.10	0.40	0.00	
Avail Cap(c_a), veh/h	443	1502		402	2270		867	0	770	826	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	12.8	0.0	9.6	4.0	0.0	18.1	0.0	17.5	19.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	9.6	0.0	0.8	0.3	0.0	0.3	0.0	0.2	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.3	22.5	0.0	10.4	4.3	0.0	18.4	0.0	17.7	20.3	0.0	0.0
LnGrp LOS	A	C		B	A		B	A	B	C	A	
Approach Vol, veh/h		1391			953			109			123	
Approach Delay, s/veh		22.3			5.4			18.3			20.3	
Approach LOS		C			A			B			C	

Timer - Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		12.1	10.2	25.0		12.1		35.2				
Change Period (Y+Rc), s		5.2	4.9	5.0		5.2		5.0				
Max Green Setting (Gmax), s		23.0	6.0	20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		4.0	4.1	19.1		6.8		6.9				
Green Ext Time (p_c), s		0.5	0.1	0.8		0.5		7.9				

Intersection Summary	
HCM 6th Ctrl Delay	15.7
HCM 6th LOS	B

Notes

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	248	1105	589	188	267	142
Future Volume (veh/h)	248	1105	589	188	267	142
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	273	1214	647	207	293	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	500	2033	930	297	381	
Arrive On Green	0.15	0.57	0.35	0.35	0.21	0.00
Sat Flow, veh/h	1781	3647	2742	847	1781	1585
Grp Volume(v), veh/h	273	1214	434	420	293	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1718	1781	1585
Q Serve(g_s), s	4.2	11.1	10.5	10.5	7.7	0.0
Cycle Q Clear(g_c), s	4.2	11.1	10.5	10.5	7.7	0.0
Prop In Lane	1.00			0.49	1.00	1.00
Lane Grp Cap(c), veh/h	500	2033	624	604	381	
V/C Ratio(X)	0.55	0.60	0.70	0.70	0.77	
Avail Cap(c_a), veh/h	1127	2135	1068	1032	892	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	8.9	6.9	13.9	13.9	18.5	0.0
Incr Delay (d2), s/veh	0.9	0.4	1.4	1.5	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.2	0.2	0.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	9.8	7.4	15.3	15.4	21.8	0.0
LnGrp LOS	A	A	B	B	C	
Approach Vol, veh/h		1487	854		293	
Approach Delay, s/veh		7.8	15.3		21.8	
Approach LOS		A	B		C	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	33.8	16.2	11.0	22.7
Change Period (Y+Rc), s	5.2	5.5	3.6	5.2
Max Green Setting (Gmax), s	30.0	25.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	13.1	9.7	6.2	12.5
Green Ext Time (p_c), s	8.0	1.1	1.4	5.1

Intersection Summary	
HCM 6th Ctrl Delay	11.8
HCM 6th LOS	B

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection: 1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	LT	R
Maximum Queue (m)	39.6	188.1	190.3	32.3	44.6	45.1	3.4	24.9	11.6	35.1	12.3
Average Queue (m)	7.0	100.7	105.0	15.9	21.6	19.2	0.1	9.2	3.0	15.7	0.4
95th Queue (m)	29.4	188.3	190.5	27.3	38.7	35.9	2.4	20.6	9.4	28.1	6.2
Link Distance (m)		332.6	332.6		496.6	496.6		488.2		734.4	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	40.0			55.0			35.0		35.0		25.0
Storage Blk Time (%)		41				0		0		2	0
Queuing Penalty (veh)		7				0		0		0	0

Intersection: 2: SOOKE RD & ACACIA DR

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	11.8	12.0
Average Queue (m)	0.6	4.1
95th Queue (m)	4.7	10.8
Link Distance (m)	219.9	275.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: SOOKE RD & MT VIEW AVE

Movement	EB	EB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (m)	37.5	24.6	3.3	20.5
Average Queue (m)	11.6	1.3	0.2	8.1
95th Queue (m)	28.1	14.6	2.0	16.4
Link Distance (m)	262.1	262.1	219.9	228.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: SOOKE RD & KELLY RD

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (m)	42.5	74.8	70.0	73.0	77.4	64.8	8.1
Average Queue (m)	28.1	32.8	34.7	33.0	40.6	32.0	0.3
95th Queue (m)	44.3	57.4	57.8	56.7	64.3	54.8	5.7
Link Distance (m)		549.3	549.3	262.1	262.1	616.6	616.6
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	35.0						
Storage Blk Time (%)	3	4					
Queuing Penalty (veh)	16	9					

Intersection: 5: SOOKE RD & Site Driveway

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 33

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	1267	772	2	8	12
Future Vol, veh/h	4	1267	772	2	8	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	1320	804	2	8	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	806	0	-	0	1473	403
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	668	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	814	-	-	-	118	597
Stage 1	-	-	-	-	400	-
Stage 2	-	-	-	-	471	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	814	-	-	-	116	597
Mov Cap-2 Maneuver	-	-	-	-	116	-
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	471	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	22.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	814	-	-	-	225
HCM Lane V/C Ratio	0.005	-	-	-	0.093
HCM Control Delay (s)	9.4	0.1	-	-	22.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	88	1263	773	19	11	35
Future Vol, veh/h	88	1263	773	19	11	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	96	1373	840	21	12	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	861	0	-	0	1730	431
Stage 1	-	-	-	-	851	-
Stage 2	-	-	-	-	879	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	776	-	-	-	79	573
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	366	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	776	-	-	-	38	573
Mov Cap-2 Maneuver	-	-	-	-	38	-
Stage 1	-	-	-	-	182	-
Stage 2	-	-	-	-	366	-

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	48.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	776	-	-	-	131
HCM Lane V/C Ratio	0.123	-	-	-	0.382
HCM Control Delay (s)	10.3	2.4	-	-	48.5
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.4	-	-	-	1.6

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1275	765	0	0	0
Future Vol, veh/h	0	1275	765	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1386	832	0	0	0

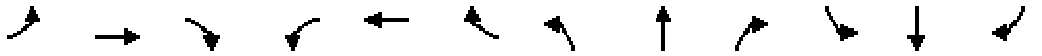
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	416
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	585
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	585
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	0
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-

HCM 6th Signalized Intersection Summary
1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

03/03/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	1014	20	52	1370	89	66	22	89	36	3	14
Future Volume (veh/h)	16	1014	20	52	1370	89	66	22	89	36	3	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	17	1102	0	57	1489	0	72	24	97	39	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	286	1588		383	2218		304	82	234	277	16	
Arrive On Green	0.45	0.45	0.00	0.07	0.62	0.00	0.15	0.15	0.15	0.15	0.15	0.00
Sat Flow, veh/h	354	3647	0	1781	3554	1585	1103	554	1585	821	107	1585
Grp Volume(v), veh/h	17	1102	0	57	1489	0	96	0	97	42	0	0
Grp Sat Flow(s),veh/h/ln	354	1777	0	1781	1777	1585	1657	0	1585	928	0	1585
Q Serve(g_s), s	1.5	11.1	0.0	0.7	12.1	0.0	0.0	0.0	2.5	1.1	0.0	0.0
Cycle Q Clear(g_c), s	5.6	11.1	0.0	0.7	12.1	0.0	2.1	0.0	2.5	3.2	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.75		1.00	0.93		1.00
Lane Grp Cap(c), veh/h	286	1588		383	2218		386	0	234	292	0	
V/C Ratio(X)	0.06	0.69		0.15	0.67		0.25	0.00	0.41	0.14	0.00	
Avail Cap(c_a), veh/h	286	1588		501	2218		937	0	814	768	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.8	9.9	0.0	6.7	5.4	0.0	17.1	0.0	17.3	18.2	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.2	0.0	0.2	1.4	0.0	0.3	0.0	1.2	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.0	0.0	0.4	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.2	12.1	0.0	6.8	6.9	0.0	17.5	0.0	18.5	18.4	0.0	0.0
LnGrp LOS	B	B		A	A		B	A	B	B	A	
Approach Vol, veh/h		1119			1546			193			42	
Approach Delay, s/veh		12.1			6.9			18.0			18.4	
Approach LOS		B			A			B			B	

Timer - Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		11.8	7.9	25.0		11.8		32.9				
Change Period (Y+Rc), s		5.2	4.9	5.0		5.2		5.0				
Max Green Setting (Gmax), s		23.0	6.0	20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		4.5	2.7	13.1		5.2		14.1				
Green Ext Time (p_c), s		0.9	0.0	5.7		0.1		5.5				

Intersection Summary	
HCM 6th Ctrl Delay	9.8
HCM 6th LOS	A

Notes

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	205	859	1136	275	240	191
Future Volume (veh/h)	205	859	1136	275	240	191
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	214	895	1183	286	250	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	338	2276	1361	326	320	
Arrive On Green	0.10	0.64	0.48	0.48	0.18	0.00
Sat Flow, veh/h	1781	3647	2938	680	1781	1585
Grp Volume(v), veh/h	214	895	734	735	250	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1748	1781	1585
Q Serve(g_s), s	3.1	7.2	21.9	22.5	8.0	0.0
Cycle Q Clear(g_c), s	3.1	7.2	21.9	22.5	8.0	0.0
Prop In Lane	1.00			0.39	1.00	1.00
Lane Grp Cap(c), veh/h	338	2276	850	836	320	
V/C Ratio(X)	0.63	0.39	0.86	0.88	0.78	
Avail Cap(c_a), veh/h	904	2276	895	880	747	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.4	5.1	13.8	14.0	23.3	0.0
Incr Delay (d2), s/veh	2.0	0.1	8.5	9.8	4.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	2.0	2.3	1.3	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.3	5.3	22.3	23.8	27.4	0.0
LnGrp LOS	B	A	C	C	C	
Approach Vol, veh/h		1109	1469		250	
Approach Delay, s/veh		7.0	23.0		27.4	
Approach LOS		A	C		C	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			43.4		16.2	9.7	33.7
Change Period (Y+Rc), s			5.2		5.5	3.6	5.2
Max Green Setting (Gmax), s			30.0		25.0	25.0	30.0
Max Q Clear Time (g_c+I1), s			9.2		10.0	5.1	24.5
Green Ext Time (p_c), s			6.2		0.9	1.1	4.0

Intersection Summary	
HCM 6th Ctrl Delay	17.1
HCM 6th LOS	B

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection: 1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	LT	R
Maximum Queue (m)	32.7	75.4	74.9	53.3	92.6	96.6	42.6	24.3	27.1	18.2	3.2
Average Queue (m)	5.8	40.2	44.3	11.1	51.2	50.0	13.6	10.9	9.6	5.8	0.1
95th Queue (m)	21.5	64.6	66.2	35.2	81.3	82.7	45.7	21.9	20.0	15.3	2.3
Link Distance (m)		332.6	332.6		496.6	496.6		488.2		734.4	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	40.0			55.0			35.0		35.0		25.0
Storage Blk Time (%)		7			5	16	0	0	0	0	
Queuing Penalty (veh)		1			3	14	0	0	0	0	

Intersection: 2: SOOKE RD & ACACIA DR

Movement	EB	EB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (m)	23.3	5.7	2.1	10.7
Average Queue (m)	2.1	0.2	0.1	2.9
95th Queue (m)	11.4	4.0	1.5	9.3
Link Distance (m)	219.9	219.9	298.4	275.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: SOOKE RD & MT VIEW AVE

Movement	EB	EB	WB	WB	SB
Directions Served	LT	T	T	TR	LR
Maximum Queue (m)	41.7	29.5	25.1	27.7	41.6
Average Queue (m)	14.7	1.8	10.4	11.3	20.3
95th Queue (m)	31.7	13.3	58.5	59.9	62.7
Link Distance (m)	262.1	262.1	219.9	219.9	228.0
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: SOOKE RD & KELLY RD

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (m)	42.0	62.5	55.8	195.9	198.2	59.3	20.2
Average Queue (m)	25.3	26.6	27.1	122.2	131.6	31.9	0.7
95th Queue (m)	40.1	48.7	47.1	245.2	250.4	52.0	10.3
Link Distance (m)		549.3	549.3	262.1	262.1	616.6	616.6
Upstream Blk Time (%)				2	4		
Queuing Penalty (veh)				17	26		
Storage Bay Dist (m)	35.0						
Storage Blk Time (%)	3	1					
Queuing Penalty (veh)	11	3					

Intersection: 5: SOOKE RD & Site Driveway

Movement	WB
Directions Served	TR
Maximum Queue (m)	68.1
Average Queue (m)	2.3
95th Queue (m)	48.0
Link Distance (m)	332.6
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 76

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	1032	1417	14	4	7
Future Vol, veh/h	10	1032	1417	14	4	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	1032	1417	14	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1431	0	-	0	1960	716
Stage 1	-	-	-	-	1424	-
Stage 2	-	-	-	-	536	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	471	-	-	-	55	373
Stage 1	-	-	-	-	188	-
Stage 2	-	-	-	-	551	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	471	-	-	-	52	373
Mov Cap-2 Maneuver	-	-	-	-	52	-
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	551	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	39.6
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	471	-	-	-	115
HCM Lane V/C Ratio	0.021	-	-	-	0.096
HCM Control Delay (s)	12.8	0.3	-	-	39.6
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	1049	1391	50	10	52
Future Vol, veh/h	56	1049	1391	50	10	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	1070	1419	51	10	53

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1470	0	-	0	2094	735
Stage 1	-	-	-	-	1445	-
Stage 2	-	-	-	-	649	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	455	-	-	-	45	362
Stage 1	-	-	-	-	183	-
Stage 2	-	-	-	-	482	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	455	-	-	-	31	362
Mov Cap-2 Maneuver	-	-	-	-	31	-
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	482	-

Approach	EB	WB	SB
HCM Control Delay, s	2.6	0	54.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	455	-	-	-	133
HCM Lane V/C Ratio	0.126	-	-	-	0.476
HCM Control Delay (s)	14	2	-	-	54.5
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	2.2

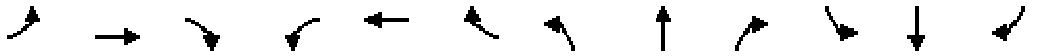
Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1036	1449	0	0	0
Future Vol, veh/h	0	1036	1449	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1126	1575	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	788
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	334
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	334
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	0
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	1129	64	139	648	50	58	13	20	66	37	20
Future Volume (veh/h)	17	1129	64	139	648	50	58	13	20	66	37	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	20	1298	0	160	745	0	67	15	23	76	43	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	458	1513		393	2281		317	58	223	222	85	
Arrive On Green	0.43	0.43	0.00	0.11	0.64	0.00	0.14	0.14	0.14	0.14	0.14	0.00
Sat Flow, veh/h	715	3647	0	1781	3554	1585	1260	408	1585	685	601	1585
Grp Volume(v), veh/h	20	1298	0	160	745	0	82	0	23	119	0	0
Grp Sat Flow(s),veh/h/ln	715	1777	0	1781	1777	1585	1669	0	1585	1286	0	1585
Q Serve(g_s), s	0.8	15.5	0.0	1.9	4.5	0.0	0.0	0.0	0.6	2.6	0.0	0.0
Cycle Q Clear(g_c), s	0.8	15.5	0.0	1.9	4.5	0.0	1.9	0.0	0.6	4.5	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.82		1.00	0.64		1.00
Lane Grp Cap(c), veh/h	458	1513		393	2281		374	0	223	307	0	
V/C Ratio(X)	0.04	0.86		0.41	0.33		0.22	0.00	0.10	0.39	0.00	
Avail Cap(c_a), veh/h	458	1513		421	2281		875	0	776	836	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.0	12.2	0.0	9.1	3.8	0.0	18.2	0.0	17.6	19.5	0.0	0.0
Incr Delay (d2), s/veh	0.1	6.2	0.0	0.7	0.3	0.0	0.3	0.0	0.2	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.3	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.1	18.4	0.0	9.8	4.1	0.0	18.4	0.0	17.8	20.3	0.0	0.0
LnGrp LOS	A	B		A	A		B	A	B	C	A	
Approach Vol, veh/h		1318			905			105			119	
Approach Delay, s/veh		18.2			5.1			18.3			20.3	
Approach LOS		B			A			B			C	

Timer - Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		11.8	10.2	25.0		11.8		35.2				
Change Period (Y+Rc), s		5.2	4.9	5.0		5.2		5.0				
Max Green Setting (Gmax), s		23.0	6.0	20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		3.9	3.9	17.5		6.5		6.5				
Green Ext Time (p_c), s		0.4	0.1	2.3		0.5		7.7				

Intersection Summary		
HCM 6th Ctrl Delay		13.5
HCM 6th LOS		B

Notes

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	238	1045	557	181	257	137
Future Volume (veh/h)	238	1045	557	181	257	137
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	262	1148	612	199	282	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	510	2012	906	294	372	
Arrive On Green	0.15	0.57	0.34	0.34	0.21	0.00
Sat Flow, veh/h	1781	3647	2730	856	1781	1585
Grp Volume(v), veh/h	262	1148	412	399	282	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1716	1781	1585
Q Serve(g_s), s	3.8	9.8	9.4	9.4	7.1	0.0
Cycle Q Clear(g_c), s	3.8	9.8	9.4	9.4	7.1	0.0
Prop In Lane	1.00			0.50	1.00	1.00
Lane Grp Cap(c), veh/h	510	2012	610	589	372	
V/C Ratio(X)	0.51	0.57	0.68	0.68	0.76	
Avail Cap(c_a), veh/h	1186	2244	1122	1084	937	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	8.3	6.6	13.3	13.3	17.7	0.0
Incr Delay (d2), s/veh	0.8	0.3	1.3	1.4	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.2	0.2	0.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	9.1	6.9	14.6	14.7	20.9	0.0
LnGrp LOS	A	A	B	B	C	
Approach Vol, veh/h		1410	811		282	
Approach Delay, s/veh		7.3	14.7		20.9	
Approach LOS		A	B		C	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	32.1	15.4	10.6	21.5
Change Period (Y+Rc), s	5.2	5.5	3.6	5.2
Max Green Setting (Gmax), s	30.0	25.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	11.8	9.1	5.8	11.4
Green Ext Time (p_c), s	7.8	1.1	1.4	4.9

Intersection Summary	
HCM 6th Ctrl Delay	11.2
HCM 6th LOS	B

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection: 1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	LT
Maximum Queue (m)	46.7	132.1	137.0	31.7	38.2	47.5	33.7	25.0	11.3	35.2
Average Queue (m)	7.1	70.3	74.5	15.8	21.4	19.2	1.1	10.5	3.0	13.8
95th Queue (m)	28.5	125.9	128.3	26.7	35.6	36.6	12.3	21.0	9.4	26.5
Link Distance (m)		332.6	332.6		496.6	496.6		488.2		734.4
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	40.0			55.0			35.0		35.0	
Storage Blk Time (%)		28			0	1	0	0		1
Queuing Penalty (veh)		5			0	0	0	0		0

Intersection: 2: SOOKE RD & ACACIA DR

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	10.1	12.0
Average Queue (m)	0.6	3.8
95th Queue (m)	4.7	10.8
Link Distance (m)	219.9	275.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: SOOKE RD & MT VIEW AVE

Movement	EB	EB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (m)	28.8	10.1	6.4	18.2
Average Queue (m)	11.2	0.8	0.3	8.3
95th Queue (m)	24.6	7.8	2.6	16.0
Link Distance (m)	262.1	262.1	219.9	228.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: SOOKE RD & KELLY RD

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	L
Maximum Queue (m)	41.9	68.4	65.2	61.9	75.4	65.2
Average Queue (m)	25.5	31.3	31.5	31.9	39.7	31.7
95th Queue (m)	42.5	55.1	53.7	55.0	65.0	55.4
Link Distance (m)		549.3	549.3	262.1	262.1	616.6
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	35.0					
Storage Blk Time (%)	3	2				
Queuing Penalty (veh)	14	6				

Intersection: 5: SOOKE RD & Site Driveway

Movement
Directions Served
Maximum Queue (m)
Average Queue (m)
95th Queue (m)
Link Distance (m)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (m)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 25

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	1201	733	2	8	12
Future Vol, veh/h	4	1201	733	2	8	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	1251	764	2	8	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	766	0	-	0	1399	383
Stage 1	-	-	-	-	765	-
Stage 2	-	-	-	-	634	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	843	-	-	-	132	615
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	491	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	843	-	-	-	130	615
Mov Cap-2 Maneuver	-	-	-	-	130	-
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	491	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	20.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	843	-	-	-	247
HCM Lane V/C Ratio	0.005	-	-	-	0.084
HCM Control Delay (s)	9.3	0.1	-	-	20.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	85	1197	734	18	11	34
Future Vol, veh/h	85	1197	734	18	11	34
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	92	1301	798	20	12	37

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	818	0	-	0	1643	409
Stage 1	-	-	-	-	808	-
Stage 2	-	-	-	-	835	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	806	-	-	-	91	592
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	386	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	806	-	-	-	54	592
Mov Cap-2 Maneuver	-	-	-	-	54	-
Stage 1	-	-	-	-	235	-
Stage 2	-	-	-	-	386	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	34
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	806	-	-	-	172
HCM Lane V/C Ratio	0.115	-	-	-	0.284
HCM Control Delay (s)	10	1.8	-	-	34
HCM Lane LOS	B	A	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	1.1

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1209	726	0	0	0
Future Vol, veh/h	0	1209	726	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1314	789	0	0	0

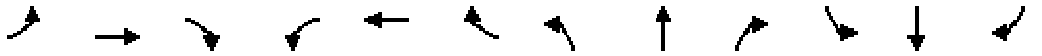
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	395
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	604
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	604
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	0
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-

HCM 6th Signalized Intersection Summary
1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

03/03/2023



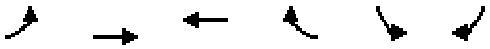
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	964	19	50	1301	86	63	21	86	35	3	13
Future Volume (veh/h)	15	964	19	50	1301	86	63	21	86	35	3	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	16	1048	0	54	1414	0	68	23	93	38	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	304	1594		396	2217		302	82	233	280	16	
Arrive On Green	0.45	0.45	0.00	0.07	0.62	0.00	0.15	0.15	0.15	0.15	0.15	0.00
Sat Flow, veh/h	380	3647	0	1781	3554	1585	1092	560	1585	843	112	1585
Grp Volume(v), veh/h	16	1048	0	54	1414	0	91	0	93	41	0	0
Grp Sat Flow(s),veh/h/ln	380	1777	0	1781	1777	1585	1651	0	1585	955	0	1585
Q Serve(g_s), s	1.2	10.3	0.0	0.6	11.1	0.0	0.0	0.0	2.4	1.1	0.0	0.0
Cycle Q Clear(g_c), s	4.5	10.3	0.0	0.6	11.1	0.0	2.0	0.0	2.4	3.1	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.75		1.00	0.93		1.00
Lane Grp Cap(c), veh/h	304	1594		396	2217		384	0	233	296	0	
V/C Ratio(X)	0.05	0.66		0.14	0.64		0.24	0.00	0.40	0.14	0.00	
Avail Cap(c_a), veh/h	304	1594		518	2217		939	0	817	778	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.1	9.6	0.0	6.4	5.2	0.0	17.1	0.0	17.2	18.0	0.0	0.0
Incr Delay (d2), s/veh	0.3	1.8	0.0	0.2	1.2	0.0	0.3	0.0	1.1	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.4	0.0	0.0	0.4	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.3	11.4	0.0	6.5	6.4	0.0	17.4	0.0	18.3	18.3	0.0	0.0
LnGrp LOS	A	B		A	A		B	A	B	B	A	
Approach Vol, veh/h		1064			1468			184			41	
Approach Delay, s/veh		11.4			6.4			17.9			18.3	
Approach LOS		B			A			B			B	

Timer - Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		11.8	7.8	25.0		11.8		32.8				
Change Period (Y+Rc), s		5.2	4.9	5.0		5.2		5.0				
Max Green Setting (Gmax), s		23.0	6.0	20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		4.4	2.6	12.3		5.1		13.1				
Green Ext Time (p_c), s		0.9	0.0	6.2		0.1		6.3				

Intersection Summary	
HCM 6th Ctrl Delay	9.3
HCM 6th LOS	A

Notes

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	197	815	1076	264	231	184
Future Volume (veh/h)	197	815	1076	264	231	184
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	205	849	1121	275	241	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	353	2267	1345	327	313	
Arrive On Green	0.10	0.64	0.47	0.47	0.18	0.00
Sat Flow, veh/h	1781	3647	2927	690	1781	1585
Grp Volume(v), veh/h	205	849	700	696	241	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1746	1781	1585
Q Serve(g_s), s	2.9	6.5	19.6	20.0	7.4	0.0
Cycle Q Clear(g_c), s	2.9	6.5	19.6	20.0	7.4	0.0
Prop In Lane	1.00			0.39	1.00	1.00
Lane Grp Cap(c), veh/h	353	2267	844	829	313	
V/C Ratio(X)	0.58	0.37	0.83	0.84	0.77	
Avail Cap(c_a), veh/h	950	2267	929	913	776	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.5	4.9	13.1	13.2	22.6	0.0
Incr Delay (d2), s/veh	1.5	0.1	5.9	6.6	4.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	1.4	1.5	1.2	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.0	5.0	19.0	19.7	26.6	0.0
LnGrp LOS	B	A	B	B	C	
Approach Vol, veh/h		1054	1396		241	
Approach Delay, s/veh		6.6	19.3		26.6	
Approach LOS		A	B		C	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	41.8	15.6	9.4	32.4
Change Period (Y+Rc), s	5.2	5.5	3.6	5.2
Max Green Setting (Gmax), s	30.0	25.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	8.5	9.4	4.9	22.0
Green Ext Time (p_c), s	5.9	0.9	1.0	5.2

Intersection Summary	
HCM 6th Ctrl Delay	15.0
HCM 6th LOS	B

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection: 1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	LT
Maximum Queue (m)	25.2	64.8	68.2	43.9	81.3	86.1	42.6	25.0	20.4	17.1
Average Queue (m)	3.7	36.3	40.8	9.7	46.0	47.1	8.0	9.3	8.0	6.2
95th Queue (m)	14.5	58.5	61.3	28.2	74.9	75.8	35.1	19.8	16.9	15.1
Link Distance (m)		332.6	332.6		496.6	496.6		488.2		734.4
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	40.0			55.0			35.0		35.0	
Storage Blk Time (%)		5		0	4	13	0	0		0
Queuing Penalty (veh)		1		0	2	11	0	0		0

Intersection: 2: SOOKE RD & ACACIA DR

Movement	EB	EB	SB
Directions Served	LT	T	LR
Maximum Queue (m)	22.8	4.2	9.5
Average Queue (m)	2.6	0.1	2.9
95th Queue (m)	12.4	3.0	9.0
Link Distance (m)	219.9	219.9	275.0
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: SOOKE RD & MT VIEW AVE

Movement	EB	EB	WB	WB	SB
Directions Served	LT	T	T	TR	LR
Maximum Queue (m)	28.9	19.2	2.4	4.0	30.0
Average Queue (m)	11.0	1.0	0.1	0.3	10.7
95th Queue (m)	24.8	8.5	1.7	2.4	21.8
Link Distance (m)	262.1	262.1	219.9	219.9	228.0
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: SOOKE RD & KELLY RD

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	L
Maximum Queue (m)	41.9	57.4	52.4	127.6	138.9	59.1
Average Queue (m)	25.2	24.7	24.2	67.3	75.6	29.6
95th Queue (m)	39.3	45.5	42.7	111.3	120.0	49.9
Link Distance (m)		549.3	549.3	262.1	262.1	616.6
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	35.0					
Storage Blk Time (%)	3	1				
Queuing Penalty (veh)	11	2				

Intersection: 5: SOOKE RD & Site Driveway

Movement	WB
Directions Served	TR
Maximum Queue (m)	68.2
Average Queue (m)	2.3
95th Queue (m)	48.1
Link Distance (m)	332.6
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 27

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	982	1346	13	4	7
Future Vol, veh/h	10	982	1346	13	4	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	982	1346	13	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1359	0	-	0	1864	680
Stage 1	-	-	-	-	1353	-
Stage 2	-	-	-	-	511	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	502	-	-	-	64	393
Stage 1	-	-	-	-	205	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	502	-	-	-	61	393
Mov Cap-2 Maneuver	-	-	-	-	61	-
Stage 1	-	-	-	-	196	-
Stage 2	-	-	-	-	567	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	34.7
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	502	-	-	-	132
HCM Lane V/C Ratio	0.02	-	-	-	0.083
HCM Control Delay (s)	12.3	0.3	-	-	34.7
HCM Lane LOS	B	A	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	54	998	1321	48	10	50
Future Vol, veh/h	54	998	1321	48	10	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	55	1018	1348	49	10	51

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1397	0	-	0	1992	699
Stage 1	-	-	-	-	1373	-
Stage 2	-	-	-	-	619	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	485	-	-	-	53	382
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	499	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	485	-	-	-	39	382
Mov Cap-2 Maneuver	-	-	-	-	39	-
Stage 1	-	-	-	-	148	-
Stage 2	-	-	-	-	499	-

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	42.6
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	485	-	-	-	155
HCM Lane V/C Ratio	0.114	-	-	-	0.395
HCM Control Delay (s)	13.4	1.6	-	-	42.6
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.4	-	-	-	1.7

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	986	1377	0	0	0
Future Vol, veh/h	0	986	1377	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1072	1497	0	0	0

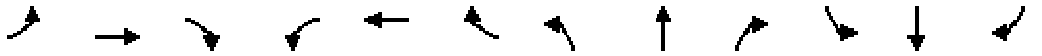
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	749
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	354
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	354
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	0
HCM Lane LOS	-	-	-	A
HCM 95th %tile Q(veh)	-	-	-	-

HCM 6th Signalized Intersection Summary
1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

03/03/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	1192	67	145	695	52	60	14	21	69	38	23
Future Volume (veh/h)	18	1192	67	145	695	52	60	14	21	69	38	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	1370	0	167	799	0	69	16	24	79	44	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	440	1502		377	2270		318	60	231	224	86	
Arrive On Green	0.42	0.42	0.00	0.11	0.64	0.00	0.15	0.15	0.15	0.15	0.15	0.00
Sat Flow, veh/h	680	3647	0	1781	3554	1585	1236	412	1585	683	593	1585
Grp Volume(v), veh/h	21	1370	0	167	799	0	85	0	24	123	0	0
Grp Sat Flow(s),veh/h/ln	680	1777	0	1781	1777	1585	1648	0	1585	1276	0	1585
Q Serve(g_s), s	0.9	17.1	0.0	2.1	5.0	0.0	0.0	0.0	0.6	2.7	0.0	0.0
Cycle Q Clear(g_c), s	0.9	17.1	0.0	2.1	5.0	0.0	2.0	0.0	0.6	4.8	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.81		1.00	0.64		1.00
Lane Grp Cap(c), veh/h	440	1502		377	2270		378	0	231	311	0	
V/C Ratio(X)	0.05	0.91		0.44	0.35		0.22	0.00	0.10	0.40	0.00	
Avail Cap(c_a), veh/h	440	1502		402	2270		867	0	770	826	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	12.8	0.0	9.6	4.0	0.0	18.1	0.0	17.5	19.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	9.6	0.0	0.8	0.3	0.0	0.3	0.0	0.2	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.3	22.5	0.0	10.4	4.3	0.0	18.4	0.0	17.7	20.3	0.0	0.0
LnGrp LOS	A	C		B	A		B	A	B	C	A	
Approach Vol, veh/h		1391			966			109			123	
Approach Delay, s/veh		22.3			5.4			18.3			20.3	
Approach LOS		C			A			B			C	

Timer - Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		12.1	10.2	25.0		12.1		35.2				
Change Period (Y+Rc), s		5.2	4.9	5.0		5.2		5.0				
Max Green Setting (Gmax), s		23.0	6.0	20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		4.0	4.1	19.1		6.8		7.0				
Green Ext Time (p_c), s		0.5	0.1	0.8		0.5		7.9				

Intersection Summary	
HCM 6th Ctrl Delay	15.7
HCM 6th LOS	B

Notes

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	248	1105	593	227	267	142
Future Volume (veh/h)	248	1105	593	227	267	142
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	273	1214	652	249	293	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	487	2060	916	350	378	
Arrive On Green	0.15	0.58	0.36	0.36	0.21	0.00
Sat Flow, veh/h	1781	3647	2608	960	1781	1585
Grp Volume(v), veh/h	273	1214	461	440	293	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1698	1781	1585
Q Serve(g_s), s	4.2	11.2	11.4	11.5	8.0	0.0
Cycle Q Clear(g_c), s	4.2	11.2	11.4	11.5	8.0	0.0
Prop In Lane	1.00			0.57	1.00	1.00
Lane Grp Cap(c), veh/h	487	2060	647	618	378	
V/C Ratio(X)	0.56	0.59	0.71	0.71	0.77	
Avail Cap(c_a), veh/h	1093	2072	1036	990	866	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	9.2	6.9	14.0	14.0	19.1	0.0
Incr Delay (d2), s/veh	1.0	0.4	1.5	1.5	3.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.3	0.3	0.7	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	10.2	7.3	15.5	15.6	22.5	0.0
LnGrp LOS	B	A	B	B	C	
Approach Vol, veh/h		1487	901		293	
Approach Delay, s/veh		7.9	15.5		22.5	
Approach LOS		A	B		C	

Timer - Assigned Phs	4	6	7	8
Phs Duration (G+Y+Rc), s	35.0	16.4	11.1	23.9
Change Period (Y+Rc), s	5.2	5.5	3.6	5.2
Max Green Setting (Gmax), s	30.0	25.0	25.0	30.0
Max Q Clear Time (g_c+I1), s	13.2	10.0	6.2	13.5
Green Ext Time (p_c), s	8.0	1.1	1.4	5.3

Intersection Summary	
HCM 6th Ctrl Delay	12.0
HCM 6th LOS	B

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection: 1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	LT	R
Maximum Queue (m)	47.4	180.2	175.7	42.3	47.9	47.5	16.5	24.9	9.9	34.8	6.5
Average Queue (m)	8.2	91.2	93.3	17.2	22.7	20.9	0.8	9.7	2.8	14.8	0.4
95th Queue (m)	32.7	155.4	155.2	30.9	38.4	39.0	10.2	20.3	8.7	26.7	6.4
Link Distance (m)		332.6	332.6		496.6	496.6		488.2		734.4	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	40.0			55.0			35.0		35.0		25.0
Storage Blk Time (%)		41		0	0	1	0	0		1	0
Queuing Penalty (veh)		7		0	0	0	0	0		0	0

Intersection: 2: SOOKE RD & ACACIA DR

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	9.3	10.8
Average Queue (m)	0.5	4.1
95th Queue (m)	5.1	10.9
Link Distance (m)	219.9	275.0
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: SOOKE RD & MT VIEW AVE

Movement	EB	EB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (m)	31.5	27.2	5.3	19.8
Average Queue (m)	11.6	1.2	0.2	8.3
95th Queue (m)	25.1	10.3	2.3	16.8
Link Distance (m)	262.1	262.1	219.9	228.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: SOOKE RD & KELLY RD

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	L
Maximum Queue (m)	42.5	79.5	74.0	71.2	76.8	68.6
Average Queue (m)	29.0	36.2	35.0	35.9	44.5	36.6
95th Queue (m)	45.3	63.4	57.9	61.5	69.3	57.8
Link Distance (m)		549.3	549.3	262.1	262.1	616.6
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	35.0					
Storage Blk Time (%)	5	4				
Queuing Penalty (veh)	28	9				

Intersection: 5: SOOKE RD & Site Driveway

Movement	SB
Directions Served	R
Maximum Queue (m)	16.6
Average Queue (m)	6.5
95th Queue (m)	14.1
Link Distance (m)	38.6
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 45

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	4	1267	815	2	8	12
Future Vol, veh/h	4	1267	815	2	8	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	1320	849	2	8	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	851	0	-	0	1518	426
Stage 1	-	-	-	-	850	-
Stage 2	-	-	-	-	668	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	783	-	-	-	110	577
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	471	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	783	-	-	-	108	577
Mov Cap-2 Maneuver	-	-	-	-	108	-
Stage 1	-	-	-	-	372	-
Stage 2	-	-	-	-	471	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	23.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	783	-	-	-	211
HCM Lane V/C Ratio	0.005	-	-	-	0.099
HCM Control Delay (s)	9.6	0.1	-	-	23.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	88	1263	816	19	11	35
Future Vol, veh/h	88	1263	816	19	11	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	96	1373	887	21	12	38

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	908	0	-	0	1777	454
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	879	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	745	-	-	-	74	553
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	366	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	745	-	-	-	34	553
Mov Cap-2 Maneuver	-	-	-	-	34	-
Stage 1	-	-	-	-	164	-
Stage 2	-	-	-	-	366	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	55.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	745	-	-	-	119
HCM Lane V/C Ratio	0.128	-	-	-	0.42
HCM Control Delay (s)	10.5	2.5	-	-	55.6
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	1.8

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1275	765	13	0	43
Future Vol, veh/h	0	1275	765	13	0	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1386	832	14	0	47

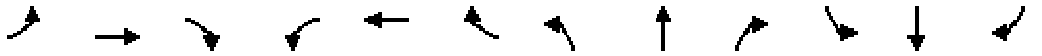
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	423
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	579
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	579
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	579
HCM Lane V/C Ratio	-	-	-	0.081
HCM Control Delay (s)	-	-	-	11.8
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.3

HCM 6th Signalized Intersection Summary
1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

03/03/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	1014	20	52	1402	89	66	22	89	36	3	20
Future Volume (veh/h)	16	1014	20	52	1402	89	66	22	89	36	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	17	1102	0	57	1524	0	72	24	97	39	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	278	1588		383	2218		304	82	234	277	16	
Arrive On Green	0.45	0.45	0.00	0.07	0.62	0.00	0.15	0.15	0.15	0.15	0.15	0.00
Sat Flow, veh/h	342	3647	0	1781	3554	1585	1103	554	1585	821	107	1585
Grp Volume(v), veh/h	17	1102	0	57	1524	0	96	0	97	42	0	0
Grp Sat Flow(s),veh/h/ln	342	1777	0	1781	1777	1585	1657	0	1585	928	0	1585
Q Serve(g_s), s	1.5	11.1	0.0	0.7	12.6	0.0	0.0	0.0	2.5	1.1	0.0	0.0
Cycle Q Clear(g_c), s	6.2	11.1	0.0	0.7	12.6	0.0	2.1	0.0	2.5	3.2	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	0.75		1.00	0.93		1.00
Lane Grp Cap(c), veh/h	278	1588		383	2218		386	0	234	292	0	
V/C Ratio(X)	0.06	0.69		0.15	0.69		0.25	0.00	0.41	0.14	0.00	
Avail Cap(c_a), veh/h	278	1588		501	2218		937	0	814	768	0	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.2	9.9	0.0	6.7	5.5	0.0	17.1	0.0	17.3	18.2	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.2	0.0	0.2	1.5	0.0	0.3	0.0	1.2	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.0	0.0	0.5	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.5	12.1	0.0	6.8	7.1	0.0	17.5	0.0	18.5	18.4	0.0	0.0
LnGrp LOS	B	B		A	A		B	A	B	B	A	
Approach Vol, veh/h		1119			1581			193			42	
Approach Delay, s/veh		12.1			7.1			18.0			18.4	
Approach LOS		B			A			B			B	

Timer - Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		11.8	7.9	25.0		11.8		32.9				
Change Period (Y+Rc), s		5.2	4.9	5.0		5.2		5.0				
Max Green Setting (Gmax), s		23.0	6.0	20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		4.5	2.7	13.1		5.2		14.6				
Green Ext Time (p_c), s		0.9	0.0	5.7		0.1		5.0				

Intersection Summary	
HCM 6th Ctrl Delay	9.9
HCM 6th LOS	A

Notes

Unsignalized Delay for [EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	205	859	1138	297	240	191
Future Volume (veh/h)	205	859	1138	297	240	191
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	214	895	1185	309	250	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	332	2282	1345	346	320	
Arrive On Green	0.10	0.64	0.48	0.48	0.18	0.00
Sat Flow, veh/h	1781	3647	2891	720	1781	1585
Grp Volume(v), veh/h	214	895	747	747	250	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1777	1741	1781	1585
Q Serve(g_s), s	3.2	7.2	22.6	23.4	8.0	0.0
Cycle Q Clear(g_c), s	3.2	7.2	22.6	23.4	8.0	0.0
Prop In Lane	1.00			0.41	1.00	1.00
Lane Grp Cap(c), veh/h	332	2282	855	837	320	
V/C Ratio(X)	0.64	0.39	0.87	0.89	0.78	
Avail Cap(c_a), veh/h	894	2282	888	870	742	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.6	5.1	13.9	14.2	23.5	0.0
Incr Delay (d2), s/veh	2.1	0.1	9.4	11.2	4.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	2.2	2.6	1.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	14.7	5.2	23.4	25.4	27.6	0.0
LnGrp LOS	B	A	C	C	C	
Approach Vol, veh/h		1109	1494		250	
Approach Delay, s/veh		7.1	24.4		27.6	
Approach LOS		A	C		C	

Timer - Assigned Phs			4		6	7	8
Phs Duration (G+Y+Rc), s			43.7		16.3	9.7	34.1
Change Period (Y+Rc), s			5.2		5.5	3.6	5.2
Max Green Setting (Gmax), s			30.0		25.0	25.0	30.0
Max Q Clear Time (g_c+I1), s			9.2		10.0	5.2	25.4
Green Ext Time (p_c), s			6.2		0.9	1.1	3.5

Intersection Summary	
HCM 6th Ctrl Delay	17.9
HCM 6th LOS	B

Notes

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Intersection: 1: UNIVERSITY DR/ALDEANE AVE & SOOKE RD

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	LT
Maximum Queue (m)	18.3	69.7	77.0	61.9	113.9	110.8	42.6	23.9	24.7	21.3
Average Queue (m)	3.5	39.7	44.5	13.5	55.9	57.3	13.5	9.5	10.1	6.1
95th Queue (m)	12.4	63.9	69.1	39.3	95.4	96.2	45.6	20.0	19.7	15.7
Link Distance (m)		332.6	332.6		496.6	496.6		488.2		734.4
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	40.0			55.0			35.0		35.0	
Storage Blk Time (%)		7			7	18	0		0	0
Queuing Penalty (veh)		1			4	16	0		0	0

Intersection: 2: SOOKE RD & ACACIA DR

Movement	EB	EB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (m)	31.4	18.8	1.8	10.6
Average Queue (m)	4.6	1.0	0.1	2.8
95th Queue (m)	17.8	9.7	1.3	9.3
Link Distance (m)	219.9	219.9	298.4	275.0
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: SOOKE RD & MT VIEW AVE

Movement	EB	EB	WB	WB	SB
Directions Served	LT	T	T	TR	LR
Maximum Queue (m)	41.4	34.9	3.4	9.0	23.1
Average Queue (m)	12.1	1.9	0.1	0.5	10.7
95th Queue (m)	29.1	15.4	2.4	4.8	19.9
Link Distance (m)	262.1	262.1	219.9	219.9	228.0
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 4: SOOKE RD & KELLY RD

Movement	EB	EB	EB	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (m)	41.5	58.6	57.2	195.1	206.0	65.0	10.8
Average Queue (m)	25.2	26.0	26.2	109.0	117.9	33.7	0.4
95th Queue (m)	39.4	46.3	45.5	187.4	197.0	54.2	7.6
Link Distance (m)		549.3	549.3	262.1	262.1	616.6	616.6
Upstream Blk Time (%)					0		
Queuing Penalty (veh)					0		
Storage Bay Dist (m)	35.0						
Storage Blk Time (%)	3	1					
Queuing Penalty (veh)	14	3					

Intersection: 5: SOOKE RD & Site Driveway

Movement	WB	SB
Directions Served	T	R
Maximum Queue (m)	3.0	12.8
Average Queue (m)	0.1	4.9
95th Queue (m)	2.1	12.3
Link Distance (m)	332.6	38.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 38

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	1032	1441	14	4	7
Future Vol, veh/h	10	1032	1441	14	4	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	10	1032	1441	14	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1455	0	-	0	1984	728
Stage 1	-	-	-	-	1448	-
Stage 2	-	-	-	-	536	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	461	-	-	-	53	366
Stage 1	-	-	-	-	183	-
Stage 2	-	-	-	-	551	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	461	-	-	-	50	366
Mov Cap-2 Maneuver	-	-	-	-	50	-
Stage 1	-	-	-	-	174	-
Stage 2	-	-	-	-	551	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	41
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	461	-	-	-	111
HCM Lane V/C Ratio	0.022	-	-	-	0.099
HCM Control Delay (s)	13	0.3	-	-	41
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	56	1049	1415	50	10	52
Future Vol, veh/h	56	1049	1415	50	10	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	1070	1444	51	10	53

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1495	0	-	0	2119	748
Stage 1	-	-	-	-	1470	-
Stage 2	-	-	-	-	649	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	445	-	-	-	43	355
Stage 1	-	-	-	-	178	-
Stage 2	-	-	-	-	482	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	445	-	-	-	29	355
Mov Cap-2 Maneuver	-	-	-	-	29	-
Stage 1	-	-	-	-	122	-
Stage 2	-	-	-	-	482	-

Approach	EB	WB	SB
HCM Control Delay, s	2.6	0	59.4
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	445	-	-	-	126
HCM Lane V/C Ratio	0.128	-	-	-	0.502
HCM Control Delay (s)	14.3	2	-	-	59.4
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.4	-	-	-	2.3

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	1036	1449	38	0	24
Future Vol, veh/h	0	1036	1449	38	0	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	1126	1575	41	0	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	808
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	-	0	324
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	324
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	17.1
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	324
HCM Lane V/C Ratio	-	-	-	0.081
HCM Control Delay (s)	-	-	-	17.1
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	0.3

Appendix 3

WESTBROOK Consulting Ltd.

October 17, 2022 3836-02

WestUrban Developments Ltd.
111 – 2036 Island Hwy S
Campbell River, BC
V9W 0E8

Attn: Ms. Meghan Norman, MCP, RPP, MCIP – Development Manager

Re: 2054 – 2076 Sooke Road Preliminary Servicing Brief

Dear Ms. Norman:

The development is proposed to encompass 160 residential units and includes two 6 storey buildings with two stories of underground parking. The 5,283 m^2 site is bordered by low density residential development to the north, Hatley Memorial Gardens to the east, Sooke Road to the south and Peace Park to the west. Each lot currently contains a single family home which will be removed prior to construction. The topography of the site is relatively flat with a high point located on 2076 Sooke Road, sloping down across 2070 Sooke Road to a plateau across 2054 – 2060 Sooke Road.

The following servicing report outlines the existing servicing infrastructure and required servicing improvements for the development of the above properties. Preliminary servicing details provided in this report are based on available as-built information and discussions with governing authorities. Information contained within this report will need to be confirmed during the detailed design phase.

EXISTING INFRASTRUCTURE AND SERVICING REQUIREMENTS

The following sections outline the existing infrastructure in the area and servicing requirements for the development that include road/access, water, sanitary sewer, storm water drainage and power.

Roadway / Access

Based on the working site plan provided by WestUrban Developments Ltd on July 25, 2022, we understand that a significant road dedication will be required. As such, property / site frontage works will be required to move or be reconstructed.

New frontage works will include concrete curb and gutter, and new concrete sidewalk. Frontage works will mimic those constructed at the intersection of Sooke Road and Acacia Drive (2130 Sooke Road).

This section of Sooke Road is not a section controlled by the Ministry of Transportation and Infrastructure (MOTI). Other sections of Sooke Road, controlled by MOTI are usually limited to a right in / right out access only. It is possible that the City would limit this development to that style access. Alternately, the City may, based on you Traffic Impact Assessment, require a left turn lane for access if there will be a significant increase in left turns into the development. A traffic impact assessment will speak more to this.

Water

Water infrastructure in the area of the proposed development is owned and managed by the Capital Regional District Integrated Water Services (CRDIWS). There is an existing 200mm AC watermain located along Sooke Road, which currently services the proposed development. An existing fire hydrant, CFD 473 is located near the frontage of 2006 Sooke Road (330 m from the site).

Residential Water Demand

Preliminary domestic servicing requirements were analyzed using the British Columbia Plumbing Code 2018 standard and water meter sizing was performed using the American Water Works Association (AWWA) standard. Fixture counts have been conservatively assumed based on a design of 160 residential units, and an assumed layout of two bedrooms and two bathrooms per unit, as summarized in the table below.

Table 1: Fixture Counts

Fixture:	Number of Fixtures:
Kitchen Sink	160
Lavatory/Bathroom Sink	320
Bathtub	320
Toilet	320
Dishwasher	160
Washing Machine	160
Hose Bibs	6

Based on the above noted design the site will require a 100mm - 150mm domestic service connection and a 50mm water meter.

Fire Flow Demand

Preliminary Fire Underwriters Survey (2020) calculations were carried out to determine the required fire flow for the proposed development.

The following design criteria were used in the determination of the fire flows required for the proposed development. Design fire flows will be determined by the greater of the Capital Regional District Integrated Water Services (CRDIWS) and Fire Underwriters Survey required fire flows.

- Fire Underwriters Survey (FUS), Water Supply for Public Fire Protection 2020
  - Fire Flow required is estimated by the equation, $F = 220C\sqrt{A}$
    $Where,$
    $\rightarrow F = Fire\ Flow, L/min$
    $\rightarrow C = Construction\ Type$
    $\rightarrow A = Floor\ Area, m^2$
- CRDIWS requirements
  - 20 psi residual pressure under fire flow conditions
  - 4,800 L/min minimum fire flow
  - 3.5 m/s maximum flow velocity within main under fire flow conditions in CRD owned mains.

Based on the FUS 2020 design criteria, the total required fire flows and the related assumptions are stated below:

- Wood frame construction will be used, resulting in a construction coefficient of 1.5.
- Residential occupancies under Group C of the National Building Code, as per FUS 2020 standards, are considered to be Limited Combustible with an occupancy adjustment factor of -15%.
- Fully supervised sprinkler systems will exist within the building.
- Proximity values were measured from the working site plan provided by WestUrban Developments Ltd on July 25, 2022.
- Total floor areas of the buildings were derived from the building footprints depicted on the working site plan provided by WestUrban Developments Ltd on July 25, 2022 and based on a concept design of 6 storeys per building.
- Parkade levels were assumed to be more than 50% below grade, and therefore, as per FUS 2020 standards, were excluded from the total floor area.

The preliminary calculations for the required fire flow is summarized in the table below.

Table 2: FUS Calculations

Building	East	West
Floor Area (A)	4,403 m^2	4,308 m^2
Type of Construction – Wood Frame (C)	1.5	1.5
Fire Flow (F)	22,000 L/min	22,000 L/min
Fire Hazard, Limited Combustible	-15%	-15%
Sprinkler System, Fully Supervised	-50%	-50%
Exposure Surcharge	North 2% East 0% South 0% West 0% Total 2%	North 2% East 0% South 0% West 11% Total 13%
Total Fire Flow	**10,000 L/min** **167 L/s**	**12,000 L/min** **200 L/s**

The maximum required fire flow of 200 L/s for the west building has been plotted on the enclosed hydrant curves. Based on the curves provided by the CRD IWS for hydrant CFD 473, the residual pressures under fire flow conditions were found to be 40 psi, which is in excess of the minimum required residual pressure of 20 psi.

Each fire hydrant can supply approximately 70 L/s for fire water. Two additional hydrants will be required to ensure each building's fire department connection is located within 45 m of a fire hydrant and to ensure that a sufficient number of fire hydrants are available to service the site.

Sewer

According to the City of Colwood GIS map, and confirmed by existing as-built information, there is a 600mm PVC sanitary sewer main located within Sooke Road, which was installed in 1999. Existing sewer service information to the property was unavailable and will require confirmation during the detailed design stage. Based on the existing use of the property, any existing sewer services will likely require capping and a new sewer service is likely required.

Sewer Demand

Preliminary sewer service sizing was performed based on the fixture counts noted in Table 1 and the British Columbia Plumbing Code 2018. Proposed fixture units total approximately 2720 FU. A service size of 250mm at 1% will be required. Complete calculations, including alternative service sizing at steeper slopes can be found in the enclosed calculation sheets.

Sewer Capacity

The City of Colwood Sewer Master Plan, dated May 2013, indicates that there are no sewer capacity issues within the sewer catchment as of the date of the report. A future scenario of peak wet weather flows was modelled in this report and indicated that sewer capacity issues will exist in this catchment in the future. Discussions with the City of Colwood indicate that there are no capacity issues currently identified for the sewer main fronting the site and that any developments in this area would be required to pay a sewer enhancement fee, contributing to the future sewer system upgrades. Sewer enhancement fees for apartments are currently estimated at $1,500 per residential unit.

Storm Drainage

According to the City of Colwood GIS map, there is an existing 762mm (30") CMP lined storm main within Sooke Road. This main was installed in 1971. Pipe condition and elevation will require confirmation during the detailed design stage.

Based on the depth of the main, as indicated on the City of Colwood GIS map, foundation and parkade drainage will require pumping up to the main. Available record drawings from the City website indicate that at the east side of the site (low side) the storm drain main may be quite shallow.

Should onsite storm water infiltration be desired, further investigation will be required. Infiltration has not been investigated, and for the purpose of this report, infiltration is considered negligible.

Storm Water Management

The site is located within an area where stormwater management will be required. It is anticipated that a stormwater detention gallery will be required in order to limit the post-development runoff rate to the pre-development levels.

Storm water detention requirements were calculated based on the conceptual site and the design assumptions noted below:

- The Rational Method was used.
- Site Area (Not Including Road Dedication) 4219m^2.
- Impervious areas have a runoff coefficient of 0.9.
- Pervious areas have a runoff coefficient of 0.35.
- Pre-development conditions have a runoff coefficient of 0.35.
- The City of Colwood IDF curve was used.
- A post-development climate change factor of 31% was applied.
- Post-development runoff rates will be limited to the pre-development 10 year, 10 minute flow rate.
- The system is designed for detention only.
- All storms up to and including the 50 year peak event will be detained.

Based on the assumptions noted above, the site will require onsite storage of 111.15 m^3 of stormwater runoff. The storage can be accommodated onsite through the use of a StormTech style detention gallery/chambers. Stormwater runoff will discharge at the pre-development flow rate to the existing 762mm CMP main located on Sooke Road. Prior to entering the the municipal drainage system, the onsite stormwater management system and stormwater runoff will require treatment through the use of oil interceptors or approved alternates to aid in keeping the system clean and ensure that no contaminants enter the municipal system. Refer to the enclosed drainage calculations for complete calculations of the storm water management requirements.

Due to the existing storm drain main being shallow at the low end of the site, the main floor or site elevation may need to be raised in order to accommodate the stormwater management system.

Storm Service

Storm service sizing calculations were performed using British Columbia Plumbing Code 2018 standards and were based on the rainfall intensity for Colwood – Colwood Corners region, as indicated in the British Columbia Building Code 2018. Site layout assumptions are as follows:

- Building heights were assumed to be 6 storeys, at 3m per storey, for a total of 18m tall.
- Building footprints and parking areas were assumed to be as indicated on the site plan provided by WestUrban Developments on July 25, 2022.
- Total area contributing to rain water loading – 5029m^2.

Based on the design assumptions noted above, a service size of 250mm at 1.5% will be required for the site. Complete calculations, including alternate sizing at steeper slopes and individual building service sizing can be found in the enclosed calculations.

Power, Telephone and Communications

There is existing overhead 3 phase power and telephone/communication lines along the north side of Sooke Road, fronting the proposed development. An electrical consultant would be required to determine the required service size for the proposed development.

Summary

Roadway / Access

Based on the conceptual design, it is expected that full frontage improvements complete with concrete curb / gutter and sidewalk will be required, with potential for road surface widening. Site access may be limited to a right in/out, with potential for the addition of a left turn lane.

Water

Based on the conceptual design, the existing water infrastructure is sufficient to service the proposed development for both domestic and fire flows. A 150mm domestic water service will be required to service the development. Detailed mechanical drawings will be required to confirm water service sizing.

Sewer

Future sewer capacity limitations are anticipated, and sewer enhancement fees will be charged on a per residential unit basis. Sewer enhancement fees are approximated at $1,500 per residential unit.

A service size of 250mm at 1% will be required to service the development. Existing sewer services will require capping and abandoning. Detailed mechanical drawings will be required to confirm sewer service sizing.

Storm

Storm water management will be required to limit the post-development runoff from the site to pre-development flows.

A service size of 250mm at 1.5% will be required to service the proposed development. Finalized site plans will be required to confirm storm service sizing.

We trust the above meets the requirements of your request. Additional information can be investigated or provided if requested.

If you have any questions, please contact the undersigned.

Yours truly,

WESTBROOK CONSULTING LTD.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA K. W. STUBBS # 43236

Kyle Stubbs, P.Eng, LEED AP
Project Engineer

ENCL: Domestic Water Service Plumbing Code Calculations
AWWA M22 Meter Calculations
FUS Calculations
CRD IWS Hydrant Map and Curve for CFD473 on Sooke Rd
Sanitary Sewer Service Plumbing Code Calculations
Storm Drain Service Plumbing Code Calculations
Stormwater Management Calculations

WESTBROOK Consulting Ltd.

PRELIMINARY DOMESTIC WATER SERVICE
BC PLUMBING CODE CALCULATIONS

Westbrook Consulting
115 - 866 Goldstream Avenue
Victoria, British Columbia V9B 0J3

Phone: (250) 391-8592
Fax: (250) 391-8593

Project Name:	2054-76 Sooke Rd	Drawn:	KS	Date:	Sept. 15, 2022
Project File Number:	3836	Checked:		Date:	

Assumptions

Based on an assumed layout of 2 bedrooms, 2 bathrooms per unit and a total of 160 residential units onsite, as per concept design

Residential

Fixture	Load	Number	Total
Bathroom Group	3.6	320	1152
Clothes Washer	1.4	160	224
Dishwasher	1.4	160	224
Kitchen Sink	1.4	160	224
Bathroom Sink	0.7	0	0
Toilet	2.2	0	0
TOTAL			**1824**

Total **1824** Fixture Units

Plumbing Code Table 2.6.3.2.-A
Domestic @ 1.5 m/s

Size (inches)	L/s	Fixture Units
1/2	0.23	3.5
5/8	0.34	6.5
3/4	0.48	9
1	0.81	18
1 1/4	1.24	29
1 1/2	1.75	46
2	3.04	120
2 1/2	4.69	245
3	6.7	400
4	11.78	850
5	18.35	1625
6	**26.38**	**2875**

WESTBROOK Consulting Ltd.

PRILIMINARY AWWA M22 CALCULATIONS

CITY OF Colwood

CUSTOMER	WestUrban Developments	BUILDING ADDRESS	2054 - 2076 Sooke Road
TYPE OF OCCUPANCY	Residential	File #:	3836-03

FIXTURE	FIXTURE VALUE @ RATED PSI	# OF FIXTURES	FIXTURE VALUE
BATHTUB	8	320	2560
BEDPAN WASHER	10		0
BIDET	2		0
DENTAL UNIT	2		0
DRINKING FOUNTAIN	2		0
FAUCET - KITCHEN @ 60 PSI	1.8	160	288
FAUCET - LAVATORY @ 60 PSI	1.5	320	480
SHOWER - SINGLE HEAD @ 80 PSI	2.5		0
FAUCET - UTILITY	4		0
TOILET – FLUSH VALVE @ 80 PSI	24		0
TOILET – FLUSH TANK @ 80 PSI	6	320	1920
URINAL – FLUSH VALVE @ 80 PSI	10		0
DISHWASHER @ 35 PSI	1.3	160	208
CLOTHES WASHER - TOP LOAD @ 35 PSI	6	160	960
CLOTHES WASHER - FRONT LOAD @ 35 PSI	3		0
HOSE (50FT WASH DOWN) – 3/4"	12	6	72
COMBINED FIXTURE VALUE TOTAL			6488

CUSTOMER PEAK DEMAND x PRESSURE FACTOR = **100** gpm

IRRIGATION DEMAND (SECTIONS x 1.16 OR 0.40)

SECTIONS* x 0.4 ROTARY **2** x1.16 SPRAY SYSTEM = **2.32** gpm

ADD FIXED LOAD = _____ gpm

TOTAL FIXED DEMAND (PRELIMINARY) = **102.32** gpm

SIZE OF METER REQUIRED: **2"**

Calculated by: MD/KS

This form is derived from the American Water Works Association (AWWA) M22 standard. It should be noted that the AWWA M22 methodology is based on the fixture value method and not the fixture unit method employed by the BC Building Code for piping on private property.

** 100 ft^2 area = 1 section*

Based on an assumed layout of 2 bedroom, 2 bathrooms per unit and a total of 160 residential units for the site

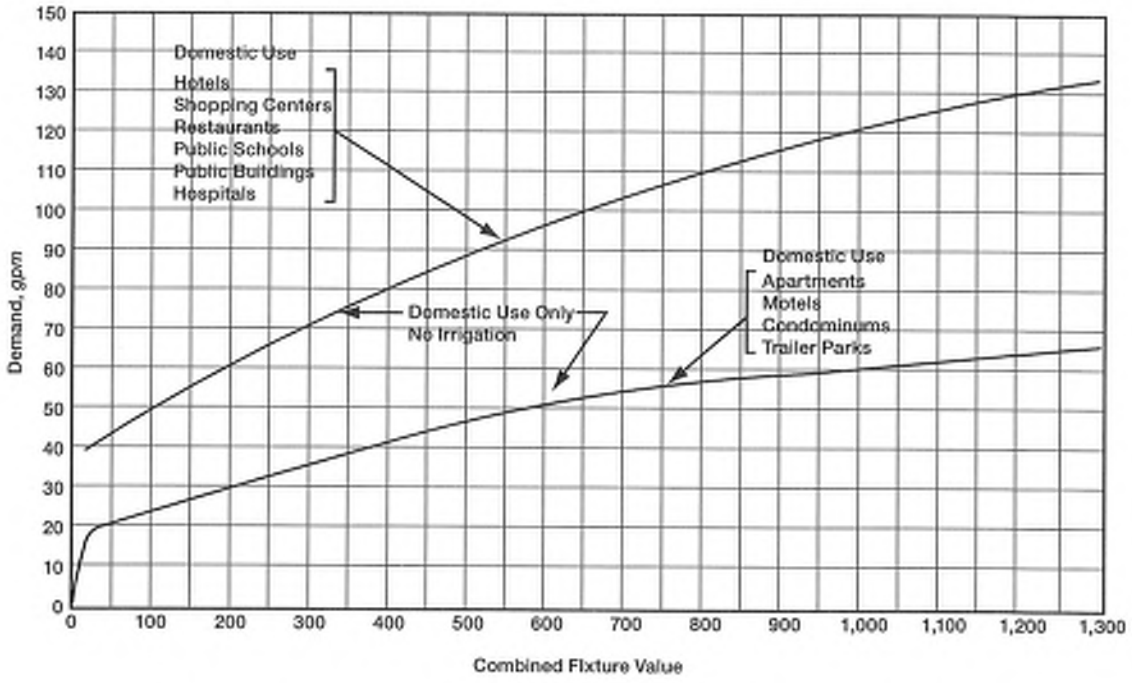


Figure 4-2 Water-flow demand per fixture value—enlarged scale from Figure 4-1

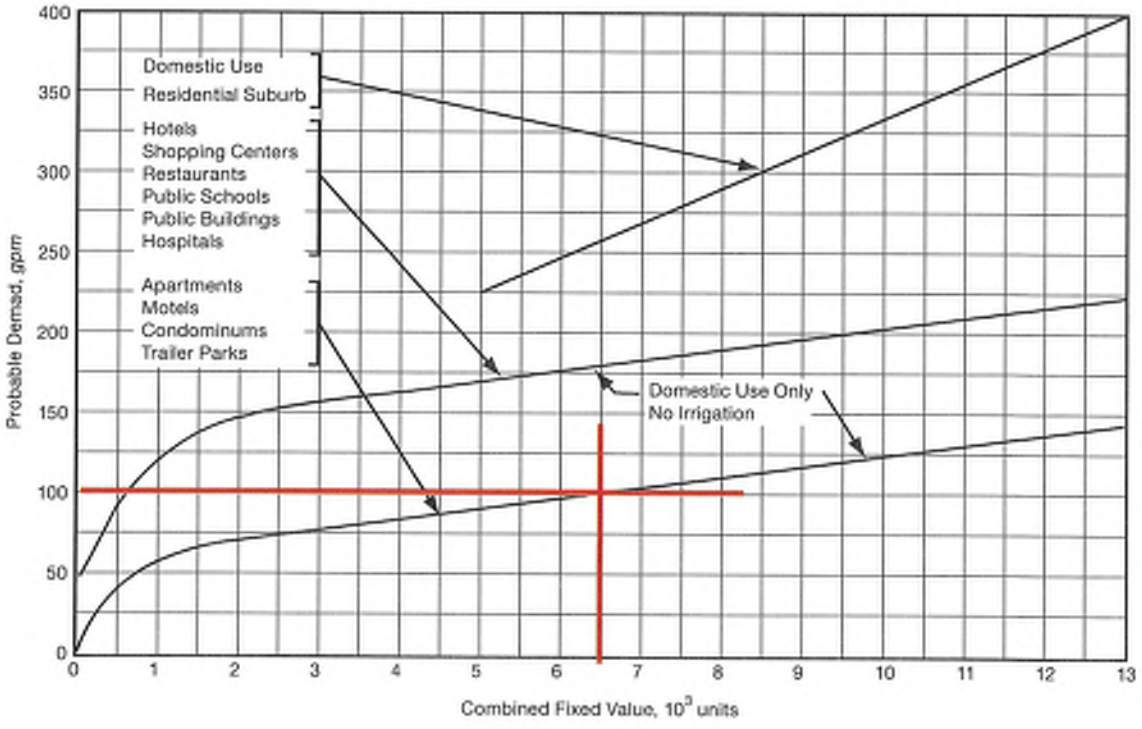


Figure 4-3 Water-flow demand per fixture value

Table 6-1 AWWA meter standards

Meter	Minimum Flow Rate, *gpm*	Low-Normal Flow Rate, *gpm*	Change-over Range (Compound Meters)	High-Normal Flow Rate, *gpm*	Maximum Flow Rate *gpm*	Head Loss at Maximum Flow, *psi*
Positive displacement						
½ in.	0.25	1	N/A	7.5	15	15
⅝ in.	0.25	1		10	20	15
¾ in.	0.50	2		15	30	15
1 in.	0.75	3		25	50	15
1½ in.	1.50	5		50	100	15
2 in.	2.00	8		80	160	15
Multijet						
⅝ in.	0.25	1	N/A	10	20	15
¾ in.	0.50	2		15	30	15
1 in.	0.75	3		25	50	15
1½ in.	1.50	5		50	100	15
2 in.	2.00	8		80	160	15
Turbine class II						
1½ in.	N/A	4	N/A	90	120	7
2 in.		4		160	190	7
3 in.		8		350	435	7
4 in.		15		650	750	7
6 in.		30		1,400	1,600	7
8 in.		50		2,400	2,800	7
10 in.		75		3,500	4,200	7
12 in.		120		4,400	5,300	7
16 in.		200		6,500	7,800	7
20 in.		300		10,000	12,000	7
Compound class II						
2 in.	0.25	1	13	80	160	15
3 in.	0.50	2	15	175	350	15
4 in.	0.75	3	18	300	600	15
6 in.	1.50	5	20	675	1,350	15
8 in.	2.00	16	35	900	1,600	15
Fire service, type II—compound						
3 in	* see note	2	30	250	350	12
4 in.		4	40	400	700	12
6 in.		5	90	900	1,600	12
8 in.		8	150	1,600	2,800	12
10 in.		8	200	2,200	4,400	12

Source: Data are drawn from AWWA Standards C700, C701, C702, C703, C704, C708, C710, C712, C713, and C714, latest revision.

N/A = not applicable.

* Minimum flow rate is per the applicable AWWA standard for the bypass meter employed.

(Table continued on next page.)

Table 6-1 AWWA meter standards (continued)

Meter	Minimum Flow Rate, *gpm*	Low-Normal Flow Rate, *gpm*	Change-over Range (Compound Meters)	High-Normal Flow Rate, *gpm*	Maximum Flow Rate *gpm*	Head Loss at Maximum Flow, *psi*
Fire service, type III—turbine						
3 in.	4	5	N/A	250	350	11
4 in.	10	15		400	700	11
6 in.	20	30		900	1,600	11
8 in.	30	35		1,600	2,800	11
10 in.	35	55		2,500	4,400	11
Propeller (main line)						
2 in.	N/A	45	N/A	100	120	5
3 in.		80		250	300	5
4 in.		85		500	600	2
6 in.		160		1,200	1,350	1
8 in.		190		1,500	1,800	0.5
10 in.		260		2,000	2,400	0.5
12 in.		275		2,800	3,375	0.5
14 in.		350		3,750	4,500	0.5
16 in.		450		4,750	5,700	0.5
18 in.		550		5,625	6,750	0.25
20 in.		650		6,875	8,250	0.25
24 in.		1,000		10,000	12,000	0.25
30 in.		1,600		15,000	18,000	0.25
36 in.		2,400		20,000	24,000	0.25
42 in.		2,800		28,000	40,000	0.1
48 in.		3,500		35,000	50,000	0.1
54 in.		5,000		45,000	55,000	0.1
60 in.		6,000		60,000	80,000	0.1
66 in.		7,500		75,000	95,000	0.1
72 in.		9,000		90,000	115,000	0.1
Fluidic oscillator						
½ in.	0.25	1	N/A	7.5	15	15
⅝ in.	0.25	1		10	20	15
¾ in.	0.50	2		15	30	15
1 in.	0.75	3		25	50	15
1½ in.	1.50	5		50	100	15
2 in.	2.00	8		80	160	15
Singlejet						
⅝ in.	0.25	1	N/A	10	20	15
¾ in.	0.50	2		15	30	15
1 in.	0.75	3		20	40	15
1½ in.	0.50	1.5	N/A	50	100	15

Source: Data are drawn from AWWA Standards C700, C701, C702, C703, C704, C708, C710, C712, C713, and C714, latest revision.

N/A = not applicable.

* Minimum flow rate is per the applicable AWWA standard for the bypass meter employed.

(Table continued on next page.)

Table 6-1 AWWA meter standards (continued)

Meter	Minimum Flow Rate, *gpm*	Low-Normal Flow Rate, *gpm*	Change-over Range (Compound Meters)	High-Normal Flow Rate, *gpm*	Maximum Flow Rate *gpm*	Head Loss at Maximum Flow, *psi*
2 in.	0.50	2.0		80	160	15
3 in.	0.50	2.5		160	320	15
4 in.	0.75	3.0		250	500	15
6 in	1.50	4.0		500	1,000	15
Residential Fire Sprinkler						
¾ in.	0.5	2	N/A	15	30	10.1
1 in.	0.75	2		25	50	10.7
1½ in.	1.5	3		50	100	7.7
2 in.	2.0	4		80	160	7.7
Residential Fire Sprinkler w/ strainer						
¾ in.	0.5	2	N/A	15	30	14.5
1 in.	0.75	2		25	50	15.3
1½ in.	1.5	3		50	100	11
2 in.	2.0	4		80	160	11

Source: Data are drawn from AWWA Standards C700, C701, C702, C703, C704, C708, C710, C712, C713, and C714, latest revision.

N/A = not applicable.

* Minimum flow rate is per the applicable AWWA standard for the bypass meter employed.

Table 6-2 Typical uses for each type of meter classification

Meter Type	Typical Use
Positive displacement, fluidic oscillator, multijet, singlejet, static, turbine, electromagnetic, or ultrasonic	Single-family residential, apartment buildings with fewer than 100 units; small businesses (e.g., filling stations, restaurants, small hotels, motels, small office buildings, retail stores, etc.); schools and other public buildings without large irrigation demands
Turbine, singlejets, static, electromagnetic or ultrasonic	Large hotels, factories, hospitals, irrigation, large office buildings, pump discharge, laundries, nursing homes
Compound, singlejets, turbine, multijet, static, electromagnetic or ultrasonic	Schools (with irrigation), apartment buildings with more than 100 units, dormitories, assisted living centers, retail shopping centers
Residential fire meters	One- and two-family dwellings and manufactured homes (NFPA 13D applications)
Fire-line meters	Fire service (for various NFPA 13 and NFPA 13R applications)
Differential pressure (venturi, flow tube), electromagnetic or ultrasonic meters	Pump discharge, wholesale water purchasers, research applications, subsystem metering

WESTBROOK Consulting Ltd.

Preliminary FUS Calculations

Westbrook Consulting
115 - 866 Goldstream Avenue
Victoria, British Columbia V9B 0J3

Phone: (250) 391-8592
Fax: (250) 391-8593

Project Name: 2054 - 2076 Sooke Road
Project Number: 3836

Calculation By: MD / KS
Checked By:

Date: Sept. 16, 2022
Date:

		FUS Calculations														Velocity							
		Construction Material			Occupancy		Sprinkler		Exposure					Fire Flow		Looped				Single Source			
Scenario	Total A	Type	C	F	Type	Surcharge	Type	Surcharge	North	South	East	West	Surcharge			150mm	200mm	250mm	300mm	150mm	200mm	250mm	300mm
	m^2			L/min		%		%	%	%	%	%	%	L/min	L/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s
West	4403	Wood Frame	1.50	22000	Limited Combustible	-0.15	Fully Supervised	-0.5	2	0	0	11	13	12000	200	5.66	3.18	2.04	1.41	11.32	6.37	4.07	2.83
East	4308	Wood Frame	1.50	22000	Limited Combustible	-0.15	Fully Supervised	-0.5	2	0	0	0	2	10000	166.67	4.72	2.65	1.7	1.18	9.43	5.31	3.4	2.36

FIRE UNDERWRITERS SURVEY CRITERIA

Type of Construction

	C
Wood Frame	1.5
Hardi Plank	1.25
Ordinary (Brick or Masonry)	1
Non-combustible	0.8
Fire-Resistive	0.6

Occupancy

Hazard		Surcharge
Low	Non-Combustible	-25%
	Limited Combustible	-15%
	Combustible	0%
	Free Burning	15%
High	Rapid Burning	25%

Sprinkler

	Reduction
Yes	-30%
Automatic	-40%
Fully Supervised	-50%
No	0%

Exposure
*maximum 75%

Distance		Surcharge
0	3	25
3.1	10	20
10.1	20	15
20.1	30	10
30.1	45	5
45.1	+	0

INSTRUCTIONS

Input Values
Maximum Required Fire Flow
Velocity Exceeds 3.5 m/s

ASSUMPTIONS

* Wood Construction - No fire resistive siding

proximity values are based on CRD GIS maps accessed on August 19, 2022 and the concept plan provided by WestUrban on July 25, 2022

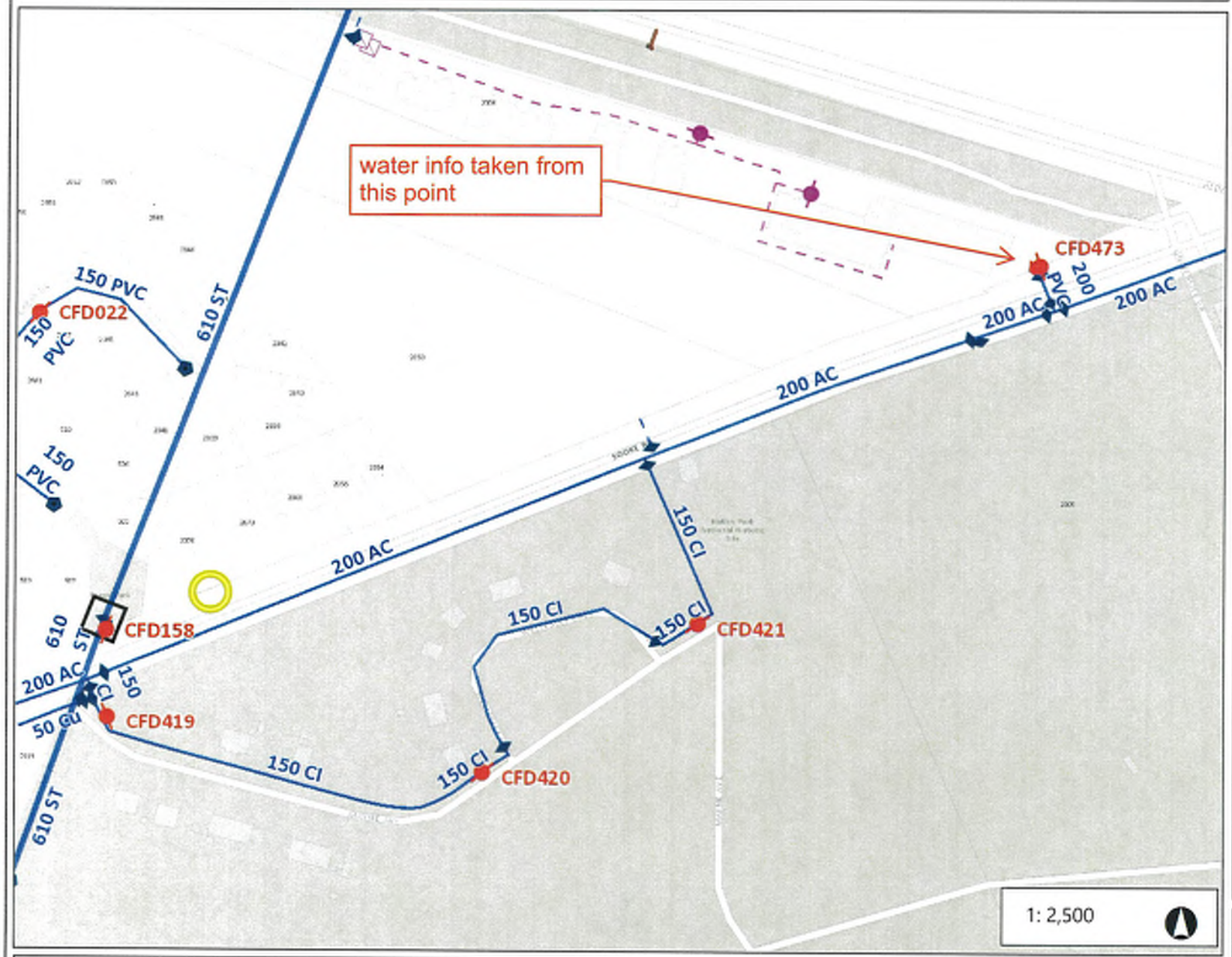
Floor areas are as measured from the site plan provided by WestUrban on July 25, 2022

NOTES

* The total floor area in square meters includes all storeys, but excluding basements at least 50% below grade.
* For fire resistive buildings, consider the two largest adjoining floors plus 50% of each of any floor immediately above them up to eight, when the vertical openings are inadequately protected.

* It the vertical openings and exterior vertical communications are properly protected (1hr rating), consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.
* Wood frame structures separated by less than 3 meters shall be considered as one fire area.
* For grouping of detached one family and small two family dwellings not exceeding 2 stories in height use the short method.

CFD 473



Legend

Facility or Station
- Disinfection Facility
- Injection
- Pump Station
- Storage Facility

Bulk Meter
- Distribution Balancing Meter
- Supply Bulk Meter

Control Valve
- Altitude Valve
- Check Valve
- Pressure Control Station

Hydrant
- <all other values>
- Piezometer
- Resilient Hydrant
- Bulk Water Station
- Hydrant
- Standpipe

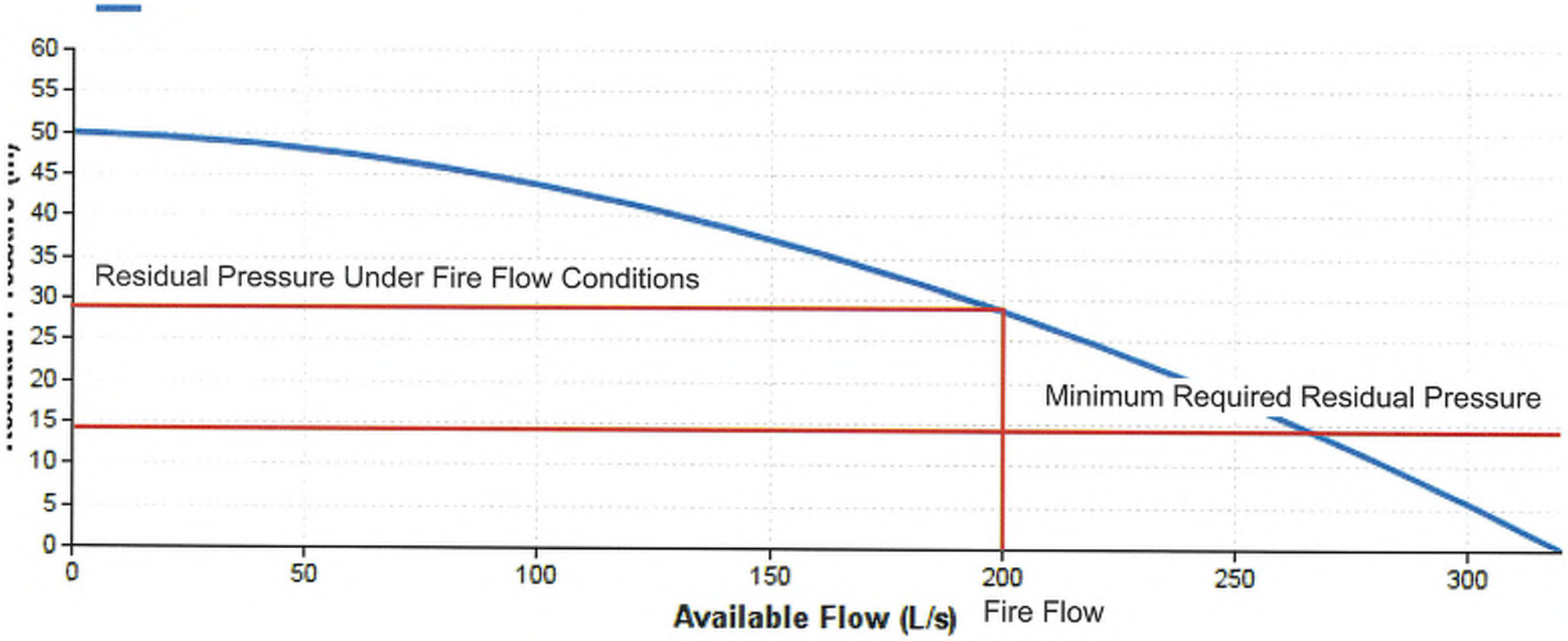
System Valve
- Air Release, True
- Flush, True
- Lateral Valve, False; Valve, False
- Lateral Valve, True; Valve, True
- Valve Vault, False
- Valve Vault, True

Notes

127.0 0 63.5 127.0 Meters

NAD_1983_UTM_Zone_10N

Hydrant Curve for CFD 473



WESTBROOK Consulting Ltd.

PRELIMINARY SANITARY SEWER SERVICE
BC PLUMBING CODE CALCULATIONS

Westbrook Consulting
115 - 866 Goldstream Avenue
Victoria, British Columbia V9B 0J3

Phone: (250) 391-8592
Fax: (250) 391-8593

Project Name: 2054-76 Sooke Rd Drawn: KS Date: Sept. 16, 2022
Project File Number: 3836 Checked: Date:

Total FiXture Units

Fixture	Load	Number of Fixtures	Total Fixture Units
Bathroom Group	6	320	1920
Clothes Washer	2	160	320
Dishwasher	1.5	160	240
Kitchen Sink	1.5	160	240
TOTAL			**2720**

BC Plumbing Code 2018 Table 2.4.10.6.C

	Slope					
Size	0.25%	0.50%	0.75%	1%	2%	4%
75 mm					27	36
100 mm				180	240	300
125 mm			380	390	480	670
150 mm			600	700	840	1300
200 mm		1400	1500	1600	2250	3370
250 mm		2500	2700	3000	4500	6500

WESTBROOK Consulting Ltd.

Preliminary Storm Drain Service Plumbing Code Calculations

Westbrook Consulting Ltd.
115 - 866 Goldstream Avenue
Victoria, British Columbia V9B 0J3

Phone: (250) 391-8592
Fax: (250) 391-8593

Project Name: 2054 - 2076 Sooke Road | Calculation By: MD/KS | Date: Sept. 16, 2022
Project File Number: 3836 | Checked By: | Date:

TOTAL VOLUME

Building	Total Lot Coverage	Half Largest Vertical Wall	Total Area	15min Rainfall	Total Volume
	m2	m2	m2	mm	L
North	718	405	1123	10	11230
West	733	405	1138	10	11380
Parking/Road/Walkway	2768		2768	10	27680
Site Total			**5029**	**10**	**50290**

BCBC Storm Sizing Table 2.4.10.9

Size of Drain	Slope 0.25%	0.50%	0.75%	1%	1.50%	2%	4%
75 mm						2770	3910
100 mm				4220	5160	5970	8430
125 mm			6760	7650	9350	10800	15300
150 mm			10700	12400	15200	17600	24900
200 mm		18900	23200	26700	32800	37800	53600
250 mm		34300	41900	48500	59400	68600	97000
300 mm	37400	55900	68300	78700	96500	112000	158000
375 mm	71400	101000	124000	143000	175000	202000	287000

Assumptions:
Parking area as per concept design provided by WestUrban on July 25, 2022 - Not including road dedication

WESTBROOK Consulting Ltd.

PRELIMINARY STORMWATER MANAGEMENT CALCULATIONS

Westbrook Consulting
115 - 866 Goldstream Avenue
Victoria, British Columbia V9B 0J3

Phone: (250) 391-6592
Fax: (250) 391-6593

Project Name: 2054 - 2076 Sooke Road
Project File Number: 3836

Calculated: MD/KS
Checked:

Date: Sept. 16, 2022
Date:

Flow

Q (l/s) =	R	A ha	I mm/hr	N
Site	0.350	0.4219	Variable	2.778

$Q_{pre\ l/s}$

Duration	Storm Event 2	5	10	25	50
5	12.72	16.41	19.69	21.74	25.02
10	9.435	12.31	15.59	16.82	19.69
15	7.79	10.67	12.31	14.36	16.00
30	6.15	7.79	9.43	11.08	11.90
60	4.92	4.92	7.38	8.20	9.43
120	3.28	2.87	5.74	6.97	7.38
360	2.05	2.05	3.28	3.69	4.10
720	1.56	2.05	2.46	2.87	3.20
1440	1.15	1.56	1.85	2.13	2.38

Q (l/s) =	R	A ha	I mm/hr	N	Climate Change Factor
	0.9000	0.4219	Variable	2.778	1.31

$Q_{post\ l/s}$

Duration	Storm Event 2	5	10	25	50
5	42.84	55.27	66.33	73.24	84.29
10	31.78	41.45	52.51	56.66	66.33
15	26.25	35.93	41.45	48.36	53.89
30	20.73	26.25	31.78	37.31	40.07
60	16.58	16.58	24.87	27.64	31.78
120	11.05	9.67	19.35	23.49	24.873
360	6.91	6.91	11.05	12.44	13.82
720	5.25	6.91	8.29	9.67	10.78
1440	3.87	5.25	6.22	7.19	8.01

City of Colwood

Intensity	IDF for Colwood 2	5	10	25	50
Duration					
5	31.00	40.00	48.00	53.00	61.00
10	23.00	30.00	38.00	41.00	48.00
15	19.00	26.00	30.00	35.00	39.00
30	15.00	19.00	23.00	27.00	29.00
60	12.00	12.00	18.00	20.00	23.00
120	8.00	7.00	14.00	17.00	18.00
360	5.00	5.00	8.00	9.00	10.00
720	3.80	5.00	6.00	7.00	7.80
1440	2.80	3.80	4.50	5.20	5.80

Required Storage Volume

Volume m^3	Storm Event 2	5	10	25	50
Duration					
5	10.02	13.75	17.07	19.14	22.46
10	13.41	19.21	25.84	28.33	34.14
15	15.14	23.84	28.82	35.04	40.01
30	20.33	30.28	40.23	50.17	55.15
60	25.73	25.73	55.58	65.53	80.45
120	11.66	1.71	71.36	101.21	111.15
360	-54.56	-54.56	34.99	64.83	94.68
720	-180.75	-109.11	-49.42	10.28	58.03
1440	-480.88	-361.49	-277.92	-194.35	-122.71

Appendix 4

2054 - 2076 Sooke Road
Tree Protection Plan

PREPARED FOR:

WestUrban Developments Ltd.
21- 3318 Oak Street
Victoria, BC V8X 2S9

PREPARED BY:

Peter McAra
Field Consulting Arborist
ISA Certified Arborist #PN-7521A
ISA Tree Risk Assessment Qualified

PROVIDED BY:

Trent Skaar
Arborist Representative
ISA Certified Arborist #PN-5533A
ISA Tree Risk Assessment Qualified

Bartlett Tree Experts
4370 Interurban Road
Victoria, BC V9E 2C4
250-479-3873
www.bartlett.com

Version 1.1, Submitted on February 14, 2023

Tree Protection Plan Report

2054 – 2076 Sooke Road
Colwood, BC
February 14, 2023

Table of Contents

Background

WestUrban Developments Ltd. contacted Bartlett Tree Experts (BTE or Bartlett) to perform a tree inventory for the five properties, 2054-2076 Sooke Road. The tree inventory was conducted on January 20, 2023, and documented trees within proximity to the purposed development.

The City of Colwood (COC) requires the contractor have a Tree Preservation Plan for the site, based on the plans involved and the trees proximity to the project. Field Consulting Arborist Peter McAra was tasked with this responsibility.

The proposed scope of work includes the following:

- Excavating the area below grade for the building foundation and parking.
- Building two six-storied structures.
- Redesigning the landscape after construction completion.

Purpose

The intended purpose of this report is to provide information on the condition of the trees, their suitability for retention and the measures required to protect any retained trees during the proposed project.

Limits of the Assignment

Information regarding the trees included in this report was obtained from:

- the physical inventory conducted by BTE.
- emailed plans from WestUrban Developments Ltd.:
    - 29.11.22_Sooke_SD(siteplan).pdf
    - 2022-07-29 – Site Survey.pdf

An inventory of the trees on and off the property was completed to assess how they may be impacted by the proposed development. A visual inspection was performed of these trees and a numbering system was assigned. Individual trees/ and or tree groupings were affixed with a blue aluminum tag for identification purposes.

Data collected in the field included species, diameter at breast height (DBH measured at 1.4m), approximate height, and the overall tree condition. Critical Root Zone radii were determined using the *Best Management Practices* and the Tree Protection Distance Table in Appendix IV.

The weather conditions were overcast and mild temperatures at the time of the assessment. This tree inventory was not a tree risk assessment. As such, no trees were assessed for risk in accordance with industry standards, nor are there any tree risk ratings or risk mitigation recommendations provided within this preservation plan.

All recommendations made in this report are based on our interpretation of the plans provided and our email communication with the client. **A review of the project and the management recommendations of the trees may need to be modified if the scope of work and/or project details are revised.**

Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

Illustrations, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

Information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plans of the property in question may not arise in the future.

Methods

The inventory of trees was conducted on January 20, 2023. The assessment included all trees 15cm and greater in diameter on the site. The following list of criteria was included within our inventory:

1. Affix a sequentially numbered tag to the main trunk of each on the site tree(only one tree was tagged per grouping);
2. Identifying the species of tree;
3. Measuring the trunk diameter at 1.4 m above grade;
4. Evaluating the health and structural condition, and assigning an overall condition of Good, Fair, Poor or Dead, based on the following criteria:

Photo 1. View of western hemlock #283 as viewed from the southern aspect. (01/20/2023)

Good A healthy tree that may have a slight decline in vigor, small amount of twig dieback, minor structural defects that could be corrected;

Fair Tree with moderate vigor, moderate twig and small branch dieback, thinning of crown, poor leaf color, moderate structural defects that might be mitigated with regular care;

Poor Tree in decline, epicormic growth, extensive dieback of medium to large branches, significant structural defects that cannot be abated;

Dead

Tree Preservation Regulations

The City of Colwood (Urban Tree Bylaw) protects tree species as follows:

(i) any Arbutus(*Arbutus menziesii*), Garry oak (*Quercus garryana*), Pacific Dogwood(*Cornus nuttallii*), and Pacific yew (*Taxus brevifolia*) 2m or greater in height or 4cm or greater in diameter;

(ii) any Douglas fir (*Pseudotsuga menziesii*), grand fir (*Abies grandis*), Big Leaf Maple (*Acer macrophyllum*), or western red cedar (*Thuja plicata*) 30cm in diameter or more;

(iii) any tree greater than 60cm in diameter or more at chest height;

(iv) a retained tree identified on a tree protection plan;

(v) a replacement tree identified on a tree replacement plan;

(vi) a wildlife tree (with nesting birds or animals;

Based on this criteria there are ten protected trees included within our inventory.

Effects of construction on trees

Tree root systems are generally confined to the uppermost 1m of the soil profile. Construction activities can cause profound changes to the area surrounding a tree's root system. Access traffic, storage of materials, grading, and trenching can result in soil compaction, crushing or severing of roots, injury to aboveground portions (trunk and branches), and drainage changes.

Cutting of roots reduces a tree's ability to supply itself with water and nutrients necessary to produce the sugars and carbohydrates necessary for sustaining life. Compaction of the soil reduces air pockets in the soil and makes it more difficult for roots to grow through it. It also slows or even prevents drainage of irrigation or storm water, which can result in excessively wet conditions, leading to root rot. Breakage and injury to a tree's trunk and branches reduce its aesthetic value, but more importantly, can leave entry points for pests and diseases.

The issues above often do not appear immediately after the area surrounding a tree has been disturbed. It can be years after the project has been completed that stress signs become apparent. Reduced growth, changes in color or leaf size, branch dieback, or even tree death can follow large disturbances.

Tree Impacts

To accommodate the construction of the proposed development, the majority of the trees will require removal.

The proposed development site contains ten protected trees under the City of Colwood Urban Tree Bylaw. These trees are as follows:

- #287 – Garry oak (*Quercus garryana*)
- #291 – Pacific dogwood (*Cornus nuttallii*)
- #292 – English walnut (*Juglans regia*)
- #293 – Garry oak (*Quercus garryana*)
- #294 – Garry oak (*Quercus garryana*)
- #296 – Grand fir (*Abies grandis*) *neighbours tree
- #300 – Garry oak (*Quercus garryana*)
- #308 – Garry oak (*Quercus garryana*)
- #315 – Paper birch (*Betula papyrifera*)
- #316 – Pacific dogwood (*Cornus nuttallii*)

Photo 2: Garry oak #287 at northeast corner of proposed development site (01/20/2023)

Garry oak #287 is a tree the developer would like to attempt to retain for the project. The tree is situated in the northeast corner of the site. The proposed building setback is to be 7m from the edge of the property line and well within the Critical Root Zone (CRZ) of the 117 Diameter at Breast Height (DBH) tree. The tree appears to be in fair condition. I recommend that prior to attempting to retain this tree, a *Level 3 Advanced Tree Risk assessment* be performed on the root collar and lower trunk of the tree. This would help to determine the structural integrity of the trees root collar and help to determine the level of risk associated with the tree. If the results of the *Level 3 advanced risk assessment* determines the tree presents a *low risk* rating, then further recommendation of an exploratory root excavation would be recommended. To be completed with the use of an airspade, at the edge of the setback area to determine which roots and their size could be impacted. If roots of 2cm in diameter or less are found, they could be pruned to accommodate the construction, in my opinion. If roots greater than 5cm in diameter are located, the tree may require removal.

The developer would also like to attempt to retain the Pacific dogwood tree #316. This tree is in poor condition based on the observed cavities and wounds at the base of the trunk. The species has a moderate tolerance to construction in general. However, given the presence of significant structural defects and the proximity to the building setback this specimen is not an ideal candidate for retention in my opinion.

The Grand fir #296 is on the neighbours property, along the fence line to the north of the proposed development. This tree is protected under the bylaw and will require tree protection fencing to ensure it is not impacted by the proposed construction activities.

The other seven protected trees within the development site are to be removed based on the proposed plan provided. Due to conflicts with location and the footprint of the proposed development, excavation, and construction activities it is not feasible to retain trees #291-294, #300, #308 and #314-315.

Unprotected boxelder maple (*Acer negundo*) #313 and a row of five Portuguese laurels (*Prunus lusitanica*) #317 are established trees that cannot be relocated. If trees #313 and #317 are to be retained, #313 will require a 2.0m wide (or larger) Tree Protection Zone (TPZ) from the center of the tree. Similar to the maple, the five laurels can be retained if a 1.8m TPZ radius from the center of the trees is used to protect them from construction damage. Fencing must remain intact for the duration of the construction project.

Similar to the protected trees, all remaining non-protected trees are planned for removal if the proposed development is approved. The landscape would be redesigned after construction completion to include the necessary replacement trees and additional plantings. Based on the City of Colwood tree bylaw this would require a tree removal to replacement ratio of 2:1.

To protect the retained trees from construction impacts, I recommend following the Tree Preservation Guidelines provided in this report.

Tree Preservation Guidelines

Tree preservation is intended to not only foster tree survival during development, but also to promote maintenance of tree health and beauty into the future. Retained trees that are injured or damaged during construction or are insufficiently maintained afterward become a liability rather than an asset. How an individual tree responds to disturbances will depend on the extent of excavation and grading, the care with which demolition is undertaken, and the construction methods employed. Coordinating any construction activity inside the Tree Protection Zone (TPZ) can minimize these impacts.

The following recommendations may help to reduce impacts to trees from development and maintain and improve their health and vitality through the clearing, grading and construction phases.

Design Recommendations

1. Any changes to the plans involving the trees should be reviewed by the Project Arborist with regard to tree impacts. These include, but are not limited to: site plans, improvement plans, utility and drainage plans, grading plans, landscape and irrigation plans, and demolition plans.

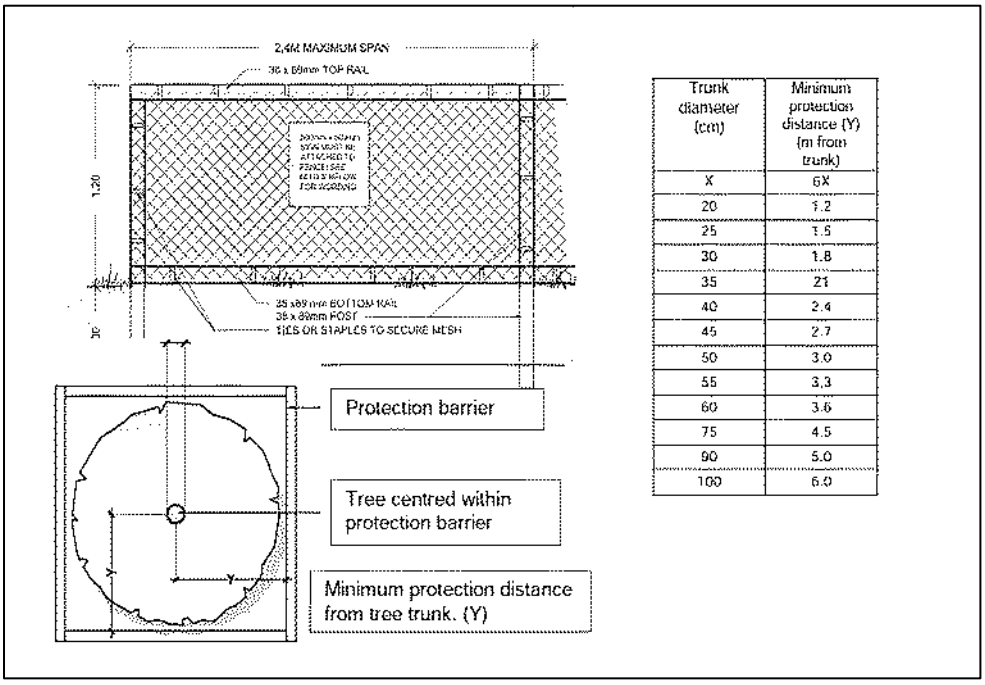
2. **Tree Preservation Guidelines** prepared by the Project Arborist, which include specifications for tree protection during construction, should be included on all plans.

3. Garry oak #287 at the northeast corner of the proposed development is a very large, protected tree that the developer would like to attempt to retain. I recommend the tree have a *Level 3 Advanced Tree Risk Assessment* performed along the trees root collar and lower trunk. Based on the results of the assessment it may be determined that the tree is not a suitable specimen for retention and will be recommended for removal. Alternatively, if it is a suitable specimen for retention a root excavation should be performed to determine the presence and size of roots within the foot print of the proposed construction zone. Note, if significant structural roots are present, the tree may need to be removed, or site plans modified to accommodate its CRZ.

Tree Protection Zone

1. **A TREE PROTECTION ZONE** shall be identified for each tree to be preserved on the Tree Protection Plan prepared by the project arborist. Fencing should be constructed to the trees dripline (unless otherwise stated) and any work conducted within the trees vicinity shall be monitored by the Project Arborist.

   a. Tree protection fences shall be installed to encompass the **TREE PROTECTION ZONE.** As detailed in this image (taken from the City of Colwood's Urban Tree Bylaw) below:



Trunk diameter (cm)	Minimum protection distance (Y) (m from trunk)
X	6X
20	1.2
25	1.5
30	1.8
35	21
40	2.4
45	2.7
50	3.0
55	3.3
60	3.6
75	4.5
90	5.0
100	6.0

   b. Fences must be installed prior to the beginning of and must remain until construction is complete.

c. No grading, excavation, construction or storage or dumping of materials shall occur within the **TREE PROTECTION ZONE** (TPZ). Any excavation, grading or digging within a retained tree's TPZ must be monitored at the time of work by the Project Arborist.

d. No underground services including utilities, sub-drains, water or sewer shall be placed in the **TREE PROTECTION ZONE**.

Pre-demolition / Pre-construction Treatments and Recommendations

1. The construction superintendents shall meet with the Project Arborist before beginning work to review all work procedures, access routes, storage areas, and tree protection measures.
2. Fence all trees to completely enclose the Tree Protection Zone prior to any demolition, grubbing or grading. Fences are to remain until all grading and construction is completed.
3. Retained trees may require building clearance prior to demolition and construction. Pruning must be provided by an ISA certified arborist in good standing.

Recommendations for Tree Protection during Construction

1. All contractors shall conduct operations in a manner that will prevent damage to trees to be preserved.
2. Tree protection devices are to remain until all site work has been completed within the work area. Fences or other protection devices may not be relocated or removed without permission of the Project Arborist.
3. Construction trailers, traffic and storage areas must remain outside **TREE PROTECTION ZONE** at all times.
4. Any root pruning required for construction purposes shall receive the prior approval of and be performed by the Project Arborist. Roots should be cut with a saw to provide a flat and smooth cut. Removal of roots larger than 2 cm in diameter should be avoided. Only the Project Arborist may prune the any of the trees roots. A report of the process will be written by the Project Arborist prior to the root pruning and the client must forward to the City of Colwood for approval.
5. Prior to grading or trenching, trees may require root pruning outside the **TREE PROTECTION ZONE.** Any root pruning required for construction purposes shall receive the prior approval of, and be conducted by, the Project Arborist. A post root-pruning arborist memorandum will be written by the Project Arborist, and the client must forward to the City of Colwood once received.

6. If injury should occur to any tree during construction, it should be evaluated as soon as possible by the Project Arborist so that appropriate treatments can be applied.
7. No excess soil, chemicals, debris, equipment or other materials shall be dumped or stored within the **TREE PROTECTION ZONE**.
8. Any tree pruning needed for clearance during construction must be performed by an ISA Certified Arborist and not by construction personnel.

Maintenance of Impacted Trees

Preserved trees will experience a physical environment different from that of the pre-development conditions. As a result, tree health and structural stability should be monitored. Occasional pruning, fertilization, mulch, pest management, replanting and irrigation may be required. In addition, provisions for monitoring both tree health and structural stability following construction must be made a priority. Inspect trees annually and following major storms to identify conditions requiring treatment to manage risk associated with tree failure.

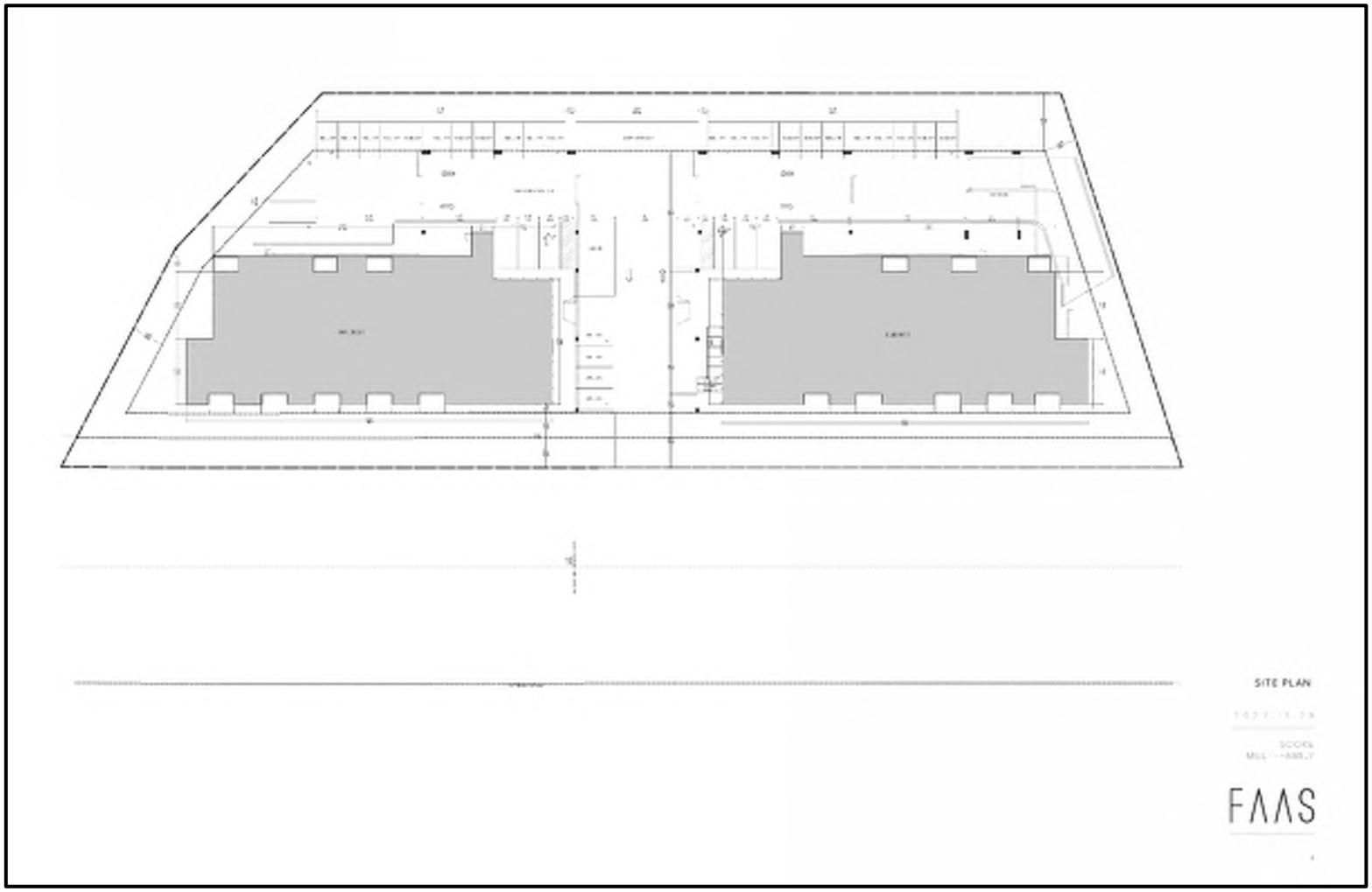
Our procedures included assessing trees for observable defects in structure. This is not to say that trees without significant defects will not fail. Failure of apparently defect-free trees does occur, especially during storm events. Wind forces, for example, can exceed the strength of defect-free wood causing branches and trunks to break. Wind forces coupled with rain can saturate soils, reducing their ability to hold roots, and blow over defect-free trees. Although we cannot predict all failures, identifying those trees with observable defects is a critical component of enhancing public safety.

Furthermore, trees change over time. Our inspections represent the condition of the tree at the time of inspection. As trees age, the likelihood of failure of branches or entire trees increases. Annual tree inspections are recommended to identify changes to tree health and structure. In addition, trees should be inspected after storms of unusual severity to evaluate damage and structural changes. Initiating these inspections is the responsibility of the client and/or tree owner.

If you have any questions about my observations or recommendations, please contact me: Peter McAra at pmcara@bartlett.com

Appendix I – Site Map

Appendix II – Site Plan



Site Plan

Appendix III – Tree Inventory Table

Tree ID	Species	DBH[1] (cm)	Crown Radius (m)	Structural Condition	Health Condition	TPZ[2] (m)	Protection Status	Relative Construction Tolerance	Suitability for Preservation[3]	Recommendations
281	Weeping willow (*Salix babylonica*)	27	4.0	Fair	Fair	3.2	Unprotected	Moderate - Good	Moderate	Remove
282	English walnut (*Juglans regia*)	49	6.0	Fair	Fair	7.4	Unprotected	Poor	Low	Remove
283	Western hemlock (*Tsuga heterophylla*)	36	4.0	Good	Good	5.4	Unprotected	Poor	Low	Remove
284	Crabapple (*Malus species*)	15	2.5	Poor	Poor	1.8	Unprotected	Moderate	Low	Remove
285	Crabapple (*Malus species*)	18	2.5	Poor	Poor	2.2	Unprotected	Moderate	Low	Remove
286	Common apple (*Malus domestica*)	18	2.5	Poor	Poor	2.2	Unprotected	Good	Low	Remove
287	Garry oak (*Quercus garryana*)	117	10	Fair	Fair	14	Protected	Moderate	Moderate	To be determined – tree should have a Level 3 Advanced Assessment on root collar/stem to determine if root plate and trunk is not compromised. If found to be of sound wood then area at edge of proposed building setback should be airspaded to determine roots size in area can be pruned without compromising trees structural integrity and health.
288	European mountain ash (*Sorbus aucuparia*)	21, 15, 12	3.0	Poor	Poor	5.8	Unprotected	Moderate	Low	Remove
289	Leyland cypress (*Cupressocyparis x leylandii*) (18 trees)	<29	6.0	Poor	Fair	2.4	Unprotected	Good	Low	Remove
290	Eastern arborvitae (*Thuja occidentalis*)	14, 14	1.0	Fair	Fair	1.9	Unprotected	Good	Low	Remove
291	Pacific dogwood (*Cornus nuttallii*)	45, 37, 26	3.5	Poor	Fair	16	Protected	Moderate	Low	Remove – permit required
292	English walnut (*Juglans regia*)	53, 43	6.0	Fair	Fair	14	Protected	Poor	Low	Remove – permit required
293	Garry oak (*Quercus garryana*)	47	6.0	Fair	Fair	5.6	Protected	Moderate	Low	Remove – permit required

Tree ID	Species	DBH[1] (cm)	Crown Radius (m)	Structural Condition	Health Condition	TPZ[2] (m)	Protection Status	Relative Construction Tolerance	Suitability for Preservation[3]	Recommendations
294	Garry oak (*Quercus garryana*)	51	6.0	Fair	Fair	6.1	Protected	Moderate	Low	Remove – permit required
295	Lawson false-cypress (*Chamaecyparis lawsoniana*)	23, 22	2.5	Poor	Poor	6.8	Unprotected	Poor	Low	Remove
296	Grand fir (*Abies grandis*)	53	4.0	Good	Fair	6.4	Protected	Moderate	Moderate	Retain – possible shared tree with neighbour. Tree is on neighbours property.
297	Sweet cherry (*Prunus avium*)	31	6.0	Fair	Fair	3.7	Unprotected	Moderate	Low	Remove
298	Eastern arborvitae (*Thuja occidentalis*) (12 trees)	~5,5, 5	1.0	Fair	Fair	1.2	Unprotected	Good	Moderate	Remove
299	Eastern arborvitae (*Thuja occidentalis*) (11 trees)	~5,5, 5	1.0	Fair	Fair	1.2	Unprotected	Good	Moderate	Remove
300	Garry oak (*Quercus garryana*)	55	8.0	Fair	Fair	6.6	Protected	Moderate	Low	Remove – permit required
301	Eastern arborvitae (*Thuja occidentalis*) (15 trees)	30cm or smaller	1.0	Fair	Fair	2.4	Unprotected	Good	Low	Remove
302	Purple leaf plum (*Prunus cerasifera*)	25	3.5	Fair	Fair	3.0	Unprotected	Moderate	Low	Remove
303	Purple leaf plum (*Prunus cerasifera*)	39	3.5	Fair	Fair	4.7	Unprotected	Moderate	Low	Remove
304	Purple leaf plum (*Prunus cerasifera*)	30	3.0	Fair	Fair	3.6	Unprotected	Moderate	Low	Remove
305	Purple leaf plum (*Prunus cerasifera*)	43	3.0	Fair	Fair	5.2	Unprotected	Moderate	Low	Remove
306	Western red cedar ‘Irish gold’ (Thuja plicata) (5 trees)	13, 12	2.0	Fair	Fair	3.0	Unprotected	Poor - Moderate	Low	Remove
307	Giant redwood (*Sequoiadendron giganteum*)	36	3.0	Good	Fair	4.3	Unprotected	Moderate	Moderate	Remove
308	Garry oak (*Quercus garryana*)	57	6.0	Fair	Fair	6.8	Protected	Moderate	Low	Remove – permit required
309	English holly (*Ilex aquifolium*) (2 trees)	17	2.0	Fair	Good	1.1	Unprotected	Good	Low	Remove

Tree ID	Species	DBH[1] (cm)	Crown Radius (m)	Structural Condition	Health Condition	TPZ[2] (m)	Protection Status	Relative Construction Tolerance	Suitability for Preservation[3]	Recommendations
310	Portuguese laurel (*Prunus lusitanica*) (4 trees)	15 or less	2.5	Good	Fair	1.8	Unprotected	Moderate	Low	Remove
311	Eastern arborvitae (*Thuja occidentalis*) (23 trees)	~5,5, 5	1.0	Fair	Fair	1.2	Unprotected	Good	Moderate	Remove
312	Giant redwood (*Sequoiadendron giganteum*)	47	3.0	Good	Fair	5.6	Unprotected	Moderate	Moderate	Remove
313	Boxelder maple (*Acer negundo*)	24	4.0	Fair	Fair	2.0	Unprotected	Good	Moderate	Retain
314	Red maple (*Acer rubrum*)	28	3.0	Fair	Fair	3.4	Unprotected	Moderate - Good	Moderate	Remove
315	Paper birch (*Betula papyrifera*)	45, 45, 41	6.0	Fair	Fair	16	Protected	Poor - Moderate	Low	Remove – permit required
316	Pacific dogwood (*Cornus nuttallii*)	46	3.5	Poor	Fair	5.5	Protected	Moderate	Low	Remove – permit required
317	Portuguese laurel (*Prunus lusitanica*) (5 trees)	15 or less	2.0	Fair	Fair	1.8	Unprotected	Moderate	Moderate	Retain

[1] DBH- Diameter at Breast Height measured at 1.4m above ground.
[2] CRZ/TPZ-critical root zone/tree protection zone-tree protection fence distance from the centre of the stem, measurements are based on the *Best Management Practices* and *ANSI A300 Part 5* standards for managing trees during constructions, calculated at 6 to 18 times the DBH relative to species tolerance to construction and maturity.
[3] Suitability for Preservation- based on the species tolerance to construction, overall condition of the specimen, and location

Species Tolerance to Construction Damage	Relative Maturity	TPZ Multiplication Factor
High / Good	Young Mature Over Mature	6 8 12
Medium/ Moderate	Young Mature Over Mature	8 12 15
Low / Poor	Young Mature Over Mature	12 15 18
Guidelines for determining tree protection zone radius for healthy, structurally sound trees (adapted from Matheny and Clark, 1998, and the British Standards Institute).		

Appendix III - Assumptions and Limiting Conditions

Any legal description provided to the consultant is assumed to be correct. Any titles and ownership to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is evaluated as though free and clear, under responsible ownership and competent management.

Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

The consultant shall not be required to give testimony or attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule and contract of engagement.

Loss or alteration of any part of this report invalidates the entire report.

Possession of this report or a copy thereof does not imply right of publication of use for any purpose by any other than the persons to whom it is addressed, without the prior expressed written or verbal consent of the consultant.

This report, or any copy thereof, shall not be conveyed, in whole or in part, by anyone, including the client, to the public via any media type or outlet, without the prior expressed consent of the consultant specifically as to value conclusions, identity of the consultant, or any reference to any professional society or institute or to any initialed designation conferred upon the consultant as stated in his qualification.

This report and values expressed herein represent the opinion of the consultant, and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

Illustrations, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

Information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection. There is no warranty or guarantee, expressed or implied, that problems of deficiencies of the plans or property in question may not arise in the future.

Appendix IV - Certificate of Performance

I, Peter McAra, certify that:

I have no current or prospective interest in the trees on the property, and have no personal interest or bias with respect to the parties involved;

The analysis, opinions and conclusions stated herein are my own and are based on current scientific procedures and facts;

My analysis, opinions, and conclusions were developed and this report has been prepared according to commonly accepted arboricultural practices;

No one provided significant professional assistance to me, except as indicated within this report;

My compensation is not contingent upon the reporting of a predetermined conclusion that factors the cause of the client or any other party, nor upon the results of the assessment, the attainment of stipulated results, or the occurrence of any subsequent events.

I further certify that I am an International Society of Arboriculture (ISA) Certified Arborist #PN-7521A and am tree risk assessment qualified. I am a member in good standing of the ISA. I have been involved in the field of Arboriculture in a fulltime capacity for a period of 17 years.

Signed: Peter McAra Date: February 14, 2023

Appendix 5

111-2036 South Island Hwy
Campbell River, BC V9W 0E8
Phone: (250)-914-8485
Fax: (250) 914-8490

30 January 2023

City of Colwood
Development Services Department
3300 Wishart Road
Colwood, BC
V9C 1R1

RE: Open House Summary for 2054-2076 Sooke Road (file no. RZ-11-017)

WestUrban Developments Ltd. (WestUrban) held an open house on January 25, 2023 at the Colwood Elementary school for the rezoning application for 2054-2076 Sooke Road. Properties within 75m of the subject lands were notified two weeks in advance of the open house (Attachment # 1 – Public Notice). The following letter summarizes the outcome of the open house.

There were 5 attendees:

- 3 of 5 attendees were supportive of the proposal and saw an opportunity to increase density in this location.
- 2 of the 5 attendees were not supportive of the development and ultimately concerned about privacy, increased traffic, and parking. A copy of the open house boards was provided to the attendees, as requested.

Comment forms were provided at the event, but none have been completed and returned to date. No other calls or emails were received in response to the open house notices that were delivered. It was discussed at the event that the next opportunity for public comments would likely be at the public hearing.

Thank you,

Meghan Norman, MCP, RPP, MCIP
Development Manager
WestUrban Developments Ltd.
111-2036 Island Hwy S
Campbell River, BC Canada V9W 0E8
C: (250) 201-8864
www.westurban.ca

Attachments enclosed:

Attachment # 1 – Open House Notice
Attachment # 2 – Open house boards
Attachment # 3 – Open house sign in sheets

111-2036 South Island Hwy
Campbell River, BC V9W 0E8
Phone: (250)-914-8485
Fax: (250) 914-8490

Attachment # 1 – Open House Notice

111 – 2036 Island Hwy S
Campbell River, BC, V9W 0E8
P 250-201-8864
Email public@westurban.ca

Public Open House

January 25, 2023 @ 6:30pm – 8:00pm (drop-in)

Location: Colwood Elementary School, Library, 3000 Wishart Road

Proposed Zoning Bylaw Amendment at 2054-2076 Sooke Road

You are receiving this notice because you live at or own a property within 75m of the proposed development at the properties of 2054-2076 Sooke Road, Colwood, BC. WestUrban Developments is hosting a public open house on Wednesday, January 25, 2023, from 6:30pm-8:00pm (drop in format) to review and discuss the proposed zoning amendment.

WestUrban is proposing to amend the zoning for 5 properties (2054-2076 Sooke Road) from Residential 1 (R1) Zone to a Comprehensive Development Zone (CD Zone) to support the development of two market rental apartment buildings that are within the Transit Growth Area Official Community Plan (OCP) designation.

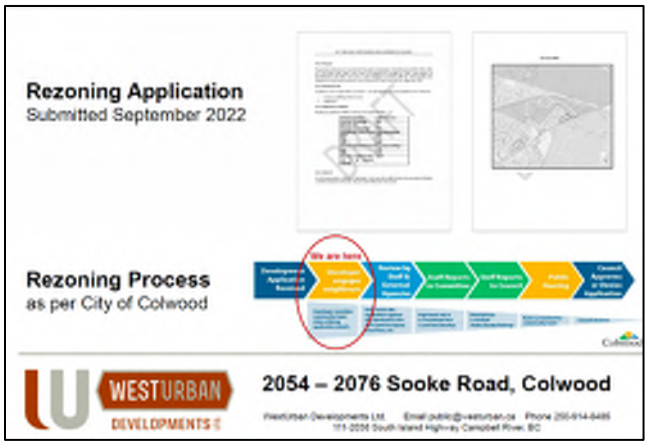
The proposed development will support greater access to public transportation along a corridor that is anticipated to support more active transportation routes, and provides residential units near designated Mixed-Use Employment Centres (e.g., Royal Roads University) and nearby commercial services, and adds diversification to the housing stock for a wide demographic.

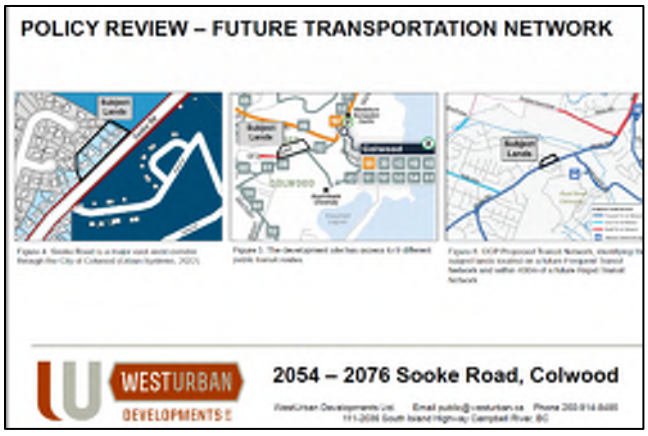
Public Open House

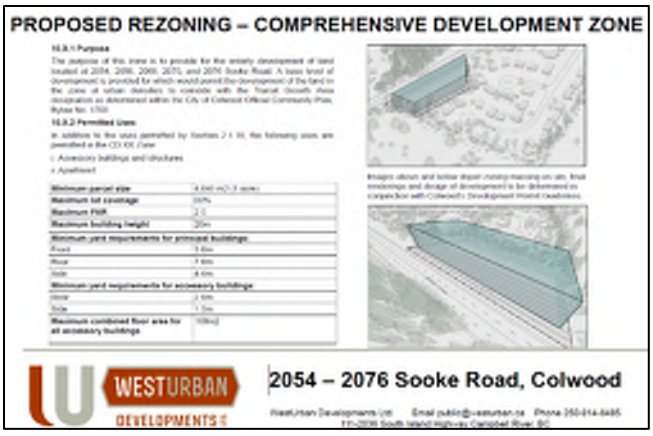
Event details: Wednesday, January 25, 2023 from 6:30pm-8:00pm (drop in format) @ Colwood Elementary Library (3000 Wishart Road, Colwood, BC)

111-2036 South Island Hwy
Campbell River, BC V9W 0E8
Phone: (250)-914-8485
Fax: (250) 914-8490

Attachment # 2 – Open house boards

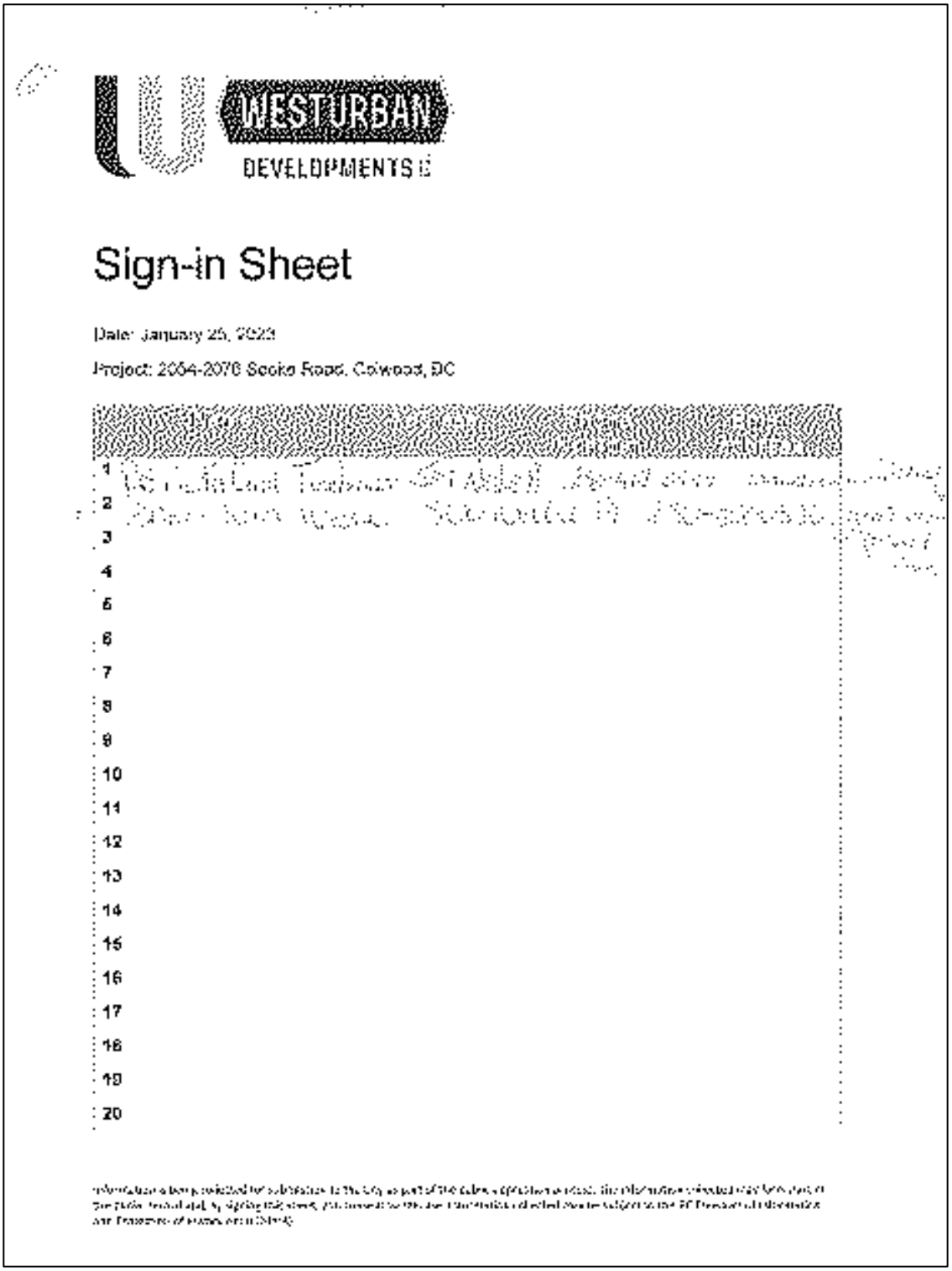






111-2036 South Island Hwy
Campbell River, BC V9W 0E8
Phone: (250)-914-8485
Fax: (250) 914-8490

Attachment # 3 – Open house sign in sheets



WESTURBAN DEVELOPMENTS LTD

Sign-in Sheet

Date: January 25, 2023

Project: 2064-2076 Seoke Road, Colwood, BC

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Appendix 6

Dear City of Colwood,

My name is Bobby Sparrow and I live at 510 Nellie Place in Colwood, BC. I own my home and am a proud resident of the City of Colwood.

Recently I received a notice in my mailbox from WestUrban Developments. I received this notice because I own a property within 75m of a proposed development at the properties 2054-2076 Sooke Road. WestUrban is proposing to amend the zoning for the 5 properties from Residential 1 Zone to a Comprehensive Development Zone to support the development of two market rental apartment buildings.

I am writing you today in support of this development. Due to the immense shortage of housing in Colwood and Langford, we need to see more developments like this happening to ptovide more housing available to the general public. This development is situated within walking distance to the Royal Roads university as well as many bus routes. This development would provide more units available for rent to potential students going to Royal Roads as well as staff teaching at the Univreristy among all the other residents who are living with family members in small rental basement suites. Providing a larger volume of rental units available to the general public will not only bring more inventory to the market, but it should help with the rental prices not skyrocketing like they have been due to no rentals available for rent.

Thank you for the opportunity to voice my opinion on the proposed developments. As someone who will be living right next to this development, you have my full support in moving forward and providing more housing for the Westshore residents.

Sincerely,

Bobby Sparrow

510 Nellie Place – Colwood, BC.

Royal Roads
UNIVERSITY

January 26, 2023

By Email (Ms. Desiree Givens, dgivens@colwood.ca)

Mayor and Council
City of Colwood
Wishart Road, Colwood

Mayor Kobayashi and Council Members,

On behalf of Royal Roads University, I am pleased to submit this letter of support in favour of the development proposed at 2054-2076 Sooke Road by WestUrban Developments Ltd.

Our understanding is that WestUrban is proposing two market rental apartment buildings, approximately 150 units, that will be developed across from the Royal Roads campus. As you appreciate through our shared conversations, the RRU Executive is fully aware of how acute vacancy rates are in the West Shore. The need for good quality and affordable housing is critical within our community and it affects Royal Roads students and employees. We are pleased to support a local initiative with the objective of making a positive impact on this challenge.

Thank you for accepting this letter of support as you consider the rezoning and associated applications submitted by WestUrban Developments Ltd. for the properties located at 2054-2076 Sooke Road.

Yours truly,

Philip Twyford, CPA, MBA, C.Dir
Vice-President Finance and Operations

cc Ms. Meghan Norman, Development Manager, WestUrban Developments Ltd.